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FIRST	edition,	published in	three	volumes,	1768—1771.
SECOND	,,	,,	ten	,,	1777—1784.
THIRD	,,	,,	eighteen	,,	1788—1797.
FOURTH	,,	,,	twenty	,,	1801—1810.
FIFTH	,,	,,	twenty	,,	1815—1817.
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TENTH	,,	ninth edition and eleven supplementary volumes,			1902—1903.
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A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL INFORMATION

ELEVENTH EDITION

VOLUME XXVIII

VETCH to ZYMOTIC DISEASES

NEW YORK
THE ENCYCLOPÆDIA BRITANNICA COMPANY
1911

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J. A. E.	James Alfred Ewing, C.B., LL.D., F.R.S., M.Inst.C.E. Director of (British) Naval Education. Hon. Fellow of King's College, Cambridge. Professor of Mechanism and Applied Mechanics in the University of Cambridge, 1890–1903. Author of *The Strength of Materials*; &c.	**Watt, James.**
J. A. F.	John Ambrose Fleming, M.A., D.Sc., F.R.S. Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John's College, Cambridge, and University Lecturer on Applied Mechanics. Author of *Magnets and Electric Currents*.	**Voltmeter; Wattmeter;** **Wheatstone's Bridge.**
J. A. H.	John Allen Howe. Curator and Librarian of the Museum of Practical Geology, London. Author of *The Geology of Building Stones*.	**Wealden; Wenlock Group.**
J. Bt.	James Bartlett. Lecturer on Construction, Architecture, Sanitation, Quantities, &c., at King's College, London. Member of the Society of Architects. Member of the Institute of Junior Engineers.	**Wall-coverings.**
J. Bu.	John Burroughs. See the biographical article: Burroughs, John.	**Whitman, Walt.**
J. E. O.	Julius Emil Olson, B.L. Professor of Scandinavian Languages and Literature at the University of Wisconsin. Author of *Norwegian Grammar and Reader*.	**Vinland.**
J. F.-K.	James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S. Gilmour Professor of Spanish Language and Literature, Liverpool University. Norman McColl Lecturer, Cambridge University. Fellow of the British Academy. Member of the Royal Spanish Academy. Knight Commander of the Order of Alphonso XII. Author of *A History of Spanish Literature*; &c.	**Villamediana, Count de;** **Villena, Enrique de;** **Zorrilla y Moral, José.**
J. F. M'L.	John Fergusson M'Lennan. See the biographical article: M'Lennan, John Fergusson.	**Werwolf** (*in part*).
J. Ga.	James Gairdner, C.B., LL.D. See the biographical article: Gairdner, James.	**York, House of.**
J. G. H.	Joseph G. Horner, A.M.I.Mech.E. Author of *Plating and Boiler Making*; *Practical Metal Turning*; &c.	**Welding** (*in part*).
J. G. M.	John Gray McKendrick, M.D., LL.D., F.R.S., F.R.S. (Edin.). Emeritus Professor of Physiology in the University of Glasgow. Professor of Physiology, 1876–1906. Author of *Life in Motion*; *Life of Helmholtz*; &c.	**Vision;** **Voice.**
J. G. R.	John George Robertson, M.A., Ph.D. Professor of German Language and Literature, University of London. Editor of the *Modern Language Journal*. Author of *History of German Literature*; *Schiller after a Century*; &c.	**Wieland, Christoph Martin.**
J. G. Sc.	Sir James George Scott, K.C.I.E. Superintendent and Political Officer, Southern Shan States. Author of *Burma*; *The Upper Burma Gazetteer*.	**Wa.**
J. H. F.	John Henry Freese, M.A. Formerly Fellow of St John's College, Cambridge.	**Xenophon** (*in part*).
J. H. M.	John Henry Middleton, M.A., Litt.D., F.S.A., D.C.L. (1846–1896). Slade Professor of Fine Art in the University of Cambridge, 1886–1895. Director of the Fitzwilliam Museum, Cambridge, 1889–1892. Art Director of the South Kensington Museum, 1892–1896. Author of *The Engraved Gems of Classical Times*; *Illuminated Manuscripts in Classical and Mediaeval Times*.	**Vitruvius;** **Wren, Sir Christopher;** **Zuccaro I.-II.**
J. J. L.*	Rev. John James Lias, M.A. Chancellor of Llandaff Cathedral. Formerly Hulsean Lecturer in Divinity and Lady Margaret Preacher, University of Cambridge. Author of *Miracles, Science and Prayer*; &c.	**Ward, William George.**
J. L. W.	Jessie Laidlay Weston. Author of *Arthurian Romances unrepresented in Malory*.	**Wolfram von Eschenbach.**
J. Mac.	James MacQueen, F.R.C.V.S. Professor of Surgery at the Royal Veterinary College, London. Editor of Fleming's *Operative Veterinary Surgery* (2nd edition); Dun's *Veterinary Medicines* (10th edition); and Neumann's *Parasites and Parasitic Diseases of the Domesticated Animals* (2nd edition).	**Veterinary Science** (*in part*)
J. Mu.*	John Muir, A.M., LL.D. Member of the American Academy of Arts and Letters. President of the Sierra Club and the American Alpine Club. Visited the Arctic regions on the United States steamer "Corwin" in search of the De Long expedition. Author of *The Mountains of California*; *Our National Parks*; &c.	**Yosemite.**
J. M. G.	John Miller Gray (1850–1894). Art Critic. Curator of the Scottish National Portrait Gallery, 1884–1894. Author of *David Scott, R.S.A.*; *James and William Tassie*.	**Wilkie, Sir David.**
J. M. J.	John Morris Jones, M.A. Professor of Welsh at the University College of North Wales, Bangor. Formerly Research Fellow of Jesus College, Oxford. Author of *The Elucidarium in Welsh*; &c.	**Wales:** *Literature* **and** *Language*.
J. M. M.	John Malcolm Mitchell. Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London College (University of London). Joint-editor of Grote's *History of Greece*.	**Winckelmann** (*in part*).

J. S.	James Sime, M.A. (1843–1895). Author of *A History of Germany*; &c.	**Winckelmann** (*in part*).
J. S. N.	Joseph Shield Nicholson, M.A., Sc.D. Professor of Political Economy at Edinburgh University. Fellow of the British Academy. Author of *Principles of Political Economy*; *Money and Monetary Problems*; &c.	**Wages;** **Wealth.**
J. S. R.	James Smith Reid, M.A., LL.M., Litt.D., LL.D. Professor of Ancient History in the University of Cambridge and Fellow and Tutor of Gonville and Caius College. Hon. Fellow, formerly Fellow and Lecturer, of Christ's College. Editor of Cicero's *Academica*; *De Amicitia*; &c.	**Wyttenbach, Daniel Albert.**
J. T.*	Rev. John Telford. Wesleyan Methodist Connexional Editor. Editor of the *Wesleyan Methodist Magazine* and the *London Quarterly Review*. Author of *Life of John Wesley*; *Life of Charles Wesley*; &c.	**Wesley** (*Family*); **Wesley, John;** **Wesleyan Methodist Church.**
J. T. Be.	John Thomas Bealby. Joint-author of Stanford's *Europe*. Formerly Editor of the *Scottish Geographical Magazine*. Translator of Sven Hedin's *Through Asia, Central Asia and Tibet*; &c.	**Vladimir:** *Government* (*in part*); **Volga** (*in part*); **Vologda:** *Government* (*in part*); **Vyatka:** *Government* (*in part*); **Warsaw:** *Poland* (*in part*); **Yakutsk** (*in part*); **Yeniseisk** (*in part*).
J. T. C.	Joseph Thomas Cunningham, M.A., F.Z.S. Lecturer on Zoology at the South-Western Polytechnic, London. Formerly Fellow of University College, Oxford, and Assistant Professor of Natural History in the University of Edinburgh. Naturalist to the Marine Biological Association.	**Whitebait.**
J. V. B.	James Vernon Bartlet, M.A., D.D. Professor of Church History, Mansfield College, Oxford. Author of *The Apostolic Age*; &c.	**Vinet, Alexandre R.**
J. W.	James Williams, M.A., D.C.L., LL.D. All Souls Reader in Roman Law in the University of Oxford, and Fellow of Lincoln College. Barrister-at-Law of Lincoln's Inn. Author of *Law of the Universities*; &c.	**Warranty; Water Rights;** **Will** (*Law*); **Women** (*Early Law*); **Writ.**
J. We.	Julius Wellhausen, D.D. See the biographical article: Wellhausen, Julius.	**Zechariah** (*in part*).
J. W. G.	John Walter Gregory, D.Sc., F.R.S. Professor of Geology in the University of Glasgow. Professor of Geology and Mineralogy in the University of Melbourne, 1900–1904. Author of *The Dead Heart of Australia*; &c.	**Victoria:** *Geology*; **Western Australia:** *Geology*.
J. W. He.	James Wycliffe Headlam, M.A. Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King's College, Cambridge, and Professor of Greek and Ancient History at Queen's College, London. Author of *Bismarck and the Foundation of the German Empire*; &c.	**Windthorst, Ludwig.**
K. G.	Karl Friedrich Geldner, Ph.D. Professor of Sanskrit and Comparative Philology in the University of Marburg. Author of *Vedische Studien*; &c.	**Zend-Avesta; Zoroaster.**
K. G. J.	Kingsley Garland Jayne. Sometime Scholar of Wadham College, Oxford. Matthew Arnold Prizeman, 1903. Author of *Vasco da Gama and his Successors*.	**Xavier, Francisco de.**
K. S.	Kathleen Schlesinger. Editor of *The Portfolio of Musical Archaeology*. Author of *The Instruments of the Orchestra*.	**Vielle; Viol; Virginal;** **Wind Instruments;** **Xylophone.**
L.	Count Lützow, Litt.D., D.Ph., F.R.G.S. Chamberlain of H.M. the Emperor of Austria, King of Bohemia. Hon. Member of the Royal Society of Literature. Member of the Bohemian Academy, &c. Author of *Bohemia: a Historical Sketch*; *The Historians of Bohemia* (Ilchester Lecture, Oxford, 1904); *The Life and Times of John Hus*; &c.	**Žižka, John.**
L. D.*	Louis Duchesne. See the biographical article: Duchesne, Louis M. O.	**Victor I.-II.** (*Popes*).
L. F. V.-H.	Leveson Francis Vernon-Harcourt, M.A., M.Inst.C.E. (1839–1907). Professor of Civil Engineering at University College, London, 1882–1905. Author of *Rivers and Canals*; *Harbours and Docks*; *Civil Engineering as applied in Construction*; &c.	**Weir.**
L. J. S.	Leonard James Spencer, M.A. Assistant in the Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the *Mineralogical Magazine*.	**Vivianite; Wad;** **Wavellite; Willemite;** **Witherite; Wollastonite;** **Zeolites; Zoisite.**
L. R. F.	Lewis Richard Farnell, M.A., Litt.D. Fellow and Senior Tutor of Exeter College, Oxford. University Lecturer in Classical Archaeology; and Wilde Lecturer in Comparative Religion. Author of *Cults of Greek States*; *Evolution of Religion*.	**Zeus.**
L. V.*	Luigi Villari. Italian Foreign Office (Emigration Department). Formerly Newspaper Correspondent in the East of Europe. Italian Vice-Consul in New Orleans, 1906; Philadelphia, 1907; and Boston, 1907–1910. Author of *Italian Life in Town and Country*; &c.	**Victor Emmanuel II.**

L. W.	Lucien Wolf. Vice-President, formerly President, of the Jewish Historical Society of England. Joint-editor of the *Bibliotheca Anglo-judaica.*	**Zionism.**
M. A. B.	Lady Broome (Mary Anne Broome). Author of *Station Life in New Zealand*; *Stories About*; *Colonial Memories*; &c.	**Western Australia:** *History.*
M. Be.	Malcolm Bell. Author of *Pewter Plate*; *Sir E. Burne-Jones: a Record and Review.*	**Watts, George Frederick.**
M. Br.	Margaret Bryant.	**Virgil:** *The Virgil Legend.*
M. C.	Rt. Rev. Mandell Creighton, D.C.L., LL.D. See the biographical article: Creighton, Mandell.	**Waldenses.**
M. Ca.	Moritz Cantor, Ph.D. Honorary Professor of Mathematics in the University of Heidelberg. Hofrat of the German Empire. Author of *Vorlesungen über die Geschichte der Mathematik*; &c.	**Vieta, François.**
M. H. S.	Marion H. Spielmann, F.S.A. Formerly Editor of the *Magazine of Art.* Member of Fine Art Committee of International Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco-British Exhibition, London. Author of *History of "Punch"*; *British Portrait Painting to the opening of the 19th Century*; *Works of G. F. Watts, R.A.*; *British Sculpture and Sculptors of To-Day*; *Henriette Ronner*; &c.	**Wauters, Emile;** **Wood-engraving** (*in part*).
N. W. T.	Northcote Whitridge Thomas, M.A. Government Anthropologist to Southern Nigeria. Corresponding Member of the Société d'Anthropologie de Paris. Author of *Thought Transference*; *Kinship and Marriage in Australia*; &c.	**Week;** **Werwolf** (*in part*); **Witchcraft.**
P. A. K.	Prince Peter Alexeivitch Kropotkin. See the biographical article: Kropotkin, Prince P. A.	**Vladimir:** *Government* (*in part*); **Volga** (*in part*); **Vologda:** *Government* (*in part*); **Vyatka:** *Government* (*in part*); **Warsaw:** *Poland* (*in part*); **Yakutsk** (*in part*); **Yeniseisk** (*in part*).
P. C. M.	Peter Chalmers Mitchell, M.A., D.Sc., LL.D., F.Z.S., F.R.S. Secretary of the Zoological Society of London. University Demonstrator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1888–1891. Author of *Outlines of Biology*; &c.	**Zoological Gardens;** **Zoological Nomenclature.**
P. Gi.	Peter Giles, M.A., LL.D., Litt.D. Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University Reader in Comparative Philology. Formerly Secretary of the Cambridge Philological Society. Author of *Manual of Comparative Philology.*	**W.** **X.** **Y.** **Z.**
P. G. H.	Philip Gilbert Hamerton. See the biographical article: Hamerton, Philip Gilbert.	**Wood-engraving** (*in part*).
P. G. K.	Paul George Konody. Art Critic of *The Observer* and *The Daily Mail.* Formerly Editor of *The Artist.* Author of *The Art of Walter Crane*; *Velasquez, Life and Work*; &c.	**Watteau, Antoine.**
P. S.	Philip Schidrowitz, Ph.D., F.C.S. Member of the Council, Institute of Brewing; Member of the Committee of the Society of Chemical Industry. Author of numerous articles on the Chemistry and Technology of Brewing, Distilling; &c.	**Whisky;** **Wine.**
P. Vi.	Paul Vinogradoff, D.C.L., LL.D. See the biographical article: Vinogradoff, Paul.	**Village Communities;** **Villenage.**
R. A. W.	Colonel Robert Alexander Wahab, C.B., C.M.G., C.I.E. Formerly H.M. Commissioner, Aden Boundary Delimitation. Served with Tirah Expeditionary Force, 1897–1898, and on the Anglo-Russian Boundary Commission, Pamirs, 1895.	**Yemen.**
R. C. D.	Romesh Chunder Dutt, C.I.E. (1848–1909). Fellow of the Royal Society of Literature; Member of the Royal Asiatic Society. Barrister-at-Law, Middle Temple. Formerly Revenue Minister of Baroda State, and Prime Minister of Baroda State. Author of *Economic History of India in the Victorian Age, 1837–1900*; &c.	**Vidyasagar, Iswar Chandra.**
R. G.	Richard Garnett, LL.D. See the biographical article: Garnett, Richard.	**Wakefield, Edward Gibbon.**
R. G. M.	Reginald Godfrey Marsden. Barrister-at-Law, Inner Temple.	**Wreck** (*in part*).
R. He.	Sir Reginald Hennell, D.S.O., C.V.O. Colonel in the Indian Army (retired). Lieutenant of the King's Body-Guard of the Yeomen of the Guard. Served in the Abyssinian Expedition, 1867–68; Afghan War, 1879–80; Burmah Campaign, 1886–87. Author of *History of the Yeomen of the Guard, 1485–1904*; &c.	**Yeomen of the Guard.**
R. J. M.	Ronald John McNeill, M.A. Christ Church, Oxford. Barrister-at-Law, Lincoln's Inn. Formerly Editor of the *St James's Gazette* (London).	**Wentworth** (*Family*).

R. K. D.	Sir Robert Kennaway Douglas. Formerly Professor of Chinese, King's College, London. Keeper of Oriental Printed Books and MSS. at the British Museum, 1892–1907. Member of the Chinese Consular Service, 1858–1865. Author of *The Language and Literature of China*; *Europe and the Far East*; &c.	**Wade, Sir Thomas F.**
R. L.*	Richard Lydekker, F.R.S., F.G.S., F.Z.S. Member of the Staff of the Geological Survey of India, 1874–1882. Author of *Catalogue of Fossil Mammals, Reptiles and Birds in the British Museum*; *The Deer of all Lands*; *The Game Animals of Africa*; &c.	**Viscacha; Vole;** **Walrus** (*in part*); **Water-Deer; Weasel;** **Whale** (*in part*); **Whale-fishery; Wolf** (*in part*); **Wombat; Zebra** (*in part*); **Zoological Distribution.**
R. L. P.	Reginald Lane Poole, M.A., Ph.D., LL.D. Keeper of the Archives of the University of Oxford and Fellow of Magdalen College. Fellow of the British Academy. Editor of the *English Historical Review*. Author of *Wycliffe and movements for Reform*; &c.	**Wycliffe** (*in part*).
R. Mu.*	Rev. Robert Munro, B.D., F.S.A. (Scot.) Barclay Manse, Old Kilpatrick, N. B.	**Vitrified Forts.**
R. N. B.	Robert Nisbet Bain (d. 1909). Assistant Librarian, British Museum, 1883–1909. Author of *Scandinavia: the Political History of Denmark, Norway and Sweden, 1513–1900*; *The First Romanovs, 1613–1725*; *Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796*; &c.	**Vladimir, St;** **Voluinsky, Artemy Petrovich;** **Vorontsov** (*Family*); **Vorosmarty, Mihaly;** **Wallqvist, Olaf;** **Wesselényi, Baron;** **Wielopolski, Aleksander;** **Witowt;** **Wladislaus I.-IV. of Poland.** **Zamoyski, Jan;** **Zolkiewski, Stanislaus;** **Zrinyi, Count** (1508–1566); **Zrinyi, Count** (1620–1664).
R. P. S.	R. Phené Spiers, F.S.A., F.R.I.B.A. Formerly Master of the Architectural School, Royal Academy, London. Past President of the Architectural Association. Associate and Fellow of King's College, London. Corresponding Member of the Institute of France. Editor of Fergusson's *History of Architecture*. Author of *Architecture: East and West*; &c.	**Villa;** **Window.**
R. S. C.	Robert Seymour Conway, M.A., D.Litt. Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville and Caius College, Cambridge. Author of *The Italic Dialects*.	**Volsci.**
R. W. F. H.	Robert William Frederick Harrison. Barrister-at-Law, Inner Temple. Assistant Secretary of the Royal Society, London.	**Violin.**
S. A. C.	Stanley Arthur Cook. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for the Palestine Exploration Fund. Author of *Glossary of Aramaic Inscriptions*; *The Laws of Moses and the Code of Hammurabi*; *Critical Notes on Old Testament History*; *Religion of Ancient Palestine*; &c.	**Zebulun;** **Zedekiah;** **Zephaniah.**
S. N.	Simon Newcomb, D.Sc., LL.D. See the biographical article: Newcomb, Simon.	**Zodiacal Light.**
S. P.	Stephen Paget, F.R.C.S. Surgeon to the Throat and Ear Department, Middlesex Hospital. Hon. Secretary, Research Defence Society. Author of *Memoirs and Letters of Sir James Paget*; &c.	**Vivisection.**
T. As.	Thomas Ashby, M.A., D.Litt. Director of the British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of the Imperial German Archaeological Institute. Author of *The Classical Topography of the Roman Campagna*.	**Vetulonium; Vicenza;** **Viterbo; Volci;** **Volsinii; Volterra;** **Volturno.**
T. A. A.	Thomas Andrew Archer, M.A. Author of *The Crusade of Richard I.*; &c.	**Vincent of Beauvais.**
T. A. C.	Timothy Augustine Coghlan, I.S.O. Agent-General for New South Wales. Government Statistician, New South Wales, 1886–1905. Honorary Fellow of the Royal Statistical Society. Author of *Wealth and Progress of New South Wales*; *Statistical Account of Australia and New Zealand*; &c.	**Victoria:** *Geography and Statistics*; **Western Australia:** *Geography and Statistics.*
T. Ba.	Sir Thomas Barclay. Member of the Institute of International Law. Officer of the Legion of Honour. Author of *Problems of International Practice and Diplomacy*; &c. M.P. for Blackburn, 1910.	**War:** *Laws of*; **Waters, Territorial.**
T. H. B.	Thomas Hudson Beare, M.Inst.C.E., M.Inst.M.E. Regius Professor of Engineering in the University of Edinburgh. Author of papers in the *Transactions* of the Societies of Civil and Mechanical Engineers, 1894–1902.	**Water Meters.**

T. R. G.	Terrot Reaveley Glover, M.A. Fellow and Classical Lecturer at St John's College, Cambridge. Professor of Latin, Queen's University, Kingston, Canada, 1896–1901. Author of *Studies in Virgil*; &c.	**Virgil (*in part*).**
T. W.-D.	Walter Theodore Watts-Dunton. See the biographical article: Watts-Dunton, Walter Theodore.	**Wycherley, William.**
T. W. F.	Thomas William Fox. Professor of Textiles in the University of Manchester. Author of *Mechanics of Weaving*.	**Weaving;** **Yarn.**
U. B.	Count Ugo Balzani, Litt.D. Member of the Reale Accademia dei Lincei. Sometime President of the Reale Società Romana di Storia Patria. Corresponding Member of the British Academy: Author of *The Popes and the Hohenstaufen*; &c.	**Villani, Giovanni.**
W. Ay.	Wilfrid Airy, M.Inst.C.E. Sometime Scholar of Trinity College, Cambridge. Technical Adviser to the Standards Department of the Board of Trade. Author of *Levelling and Geodesy*; &c.	**Weighing Machines.**
W. A. B. C.	Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880–1881. Author of *Guide du Haut Dauphiné*; *The Range of the Todi*; *Guide to Grindelwald*; *Guide to Switzerland*; *The Alps in Nature and in History*; &c. Editor of the *Alpine Journal*, 1880–1881; &c.	**Vevey; Vienne: *Town*;** **Vorarlberg; Walensee;** **Winkelried, Arnold von;** **Winterthur; Zug: *Canton*;** **Zug: *Town*; Zug, Lake of;** **Zürich: *Canton*;** **Zürich: *Town*;** **Zürich, Lake of.**
W. A. J. F.	Walter Armitage Justice Ford. Sometime Scholar of King's College, Cambridge. Teacher of Singing at the Royal College of Music, London.	**Wolf, Hugo.**
W. A. P.	Walter Alison Phillips, M.A. Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of *Modern Europe*; &c.	**Walther von der Vogelweide;** **Wycliffe (*in part*).**
W. B.*	William Burton, M.A., F.C.S. Chairman of the Joint Committee of Pottery Manufacturers of Great Britain. Author of *English Stoneware and Earthenware*; &c.	**Wedgwood, Josiah.**
W. C. U.	William Cawthorne Unwin, F.R.S., LL.D., M.Inst.C.E., M.Inst.M.E. Emeritus Professor, Central Technical College, City and Guilds of London Institute. Author of *Wrought Iron Bridges and Roofs*; *Treatise on Hydraulics*; &c.	**Windmill.**
W. E. G.	Sir William Edmund Garstin, G.C.M.G. British Government Director, Suez Canal Co. Formerly Inspector-General of Irrigation, Egypt. Adviser to the Ministry of Public Works in Egypt, 1904–1908.	**Victoria Nyanza (*in part*).**
W. F. C.	William Feilden Craies, M.A. Barrister-at-Law, Inner Temple. Lecturer on Criminal Law, King's College, London. Editor of Archbold's *Criminal Pleading* (23rd edition).	**Wager; Warrant;** **Witness.**
W. Hy.	William Henry. Founder and Chief Secretary of the Royal Life Saving Society. Associate of the Order of St John of Jerusalem. Joint Author of *Swimming* (Badminton Library); &c.	**Water Polo.**
W. H. F.	Sir William Henry Flower, F.R.S. See the biographical article: Flower, Sir W. H.	**Walrus (*in part*);** **Whale (*in part*);** **Wolf (*in part*);** **Zebra (*in part*).**
W. L. G.	William Lawson Grant, M.A. Professor of Colonial History, Queen's University, Kingston, Canada. Formerly Beit Lecturer on Colonial History, Oxford University. Editor of *Acts of the Privy Council* (Canadian Series).	**Wilson, Sir Daniel.**
W. M.	William Minto, M.A. See the biographical article: Minto, William.	**Wordsworth, William (*in part*).**
W. MacD.*	William MacDonald, LL.D., Ph.D. Professor of American History in Brown University, Providence, R.I. Formerly Professor of History and Political Science, Bowdoin. Member of the American Historical Association, &c. Author of *History and Government of Maine*; &c. Editor of *Select Charters and other documents illustrative of American History*.	**Washington, George.**
W. M. F. P.	William Matthew Flinders Petrie, F.R.S., D.C.L., Litt.D. See the biographical article: Petrie, W. M. Flinders.	**Weights and Measures:** ***Ancient Historical.***
W. M. R.	William Michael Rossetti. See the biographical article: Rossetti, Dante Gabriel.	**Vivarini;** **Zurbaran, Francisco.**
W. O. S.	William Oscar Scroggs, Ph.D. Assistant Professor of History and Economics at Louisiana State University. Formerly Goodwin and Austin Fellow, Harvard University.	**Walker, William.**
W. P. C.	William Prideaux Courtney. See the biographical article: Courtney, L. H. Baron.	**Walpole, Horatio;** **Wilkes, John.**
W. P. J.	William Price James. Barrister-at-Law, Inner Temple. High Bailiff, Cardiff County Court. Author of *Romantic Professions*; &c.	**Watson, William (*poet*).**

W. P. R.	Hon. William Pember Reeves. Director of the London School of Economics. Agent-General and High Commissioner for New Zealand, 1896–1909. Minister of Education, Labour and Justice, New Zealand, 1891–1896. Author of *The Long White Cloud: a History of New Zealand*; &c.	**Vogel, Sir Julius.**
W. Ri.	William Ridgeway, M.A., D.Sc., Litt.D. Disney Professor of Archaeology, and Brereton Reader in Classics, in the University of Cambridge. Fellow of Gonville and Caius College. Fellow of the British Academy. President of the Royal Anthropological Institute, 1908. Author of *The Early Age of Greece*; &c.	**Villanova.**
W. S. R.	William Smyth Rockstro. Author of *A Great History of Music from the Infancy of the Greek Drama to the Present Period*; &c.	**Wagner:** ***Biography (in part)*****,** **Weber.**
W. T. Ca.	William Thomas Calman, D.Sc., F.Z.S. Assistant in charge of Crustacea, Natural History Museum, South Kensington. Author of "Crustacea," in a *Treatise on Zoology*, edited by Sir E. Ray Lankester.	**Water-flea;** **Wood-louse.**
W. Wr.	Williston Walker, Ph.D., D.D. Professor of Church History, Yale University. Author of *History of the Congregational Churches in the United States*; *The Reformation*; *John Calvin*; &c.	**Winthrop, John (1588–1649).**
W. W. F.*	William Warde Fowler, M.A. Fellow of Lincoln College, Oxford. Sub-rector, 1881–1904. Gifford Lecturer, Edinburgh University, 1908. Author of *The City-State of the Greeks and Romans*; *The Roman Festivals of the Republican Period*; &c.	**Vulcan.**
W. W. R.*	William Walker Rockwell, Lic.Theol. Assistant Professor of Church History, Union Theological Seminary, New York.	**Westminster, Synods of.**
W. Y. S.	William Young Sellar, LL.D. See the biographical article: Sellar, William Young.	**Virgil (*in part*).**

PRINCIPAL UNSIGNED ARTICLES

- **Vicksburg.**
- **Vienna.**
- **Vine.**
- **Vinegar.**
- **Vingt-et-Un.**
- **Violet.**
- **Virginia.**
- **Viscount.**
- **Vlachs.**
- **Volunteers.**
- **Vote and Voting.**
- **Wadai.**
- **Wagram.**
- **Wakefield.**
- **Waldeck-Pyrmont.**
- **Wallingford.**
- **Walnut.**
- **War Game.**
- **Warrington.**
- **Warwick.**
- **Warwickshire.**
- **Washington.**
- **Water.**
- **Waterford.**
- **Watertown.**
- **Wax Figures.**
- **Weimar.**
- **Well.**
- **Wells.**
- **West Indies.**
- **Westmeath.**
- **Westminster.**
- **Westmorland.**
- **Westphalia.**
- **West Point (N.Y.).**
- **West Virginia.**
- **Wexford.**
- **Weymouth.**
- **Wheat.**
- **Wheeling.**
- **Whig and Tory.**
- **Whist.**
- **Whitby.**
- **White Plains.**
- **Whooping-Cough.**
- **Wicklow.**
- **Wiesbaden.**
- **Wig.**
- **Wigan.**
- **Wight, Isle of.**
- **Wigtownshire.**
- **Wilkes-Barré.**
- **Williamsburg (Va.).**
- **Willow.**
- **Wilmington (Del.).**
- **Wilton.**
- **Wiltshire.**
- **Winchester.**
- **Windsor.**
- **Winnipeg.**
- **Wire.**
- **Wisconsin.**
- **Wisconsin, University of.**
- **Woolwich.**
- **Worcester.**
- **Worcestershire.**
- **Worms.**
- **Wrestling.**
- **Writing.**
- **Württemberg.**
- **Würzburg.**
- **Wyoming.**
- **Wyoming Valley.**
- **Yale University.**
- **Yarmouth.**
- **Yaws.**
- **Yellow Fever.**
- **Yellowstone National Park.**
- **Yew.**
- **Yezo.**
- **York.**
- **Yorkshire.**
- **Yorktown.**
- **Ypsilanti.**
- **Yucatan.**
- **Yukon.**
- **Zante.**
- **Zanzibar.**
- **Zeeland.**
- **Zeuxis.**
- **Zinc.**
- **Zirconium.**
- **Zuider Zee.**

ENCYCLOPÆDIA BRITANNICA

ELEVENTH EDITION

VOLUME XXVIII

VETCH, in botany, the English name for *Vicia sativa*, also known as tare, a leguminous annual herb with trailing or climbing stems, compound leaves with five or six pairs of leaflets, reddish-purple flowers borne singly or in pairs in the leaf-axis, and a silky pod containing four to ten smooth seeds. The wild form, sometimes regarded as a distinct species, *V. angustifolia*, is common in dry soils. There are two races of the cultivated vetch, winter and spring vetches: the former, a hardy form, capable of enduring frost, has smoother, more cylindrical pods with smaller seeds than the summer variety, and gives less bulk of stem and leaves. The spring vetch is a more delicate plant and grows more rapidly and luxuriantly than the winter variety.

The name vetch is applied to other species of the genus *Vicia*. *Vicia orobus*, bitter vetch, and *V. sylvatica*, wood vetch, are British plants. Another British plant, *Hippocrepis*, is known as horseshoe vetch from the fact of its pod breaking into several horseshoe-shaped joints. *Anthyllis vulneraria* is kidney-vetch, a herb with heads of usually yellow flowers, found on dry banks. *Astragalus* is another genus of Leguminosae, and is known as milk-vetch.

Vetches are a very valuable forage crop. Being indigenous to Britain, and not fastidious in regard to soil, they can be cultivated successfully under a great diversity of circumstances, and are well adapted for poor soils. By combining the winter and spring varieties, and making several sowings of each in its season at intervals of two or three weeks, it is practicable to have them fit for use from May till October, and thus to carry out a system of soiling by means of vetches alone. But it is usually more expedient to use them in combination with grass and clover, beginning with the first cutting of the latter in May, taking the winter vetches in June, recurring to the Italian ryegrass or clover as the second cutting is ready, and afterwards bringing the spring vetches into use. Each crop can thus be used when in its best state for cattle food, and so as gratefully to vary their dietary.

Winter Vetches.—There is no botanical difference between winter and spring vetches, and the seeds being identical in appearance, caution is required in purchasing seed to get it of the right sort. Seed grown in England is found the most suitable for sowing in Scotland, as it vegetates more quickly, and produces a more vigorous plant than that which is home-grown. As the great inducement to cultivate this crop is the obtaining of a supply of nutritious green food which shall be ready for use about the 1st of May, so as to fill up the gap which is apt to occur betwixt the root crops of the previous autumn and the ordinary summer food, whether for grazing or soiling, it is of the utmost importance to treat it in such a way that it may be ready for use by the time mentioned. To secure this, winter tares should be sown in August if possible, but always as soon as the land can be cleared of the preceding crop. They may yield a good crop though sown in October, but in this case will probably be very little in advance of early-sown spring vetches, and possess little, if any, advantage over them in any respect. The land on which they are sown should be dry and well sheltered, clean and in good heart, and be further enriched by farmyard manure. Not less than 3½ bushels of seed per acre should be sown, to which some think it beneficial to add half a bushel of wheat. Rye is frequently used for this purpose, but it gets reedy in the stems, and is rejected by the stock. Winter beans are better than either. The land having been ploughed rather deeply, and well harrowed, it is found advantageous to deposit the seed in rows, either by a drilling-machine or by ribbing. The latter is the best practice, and the ribs should be at least a foot apart and rather deep, that the roots may be well developed before top-growth takes place. As soon in spring as the state of the land and weather admits of it, the crop should be hoed betwixt the drills, a top-dressing at the rate of 40 bushels of soot or 2 cwt. of guano per acre applied by sowing broadcast, and the roller then used for the double purpose of smoothing the surface so as to admit of the free use of the scythe and of pressing down the plants which may have been loosened by frost. It is thus by early sowing, thick seeding and liberal manuring that this crop is to be forced to an early and abundant maturity. May and June are the months in which winter vetches are used to advantage. A second growth will be produced from the roots if the crop is allowed to stand; but it is much better practice to plough up the land as the crop is cleared, and to sow turnips upon it. After a full crop of vetches, land is usually in a good state for a succeeding crop. When the whole process has been well managed, the gross amount of cattle food yielded by a crop of winter vetches, and the turnip crop by which it is followed in the same summer, will be found considerably to exceed what could be obtained from the fullest crop of turnips alone, grown on similar soil, and with the same quantity of manure. It is useless to sow this crop where game abounds.

Spring vetches, if sown about the 1st of March, will be ready for use by the 1st of July, when the winter vetches are just cleared off. To obtain the full benefit of this crop, the land on which it is sown must be clean, and to keep it so a much fuller allowance of seed is required than is usually given in Scotland. When the crop is as thick set as it should be, the tendrils intertwine, and the ground is covered by a solid mass of herbage, under which no weed can live. To secure this, not less than 4 bushels of seed per acre should be used if sown broadcast, or 3 bushels if in drills. The latter plan, if followed by hoeing, is certainly the best; for if the weeds are kept in check until the crop is fairly established, they have no chance of getting up afterwards. With a thin crop of vetches, on the other hand, the land is so certain to get foul, that they should at once be ploughed down, and something else put in their place. As vetches are in the best state for use when the seeds begin to form in the pods, repeated sowings are made at intervals of three weeks, beginning by the end of February, or as early in March as the season admits, and continuing till May. The usual practice in Scotland has been to sow vetches on part of the oat break, once ploughed from lea. Sometimes this does very well, but a far better plan is to omit sowing clover and grass seeds on part of the land occupied by wheat or barley after a crop of turnips, and having ploughed that portion in the autumn to occupy it with vetches, putting them *instead of* "*seeds*" for one revolution of the course.

When vetches are grown on poor soils, the most profitable way of using them is by folding sheep upon them, a practice very suitable also for clays, upon which a root crop cannot safely be consumed in this way. A different course must, however, be adopted from that followed when turnips are so disposed of. When sheep are turned in upon a piece of tares, a large portion of the food is trodden down and wasted. Cutting the vetches and putting them into racks does not much mend the matter, as much is still pulled out and wasted, and the manure unequally distributed over the land. To avoid those evils, hurdles with vertical spars, betwixt which the sheep can reach with head and neck, are now used. These are set close up to the growing crop along a considerable stretch, and shifted forward as the sheep eat up what is within their reach. This requires the constant attention of the shepherd, but the labour is repaid by the saving of the food, which being always fresh and clean, does the sheep more good. A modification of this plan is to use the same kind of hurdles, but instead of shifting them as just described, to mow a swathe parallel to them, and fork this forward within reach of the sheep as required, repeating this as often during the day as is found necessary, and at night moving the sheep close up to the growing crop, so that they may lie for the next twenty-four hours on the space which has yielded food for the past day. During the night they have such pickings as have been left on the recently mown space and so much of the growing crop as they can get at through the spars. There is less labour by this last mode than the other, and having practised it for many years, we know that it answers well. This folding upon vetches is suitable either for finishing off for market sheep that are in forward condition, or for recently weaned lambs, which, after five or six weeks' folding on this clean, nutritious herbage, are found to take on more readily to eat turnips, and to thrive better upon them, than if they had been kept upon the pastures all the autumn. Sheep folded upon vetches must have water always at command, otherwise they will not prosper.

As spring-sown vetches are in perfection at the season when pastures usually get dry and scanty, a common practice is to cart them on to grass land and spread them out in wisps, to be eaten by the sheep or cattle. It is, however, much better either to have them eaten by sheep where they grow, or to cart them to the homestead.

VETERAN, old, tried, experienced, particularly used of a soldier who has seen much service. The Latin *veteranus* (*vetus*, old), as applied to a soldier, had, beside its general application in opposition to *tiro*, recruit, a specific technical meaning in the Roman army. Under the republic the full term of service with the legion was twenty years; those who served this period and gained their discharge (*missio*) were termed *emeriti*. If they chose to remain in service with the legion, they were then called *veterani*. Sometimes a special invitation was issued to the *emeriti* to rejoin; they were then styled *evocati*.

The base of Lat. *vetus* meant a year, as seen in the Gr. ἔτος (for *Fέτος*) and Sanskrit *vatsa*; from the same base comes *vitulus*, a calf, properly a yearling, *vitellus*, a young calf, whence O. Fr. *veel*, modern, *veau*, English "veal," the flesh of the calf. The Teutonic cognate of *vitulus* is probably seen in Goth. *withrus*, lamb, English "wether," a castrated ram.

VETERINARY SCIENCE (Lat. *veterinarius*, an adjective meaning "connected with beasts of burden and draught," from *veterinus*, "pertaining to yearlings," and *vitulus*, "a calf"),[1] the science, generally, that deals with the conformation and structure of the domesticated animals, especially the horse; their physiology and special racial characteristics; their breeding, feeding and general hygienic management; their pathology, and the preventive and curative, medical and surgical, treatment of the diseases and injuries to which they are exposed; their amelioration and improvement; their relations to the human family with regard to communicable maladies; and the supply of food and other products derived from them for the use of mankind. In this article it is only necessary to deal mainly with veterinary science in its relation with medicine, as other aspects are treated under the headings for the particular animals, &c. In the present edition of the *Encyclopaedia Britannica* the various anatomical articles (see ANATOMY for a list of these) are based on the comparative method, and the anatomy of the lower animals is dealt with there and in the separate articles on the animals.

History.

There is evidence that the Egyptians practised veterinary medicine and surgery in very remote times; but it is not until we turn to the Greeks that we obtain any very definite information with regard to the state of veterinary as well as human medicine in antiquity. The writings of Hippocrates (460–377 B.C.) afford evidence of excellent investigations in comparative pathology. Diocles of Carystus, who was nearly a contemporary, was one of the first to occupy himself with anatomy, which he studied in animals. Aristotle, too, wrote on physiology and comparative anatomy, and on the maladies of animals, while many other Greek writers on veterinary medicine are cited or copied from by Varro, Columella and Galen. And we must not overlook Mago of Carthage (200 B.C.), whose work in twenty-eight books was translated into Greek and was largely used by Varro and Columella.

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[1] Regarding the origin of the word "veterinary," the following occurs in D'Arboval's *Dictionnaire de médecine et de chirurgie vétérinaires*, edited by Zundel (1877), iii. 814: "Les mots *veterinaria* et *veterinarius* étaient employés par les Romains pour désigner: le premier, la médecine des bêtes de somme; le second, pour indiquer celui qui la pratiquait; le mot *veterinae* indiquait les bêtes de somme, et était la contraction de *veheterinae*, du verbe *vehere*, porter, tirer, traîner. L'étymologie réelle du mot *vétérinaire*, ou plutôt du mot *veterinarius* des Romains, serait d'après Lenglet encore plus ancienne; elle viendrait du celtique, d'où le mot serait passé chez les Romains; cet auteur fait venir le mot de *vee*, bétail (d'où l'allemand *Vieh*), *teeren*, être malade (d'où l'allemand *Zehren*, consomption), *aerts* ou *arts*, artiste, médecin (d'où l'allemand *Arzt*)."

Amongst the Romans.

Until after the conquest of Greece the Romans do not appear to have known much of veterinary medicine. Varro (116–28 B.C.) may be considered the first Roman writer who deals with animal medicine in a scientific spirit in his *De Re Rustica*, in three books, which is largely derived from Greek writers. Celsus is supposed to have written on animal medicine, and Columella (1st century) is credited with having utilized those relating to veterinary science in the sixth and seventh parts of his *De Re Rustica*, one of the best works of its class of ancient times; it treats not only of medicine and surgery, but also of sanitary measures for the suppression of contagious diseases. From the 3rd century onwards veterinary science had a literature of its own and regular practitioners, especially in the service of the Roman armies (*mulomedici*, *veterinarii*). Perhaps the most renowned veterinarian of the Roman empire was Apsyrtus of Bithynia, who in 332 accompanied the expedition of Constantine against the Sarmatians in his professional capacity, and seems to have enjoyed a high and well-deserved reputation in his time. He was a keen observer; he distinguished and described a number of diseases which were badly defined by his predecessors, recognized the contagious nature of glanders, farcy and anthrax, and prescribed isolation for their suppression; he also made interesting observations on accidents and diseases of horses' limbs, and waged war against certain absurd empirical practices then prevailing in the treatment of disease, indicating rational methods, some of which are still successfully employed in veterinary therapeutics, such as splints for fractures, sutures for wounds, cold water for the reduction of prolapsed vagina, hot baths for tetanus, &c. Not less eminent was Hierocles, the successor of Apsyrtus, whose writings he largely copied, but with improvements and valuable additions, especially in the hygiene and training of horses. Pelagonius, again, was a writer of empirical tendency, and his treatment of disease in general was most irrational. Publius Vegetius (not to be confounded with Flavius Vegetius Renatus, who wrote on the military art) was a popular author of the end of the 5th century, though less distinguished than Apsyrtus, to whom and to Pelagonius he was to a great extent indebted in the preparation of his *Mulomedicina sive Ars Veterinaria*. He appears to have been more of a horse-dealer than a veterinary practitioner, and knew next to nothing of anatomy, which seems to have been but little cultivated at that period. He was very superstitious and a believer in the influence of demons and sorcerers; nevertheless, he gives some interesting observations derived from his travels. He had also a good idea of aërial infection, recognized the utility of disinfectants, and describes some operations not referred to by previous writers, such as removal of calculi from the bladder through the rectum, couching for cataract, the extirpation of certain glands, and several serious operations on the horse's foot. Though inferior to several works written by his predecessors, the *Mulomedicina* of Vegetius maintained its popularity through many centuries. Of most of the ancient veterinary writers we know little beyond what can be gathered from the citations and extracts in the two great collections of *Hippiatrica* and *Geoponica* compiled by order of Constantine Porphyrogenitus in the 10th century.

It is unnecessary to dwell here on the progress of the veterinary art during the middle ages. Towards the close of the medieval period the subject was much cultivated in the cavalry schools of Italy; and Spain also had an organized system of good practitioners in the 15th century, who have left many books still extant. Germany was far behind, and literature on the subject did not exist until the end of the 15th century, when in 1492 there was published anonymously at Augsburg a *Pferdearzneibüchlein*. In the following century the influence of the Italian writers was becoming manifest, and the works of Fugger and Fayser mark the commencement of a new era. Fayser's treatises, *Von der Gestüterei* and *Von der Zucht der Kriegs- und Bürger-Pferde* (1529–97), are remarkable for originality and good sense. In Great Britain animal medicine was perhaps in a more advanced condition than in Germany, if we accept the evidence of the *Ancient Laws and Institutes of Wales* (London, 1841); yet it was largely made up of the grossest superstitions.[1] Among the Celts the healer of horse diseases and the shoer were held in high esteem, as among the more civilized nations of Europe, and the court farrier enjoyed special privileges.[2] The earliest known works in English appeared anonymously towards the commencement of the 16th century, viz. *Propertees and Medcynes for a Horse* and *Mascal of Oxen, Horses, Sheepes, Hogges, Dogges*. The word "mascal" shows that the latter work was in its origin Italian. There is no doubt that in the 15th century the increasing taste for horses and horsemanship brought Italian riding-masters and farriers into England; and it is recorded that Henry VIII. brought over two of these men who had been trained by Grisone in the famous Neapolitan school. The knowledge so introduced became popularized, and assumed a concrete form in Blundeville's *Fowre Chiefest Offices belonging to Horsemanship* (1566), which contains many references to horse diseases, and, though mainly a compilation, is yet enriched with original observations. In the 15th century the anatomy of the domesticated animals, formerly almost entirely neglected, began to receive attention. A work on comparative anatomy by Volcher Koyter was issued at Nuremberg in 1573; about the same time a writer in Germany named Copho or Cophon published a book on the anatomy of the pig, in which were many original remarks on the lymphatic vessels; and Jehan Hervard in France produced in 1594 his rather incomplete *Hippo-Ostéologie*. But by far the most notable work, and one which maintained its popularity for a century and a half, was that of Carlo Ruini, a senator of Bologna, published in 1598 in that city, and entitled *Dell' Anatomia e dell' Infirmità del Cavallo, e suoi Remedii*. Passing through many editions, and translated into French and German, this book was for the most part original, and a remarkable one for the time in which it was composed, the anatomical portion being especially praiseworthy. English books of the 17th century exhibit a strong tendency towards the improvement of veterinary medicine and surgery, especially as regards the horse. This is even more notable in the writings of the 18th century, among which may be particularized Gibson's *Farrier's New Guide* (1719), *Method of Dieting Horses* (1721) and (best of all) his *New Treatise on the Diseases of Horses*, besides Braken's, Burdon's, Bridge's and Bartlet's treatises. Veterinary anatomy was greatly advanced by the *Anatomy of an Horse* (1683) of Snape, farrier to Charles II., illustrated with copperplates, and by the still more complete and original work of Stubbs, the *Anatomy of the Horse* (1766), which decidedly marked a new era in this line of study. Of foreign works it may suffice to mention that of Solleysel, *Véritable parfait maréschal* (1664), which passed through many editions, was translated into several languages, and was borrowed from for more than a century by different writers. Sir W. Hope's *Compleat Horseman* (1696) is a translation from Solleysel by a pupil.

France and Continental Europe.

Modern Schools and Colleges.—The most important era in the history of modern veterinary science commenced with the institution of veterinary schools. France was the first to take the great initiative step in this direction. Buffon had recommended the formation of veterinary schools, but his recommendations were not attended to. Claude Bourgelat (1712–1799), an advocate at Lyons and a talented hippologist, through his influence with Bertin, prime minister under Louis XV., was the first to induce the government to establish a veterinary school and school of equitation at Lyons, in 1761. This school he himself directed for only a few years, during which the great benefits that had resulted from it justified an extension of its teaching to other parts of France. Bourgelat, therefore, founded (1766) at Alfort, near Paris, a second veterinary school, which soon became, and has remained to this day, one of the finest and most advanced veterinary schools in the world. At Lyons he was replaced by the Abbé Rozier, a learned agriculturist, who was killed at the siege of Lyons after a very successful period of school management, during which he had added largely to agricultural and physical knowledge by the publication of his *Journal de Physique* and *Cours d'Agriculture*. Twenty years later the Alfort school added to its teaching staff several distinguished professors whose names still adorn the annals of science, such as Dauberton, who taught rural economy; Vic d'Azyr, who lectured on comparative anatomy; Fourcroy, who undertook instruction in chemistry; and Gilbert, one of its most brilliant pupils, who had veterinary medicine and surgery for his department. The last-named was also a distinguished agriculturist and published many important treatises on agricultural as well as veterinary subjects. The position he had acquired, added to his profound and varied knowledge, made him most useful to France during the period of the Revolution. It is chiefly to him that it is indebted for the celebrated Rambouillet flock of Merino sheep, for the conservation of the Tuileries and Versailles parks, and for the creation of the fine experimental agricultural establishment organized in the ancient domain of Sceaux. The Alfort school speedily became the nursery of veterinary science, and the source whence all similar institutions obtained their first teachers and their guidance. A third government school was founded in 1825 at Toulouse; and these three schools have produced thousands of thoroughly educated veterinary surgeons and many professors of high scientific repute, among whom may be named Bouley, Chauveau, Colin, Toussaint, St Cyr, Goubaux, Arloing, Galtier, Nocard, Trasbot, Neumann, Cadiot and Leclainche. The opening of the Alfort school was followed by the establishment of national schools in Italy (Turin, 1769), Denmark (Copenhagen, 1773), Austria (Vienna, 1775), Saxony (Dresden, 1776), Prussia (Hanover, 1778; Berlin, 1790), Bavaria (Munich, 1790), Hungary (Budapest, 1787) and Spain (Madrid, 1793); and soon government veterinary schools were founded in nearly every European country, except Great Britain and Greece, mostly on a munificent scale. Probably all, but especially those of France and Germany, were established as much with a view to training veterinary surgeons for the army as for the requirements of civil life. In 1907 France possessed three national veterinary schools, Germany had six, Russia four (Kharkov, Dorpat, Kazan and Warsaw), Italy six, Spain five, Austria-Hungary three (Vienna, Budapest and Lemberg), Switzerland two (Zürich and Bern), Sweden two (Skara and Stockholm), Denmark, Holland, Belgium and Portugal one each. In 1849 a government veterinary school was established at Constantinople, and in 1861 the government of Rumania founded a school at Bucharest. The veterinary schools of Berlin, Hanover and Vienna have been raised to the position of universities.

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[1] See *Leechdoms, Wortcunning and Starcraft of Early England* (3 vols. 8vo, London, 1864).

[2] See Fleming, *Horse-shoes and Horse-Shoeing* (London, 1869).

United Kingdom.

In 1790 St Bel (whose real name was Vial, St Bel being a village near Lyons, where was his paternal estate), after studying at the Lyons school and teaching both at Alfort and Lyons, came to England and published proposals for founding a school in which to instruct pupils in veterinary medicine and surgery. The Agricultural Society of Odiham, which had been meditating sending two young men to the Alfort school, elected him an honorary member, and delegated a committee to consult with him respecting his scheme. Some time afterwards this committee detached themselves from the Odiham Society and formed an institution styled the Veterinary College of London, of which St Bel was appointed professor. The school was to be commenced and maintained by private subscription. In March 1792 arrangements were made for building temporary stabling for fifty horses and a forge for shoeing at St Pancras. The college made rapid progress in public estimation, notwithstanding considerable pecuniary embarrassments. As soon as the building was ready for the reception of animal patients, pupils began to be enrolled; and among the earliest were some who afterwards gained celebrity as veterinarians, as Bloxam, Blaine, R. Lawrence, Field and Bracy Clark. On the death of St Bel in August 1793 there appears to have been some difficulty in procuring a suitable successor; but at length, on the recommendation of John Hunter and Cline, two medical men were appointed, Coleman and Moorcroft, the latter then practising as a veterinary surgeon in London. The first taught anatomy and physiology, and Moorcroft, after visiting the French schools, directed the practical portion of the teaching. Unfortunately, neither of these teachers had much experience among animals, nor were they well acquainted with their diseases; but Coleman (1765-1839) had as a student, in conjunction with a fellow-student (afterwards Sir Astley Cooper), performed many experiments on animals under the direction of Cline. Moorcroft, who remained only a short time at the college, afterwards went to India, and during a journey in 1819 was murdered in Tibet. Coleman, by his scientific researches and energetic management, in a few years raised the college to a high standard of usefulness; under his care the progress of the veterinary art was such as to qualify its practitioners to hold commissions in the army; and he himself was appointed veterinary surgeon-general to the British cavalry. In 1831 he was elected a fellow of the Royal Society. Owing to the lack of funds, the teaching at the college must have been very meagre, and had it not been for the liberality of several medical men in throwing open the doors of their theatres to its pupils for instruction without fee or reward, their professional knowledge would have been sadly deficient. The board of examiners was for many years chiefly composed of eminent members of the medical profession. Coleman died in 1839, and with him disappeared much of the interest the medical profession of London took in the progress of veterinary medicine. Yet the Royal Veterinary College (first styled "Royal" during the presidentship of the duke of Kent) continued to do good work in a purely veterinary direction, and received such public financial support that it was soon able to dispense with the small annual grant given to it by the government. In the early years of the institution the horse was the only animal to which much attention was given. But at the instigation of the Royal Agricultural Society of England, which gave £200 per annum for the purpose, an additional professor was appointed to investigate and teach the treatment of the diseases of cattle, sheep and other animals; outbreaks of disease among these were also to be inquired into by the officers of the college. This help to the institution was withdrawn in 1875, but renewed and augmented in 1886. For fifteen years the Royal Agricultural Society annually voted a sum of £500 towards the expenses of the department of comparative pathology, but in 1902 this grant was reduced to £200.

As the result of representations made to the senate of the university of London by the governors of the Royal Veterinary College, the university in 1906 instituted a degree in veterinary science (B.Sc.). The possession of this degree does not of itself entitle the holder to practise as a veterinary surgeon, but it was hoped that an increasing number of students would, while studying for the diploma of the Royal College of Veterinary Surgeons, also adopt the curriculum which is necessary to qualify for the university examinations and obtain the degree of bachelor of science. To provide equipment for the higher studies required for the university degree, the Board of Agriculture and Fisheries in 1906 made a grant to the college of £800 per annum. At this school post-graduate instruction is given on the principles of bacteriological research, vaccination and protective inoculation, the preparation of toxins and vaccines and the bacteriology of the specific diseases of animals.

The London Veterinary School has been the parent of other schools in Great Britain, one of which, the first in Scotland, was founded by Professor Dick, a student under Coleman, and a man of great perseverance and ability. Beginning at Edinburgh in 1819-20 with only one student, in three years he gained the patronage of the Highland and Agricultural Society of Scotland, which placed a small sum of money at the disposal of a committee appointed by itself to take charge of a department of veterinary surgery it had formed. This patronage, and very much in the way of material assistance and encouragement, were continued to the time of Dick's death in 1866. During the long period in which he presided over the school considerable progress was made in diffusing a sound knowledge of veterinary medicine in Scotland and beyond it For many years his examining board, which gave certificates of proficiency under the auspices of the Highland and Agricultural Society, was composed of the most distinguished medical men in Scotland, such as Goodsir, Syme, Lizars, Ballingall, Simpson and Knox. By his will Dick vested the college in the lord provost and town council of Edinburgh as trustees, and left a large portion of the fortune he had made to maintain it for the purposes for which it was founded. In 1859 another veterinary school was established in Edinburgh by John Gamgee, and the Veterinary College, Glasgow, was founded in 1863 by James McCall. Gamgee's school was discontinued in 1865; and William Williams established in 1873 the "New Veterinary College," Edinburgh. This school was transferred in 1904 to the university, Liverpool. In 1900 a veterinary school was founded in Dublin.

In 1844 the Royal College of Veterinary Surgeons (to be carefully distinguished from the Royal Veterinary College) obtained its charter of incorporation. The functions of this body were until 1881 limited almost entirely to examining students taught in the veterinary schools, and bestowing diplomas of membership on those who successfully passed the examinations conducted by the boards which sat in London and Edinburgh. Soon after the Royal College of Veterinary Surgeons obtained its charter of incorporation, a difference arose between the college and Dick, which resulted in the latter seceding altogether from the union that had been established, and forming an independent examining board, the Highland and Agricultural Society of Scotland granting certificates of proficiency to those students who were deemed competent. This schism operated very injuriously on the progress of veterinary education and on professional advancement, as the competition engendered was of a rather deteriorating nature. After the death of Dick in 1866, the dualism in veterinary licensing was suppressed and the Highland Society ceased to grant certificates. Now there is only one portal of entry into the profession, and the veterinary students of England, Ireland and Scotland must satisfy the examiners appointed by the Royal College of Veterinary Surgeons before they can practise their profession.

Before beginning their professional studies students of veterinary medicine must pass an examination in general education equivalent in every respect to that required of students of human medicine. The minimum length of the professional training is four years of three terms each, and during that course four searching examinations must be passed before the student obtains his diploma or licence to practise as a veterinary surgeon. The subjects taught in the schools have been increased in numbers conformably with the requirements of ever extending science, and the teaching is more thorough and practical. During the four years' curriculum, besides the preliminary technical training essential to every scientist, the student must study the anatomy and physiology of the domesticated animals, the pathology and bacteriology of the diseases to which these animals are exposed, medicine, surgery, hygiene, dietetics and meat inspection, and learn to know the results of disease as seen *post mortem* or in the slaughter-house.

In 1881 an act of parliament was obtained protecting the title of the graduates of the Royal College of Veterinary Surgeons and conferring other advantages, not the least of which is the power granted to the college to remove the names of unworthy members from its register. In some respects the Veterinary Surgeons Act is superior to the Medical Act, while it places the profession on the same level as other learned bodies, and prevents the public being misled by empirics and imposters.

In 1876 the college instituted a higher degree than membership—that of fellow (F.R.C.V.S.), which can only be obtained after the graduate has been five years in practice, and by furnishing a thesis and passing a severe written and oral examination on pathology and bacteriology, hygiene and sanitary science, and veterinary medicine and surgery. Only fellows can be elected members of the examining boards for the membership and fellowship diplomas. The graduates of the Royal College of Veterinary Surgeons registered from its foundation in 1844 until 1907 numbered about 6000.

In the British army a veterinary service was first instituted at the beginning of the 19th century, when veterinary surgeons with the relative rank of lieutenant were appointed to regiments of cavalry, the royal artillery and the royal wagon train. After the Crimean War, and consequent on the abolition of the East India Company (which then possessed its own veterinary service), the number of veterinary surgeons employed was increased, and in 1878 they were constituted a "department," with distinctive uniform, instead of being regimental officers as was previously the case. At the same time they were all brought on to a general roster for foreign service, so that every one in turn has to serve abroad. In 1903 the officers of the department were given substantive rank, and in 1904 were constituted a "corps," with a small number of non-commissioned officers and men under their command and specially trained by them. In 1907 the Army Veterinary Corps consisted of 167 officers and 820 non-commissioned officers and men. The men are stationed at the veterinary hospitals, Woolwich depot, Aldershot, Bulford and the Curragh, but when trained are available for duty under veterinary officers at any station, and a proportion of them are employed at the various hospitals in South Africa. Owing to their liability to service abroad in rotation, it follows that every officer spends a considerable portion of his service in India, Burma, Egypt or South Africa. Each tour abroad is five years, and the average length of service abroad is about one-half the total. This offers a wide and varied field for the professional activities of the corps, but naturally entails a corresponding strain on the individuals. Commissions as lieutenants are obtained by examination, the candidates having previously qualified as members of the Royal College of Veterinary Surgeons. Promotion to captain and major is granted at five and fifteen years' service respectively, and subsequently, by selection, to lieutenant-colonel and colonel, as vacancies occur. The director-general has the honorary rank of major-general.

India.

The Indian civil veterinary department was at first recruited from the A. V. Corps, but candidates who qualified as members of the R.C.V.S. were subsequently granted direct appointments by the India Office, by selection. The service is paid and pensioned on the lines of the other Indian civil services, and offers an excellent professional career to those whose constitution permits them to live in the tropics. The work comprises the investigation of disease in animals and the management of studs and farms, in addition to the clinical practice which falls to the share of all veterinary surgeons.

In India there are schools for the training of natives as veterinary surgeons in Bombay, Lahore, Ajmere and Bengal. The courses extend over two and three years, and the instruction is very thorough. The professors are officers of the Indian civil veterinary department, and graduates are given subordinate appointments in that service, or find ready employment in the native cavalry or in civil life.

United States.

In the United States of America, veterinary science made very slow progress until 1884, when the Bureau of Animal Industry was established in connexion with the Department of Agriculture at Washington. The immediate cause of the formation of the bureau was the urgent need by the Federal government of official information concerning the nature and prevalence of animal diseases, and of the means required to control and eradicate them, and also the necessity of having an executive agency to carry out the measures necessary to stop the spread of disease and to prevent the importation of contagion into the country, as well as to conduct investigations through which further knowledge might be obtained. In 1907 the bureau consisted of ten divisions, employing the services of 815 veterinary surgeons. It deals with the investigation, control and eradication of contagious diseases of animals, the inspection and quarantine of live stock, horse-breeding, experiments in feeding, diseases of poultry and the inspection of meat and dairy produce. It makes original investigations as to the nature, cause and prevention of communicable diseases of live stock, and takes measures for their repression, frequently in conjunction with state and territorial authorities. It prepares tuberculin and mallein, and supplies these substances free of charge to public health officers, conducts experiments with immunizing agents, and prepares vaccines, sera and antitoxins for the protection of animals against disease. It prepares and publishes reports of scientific investigations and treatises on various subjects relating to live stock. The diseases which claim most attention are Texas fever, sheep scab, cattle mange, venereal disease of horses, tuberculosis of cattle and pigs, hog cholera, glanders, anthrax, black-quarter, and parasitic diseases of cattle, sheep and horses. The effect of the work of the bureau on the health and value of farm animals and their products is well known, and the people of the United States now realize the immense importance of veterinary science.

Veterinary schools were established in New York City in 1846, Boston in 1848, Chicago in 1883, and subsequently in Kansas City and elsewhere, but these, like those of Great Britain, were private institutions. The American Veterinary College, N.Y., founded in 1875, is connected with New York University, and the N.Y. State Veterinary College forms a department of Cornell University at Ithaca. Other veterinary schools attached to state universities or agricultural colleges are those in Philadelphia. Pa.; Columbus, Ohio; Ames, Iowa; Pullman, Washington; Auburn, Alabama; Manhattan, Kansas; and Fort Collins, Colorado. Other veterinary colleges are in San Francisco; Washington, D.C. (two); Grand Rapids, Michigan; St Joseph, Missouri; and Cincinnati, Ohio.

Canada.

In Canada a veterinary school was founded at Toronto in 1862, and four years later another school was established at Montreal. For some years the Montreal school formed a department of McGill University, but in 1902 the veterinary branch was discontinued. Veterinary instruction in French is given by the faculty of comparative medicine at Laval University. The Canadian Department of Agriculture possesses a fully equipped veterinary sanitary service employing about 400 qualified veterinary surgeons as inspectors of live stock, meat and dairy produce.

Australia.

In the Australian commonwealth there is only one veterinary school, which was established in Melbourne, Victoria, in 1888. The Public Health Departments of New South Wales, Western Australia, Tasmania and the other states employ qualified veterinary surgeons as inspectors of live stock, cowsheds, meat and dairy produce.

New Zealand.

There is no veterinary school in New Zealand, but the Department of Agriculture has arranged to establish one at Wellington in connexion with the investigation laboratory and farm of the division of veterinary science at Wallaceville. The government employs about forty qualified veterinarians as inspectors of live stock, abattoirs, meat-works and dairies.

Egypt.

In Egypt a veterinary school with French teachers was founded in 1830 at Abu-Zabel, near Cairo, by Clot-Bey, a doctor of medicine. This school was discontinued in 1842. The Public Health Department in 1901 established at Cairo a new veterinary school for the instruction of natives. Ten qualified veterinary surgeons are employed in the sanitary service.

South Africa.

Each of the colonies Natal, Cape Colony, Transvaal, Orange River Colony, Swaziland, Bechuanaland and Rhodesia has a veterinary sanitary police service engaged in dealing with the contagious diseases of animals. Laboratories for the investigation of disease and the preparation of antitoxins and protective sera have been established at Grahamstown, Pretoria and Pietermaritzburg.

Characteristics of Veterinary Medicine.

Veterinary medicine has been far less exposed to the vagaries of theoretical doctrines and systems than human medicine. The explanation may perhaps be that the successful practice of this branch of medicine more clearly than in any other depends upon the careful observation of facts and the rational deductions to be made therefrom. No special doctrines seem, in later times at least, to have been adopted, and the dominating sentiment in regard to disease and its treatment has been a medical eclecticism, based on practical experience and anatomico-pathological investigation, rarely indeed on philosophical or abstract theories. In this way veterinary science has become pre-eminently a science of observation. At times indeed it has to some extent been influenced by the doctrines which have controlled the practice of human medicine—such as those of Broussais, Hahnemann, Brown, Rasori, Rademacher and others—yet this has not been for long: experience of them when tested upon dumb unimaginative animals soon exposed their fallacies and compelled their discontinuance.

Of more moment than the cure of disease is its prevention, and this is now considered the most important object in connexion with veterinary science. More especially is this the case with those contagious disorders that depend for their existence and extension upon the presence of an infecting agent, and whose ravages for so many centuries are written largely in the history of civilization. Every advance made in human medicine affects the progress of veterinary science, and the invaluable investigations of Davaine, Pasteur, Chauveau, Lister and Koch have created as great a revolution in veterinary practice as in the medicine of man. In "preventive medicine" the benefits derived from the application of the germ theory are now realized to be immense; and the sanitary police measures based on this knowledge, if carried rigorously into operation, must eventually lead to the extinction of animal plagues. Bacteriology has thrown much light on the nature, diagnosis and cure of disease both in man and animals, and it has developed the beneficent practice of aseptic and antiseptic surgery, enabling the practitioner to prevent exhausting suppuration and wound infection with its attendant septic fever, to ensure the rapid healing of wounds, and to undertake the more serious operations with greater confidence of a successful result.

The medicine of the lower animals differs from that of man in no particular so much, perhaps, as in the application it makes of utilitarian principles. The life of man is sacred; but in the case of animals, when there are doubts as to complete restoration to health or usefulness, pecuniary considerations generally decide against the adoption of remedial measures. This feature in the medicine of domesticated animals brings very prominently before us the value of the old adage that "prevention is better than cure." In Great Britain the value of veterinary pathology in the relations it bears to human medicine, to the public health and wealth, as well as to agriculture, has not been sufficiently appreciated; and in consequence but little allowance has been made for the difficulties with which the practitioner of animal medicine has to contend. The rare instances in which animals can be seen by the veterinary surgeon in the earliest stages of disease, and when this would prove most amenable to medical treatment; delay, generally due to the inability of those who have the care of animals to perceive these early stages; the fact that animals cannot, except in a negative manner, tell their woes, describe their sensations or indicate what and where they suffer; the absence of those comforts and conveniences of the sick-room which cannot be called in to ameliorate their condition; the violence or stupor, as well as the attitude and structural peculiarities of the sick creatures, which only too frequently render favourable positions for recovery impossible; the slender means generally afforded for carrying out recommendations, together with the oftentimes intractable nature of their diseases; and the utilitarian influences alluded to above—all these considerations, in the great majority of instances, militate against the adoption of curative treatment, or at least greatly increase its difficulties. But notwithstanding these difficulties, veterinary science has made greater strides since 1877 than at any previous period in its history. Every branch of veterinary knowledge has shared in this advance, but in none has the progress been so marked as in the domain of pathology, led by Nocard in France, Schütz and Kitt in Germany, Bang in Denmark, and McFadyean in England. Bacteriological research has discovered new diseases, has revolutionized the views formerly held regarding many others, and has pointed the way to new methods of prevention and cure. Tuberculosis, anthrax, black-quarter, glanders, strangles and tetanus furnish ready examples of the progress of knowledge concerning the nature and causation of disease. These diseases, formerly attributed to the most varied causes—including climatic changes, dietetic errors, peculiar condition of the tissues, heredity, exposure, close breeding, overcrowding and even spontaneous origin—have been proved beyond the possibility of doubt to be due to infection by specific bacteria or germs.

In the United Kingdom veterinary science has gained distinction by the eradication of contagious animal diseases. For many years prior to 1865, when a government veterinary department was formed, destructive plagues of animals had prevailed almost continuously in the British islands, and scarcely any attempt had been made to check or extirpate them. Two exotic bovine diseases alone (contagious pleuro-pneumonia or lung plague and foot-and-mouth disease) are estimated to have caused the death, during the first thirty years of their prevalence in the United Kingdom, of 5,549,780 cattle, roughly valued at £83,616,854; while the invasion of cattle plague (rinderpest) in 1865–66 was calculated to have caused a money loss of from £5,000,000 to £8,000,000. The depredations made in South Africa and Australia by the lung plague alone are quite appalling; and in India the loss brought about by contagious diseases among animals has been stated at not less than £6,000,000 annually. The damage done by tuberculosis—a contagious disease of cattle, transmissible to other animals and to man by means of the milk and flesh of diseased beasts—cannot be even guessed at; but it must be enormous considering how widely this malady is diffused. But that terrible pest of all ages, cattle plague, has been promptly suppressed in England with comparatively trifling loss. Foot-and-mouth disease, which frequently proved a heavy infliction to agriculture, has been completely extirpated. Rabies may now be included, with rinderpest, lung plague and sheep-pox, in the category of extinct diseases; and new measures have been adopted for the suppression of glanders and swine fever. To combat such diseases as depend for their continuance on germs derived from the soil or herbage, which cannot be directly controlled by veterinary sanitary measures, recourse has been had to protective inoculation with attenuated virus or antitoxic sera. The Board of Agriculture and Fisheries has an efficient staff of trained veterinary inspectors, who devote their whole time to the work in connexion with the scheduled diseases of animals, and are frequently employed to inquire into other diseases of an apparently contagious nature, where the circumstances are of general importance to agriculturists.

Veterinary science can offer much assistance in the study and prevention of the diseases to which mankind are liable. Some grave maladies of the human species are certainly derived from animals, and others may yet be added to the list. In the training of the physician great benefit would be derived from the study of disease in animals—a fact which has been strangely overlooked in England, as those can testify who understand how closely the health of man may depend upon the health of the creatures he has domesticated and derives subsistence from, and how much more advantageously morbid processes can be studied in animals than in our own species.

Although as yet few chairs of comparative pathology have been established in British universities, on the European continent such chairs are now looked upon as almost indispensable to every university. Bourgelat, towards the middle of the 18th century, in speaking of the veterinary schools he had been instrumental in forming, urged that "leurs portes soient sans cesse ouvertes à ceux qui, chargés par l'état de la conservation des hommes, auront acquis par le nom qu'ils se seront fait le droit d'interroger la nature, chercher des analogies, et vérifier des idées dont la conformation ne peut être qu'utile à l'espèce humaine." And the benefits to be mutually derived from this association of the two branches of medicine inspired Vicq d'Azyr to elaborate his *Nouveau plan de la constitution de la médecine en France*, which he presented to the National Assembly in 1790. His fundamental idea was to make veterinary teaching a preliminary (*le premier degré*) and, as it were, the principle of instruction in human medicine. His proposal went so far as to insist upon a veterinary school being annexed to every medical college established in France. This idea was reproduced in the *Rapport sur l'instruction publique* which Talleyrand read before the National Assembly in 1790. In this project veterinary teaching was to form part of the National Institution at Paris. The idea was to initiate students of medicine into a knowledge of diseases by observing those of animals. The suffering animal always appears exactly as it is and feels, without the intervention of mind obscuring the symptomatology, the symptoms being really and truly the rigorous expression of its diseased condition. From this point of view, the dumb animal, when it is ill, offers the same difficulties in diagnosis as does the ailing infant or the comatose adult.

Of the other objects of veterinary science there is only one to which allusion need here be made: that is the perfectioning of the domestic animals in everything that is likely to make them more valuable to man. This is in an especial manner the province of this science, the knowledge of the anatomy, physiology and other matters connected with these animals by its students being essential for such improvement.

Diseases of Domestic Animals.

Considerations of space forbid a complete or detailed description of all the diseases, medical and surgical, to which the domesticated animals are liable. Separate articles are devoted to the principal plagues, or murrains, which affect animals—RINDERPEST, FOOT-AND-MOUTH DISEASE, PLEURO-PNEUMONIA, ANTHRAX, &c. Reference will be made here only to the more important other disorders of animals which are of a communicable nature.

Diseases of the Horse.

Every horseman should know something of the injuries, lamenesses and diseases to which the horse is liable. Unfortunately not very much can be done in this direction by book instruction; indeed, there is generally too much doctoring and too little nursing of sick animals. Even in slight and favourable cases of illness recovery is often retarded by too zealous and injudicious medication; the object to be always kept in view in the treatment of animal patients is to place them in those conditions which allow nature to

Nursing.

operate most freely in restoring health. This can best be rendered in the form of nursing, which sick animals greatly appreciate. However indifferent a horse may be to caressing or kind attention during health, when ill he certainly appreciates both, and when in pain will often apparently endeavour to attract notice and seek relief from those with whom he is familiar. Fresh air and cleanliness, quiet and comfort, should always be secured, if possible. The stable or loose-box should be warm, without being close, and free from draughts. If the weather is cold, and especially if the horse is suffering from inflammation of the air-passages, it may be necessary to keep up the temperature by artificial means; but great care should be taken that this does not render the air too dry to breathe. The surface of the body can be kept warm by rugs, and the legs by woollen bandages. Yet a sick horse is easily fatigued and annoyed by too much clothing, and therefore it is better to resort to artificial heating of the stable than to overload the body or impede movement by heavy wrappings. If blankets are used, it is well to place a cotton or linen sheet under them, should the horse have an irritable skin. For bedding, long straw should be employed as little as possible, since it hampers movement. Clean old litter, sawdust or peat-moss litter is the best. If the hoofs are strong, and the horse likely to be confined for some weeks, it affords relief to take off the shoes. Tying up should be avoided, if possible, unless it is urgently required, the horse being allowed to move about or lie down as he may prefer.

Food for a sick horse.

When a sick horse has lost his appetite, he should be tempted to eat by offering him such food as will be enticing to him. It should be given frequently and in small quantities, but should not be forced on him; food will often be taken if offered from the hand, when it will not be eaten out of the manger. Whether the animal be fed from a bucket or from a manger, any food that is left should be thrown away, and the receptacle well cleaned out after each meal. As a rule, during sickness a horse requires laxative food, in order to allay fever or inflammatory symptoms, while supporting the strength. The following list comprises the usual laxative foods employed: green grass, green wheat, oats and barley, lucerne, carrots, parsnips, gruel, bran mash, linseed and bran mash, boiled barley, linseed tea, hay tea and linseed oil. Green grass, lucerne, and similar articles of food if cut when in a wet state, should be dried before being given. Boiled grain should be cooked with very little water, so that it may be floury and comparatively dry when ready; a little salt should be mixed with it. One gallon of good gruel may be made with a pound of meal and cold water, which should be stirred till it boils, and afterwards permitted to simmer over a gentle fire till the fluid is quite thick. To make a bran mash, scald a stable bucket, throw out the water, put in 3 lb of bran and 1 oz. of salt, add 2½ pints of boiling water, stir up well, cover over and allow the mash to stand for fifteen or twenty minutes until it is well cooled. For a bran and linseed mash, boil slowly for two or three hours 1 lb of linseed, so as to have about a couple of quarts of thick fluid, to which 2 lb of bran and 1 oz. of salt may be added. The whole should be stirred up, covered over and allowed to steam as before described. The thicker the mash the more readily will the horse eat it. Linseed tea is made by boiling 1 lb of linseed in a couple of gallons of water until the grains are quite soft. It may be economically made by using less water to cook the linseed, and afterwards making up the quantity of water to about a gallon and a half. Hay tea may be prepared by filling a bucket, after scalding it, with good sweet hay, pouring in as much boiling water as the bucket will hold, covering it over, and allowing it to stand until cold, when the fluid may be strained off and given to the horse. This forms a refreshing drink. Linseed oil, in quantities of from 1 oz. to 6 oz. daily, may be mixed with the food; it keeps the bowels in a lax condition, has a good effect on the skin and air-passages, and is useful as an article of diet. When debility has to be combated, as in low fever or other weakening diseases, strengthening and other easily digested food must be administered, though some of the foods already mentioned, such as boiled grain, answer this purpose to a certain extent. Milk, eggs, bread and biscuits, malt, corn, &c., are often prescribed with this object. Milk may be given skimmed or unskimmed; a little sugar may be mixed with it; and one or two gallons may be given daily, according to circumstances. One or two eggs may be given beaten up with a little sugar and mixed with milk, three or four times a day, or more frequently; or they may be boiled hard and powdered, and mixed in the milk. A quart of stout, ale or porter may be given two or three times a day, or a half to one bottle of port wine daily. Scalded oats, with a little salt added, are very useful when convalescence is nearly completed. As a rule, a sick horse should have as much water as he likes to drink, though it may be necessary in certain cases to restrict the quantity, and to have the chill taken off; but it should never be warmer than 75° to 80°.

As little grooming as possible should be allowed when a horse is very weak; it should be limited to sponging the mouth, nostrils, eyes and forehead with clean water, to which a little eucalyptus or sanitas may be added. Rub the legs and ears with the hand, take off the clothing, and shake or change it once a day, and if possible rub over the body with a soft cloth. Exercise is of course not required during sickness or injury, and the period at which it is allowed will depend upon circumstances. Care must be taken that it is not ordered too early, or carried too far at first.

Administration of medicine.

Much care is required in administering medicines in the form of ball or bolus; and practice, as well as courage and tact, is needed in order to give it without danger to the administrator or the animal. The ball should be held between the fingers of the right hand, the tips of the first and fourth being brought together below the second and third, which are placed on the upper side of the ball; the right hand is thus made as small as possible, so as to admit of ready insertion into the mouth. The left hand grasps the horse's tongue, gently pulls it out and places it on that part of the right side of the lower jaw which is bare of teeth. With the right hand the ball is placed at the root of the tongue. The moment the right hand is withdrawn, the tongue should be released. This causes the ball to be carried still farther back. The operator then closes the mouth and watches the left side of the neck, to note the passage of the ball down the gullet. Many horses keep a ball in the mouth a considerable time before they will allow it to go down. A mouthful of water or a handful of food will generally make them swallow it readily. It is most essential to have the ball moderately soft; nothing can be more dangerous than a hard one.

To administer a drink or drench requires as much care as giving a ball, in order to avoid choking the horse, though it is unattended with risk to the administrator. An ordinary glass or stone bottle may be used, providing there are no sharp points around the mouth; but either the usual drenching-horn or a tin vessel with a narrow mouth or spout is safer. It is necessary to raise the horse's head, so that the nose may be a little higher than the horizontal line. The drink must be given by a person standing on the right side (the attendant being in front or on the left side of the horse), the cheek being pulled out a little, to form a sack or funnel, into which the medicine is poured, a little at a time, allowing an interval now and again for the horse to swallow. If any of the fluid gets into the windpipe (which it is liable to do if the head is held too high), it will cause coughing, whereupon the head should be instantly lowered. Neither the tongue nor the nostrils should be interfered with. Powders may be given in a little mash or gruel, well stirred up, or in the drinking water.

If a wide surface is to be fomented (as the chest, abdomen or loins), a blanket or other large woollen cloth should be dipped in water as hot as the hand can comfortably bear it, moderately wrung out and applied to the part, the heat and moisture being retained by covering it with a waterproof sheet or dry rug. When it has lost some of its heat, it should be removed, dipped in warm water and again applied. In cases of acute inflammation, it may be necessary to have the water a little hotter; and, to avoid the inconvenience of removing the blanket, or the danger of chill when it is removed, it may be secured round the body by skewers or twine, the hot water being poured on the outside of the top part of the blanket by any convenient vessel. To foment the feet, they should be placed in a bucket or tub (the latter with the bottom resting wholly on the ground) containing warm water; a quantity of moss litter put in the tub or bucket prevents splashing and retains the heat longer.

Poultices.

Poultices are used for allaying pain, softening horn or other tissues, and, when antiseptic, cleansing and promoting healthy action in wounds. To be beneficial they should be large and always kept moist. For applying poultices to the feet, a piece of sacking, or better a poultice-boot, supplied by saddlers, may be used with advantage. Poultices are usually made with bran, though this has the disadvantage of drying quickly, to prevent which it may be mixed with linseed meal or a little linseed oil. Antiseptic poultices containing lysol, izal, carbolic acid or creolin, are very useful in the early treatment of foul and punctured wounds. A charcoal poultice is sometimes employed when there is an offensive smell to be got rid of. It is made by mixing linseed meal with boiling water and stirring until a soft mass is produced; with this some wood charcoal in powder is mixed, and when ready to be applied some more charcoal is sprinkled on the surface. It may be noted that, in lieu of these materials for poultices, spongiopiline can be usefully employed. A piece of sufficient size is steeped in hot water, applied to the part, covered with oiled silk or waterproof sheeting, and secured by tapes. Even an ordinary sponge, steeped in hot water and covered with waterproof material, makes a good poulticing medium; it is well adapted for the throat, the space between the branches of the lower jaw, as well as for the lower joints of the limbs.

Enemata or clysters.

Enemata or clysters are given in fevers, constipation, colic, &c., to empty the posterior part of the bowels. They can be administered by a large syringe capable of containing a quart or more of water, with a nozzle about 12 in. long, or by a large funnel with a long nozzle at a right angle. Water, soap and water, or oil may be employed. To administer an enema, one of the horse's fore feet should be held up, while the operator introduces the nozzle, smeared with oil or lard, very gently and steadily into the rectum, then injects the water. The quantity injected will depend on the nature of the malady and the size of the horse; from 2 or 3 quarts to several gallons may be used.

Epizootic and contagious diseases.

The epizootic diseases affecting the horse are not numerous, and may generally be considered as specific and infectious or contagious in their nature, circumstances of a favourable kind leading to their extension by propagation of the agent upon which their existence depends. This agent, in most of the maladies, has been proved to be a micro-organism, and there can be little doubt that it is so for all of them.

Glanders: farcy.

Glanders (*q.v.*), or *equinia*, one of the most serious maladies of the horse, ass and mule, prevails in nearly every part of the world. It is a contagious, inoculable disease, caused by the *bacillus mallei*, and specially affects the lungs, respiratory mucous membrane and the lymphatic system. The virulent agent of glanders appears to establish itself most easily among horses kept in foul, crowded, badly ventilated stables, or among such as are over-worked, badly fed or debilitated. Glanders, however, is always due to contagion, and in natural infection it may be contracted by inhalation of the bacilli, by ingestion of the virus with food or water, or by inoculation of a wound of the skin or a mucous membrane. Carnivorous animals—lions, tigers, dogs and cats—have become infected through eating the flesh of glandered horses; and men attending diseased horses are liable to be infected, especially if they have sores on the exposed parts of their bodies. Though in man infection through wounds is the readiest way of receiving the disease, the bacillus may also obtain access through the digestive organs, the lungs and mucous membranes of the eyes, nose and lips.

In descriptions of the equine disease sometimes a distinction is made between glanders with nasal ulcers and other symptoms of respiratory disease, and glanders of the skin, or *farcy*, but there is no essential difference between them. Glanders and farcy are due to the same causal organism, and both may be acute or chronic. Acute glanders is always rapidly fatal, and chronic glanders may become acute or it may terminate by apparent recovery.

The symptoms of acute glanders are initial fever with its accompaniments, thirst, loss of appetite, hurried pulse and respiration, emaciation, languor and disinclination to move. Sometimes the legs or joints are swollen and the horse is stiff; but the characteristic symptoms are a greyish-yellow viscid discharge from one or both nostrils, a peculiar enlarged and nodulated condition of one or both submaxillary lymphatic glands, which though they may be painful very rarely suppurate, and on the nasal membrane small yellow pimples or pustules, running into deep, ragged-edged ulcers, and sometimes on the septum large patches of deep ulceration. The discharge from the nose adheres to the nostrils and upper lip, and the infiltrated nasal lining, impeding breathing, causes snuffling and frequent snorting. The lymphatic vessels of the face are often involved and appear as painful subcutaneous "cords" passing across the cheek. These vessels sometimes present nodules which break and discharge a glutinous pus. As the disease progresses, the ulcers on the nose increase in number, enlarge or become confluent, extend in depth and sometimes completely perforate the septum. The nasal discharge, now more abundant and tenacious, is streaked with blood and offensive, the respiration is noisy or roaring, and there may be coughing with bleeding from the nose. Painful oedematous swellings appear on the muzzle, throat, between the fore legs, at the flank or on the limbs, and "farcy buds" may form on some of the swollen parts. Symptoms of congestion of the lungs, or pneumonia and pleurisy, with extreme prostration, diarrhoea and gasping respiration, precede death, which is due to asphyxia or to exhaustion.

Chronic or latent glanders generally presents few definite symptoms. The suspected animal may have a discharge from the nose, or an enlarged submaxillary gland, or both, and small unbroken nodules may exist on the septum, but usually there is no visible ulceration of the nasal membrane. In some horses suspicion of glanders may be excited by lameness and sudden swelling of a joint, by profuse staling, sluggishness, loss of condition and general unthriftiness, or by refusal of food, rise of temperature, swollen fetlocks, with dry hacking cough, nasal catarrh and other symptoms of a common cold. With rest in the stable the horse improves, but a one-sided nasal discharge continues, the submaxillary gland enlarges, and, after an interval, ulcers appear in the nose or "farcy buds" form on a swollen leg. In occult glanders the horse may appear to be in good health and be able to perform ordinary work. In these cases the existence of glanders can only be discovered by resorting to inoculation or the mallein test.

In cutaneous glanders, or farcy, symptoms occur on the skin of a limb, usually a hind one, or on the body, where the lymphatics become inflamed and ulcerated. The limb is much swollen, and the animal moves with pain and difficulty. The lymphatic vessels appear as prominent lines or "cords," hard and painful on manipulation, and along their course arise nodular swellings—the so-called "farcy buds." These small abscesses break and discharge a yellow, glutinous, blood-stained pus, leaving sores which heal very slowly. There is a rise of temperature with other symptoms of constitutional disturbance.

Medical treatment of glanders or farcy should not be attempted. The disease is dealt with under the Contagious Diseases (Animals) Acts. Horses which present suspicious symptoms, or those which have been in contact, or have stood in the same stable with glandered horses, should be isolated and tested with mallein. Animals which are found affected should immediately be destroyed, and their harness, clothing and the utensils employed with them thoroughly cleansed, while the stalls, horse-boxes and places which the horses have frequented should be disinfected. Forage left by glandered horses should be burned or fed to cattle.

Mallein, which is almost indispensable in the diagnosis of latent glanders, was discovered in 1888 by Helman, a Russian military veterinary surgeon, and the first complete demonstration of its diagnostic value was given in 1891 by Kalning, also of Russia. Mallein, prepared for the diagnosis of glanders in animals, is the sterilized and filtered liquid-culture of glanders bacilli. It therefore does not contain even dead bacilli, but it has in solution certain substances which are added to the liquid by the bacilli during their growth (McFadyean). Employed under proper precautions and subcutaneously injected in a glandered horse, mallein causes a marked rise of temperature and an extensive painful swelling at the seat of injection.

Epizootic lymphangitis.

Epizootic lymphangitis is a contagious eruptive disease of the horse caused by the *cryptococcus farciminosus*, and characterized by nodular swellings and suppuration of the superficial lymphatics. Infection can be transmitted by mediate or immediate contagion. The eruption usually appears on the limbs, but it may occur on the body or on the head and neck. The symptoms closely resemble those of cutaneous glanders or farcy, from which this disease may readily be distinguished by microscopic examination of the pus discharged from the sores, or by testing the horse with mallein. Glanders and epizootic lymphangitis may coexist in the same animal. It is a scheduled disease, and treatment should not be attempted.

Strangles.

Strangles is a specific contagious eruptive fever peculiar to horses, and is more especially incidental to young animals. It is particularly characterized by the formation of abscesses in the lymphatic glands, chiefly those between the branches of the lower jaw (submaxillary). Various causes have been ascribed for its production, such as change of young horses from field to stable, from grass to dry feeding, from idleness to hard work, irritation of teething, and change of locality and climate. But the sole cause is infection by the strangles *streptococcus*. Languor and feverishness, diminution of appetite, cough, redness of the nasal membrane, with discharge from the eyes and nose, and thirst are among the earliest symptoms. Then there is difficulty in swallowing, coincident with the development of swelling between the branches of the lower jaw, which often causes the water in drinking to be returned through the nose and the masticated food to be dropped from the mouth. The swelling is hot and tender, diffused, and uniformly rounded and smooth; at first it is hard, with soft, doughy margins; but later it becomes soft in the centre, where an abscess is forming, and soon "points" and bursts, giving exit to a quantity of pus. Relief is now experienced by the animal; the symptoms subside, and recovery takes place. In some cases the swelling is so great or occurs so close to the larynx that the breathing is interfered with, and even rendered so difficult that suffocation is threatened. In other cases the disease assumes an irregular form, and the swelling, instead of softening in the centre, remains hard for an indefinite time, or it may subside and abscesses form in various parts of the body, sometimes in vital organs, as the brain, lungs, liver, kidneys, &c., or in the bronchial or mesenteric glands, where they generally produce serious consequences. Not unfrequently a pustular eruption accompanies the other symptoms. The malady may terminate in ten days or be protracted for months, sometimes terminating fatally from complications, even when the animal is well nursed and kept in a healthy stable.

Good nursing is the chief part of the treatment. The strength should be maintained by soft nutritious food, and the body kept warm and comfortable; the stable or loose-box must have plenty of fresh air and be kept clean. The swelling may be fomented with warm water or poulticed. The poultice may be a little bag containing bran and linseed meal mixed with hot water and applied warm to the tumefaction, being retained there by a square piece of calico, with holes for the ears and eyes, tied down the middle of the face and behind the ears. If the breathing is disturbed and noisy, the animal may be made to inhale steam from hot water in a bucket or from bran mash. If the breathing becomes very difficult, the windpipe must be opened and a tube inserted. Instead of the swelling being poulticed, a little blistering ointment is sometimes rubbed over it, which hastens pointing of the abscess. When the abscess points, it may be lanced, though sometimes it is better to allow it to break spontaneously.

It is important to distinguish strangles from glanders, and the distinction can, with certainty, be ascertained by resorting to the mallein test for glanders, or by microscopical examination of the pus from the strangles abscess.

Influenza.

Under influenza several diseases are sometimes included, and in different invasions it may (and doubtless does) assume varying forms. It is a specific fever of a low or asthenic type, associated with inflammation of the mucous membrane lining the air-passages, and also sometimes with that of other organs. At various times it has prevailed extensively over different parts of the world, more especially during the 18th and 19th centuries. Perhaps one of the most widespread outbreaks recorded was that of 1872, on the American continent. It usually radiates from the district in which it first appears. The symptoms have been enumerated as follows: sudden attack, marked by extreme debility and stupor, with increased body-temperature, quick weak pulse, rigors and cold extremities. The head is pendent, the eyelids swollen and half closed, eyes lustreless, and tears often flowing down the face. There is great disinclination to move; the body sways on the animal attempting to walk; and the limb-joints crack. The appetite is lost and the mouth is hot and dry; the bowels are constipated and the urine scanty and high-coloured; there is nearly always a deep, painful and harassing cough; on auscultation of the chest, crepitation or harsh blowing sounds are audible; and the membrane lining the eyelids and nose assumes either a bright pink colour or a dull leaden hue. A white, yellowish or greenish-coloured discharge flows from the nostrils. In a few days the fever and other symptoms subside, and convalescence rapidly sets in. In unfavourable cases the fever increases, as well as the prostration, the breathing becomes laboured, the cough more painful and deep, and auscultation and percussion indicate that the lungs are seriously involved, with perhaps the pleura or the heart. Clots sometimes form in the latter organ, and quickly bring about a fatal termination. When the lungs do not suffer, the bowels may, and with this complication there are, in addition to the stupor and torpor, tension and tenderness of the abdominal walls when pressed upon, manifestations of colic, great thirst, a coated tongue, yellowness of the membranes of nose and eyes, high-coloured urine, constipation, and dry faeces covered with mucus. Sometimes rheumatic swelling and tenderness takes place in the muscles and joints of the limbs, which may persist for a long time, often shifting from leg to leg, and involving the sheaths of tendons. At other times acute inflammation of the eyes supervenes, or even paralysis.

In this disease good nursing is the chief factor in the treatment. Comfortable, clean and airy stables or loose-boxes should be provided, and the warmth of the body and limbs maintained. Cold and damp, foul air and uncleanliness, are as inimical to health and as antagonistic to recovery as in the case of mankind. In influenza it has been generally found that the less medicine the sick animal receives the more likely it is to recover. Nevertheless, it may be necessary to adopt such medical measures as the following. For constipation administer enemata of warm water or give a dose of linseed oil or salines. For fever give quinine or mild febrifuge diuretics (as liquor of acetate of ammonia or spirit of nitrous ether), and, if there is cough or nervous excitement, anodynes (such as extract of belladonna). When the fever subsides and the prostration is great, it may be necessary to give stimulants (carbonate of ammonia, nitrous ether, aromatic ammonia) and tonics, both vegetable (gentian, quassia, calumba) and mineral (iron, copper, arsenic). Some veterinary surgeons administer large and frequent doses of quinine from the onset of the disease, and, it is asserted, with excellent effect. If the abdominal organs are chiefly involved, demulcents may supplement the above (linseed boiled to a jelly, to which salt may be added, is the most convenient and best), and drugs to allay pain (as opium and chloral hydrate). Olive oil is a safe laxative in such cases. When nervous symptoms are manifested, it may be necessary to apply wet cloths and vinegar to the head and neck; even blisters to the neck have been recommended. Bromide of potassium has been beneficially employed. To combat inflammation of the throat, chest or abdomen, counter-irritants may be resorted to, such as mustard, soap liniment or the ordinary white liniment composed of oil of turpentine, solution of ammonia and olive oil. The food should be soft mashes and gruel of oatmeal, with carrots and green food, and small and frequent quantities of scalded oats in addition when convalescence has been established.

Dourine, or covering disease.

Dourine, *maladie du coït*, or covering disease of horses, is a contagious malady caused by the *Trypenosoma equiperdum*, and characterized by specific lesions of the male and female genital organs, the lymphatic and central nervous systems. It occurs in Arabia and continental Europe, and has recently been carried from France to the United States of America (Montana, Nebraska, the Dakotas, Iowa and Illinois) and to Canada. In some of its features it resembles human syphilis, and it is propagated in the same manner. From one to ten days after coitus, or in the stallion not unfrequently after some weeks, there is irritation, swelling and a livid redness of the external organs of generation (in stallions the penis may shrink), followed by unhealthy ulcers, which appear in successive crops, often at considerable intervals. In mares these are near the clitoris, which is frequently erected, and the animals rub and switch the tail about, betraying uneasiness. In horses the eruption is on the penis and sheath. In the milder forms there is little constitutional disturbance, and the patients may recover in a period varying from two weeks to two months. In the severe forms the local swelling increases by intermittent steps. In the mare the vulva is the seat of a deep violet congestion and extensive ulceration; pustules appear on the perinaeum, tail and between the thighs; the lips of the vulva are parted, exposing the irregular, nodular, puckered, ulcerated and lardaceous-looking mucous membrane. If the mare happen to be pregnant, abortion occurs. In all cases emaciation sets in; lameness of one or more limbs occurs; great debility is manifested, and this runs on to paralysis, when death ensues after a miserable existence of from four or five months to two years. In horses swelling of the sheath may be the only symptom for a long time, even for a year. Then there may follow dark patches of extravasated blood on or swellings of the penis; the testicles may become tumefied; a dropsical engorgement extends forward beneath the abdomen and chest; the lymphatic glands in different parts of the body may be enlarged; pustules and ulcers appear on the skin; there is a discharge from the eyes and nose; emaciation becomes extreme; a weak and vacillating movement of the posterior limbs gradually increases, as in the mare, to paralysis; and after from three months to three years death puts an end to loathsomeness and great suffering. This malady appears to be spread only by the act of coition. The indications for its suppression and extinction are therefore obvious. They are (1) to prevent diseased animals coming into actual contact, especially *per coitum*, with healthy ones; (2) to destroy the infected; and (3) as an additional precautionary measure, to thoroughly cleanse and disinfect the stables, clothing, utensils and implements used for the sick horse. Various medicines have been tried in the treatment of slowly developing cases of dourine, and the most successful remedy is atoxyl—a preparation of arsenic.

Horse-pox.

Horse-pox, which is somewhat rare, is almost, if not quite, identical with cow-pox, being undistinguishable when inoculated on men and cattle. It most frequently attacks the limbs, though it may appear on the face and other parts of the body. There is usually slight fever; then swelling, heat and tenderness are manifest in the part which is to be the seat of eruption, usually the heels; firm nodules form, increasing to one-third or one-half an inch in diameter; the hair becomes erect; and the skin, if light-coloured, changes to an intense red. On the ninth to the twelfth day a limpid fluid oozes from the surface and mats the hairs together in yellowish scabs; when one of these is removed, there is seen a red, raw depression, whereon the scab was fixed. In three or four days the crusts fall off, and the sores heal spontaneously. No medical treatment is needed, cleanliness being requisite to prevent the pocks becoming sloughs. If the inflammation runs high, a weak solution of carbolic acid may be employed.

Diseases of Cattle.

The diseases of the bovine species are not so numerous as those of the horse, and the more acute contagious maladies are dealt with under RINDERPEST and other articles already mentioned.

Tuberculosis.

Tuberculosis is a most formidable and widespread disease of cattle, and it is assuming greater proportions every year, in consequence of the absence of legislative measures for its suppression. It is a specific disease, contracted through cohabitation, and caused by the *Bacillus tuberculosis*, discovered by Koch in 1882. Infection takes place by inhalation of the bacilli or their spores, derived from the dried expectorate or other discharges of tuberculous animals; by ingestion of the bacilli carried in food, milk or water, or by inoculation of a wound of the skin or of a mucous or serous membrane. Occasionally the disease is transmitted by an infected female to the foetus *in utero*. Its infective properties and communicability to other species render it a serious danger to mankind through the consumption of the milk or flesh of tuberculous cows. The organs chiefly involved are the lymphatic glands, lungs, liver, intestine and the serous membranes—the characteristic tubercles or "grapes" varying in size from a millet seed to immense masses weighing several pounds. The large diffused nodular growths are found principally in the chest and abdomen attached to the membranes lining these cavities.

The symptoms somewhat resemble those of contagious pleuro-pneumonia (*q.v.*) in its chronic form, though tubercles, sometimes in large numbers, are often found after death in the bodies of cattle which exhibited no sign of illness during life and which when killed were in excellent condition. When the lungs are extensively involved there are signs of constitutional disturbance, irregular appetite, fever, difficult breathing, dry cough, diarrhoea, wasting and debility, with enlarged throat glands, and, in milch cows, variation in the quantity of milk. Auscultation of the chest discovers dullness or absence of respiratory sounds over the affected parts of the lungs. If the animal is not killed it becomes more and more emaciated from anaemia, respiratory difficulty, defective nutrition and profuse diarrhoea. Tuberculosis of the mammary glands usually begins as a slowly developing, painless, nodular induration of one quarter of the udder. The milk at first may be normal in quantity and quality, but later it becomes thin or watery and assumes a blue tint. Cattle with tubercular lesions unaltered by retrogressive changes may appear to be in an ordinary state of health, and in such animals the existence of the disease can only be discovered by resorting to the tuberculin test. Tuberculin, as prepared for the purpose of diagnosis, is a sterilized culture of tubercle bacilli, and when employed with proper precautions it causes a marked rise of temperature in affected cattle, but in non-tuberculous animals it has no appreciable action. Medical treatment is of little if any avail. Preventive measures are of the utmost importance. Animals proved free of tuberculous taint should alone be bred from, and those found diseased should be at once completely segregated or slaughtered. Before being used as food the flesh should be well cooked, and the milk from tuberculous cows should be boiled or heated to a temperature of 155° F.

Black-quarter.

Black-quarter, or black-leg, is a specific, inoculable disease which occurs in young stock from a few months to two years old, in various parts of the country, and generally in low-lying damp situations. It was classed with anthrax until 1879, when its nature was investigated by Arloing, Cornevin and Thomas, who termed it symptomatic anthrax (*Charbon symptomatique*)—a misleading name for a disease which is perfectly distinct from anthrax. This disease is caused by the *Bacillus Chauvaei*, and natural infection takes place through small wounds of the legs and feet or other parts. At first it is a local disease affecting usually a hind quarter, though sometimes the characteristic swelling forms on the shoulder, neck, breast, loins or flank. The chief symptoms are sudden loss of appetite, accelerated pulse and respiration, high temperature, debility, lameness or stiffness, followed by the formation of a small, painful swelling which rapidly increases in extent, becomes emphysematous, and in the centre cold and painless. Incision of the tumour gives escape to a red, frothy, sour-smelling fluid. This disease runs its course very rapidly and nearly always terminates fatally, even when medical treatment is promptly applied. Infection can be prevented by resorting to protective inoculation by one of the methods introduced by Arloing, Kitt and others. The natural virus-muscle from the lesion, dried, reduced to powder and attenuated by heat at a high temperature, and a pure culture of the causal organism, are employed as vaccines. The vaccine is introduced subcutaneously at the tip of the tail or behind the shoulder. Immunity lasts for about twelve months.

Abortion.

Abortion, or the expulsion of the foetus before viability, is a contagious disease in cows. In a herd a case of abortion or premature birth from accident or injury sometimes occurs, but when a number of pregnant females abort the cause is due to specific infection of the womb. The microbe of abortion induces catarrh of the uterus and the discharge contains the infective agent. The virus may be transmitted by the bull, by litter, attendants, utensils, or anything which has been contaminated by the discharge from an infected cow. Whenever abortion occurs in a shed the cow should be at once isolated from the others, if they are pregnant, and cleansing and disinfection immediately resorted to, or preferably the pregnant cows should be quickly removed out of the shed and every care should be taken to keep them away from the affected cow and its discharges; the litter and the aborted foetus being burned or otherwise completely destroyed, and the cowshed thoroughly disinfected with quicklime. To prevent further infection, the hinder parts of the in-calf cows should be washed and disinfected from time to time.

Contagious mammitis.

Contagious mammitis is a common disease in milch cows. It has been investigated by Nocard and Mollereau, and proved to be caused by a streptococcus which is transmitted from one cow to another by the hands of the milkers. The microbe gains access to the quarter by the teat and induces catarrhal inflammation of the milk ducts and sinuses, with induration of the gland tissue. This disease develops slowly, and except in cases complicated by suppuration, there is little or no constitutional disturbance, though sometimes the affected cows lose condition. The milk at first preserves its normal appearance, but is less in quantity; it curdles quickly, is acid, and when mixed with good milk produces clotting; then it becomes thin and watery, and finally viscous, yellowish and foetid. At the base of the teat of the affected quarter induration begins and gradually extends upwards, and if not checked the disease passes from one quarter to another until the whole udder is attacked. Prevention can be secured by washing and disinfecting the udder and teats and the milkers' hands before and after milking. Diseased cows should be isolated, their milk destroyed or boiled and fed to pigs, and after each milking the teats should be injected with a warm solution of boracic acid or sodium fluoride. Infected cowsheds should be thoroughly cleansed and disinfected.

Milk fever.

Parturient paralysis, or mammary toxaemia, also known as milk fever, though neither a febrile nor a contagious malady, was until quite recently a very fatal affection of dairy cows. It is caused by a nerve poison which is formed in the udder soon after parturition; and, according to Schmidt, the toxin enters the circulation and affects especially, the central nervous system and the muscles, and in a less degree all the organs of the body. This disease usually attacks good milking cows within a few days of an easy labour and seldom before the third or fourth parturition. In twenty-four to forty-eight hours after calving the cow becomes excited and restless, strikes at the abdomen with the hind feet, whisks the tail, lows, grinds the teeth, staggers, falls, makes ineffectual attempts to rise, and eventually lies comatose, stretched on her side with the head extended or inclined towards the shoulder. The eyes are dull, injected and insensitive; general sensation, voluntary motion and the power of swallowing are lost. Secretion of milk fails, digestion is suspended, fermentation of the contents of the paunch sets in, with tympany, constipation and retention of urine. The pulse becomes feeble or imperceptible. Respiration is slow, sometimes stertorous or groaning; and the temperature is low or subnormal. If not treated the animal dies in two or three days from prolonged coma or heart failure.

The curative treatment of this disease continued very unsatisfactory until 1897, when Schmidt, a veterinarian of Kolding, Denmark, introduced the method of injecting the teats with a solution of potassium iodide in conjunction with insufflation of atmospheric air. The immediate results of this line of treatment were astonishing. Rapid recovery became the rule, and in most cases the comatose condition disappeared in less than six hours, and the average mortality (40 to 60%) was reduced to 6%. Afterwards chinosol and other antiseptics were substituted for the potassium salt, and later pure oxygen or atmospheric air alone was injected into the udder, with the result of increasing the recoveries to 99%.

Cowpox.

Cowpox is a contagious disease of much less frequent occurrence now than formerly, probably owing to improved hygienic management. In many localities the disease appears in all heifers which have recently calved on certain farms. There is usually a slight premonitory fever, which is generally overlooked; this is succeeded by some diminution in the quantity of the milk, with some increased coagulability, and by the appearance of the eruption or "pox" on the udder and teats. In well-observed cases the udder is hot and tender on manipulation for a day or two previous to the development of small pale-red nodules about the size of peas; these increase in dimensions to from three-fourths to one inch in diameter by the eighth or tenth day, when their contents have become fluid and they present a depressed centre. This fluid, at first clear and limpid, becomes yellowish white as it changes to pus, and soon dries up, leaving a hard, button-shaped black crust, which gradually becomes detached. On the teats, owing to the handling of the milker or to the cow lying on the hard ground or on straw. the vesicles are early ruptured and sores are formed, which often prove troublesome and may cause inflammation of the udder.

Actinomycosis.

Actinomycosis, though affecting man, horses, pigs and other creatures, is far more common in the bovine species. The fungus (*Actinomyces*) may be found in characteristic nodules in various parts of the body, but it usually invades the bones of the jaws, upper and lower, or the soft parts in the neighbourhood of these, as the tongue, cheeks, face, throat and glands in its vicinity. About the head the disease appears to commence with slight sores on the gums or mucous membrane of the mouth or with ulcers alongside decaying teeth, and these extend slowly into the tissues. If the jaw is affected, a large rounded tumour grows from it, the dense outer bone becoming absorbed before the increasing soft growth within. Soon the whole becomes ulcerated and purulent discharges take place, in which are found the minute, hard, yellow granules which contain the fungus. When the tongue is affected, it becomes enlarged and rigid; hence the designation of "wooden tongue" given to it by the Germans. In the course of time the surface of the organ becomes ulcerated, and yellowish masses or nodules may be seen on the surface. Sometimes the entire face is involved, the lips and nostrils becoming swollen, hard and immovable, often rendering respiration difficult. Around the throat there are rounded dense swellings, implicating the glands. When the disease is well-defined and of slight extent, the parts involved may be removed by the knife, wholly or partially. If the latter only, then the remaining affected tissues should be dressed with tincture of iodine or iodized carbolic acid. Chromic acid has also been found useful. A course of potassium iodide internally is sometimes curative and always beneficial.

Diseases of Sheep.

The contagious diseases of the sheep (other than those of foot-and-mouth disease, anthrax, rinderpest, black-quarter) are comparatively few.

Sheep-pox.

The formidable disorder of sheep-pox is confined chiefly to the continent of Europe. It is extremely contagious and fatal, and in these and some other characteristics resembles human smallpox. From three to twelve days after being exposed to infection the sheep appears dull and listless, and eats little, if anything; the temperature rises; there are frequent tremblings; tears flow from the eyes; and there is a nasal discharge. Red patches appear inside the limbs and under the abdomen; and on them, as well as on other parts where the skin is thin, dark red spots show themselves, which soon become papules, with a deep hard base. These are generally conical, and the apex quickly becomes white from the formation of pus. This eruption is characteristic and unmistakable; and the vesicles or pustules may remain isolated (discrete pox) or coalesce into large patches (confluent pox). The latter form of the disease is serious. In bad cases the eruption may develop on the eyes and in the respiratory and digestive passages. The course of the disease lasts about three weeks or a month, and the eruption passes through the same stages as that of cowpox. The mortality may extend from 10% in mild outbreaks to 90 or 95% in very virulent ones. Diseased animals should be sheltered, and fed on nourishing food, especially gruels of oatmeal flour or linseed; acidulated water may be allowed. If there is sloughing of the skin or extensive sores, oxide of zinc ointment should be applied. But treatment should not be adopted unless there is general infection over a wide extent of country. All diseased animals should be destroyed, as well as those which have been in contact with them, and thorough disinfection resorted to.

Foot-rot.

Foot-rot is a disease of the claws of sheep. It occurs most frequently in badly drained, low-lying, marshy land, and is caused by the *Bacillus necrophorus*. Infection appears to be transmitted by cohabitation, litter, manure and infected pastures. The disease begins at the sole or between the claws and gradually extends, causing changes in the bones and tendons, with suppuration, degeneration of horn and sloughing. The symptoms are lameness, foot or feet hot, tender and swollen at the coronet; the horn soft and rotten. Affected sheep when feeding may rest on the knees, or, if fore and hind feet are involved, they lie down constantly. The claws must be cleansed, loose and underrun horn removed, abscesses opened, and the foot thoroughly disinfected and protected from further infection by an appropriate bandage. Some cases require daily dressing, and all affected feet should receive frequent attention. When large numbers of sheep are attacked they should be slowly driven through a foot-bath containing an antiseptic solution. Pastures on which foot-rot has been contracted should be avoided, the feet examined every month or oftener, and where necessary pared and dressed with pine tar.

Diseases of the Pig.

The pig may become affected with anthrax, foot-and-mouth disease and tuberculosis, and it also has its own particular variola. But the contagious diseases which cause enormous destruction of pigs are swine fever and swine erysipelas in Great Britain, hog cholera and swine plague in the United States, and swine erysipelas and swine plague in France, Germany and other countries of the European continent.

Swine fever.

Swine fever is an exceedingly infectious disease, caused by a bacillus, and associated with ulceration of the intestine, enlargement of the lymphatic glands, and limited disease of other organs. It is spread with great facility by mediate as well as immediate contagion; the virus can be carried by apparently healthy pigs from an infected piggery, by litter, manure, food, attendants, dogs, cats, vermin, crates, troughs or anything which has been soiled by the discharges from a diseased pig. It is generally very rapid in its course, death ensuing in a very few days, and when the animal survives, recovery is protracted. After exposure to infection the animal exhibits signs of illness by dullness, weakness, shiverings, burying itself in the litter, disinclination to move, staggering gait, great thirst, hot dry snout, loss of appetite, and increased pulse, respiration and temperature (105° F.). Red and violet patches appear on the skin; there is a hacking cough; nausea is followed by vomiting; diarrhoea ensues; the hind legs become paralysed; stupor sets in, and the animal perishes. Treatment should not be attempted. Notification of the existence of swine fever is compulsory, and outbreaks are dealt with by the Board of Agriculture and Fisheries. To suppress the disease kill all affected pigs and those which have been in contact with them; burn or deeply bury the carcasses and litter, and cover with quicklime. Disinfect everything that may have been contaminated with the virus.

Diseases of the Dog.

Distemper.

The contagious diseases of the dog are likewise very few, but the one which attracts most attention is common and generally serious. This is what is popularly known as distemper. It is peculiar to the canine species, for there is no evidence that it can be conveyed to other animals, though the different families of Carnivora appear each to be liable to a similar disease. Distemper is a specific fever which most frequently attacks young dogs, its effects being primarily developed in the respiratory passages, though the brain, spinal chord and abdominal organs may subsequently be involved. Highly bred and pet dogs suffer more severely than the commoner and hardier kinds. It is a most infectious disease, and there is much evidence to prove that it owes its existence and prevalence solely to its virulence. One attack confers immunity from another. The symptoms are rigors, sneezing, dullness, loss of appetite, desire for warmth, and increased temperature, respiration and pulse. The eyes are red, and the nose, at first dry and harsh, becomes smeared with the discharge which soons begins to flow from the nostrils. Suppuration also begins at the eyes; vision is more or less impaired by the mucus and pus, and often the cornea becomes ulcerated, and even perforated. There is a cough, which in some cases is so violent as to induce vomiting. Debility rapidly ensues, and emaciation is soon apparent; diarrhoea in the majority of cases sets in; the body emits an unpleasant odour; ulceration of the mouth is noticed; the nostrils become obstructed by the discharge from them; convulsions generally come on; signs of bronchitis, pneumonia, jaundice or other complications manifest themselves; and in some instances there is a pustular or vesicular eruption on the skin. In fatal cases the animal dies in a state of marasmus. Many which recover are affected with chorea for a long time afterwards. Here, again, good nursing is all-important. Comfort and cleanliness, with plenty of fresh air, must be ensured. Debility being the most serious feature of the disease, the strength should be maintained or restored until the fever has run its course. Light broth, beef tea, or bread and milk, or these alternately, may be allowed as diet. Preparations of quinine, given from the commencement of the attack in a little wine, such as sherry, have proved very beneficial. Often a mild laxative is required. Complications should be treated as they arise. The disease being extremely infectious, precautions should be adopted with regard to other dogs. Protective vaccines and antidistemper sera have been introduced by Lignieres, Copeman, Phisalix and others, but their action is uncertain.

The formidable affliction known as hydrophobia (*q.v.*) or rabies is treated of under that name.

Principal Parasites of Domestic Animals.

In horse.

Perhaps the commonest worm infesting the horse is *Ascaris equorum*, or common lumbricoid. The males are from 6 to 8 in. long; females 7 to 17 in. They are found in almost every part of the intestine. When present in considerable numbers they produce slight intermittent colicky pains, an unthrifty condition of the skin, with staring coat. Although the horse feeds well, it does not improve in condition, but is "tucked up" and anaemic. Among the principal remedies is a mixture of tartar emetic, turpentine and linseed oil. Santonin, ferrous sulphate, common salt and arsenic are also employed. *Sclerostomum equinum* or palisade worm is a moderate-sized nematode, having a straight body with a somewhat globular head—males ¾ to 1¼ in., females 1 in. to 2 in. long. This worm is found in the intestines, especially the double colon and caecum. The embryos are developed in the eggs after their expulsion from the host, and are lodged in moist mud, where, according to Cobbold, they change their first skin in about three weeks, after which they probably enter the body of an intermediate bearer, whence they are conveyed in food or water to the digestive canal of the horse, the ultimate host. They then penetrate the mucous membrane and enter the blood vessels, where they are sexually differentiated and give rise to aneurism. After a time they resume their wanderings and reach the large intestine, where they form small submucous cysts and rapidly acquire sexual maturity. They are most dangerous when migrating from one organ to another. They are found in the anterior mesenteric artery, but they also produce aneurism of the coeliac axis and other abdominal blood vessels, including the aorta. These parasitic aneurisms are a frequent cause of fatal colic in young horses.

Sclerostomum tetracanthum, or four-spined sclerostome, is about the same size as the palisade worm, and like it is found in the colon, caecum and small intestine. It finds its way to the bowel in water or green fodder swallowed by the horse. It is a true blood-sucker, and its development is very similar to that of the *S. equinum*, except that it directly encysts itself in the mucous membrane and does not enter the blood vessels. The symptoms of its presence are emaciation, colicky pains, harsh unthrifty coat, flabby muscles, flatulence, foetid diarrhoea, anaemia, great weakness and, sometimes, haemorrhagic enteritis. Treatment of equine sclerostomiasis frequently fails, as the remedies cannot reach the encysted parasites. As vermicides, thymol, areca, ferrous sulphate, tartar emetic, arsenic, sodium chloride, oil of turpentine, lysol, creolin and carbolic acid have been found useful.

Oxyuris curvula, or pin worm, is a common parasite of the large intestine. The anterior part of the body is curved and the tail sharply pointed. The male is seldom seen. The female measures 1 to 1½ in. in length. It is found in the caecum, colon and rectum, and it causes pruritus of the anus, from which it may be found projecting. This parasite is best treated by means of a cathartic, followed by a course of mineral tonics, and repeated rectal injections of sodium chloride solution, infusion of quassia or diluted creolin.

The cestodes or taeniae of the horse are insignificant in size and they produce no special symptoms. Three species—*Anoplocephala perfoliata* (26–28 mm. long), *A. plicata* (1½–8 cm.) and *A. mamillana* (1–3 cm.)—have been described. The first is found in the small intestine and caecum, rarely in the colon; the second occurs in the small intestine and stomach; the third in the small intestine. Generally a horse may be proved to be infested with tape-worm by finding some of the ripe segments or proglottides in the faeces. The best remedy is male fern extract with turpentine and linseed oil.

Gastrophilus equi, or the common bot-fly, is classed with the parasites on account of its larval form living as a parasite. The bot-fly deposits its eggs on the fore-arm, knee and shank of the horse at pasture. In twenty-four hours the ova are hatched and the embryo, crawling on the skin, causes itching, which induces the horse to nibble or lick the part, and in this way the embryo is carried by the tongue to the mouth and swallowed. In the stomach the embryo attaches itself to the mucous membrane, moults three times, increases in size and changes from a blood-red to a yellowish-brown colour. The bot remains in the stomach till the following spring, when it detaches itself, passes into the food and is discharged with the faeces. When very numerous, bots may cause symptoms of indigestion, though frequently their presence in the stomach is not indicated by any sign of ill-health. They are difficult to dislodge or kill. Green food, iodine, naphthalin, hydrochloric acid and vegetable bitters have been recommended; but the most effective remedy is a dose of carbon bisulphide given in a gelatin capsule, repeated in twelve hours, and followed twelve hours later by an aloetic ball.

In cattle and sheep.

Of the parasites which infest cattle and sheep mention will only be made of *Distomum hepaticum*, or common fluke, which causes liver-rot or distomiasis, a very fatal disease of lambs and sheep under two years old. It occurs most frequently after a wet season on low-lying, marshy or undrained land, but it may be carried to other pastures by sheep which have been driven through a fluke-infested country, and sheep allowed to graze along ditches by the roadside may contract the parasite. For a full description of its anatomy and development see Trematodes. Preventive treatment comprises the destruction of flukes and snails; avoidance of low-lying, wet pastures draining infested land, and top-dressing with salt, gas-lime, lime water or soot; supplying sheep with pure drinking water; placing rock-salt in the fields, and providing extra food and a tonic lick consisting of salt, aniseed, ferrous sulphate, linseed and peas-meal.

Husk, hoose or verminous bronchitis of calves is caused by *Strongylus micrurus*, or pointed-tailed strongyle, a thread-worm 1 to 3 in. long, and *S. pulmonaris*, a similar but smaller nematode; and the corresponding disease of sheep is due to *S. filaria* and *S. rufescens*. The male *S. filaria* is 1 to 2 in., and the female 2 to 4 in. long. They are white in colour and of the thickness of ordinary sewing cotton. The *S. rufescens* is thinner and shorter than *S. filaria* and its colour is brownish red. The development of these strongyles is not accurately known. When expelled and deposited in water or moist earth, the embryos may live for many months. Hoose occurs in spring and continues until autumn, when it may be most severe. In sheep the symptoms are coughing, at first strong, with long intervals, then weak and frequent, leaving the sheep distressed and wheezing; discharge from the nose, salivation, occasional retching with expulsion of parasites in frothy mucus, advancing emaciation, anaemia and weakness. In calves the symptoms are similar but less acute. Various methods of cure have been tried. Remedies given by the mouth are seldom satisfactory. Good results have followed fumigations with chlorine, burning sulphur, tar, &c., and intra-tracheal injections of chloroform, iodine and ether, oil of turpentine, carbolic acid, and opium tincture, or chloroform, ether, creosote and olive oil. The system should be supported with as much good nourishing food as possible.

The principal parasites which infest the alimentary canal of cattle or sheep are strongyles and taeniae. The strongyles of the fourth stomach are *S. contortus*, or twisted wire-worm (male 10 to 20 mm., female 20 to 30 mm. long), *S. convolutus* (female 10 to 13 mm.), *S. cervicornis* (female 10 to 12 mm.), *S. gracilis* (female 3 to 4 mm.), and an unnamed species (female 9 mm. long) discovered by McFadyean in 1896. In the contents of the stomach the *contortus* may easily be recognized, but the other parasites, owing to their small size or situation in the mucous membrane, may be overlooked in an ordinary post-mortem examination. The *contortus*, which is best known, may serve as the type. It lives on the blood which it abstracts from the mucous membrane, and, according to the state of repletion, its body may be red or white. The ova of this worm are discharged in the faeces and spread over the pastures by infected sheep. The ova hatch in a few days, and, according to Ransom, within a fortnight embryos one-thirtieth of an inch long may be found encased in a chitinoid investment, which protects them from the effects of excessive cold, heat or moisture. When the ground is damp and the temperature not too low, the embryos creep up the leaves of grasses and other plants, but when the temperature is below 40° F. they are inactive (Ransom). Sheep feeding on infected pasture gather the young worms and convey them to the fourth stomach, where they attain maturity in two or three weeks. In wet weather the embryos may be washed into ponds and ditches, and cattle and sheep may swallow them when drinking. Strongyles cause loss of appetite, irritation and inflammation of the stomach and bowel, diarrhoea, anaemia, progressive emaciation, and, if not destroyed or expelled, a lingering death from exhaustion. The success or failure of medicinal treatment depends on the degree of infestation. A change of pasture is always desirable, and as remedies a few doses of oil of turpentine in linseed oil, or a solution of lysol or cyllin, and a powder consisting of arsenic, ferrous sulphate, areca, nux vomica and common salt may be tried. The ox may be the bearer of three and the sheep of twelve species of taeniae, and of these the commonest is *Monietia* (*taenia*) *expansa*, which is more frequently found in sheep than in cattle. It is the longest tapeworm, being from 6 to 30 ft. in sheep and from 40 to 100 ft. in cattle. Its maximum breadth is ¾ in.; it is found in the small intestine, and sometimes in sufficient numbers in lambs to obstruct the bowel. Infested animals are constantly spreading the ripe segments over the pastures, from which the ova or embryos are gathered by sheep. The symptoms are inappetence, dry harsh wool, weakness, anaemia and diarrhoea with segments of the worms in the faeces. Various drugs have been prescribed for the expulsion of tapeworms, but the most useful are male fern extract, turpentine, kamala, kousso, aloes and linseed oil. Very young animals should be supported by dry nourishing food and tonics, including salt and ferrous sulphate.

The principal round-worms of the intestine of ruminants are *Ascaris vitulorum*, or calf ascarid, *Strongylus filicollis*, *S. ventricosus*, *Sclerostomum hypostomum*, *Anchylostomum cernuum* and *Trichocephalus affinis*, or common whip-worm, which sometimes causes severe symptoms in sheep. For a full account of the development of *Cysticercus bovis*, or beef measle, the larval form of *Taenia saginata* of the human subject, see Tapeworms. Another bladder-worm, found in the peritoneum of sheep and cattle, is *Cysticercus tenuicollis*, or slender-necked hydatid, the larval form of *Taenia marginata* of the dog. It seldom produces serious lesions. An important hydatid of ruminants in *Coenurus cerebralis*, which produces in sheep, cattle, goats and deer gid or sturdy, a peculiar affection of the central nervous system characterized by congestion, compression of the brain, vertigo, inco-ordination, and other symptoms of cerebro-spinal paralysis. This bladder-worm is the cystic form of *Taenia coenurus* of the dog. It is found in the cranial cavity, resting on the brain, within its substance or at its base, and sometimes in the spinal canal. The symptoms vary with the position and number of the vesicles. In an ordinary case the animal feeds intermittently or not at all; appears unaccountably nervous or very dull, more or less blind and deaf, with glazed eye, dilated pupil, the head twisted or inclined always to one side—that occupied by the cyst—and when moving the sheep constantly tends to turn in the same direction. When the vesicle is deep-seated or within the cerebral lobe, the sheep carries the head low, brings the feet together and turns round and round like a dog preparing to lie down. When the developing cyst exerts pressure at the base of the cerebellum, the sheep repeatedly falls and rolls over. In other cases the chief symptoms may be frequent falling, always on the same side, high trotting action with varying length of step, advancing by rearing and leaping, complete motor paralysis, and in spinal cases posterior paralysis with dragging of the hind limbs. Medicinal treatment is of no avail, but in some cases the hydatid can be removed by trephining the skull. Gid may be prevented by attending to the treatment of dogs infested with the tapeworm.

In the pig.

The helminthes of the pig, although not very detrimental to the animal itself, are nevertheless of great importance as regards the entozoa of man. Allusion must be made to *Trickinella spiralis*, which causes trichinosis. The male is $\frac{1}{18}$th, the female $\frac{1}{8}$th in. long, and the embryos $\frac{1}{100}$th to $\frac{1}{25}$th in. The ova measure $\frac{1}{1000}$th in. in their long diameter; they are hatched within the body of the female worm. When scraps of trichinous flesh or infested rats have been ingested by the pig, the cysts enclosing the larval trichinae are dissolved by the gastric juice in about eighteen hours, and the worms are found free in the intestine. In twenty-four to forty-eight hours later these larvae, having undergone certain transformations, become sexually mature; then they copulate, and after an interval the embryos leave the body of the female worm and immediately begin to penetrate the intestinal wall in order to pass into various voluntary muscles, where they become encysted. About twelve days elapse from the time they begin their wandering. Usually each larva is enveloped in a capsule, but two or even three larvae have been found in one investment. They have been known to live in their capsules for eighteen months to two years.

Cysticercus cellulosae is the larval form of *Taenia solium* of man (see Tapeworms). "Measly pork" is caused by the presence in the flesh of the pig of this entozoon, which is bladder-like in form. It has also been discovered in the dog. Other important parasites of the pig are *Stephanurus dentatus*, or crown-tailed strongyle, *Echinorhynchus gigas*, or thorn-headed worm, *Ascaris suis*, or pig ascarid, and *Strongyloides suis*. For these the most useful remedies are castor oil seeds, given with the food, and oil of turpentine in milk, followed by a dose of Epsom salts.

In the dog.

Of all the domesticated animals the dog is by far the most frequently infested with worms. A very common round-worm is *Ascaris marginata* (3 to 8 in. long), a variety of the ascarid (*A. mystax*) of the cat. It occurs in the intestine or stomach of young dogs. The symptoms are emaciation, drooping belly, irritable skin, irregular appetite, vomiting the worms in mucus, colic and diarrhoea. The treatment comprises the administration of areca or santonin in milk, followed by a dose of purgative medicine. A nematode, *Filaria immitis*, inhabits the heart of the dog, and its larvae may be found in the blood, causing endocarditis, obstruction of the vessels, and fits, which often end in death. *Spiroptera sanguinolenta* may be found in the dog encysted in the wall of the stomach. Other nematodes of the dog are *Anchylostomum trigonocephalum*, which causes frequent bleeding from the nose and pernicious anaemia, and *Trichocephalus depressiusculus*, or whip-worm, which is found in the caecum. The dog harbours eight species of taeniae and five species of *Bothriocephalus*. *Taenia serrata*, about 3 ft. in length, is found in about 10% of

English dogs, most frequently in sporting dogs and those employed on farms, owing to their eating the viscera of rabbits, &c., in which the larval form (*Cysticercus pisiformis*) of this tapeworm dwells. *T. marginata* is the largest cestode of the dog It varies in length from 5 to 8 ft., and is found in the small intestine of 30% of dogs in Great Britain; its cystic form (*C tenuicollis*) occurs in the peritoneum of sheep. *T coenurus* causes gid in sheep as previously stated. It seldom exceeds 3 ft. in length Dogs contract this parasite by eating the heads of sheep infested with the bladder-worm (*Coenurus cerebralis*) *Dipylidium caninum*, *T. cucumerina*, or melon seed tapeworm, is a very common parasite of dogs. It varies in length from 3 to 15 in.; its larval form (*Cryptocystis trichodectis et pulicis*) is found in the abdomen of the dog-flea (*Pulex serraticeps*), the dog-louse (*Trichodectus latus*) and in the flea (*P irritans*) of the human subject. The dog contracts this worm by swallowing fleas or lice containing the cryptocysts. *T echinococcus* may be distinguished from the other tapeworms by its small size. It seldom exceeds ¼ in. in length, and consists of four segments including the head The fourth or terminal proglottis when ripe is larger than all the rest. Its cystic form is *Echinococcus veterinorum*, which causes hydatid disease of the liver, lungs, and other organs of cattle, pigs, sheep, horses, and even man This affection may not be discovered during life. In well-marked cases the liver is much deformed, greatly enlarged, and increased in weight, in the ox the hydatid liver may weigh from 50 to 100 lb or more Another tapeworm (*T. serialis*) sometimes occurs in the small intestine. Its cystic form is found in rodents. *Bothriocephalus latus*, or broad tapeworm, about 25 ft. long and 1 in. broad, is found in the intestine of the dog and sometimes in man. Its occurrence appears to be confined to certain parts of the European continent. Its larval form is met with in pike, turbot, tench, perch, and other fishes. The heart-shaped bothriocephalus (*B. cordatus*) infests the dog and man in Greenland. For the expulsion of tapeworm male fern extract has been found the most effectual agent; areca powder in linseed oil, and a combination of areca, colocynth and jalap, the dose varying according to the age, size and condition of the dog, have also proved beneficial.

Dermatozoa.

The parasites which cause numerous skin affections in the domesticated animals may be arranged in two groups, viz. animal parasites or *Dermatozoa*, and vegetable parasites or *Dermatophytes*. The dermatozoa, or those which produce pruritus, mange, scab, &c., are lice, fleas, ticks, acari or mange mites, and the larvae of certain flies. The lice of the horse are *Haematopinus macrocephalus*, *Trichodectes pilosus* and *T. pubescens*; those of cattle, *H. eurysternus*, or large ox-louse, *H. vituli*, or calf-louse, and *T. scalaris*, or small ox-louse; and sheep may be attacked by *T. sphaerocephalus*, or sheep-louse, and by the louse-like ked or fag (*Melophagus ovinus*) which belongs to the pupiparous diptera. Dogs may be infested with two species of lice, *H. piliferus* and *T. latus*, and the pig with one, *H. urius*.

Ticks belong to the family Ixodidae of the order Acarina. A few species have been proved responsible for the transmission of diseases caused by blood parasites, and this knowledge has greatly increased the importance of ticks in veterinary practice. The best known ticks are *Ixodes ricinus*, or castor-bean tick, and *I. hexagonus*, which are found all over Europe, and which attack dogs, cattle, sheep, deer and horses. *Rhipicephalus annulatus*, or Texan fever-tick of the United States, *Rh. decoloratus*, or blue-tick of South Africa, and *Rh. australis*, or scrub-tick of Australia, transmit the parasite of red water or bovine piroplasmosis. *Rh. appendiculatus* carries the germs of East Coast fever, *Rh. bursa* is the bearer of the parasite of ovine piroplasmosis, and *Rh. evertsi* distributes the germs of equine biliary fever. *Amblyomma hebraeum* conveys the parasite of "heart-water" of cattle and sheep, and *Haemaphysalis leachi* transmits the parasite of canine piroplasmosis. *Hyalomma aegyptium*, or Egyptian tick, *Rh. simus* and *Rh. capensis*, are common in most parts of Africa.

The acari of itch, scab or mange are species of *Sarcoptes*, which burrow in the skin; *Psoroptes*, which puncture the skin and live on the surface sheltered by hairs and scurf; and *Chorioptes*, which live in colonies and simply pierce the epidermis. Representatives of these three genera have been found on the horse, ox and sheep; varieties of the first genus (*Sarcoptes*) cause mange in the dog and pig; and *Chorioptes cynotis* sometimes invades the ears of the dog and cat. These parasites live on the exudation produced by the irritation which they excite. Another acarus (*Demodex folliculorum*) invades the dog's skin and sometimes occurs in other animals. It inhabits the hair follicles and sebaceous glands, and causes a very intractable acariasis—the follicular or demodecic mange of the dog (see MITE). A useful remedy for mange in the horse is a mixture of sulphur, oil of tar and whale oil, applied daily for three days, then washed off and applied again. For the dog, sulphur, olive oil and potassium carbonate, or oil of tar and fish oil, may be tried. Various approved patent dips are employed for scab in sheep. A good remedy for destroying lice may be compounded from Stavesacre powder, soft soap and hot water, applied warm to the skin. Follicular mange is nearly incurable, but recent cases should be treated by daily rubbing with an ointment of 5 parts cyllin and 100 parts of lanoline.

Dermatophytes.

The vegetable parasites, or *Dermatophytes*, which cause *tinea* or ringworm in horses, cattle and dogs, belong to five distinct genera. *Trichophyton*, *Microsporum*, *Eidamella*, *Achorion* and *Oospora*. Ringworm of the horse is either a Trichophytosis produced by one of four species of fungi (*Trichophyton mentagrophytes*, *T. flavum*, *T equinum* and *T. verrucosum*), or a Microsporosis caused by *Microsporum audouini*. Ringworm of cattle is always a Trichophytosis, and due to *T. mentagrophytes*. Four different dermatophytes (*T caninum*, *M audouini* var. *caninum*, *Eidamella spinosa* and *Oospora canina*) affect the dog, producing Trichophytic, Microsporous and Eidamellian ringworm and favus. Little is known of ringworm in sheep and swine. The fungi attack the roots of the hairs, which after a time lose their elasticity and break off, leaving a greyish-yellow, bran-like crust of epidermic products, dried blood and sometimes pus. In favus the crusts are yellow, cupped, almost entirely composed of fungi, and have an odour like that of mouldy cheese. Ringworm may affect any part of the skin, but occurs principally on the head, face, neck, back and hind quarters. It is very contagious, and it may be communicated from one species to another, and from animals to man. The affected parts should be carefully scraped and the crusts destroyed by burning; then the patches should be dressed with iodine tincture, solution of copper sulphate or carbolic acid, or with oil of tar.

BIBLIOGRAPHY.—Modern veterinary literature affords striking evidence of the progress made by the science: excellent text-books, manuals and treatises on every subject belonging to it are numerous, and are published in every European language, while the abundant periodical press, with marked ability and discrimination, records and distributes the ever-increasing knowledge. The substantial advances in veterinary pathology, bacteriology, hygiene, surgery and preventive medicine point to a still greater rate of progress. The schools in every way are better equipped, the education and training—general and technical—of students of veterinary medicine are more comprehensive and thorough, and the appliances for observation and investigation of disease have been greatly improved. Among the numerous modern works in English on the various branches of veterinary science, the following may be mentioned: McFadyean, *Anatomy of the Horse: a Dissection Guide* (London, 1902); Chauveau, *Comparative Anatomy of the Domesticated Animals* (London, 1891); Cuyer, *Artistic Anatomy of Animals* (London, 1905); Share-Jones, *Surgical Anatomy of the Horse* (London, 1907); Jowett, *Blood-Serum Therapy and Preventive Inoculation* (London, 1906); Swithinbank and Newman, *The Bacteriology of Milk* (London, 1905); Fleming, *Animal Plagues* (London, 1882); Merillat, *Animal Dentistry* (London, 1905); Liautard, *Animal Castration* (9th ed., London, 1902); Moussu and Dollar, *Diseases of Cattle, Sheep, Goats and Swine* (London, 1905); Reeks, *Common Colics of the Horse* (London, 1905); Sessions, *Cattle Tuberculosis* (London, 1905); Sewell, *Dogs: their Management* (London, 1897); Hobday, *Surgical Diseases of the Dog and Cat* (London, 1906); Hill, *Management and Diseases of the Dog* (London, 1905); Sewell, *The Dog's Medical Dictionary* (London, 1907); Goubaux and Barrier, *Exterior of the Horse* (London, 1904); Reeks, *Diseases of the Foot of the Horse* (London, 1906); Roberge, *The Foot of the Horse* (London, 1894); Jensen, *Milk Hygiene: a Treatise on Dairy and Milk Inspection, &c.* (London, 1907); Smith, *Manual of Veterinary Hygiene* (London, 1905); Fleming, *Human and Animal Variolae* (London, 1881); Hunting, *The Art of Horse-shoeing* (London, 1899); Fleming, *Horse-shoeing* (London, 1900); Dollar and Wheatley, *Handbook of Horse-shoeing* (London, 1898); Lungwitz, *Text-Book of Horse-shoeing* (London, 1904); Axe, *The Horse: its Treatment in Health and Disease* (9 vols., London, 1905); Hayes, *The Points of the Horse* (London, 1904); Robertson, *Equine Medicine* (London, 1883); Hayes, *Horses on Board Ship* (London, 1902); FitzWygram, *Horses and Stables* (London, 1901); Liautard, *Lameness of Horses* (London, 1888); Walley, *Meat Inspection* (2nd ed., London, 1901); Ostertag, *Handbook of Meat Inspection* (London, 1907); Courtenay, *Practice of Veterinary Medicine and Surgery* (London, 1902); Williams, *Principles and Practice of Veterinary Medicine* (8th ed., London, 1897); J. Law, *Text-book of Veterinary Medicine* (5 vols., New York, 1905); Cadiot and Dollar, *Clinical Veterinary Medicine and Surgery* (London, 1900); Steel, *Diseases of the Ox* (London, 1881); Leblanc, *Diseases of the Mammary Gland* (London, 1904); De Bruin, *Bovine Obstetrics* (London, 1901); Fleming, *Veterinary Obstetrics* (London, 1896); Dalrymple, *Veterinary Obstetrics* (London, 1898); Neumann, *Parasites and Parasitic Diseases of the Domesticated Animals* (London, 1905); F. Smith, *Veterinary Physiology* (3rd ed., London, 1907); Meade Smith, *Physiology of the Domestic Animals* (London, 1889); Kitt, *Comparative General Pathology* (London, 1907); Friedberger and Fröhner, *Veterinary Pathology* (London, 1905); Brown, *Atlas of the Pig* (London, 1900); Rushworth, *Sheep and their Diseases* (London, 1903); Fleming, *Operative Veterinary Surgery* (London, 1903); Williams, *Principles and Practice of Veterinary Surgery* (10th ed., London, 1903); Moller and Dollar, *Practice of Veterinary Surgery* (London, 1904); Fröhner, *General Veterinary Surgery* (New York, 1906); Merillat, *Principles of Veterinary Surgery and Surgical Pathology* (London, 1907); Cadiot and Almy, *Surgical*

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(G. Fl.; J. Mac.)

VETO (Lat. for "I forbid"), generally the right of preventing any act, or its actual prohibition, in public law, the constitutional right of the competent authority, or in republics of the whole people in their primary assembly, to protest against a legislative or administrative act, and to prevent wholly, or for the time being, the validation or execution of the same.

It is generally stated that this right was called into existence in the Roman republic by the *tribunicia potestas*, because by this authority decisions of the senate, and of the consuls and other magistrates, could be declared inoperative. Such a statement must, however, be qualified by reference to the facts that *interdico, interdicimus* were the expressions used, and, in general, that in ancient Rome every holder of a magistracy would check a negotiation set on foot by a colleague, his equal in rank, by his opposition and intervention. This was a consequence of the position that each of the colleagues possessed the whole power of the magistracy, and this right of intervention must have come into existence with the introduction of colleagued authorities, *i.e.* with the commencement of the republic. In the Roman magistracy a twofold power must be distinguished: the positive management of the affairs of the state entrusted to each individual, and the power of restraining the acts of magistrates of equal or inferior rank by his protest. As the *tribuni plebis* possessed this latter negative competence to a great extent, it is customary to attribute to them the origin of the veto.

In the former kingdom of Poland the precedent first set in 1652 was established by law as a constant right, that in the imperial diet a single deputy by his protest "Nie pozwalam," *i.e.* "I do not permit it," could invalidate the decision sanctioned by the other members. The king of France received the right of a suspensory veto at the commencement of the French Revolution, from the National Assembly sitting at Versailles in 1789, with regard to the decrees of the latter, which was only to be valid for the time being against the decisions come to and during the following National Assembly, but during the period of the third session it was to lose its power if the Assembly persisted in its resolution. By this means it was endeavoured to diminish the odium of the measure; but, as is well known, the monarchy was soon afterwards entirely abolished. Similarly the Spanish Constitution of 1812 prescribed that the king might twice refuse his sanction to bills laid twice before him by two sessions of the cortes, but if the third session repeated the same he could no longer exercise the power of veto. The same was the case in the Norwegian Constitution of 1814.

In the French republic the president has no veto strictly so called, but he has a power somewhat resembling it. He can, when a bill has passed both Chambers, by a message to them, refer it back for further deliberation. The king or queen of England has the right to withhold sanction from a bill passed by both houses of parliament. This royal prerogative has not been exercised since 1692 and may now be considered obsolete. The governor of an English colony with a representative legislature has the power of veto against a bill passed by the legislative body of a colony. In this case the bill is finally lost, just as a bill would be which had been rejected by the colonial council, or as a bill passed by the English houses of parliament would be if the crown were to exert the prerogative of refusing the royal assent. The governor may, however, without refusing his assent, reserve the bill for the consideration of the crown. In that case the bill does not come into force until it has either actually or constructively received the royal assent, which is in effect the assent of the English ministry, and therefore indirectly of the imperial parliament. Thus the colonial liberty of legislation is made legally reconcilable with imperial sovereignty, and conflicts between colonial and imperial laws are prevented.[1]

The constitution of the United States of America contains in art. i., sect. 7, par 2, the following order:—

> "Every bill which shall have passed the House of Representatives and the Senate shall, before it become a law, be presented to the president of the United States, if he approve, he shall sign it, if not, he shall return it with his objections to that house in which it shall have originated, who shall enter the objections at large on their journal and proceed to reconsider it. If, after such reconsideration, two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and, if approved by two-thirds of that house, it shall become a law. Every order, resolution or vote to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the president of the United States, and, before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill."

In all states of the Union except one the governors, in the same manner or to a modified extent, possess the right of vetoing bills passed by the legislature. Here, therefore, we have again a suspensory veto which is frequently exercised.

According to the constitution of the German empire of 1871, the imperial legislation is executed by the federal council and imperial diet; the emperor is not mentioned. In the federal council the simple majority of votes decides. But in the case of bills concerning the army, the navy and certain specially noted taxes, as well as in the case of decisions concerning the alteration of orders for the administration, and arrangements for the execution of the laws of customs and taxes, the proposal of the federal council is only accepted if the Prussian votes are on the side of the majority in favour of the same (art. vii., sect. 3). Prussia presides in the federal council. The state of things is therefore, in fact, as follows: it is not the German emperor, but the same monarch as king of Prussia, who has the right of veto against bills and decisions of the federal council, and therefore can prevent the passing of an imperial law. The superior power of the presidential vote obtains, it is true, its due influence only in one legislative body, but in reality it has the same effect as the veto of the head of the empire.

The Swiss federal constitution grants the president of the Confederation no superior position at all; neither he nor the federal council possesses the power of veto against laws or decisions of the federal assembly. But in some cantons, viz. St Gall (1831), Basel (1832) and Lucerne (1841), the veto was introduced as a right of the people. The citizens had the power to submit to a plebiscite laws which had been debated and accepted by the cantonal council (the legislative authority), and to reject the same. If this plebiscite was not demanded within a certain short specified time, the law came into force. But, if the voting took place, and if the number of persons voting against the law exceeded by one vote half the number of persons entitled to vote in the canton, the law was rejected. The absent voters were considered as having voted in favour of the law. An attempt to introduce the veto in Zurich in 1847 failed. Thurgau and Schaffhausen accepted it later. Meanwhile another arrangement has quite driven it out of the field. This is the so-called "referendum"—properly speaking, direct legislation by the people—which has been introduced into most of the Swiss cantons. Formerly in all cantons—with the exception of the small mountainous districts of Uri, Schwyz, Unterwalden, Zug, Glarus and Appenzell—it was not a pure democracy, but a representative constitution that prevailed: the great councillors or cantonal councillors periodically chosen by the people were the possessors of the sovereign power, and after deliberating twice passed the bills definitely. Now they have only to discuss the bills, which are printed and sent to all voters with an explanatory message; then the people on a certain day vote for the acceptance or rejection of the law by writing "yes" or "no" on a printed voting paper, which is placed in an urn under official control. In some cantons important financial resolutions involving large state expenses are also submitted to the decision of the people. In the revised federal constitution of 1874, under certain suppositions which have no further interest for us at present, a facultative referendum or *Initiative* (*i.e.* the possibility of demanding a plebiscite under exceptional circumstances) was introduced for federal laws. Since that period it has often been employed and has operated like a veto. It is evident that by the compulsory referendum in the cantons the mere veto is rendered superfluous.

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[1] A. V. Dicey, *Introduction to the Study of the Law of the Constitution*, pp. 111 seq. (6th ed., London, 1902); Sir H. Jenkyns, *British Rule and Jurisdiction beyond the Seas*, pp. 113 seq. (London, 1902).

In examining the question as to what position the veto occupies in jurisprudence, we must separate quite different conceptions which are comprised under the same name.

1. The veto may be a mere *right of intervention* on the part of a magistrate against the order of another official, or against that of an authority of equal or inferior rank. This was the case in ancient Rome. To this class belong also those cases in which, as in the French republic, the president makes his "no" valid against decisions of the general councillors, and the prefect does the same against decisions of the communal councillors. The use of the expression here is quite justifiable, and this veto is not confined to bills, but refers particularly to administrative measures. It affords a guarantee against the abuse of an official position.

2. The veto may be a safety-valve against precipitate decisions, and so a *preventive measure*. This task is fulfilled by the suspensory veto of the president of the United States. Similarly, to this class belong the above-mentioned prescriptions of the Spanish and Norwegian constitutions, and also the veto of the governor of an English colony against decisions of the legislature; for this protest is only intended to prevent a certain want of harmony between the general and the colonial legislation, by calling forth a renewed investigation. This veto is neither an interference with the competence of an authority, nor a division of the legislative power among different factors, but simply a guarantee against precipitancy in the case of a purely legislative measure. The wisdom of establishing this veto power by the constitution is thus manifest.

3. It is wrong to apply the term veto to what is merely the *negative side of the sanctioning of the laws*, in other words, an act of sovereignty. It would not be in accordance with the nature of a constitutional monarchy to declare the monarch's consent to a law unnecessary, or make it a compulsory duty; the legislative power is divided between him and the chambers. The sovereign must therefore be perfectly at liberty to say "yes" or "no" in each single case according to his opinion. If he says the latter, we speak of it as his veto, but this—if he possesses an absolute and not merely a suspensory veto—is not an intervention and not a preventive measure, but the negative side of the exercise of the legislative power, and therefore an act of sovereignty. That this right belongs fully and entirely to the holder of sovereign power—however he may be called—is self-evident. One chamber can also by protest prevent a bill of the other from coming into force. The "placet of the temporal power for church affairs—when it occurs—also involves in this manner in itself the veto or non placet." Where in pure democracies the people in their assembly have the right of veto or referendum, the exercise of it is also a result of the sovereign rights of legislature. (For the question of the conflict between the two houses of England, see REPRESENTATION.)

The peculiar power of veto possessed by the (Prussian) president of the federal council of Germany lies on the boundary between (2) and (3). (A. v. O.)

VETTER [*Vätter* or *Wetter*, often written, with the addition of the definite article, *Vettern*], a lake of southern Sweden, 80 m. long, and 18 m. in extreme breadth. It has an area of 733 sq. m., and a drainage area of 2528 sq. m.; its maximum depth is 390 ft., and its elevation above sea-level 289 ft. It drains eastward by the Motala river to the Baltic. Its waters are of remarkable transparency and blueness, its shores picturesque and steep on the east side, where the Omberg (863 ft.) rises abruptly, with furrowed flanks pierced by caves. The lake is subject to sudden storms. Its northern part is crossed from Karlsborg to Motala (W. to E.) by the Göta canal route. At the southern end is the important manufacturing town of Jönköping, and 15 m. N. of it the picturesque island of Vising, with a ruined palace of the 17th century and a fine church. Vadstena, 8 m. S. of Motala, with a staple industry in lace, has a convent (now a hospital) of St Bridget or Birgitta (1383), a beautiful monastic church (1305–1424) and a castle of King Gustavus Vasa. At Alvastra, 16 m. S. again, are ruins of a Cistercian monastery of the 11th century. Close to Motala are some of the largest mechanical workshops in Sweden, building warships, machinery, bridges, &c.

VETULONIUM, or VETULONIA (Etruscan *Vetluna*), an ancient town of Etruria, Italy, the site of which is probably occupied by the modern village of Vetulonia, which up to 1887 bore the name of Colonna. It lies 1130 ft. above sea-level, about 10 m. direct N.W. of Grosseto, on the N.E. side of the hills which project from the flat Maremma and form the promontory of Castiglione. The place is little mentioned in ancient literature, though Silius Italicus tells us that it was hence that the Romans took their magisterial insignia (fasces, curule chair, purple toga and brazen trumpets), and it was undoubtedly one of the twelve cities of Etruria. Its site was not identified before 1881, and the identification has been denied in various works by C. Dotto dei Dauli, who places it on the Poggio Castiglione near Massa Marittima, where scanty remains of buildings (possibly of city walls) have also been found. This site seems to agree better with the indications of medieval documents. But certainly an Etruscan city was situated on the hill of Colonna, where there are remains of city walls of massive limestone, in almost horizontal courses. The objects discovered in its extensive necropolis, where over 1000 tombs have been excavated, are now in the museums of Grosseto and Florence. The most important were surrounded by tumuli, which still form a prominent feature in the landscape.

See G. Dennis, *Cities and Cemeteries of Etruria* (London, 1883), ii. 263; *Notizie degli Scavi*, passim; I. Falchi, *Ricerche di Vetulonia* (Prato, 1881), and other works, especially *Vetulonia e la sua necropoli antichissima* (Florence, 1891); G. Sordini, *Vetulonia* (Spoleto, 1894) and references. (T. As.)

VEUILLOT, LOUIS (1813–1883), French journalist and man of letters, was born of humble parents at Boynes (Loiret) on the 11th of October 1813. When Louis Veuillot was five years old his parents removed to Paris. After a very slight education he entered a lawyer's office, and was sent in 1830 to serve on a Rouen paper, and afterwards to Périgueux. He returned to Paris in 1837, and a year later visited Rome during Holy Week. There he embraced extravagant ultramontane sentiments, and was from that time an ardent champion of Catholicism. The results of his conversion appeared in *Pèlerinage en Suisse* (1839), *Rome et Lorette* (1841) and other works. In 1843 he entered the staff of the *Univers religieux*. His violent methods of journalism had already provoked more than one duel, and for his polemics against the university of Paris in the *Univers* he was imprisoned for a short time. In 1848 he became editor of the paper, which was suppressed in 1860, but revived in 1867, when Veuillot recommenced his ultramontane propaganda, which brought about a second suppression of his journal in 1874. When his paper was suppressed Veuillot occupied himself in writing violent pamphlets directed against the moderate Catholics, the Second Empire and the Italian government. His services to the papal see were fully recognized by Pius IX., on whom he wrote (1878) a monograph. He died on the 7th of March 1883.

Some of his scattered papers were collected in *Mélanges religieux, historiques et littéraires* (12 vols., 1857–75), and his *Correspondance* (6 vols., 1883–85) has great political interest. His younger brother, Eugène Veuillot, published (1901–4) a comprehensive and valuable life, *Louis Veuillot*.

VEVEY [German *Vivis*], a small town in the Swiss canton of Vaud and near the eastern extremity of the Lake of Geneva. It is by rail 10 m. S.E. of Lausanne or 3½ m. N.W. of the Vernex-Montreux railway station, while it is well served by steamers plying over the Lake of Geneva. In 1900 it had a population of 11,781, of whom 8878 were French-speaking, while there were 8277 Protestants to 3424 Romanists and 56 Jews. It is the second town in point of population in the canton, coming next after Lausanne, though inferior to the "agglomeration" known as Montreux. It stands at the mouth of the Veveyse and commands fine views of the snowy mountains seen over the glassy surface of the lake. The whole of the surrounding country is covered with vineyards, which (with the entertainment of foreign visitors) occupy the inhabitants. Every twenty years or so (last in 1889 and 1905) the *Fête des Vignerons* is held here by an ancient gild of vinedressers, and attracts much attention. Besides a railway line that joins the Montreux-Bernese Oberland line at Chamby (5 m. from Vevey and 1¼ m. below Les Avants) there is a funicular railway from Vevey up the Mont Pèlerin (3557 ft.) to the north-west.

Vevey was a Roman settlement [*Viviscus*] and later formed part of the barony of Vaud, that was held by the counts and dukes of Savoy till 1536, when it was conquered by Bern. In 1798 it was freed from Bernese rule and became part of the canton du Léman (renamed canton de Vaud in 1803) of the Helvetic Republic.
(W. A. B. C.)

VEXILLUM (Lat. dim. of *velum*, piece of cloth, sail, awning, or from *vehere, vectum*, to carry), the name for a small ensign consisting of a square cloth suspended from a cross-piece fixed to a spear. The *vexillum* was strictly the ensign of the maniple, as *signum* was of the cohort, but the term came to be used for all standards or ensigns other than the eagle (*aquila*) of the legion (see FLAG). Caesar (*B.G.* ii. 20) uses the phrase *vexillum proponere* of the red flag hoisted over the general's tent as a signal for the march or battle. The standard-bearer of the maniple was styled *vexillarius*, but by the time of the Empire *vexillum* and *vexillarius* had gained a new significance. Tacitus uses these terms frequently both of a body of soldiers serving apart from the legion under a separate standard, and also with the addition of some word implying connexion with a legion of those soldiers who, after serving sixteen years with the legion, continued their service, under their own *vexillum*, with the legion. The term is also used for the scarf wrapped round a bishop's pastoral staff (*q.v.*). Modern science has adopted the word for the web or vein of a feather of a bird and of the large upper petal of flowers, such as the pea, whose corolla is shaped like a butterfly.

VEXIÖ, or WEXIÖ, a town and bishop's see of Sweden, capital of the district (*län*) of Kronoberg, 124 m. N.E. of Malmö by rail. Pop. (1900) 7365. It is pleasantly situated among low wooded hills at the north end of Lake Vexiö, and near the south end of Lake Helga. Its appearance is modern, for it was burnt in 1843. The cathedral of St Siegfrid dates from about 1300, but has been restored, the last time in 1898. The Småland Museum has antiquarian and numismatic collections, a library and a bust of Linnaeus. There are iron foundries, a match factory, &c. At Östrabo, the episcopal residence without the town, the poet Esaias Tegnér died in 1846, and he is buried in the town cemetery. On the shore of Lake Helga is the royal estate of Kronoberg, and on an island in the lake the ruins of a former castle of the same name.

VÉZELAY, a village of France, in the department of Yonne, 10 m. W.S.W. of Avallon by road. Its population, which was over 10,000 in the middle ages, was 524 in 1906. It is situated on the summit and slopes of a hill on the left bank of the Cure, and owes its renown to the Madeleine, one of the largest and most beautiful basilicas in France. The Madeleine dates from the 12th century and was skilfully restored by Viollet-le-Duc. It consists of a narthex, with nave and aisles; a triple nave, without triforium, entered from the narthex by three doorways; transepts; and a choir with triforium. The oldest portion of the church is the nave, constructed about 1125. Its groined vaulting is supported on wide, low, semicircular arches, and on piers and columns, the capitals of which are embellished with sculptures full of animation. The narthex was probably built about 1140. The central entrance, leading from it to the nave, is one of the most remarkable features of the church; it consists of two doorways, divided by a central pier supporting sculptured figures, and is surmounted by a tympanum carved with a representation of Christ bestowing the Holy Spirit upon His apostles. The choir and transepts are later in date than the rest of the church, which they surpass in height and grace of proportion. They resemble the eastern portion of the church of St Denis, and were doubtless built in place of a Romanesque choir damaged in a fire in 1165. A crypt beneath the choir is perhaps the relic of a previous Romanesque church which was destroyed by fire in 1120. The west facade of the Madeleine has three portals; that in the centre is divided by a pier and surmounted by a tympanum sculptured with a bas-relief of the Last Judgment. The upper portion of this front belongs to the 13th century. Only the lower portion of the northernmost of the two flanking towers is left, and of the two towers which formerly rose above the transept that to the north has disappeared. Of the other buildings of the abbey, there remains a chapter-house (13th century) adjoining the south transept. Most of the ramparts of the town, which have a circuit of over a mile, are still in existence. In particular the Porte Neuve, consisting of two massive towers flanking a gateway, is in good preservation. There are several interesting old houses, among them one in which Theodore of Beza was born. Of the old parish church, built in the 17th century, the clock-tower alone is left. A mile and a half from Vézelay, in the village of St Père-sous-Vézelay, there is a remarkable Burgundian Gothic church, built by the monks of Vézelay in the 13th century. The west façade, flanked on the north by a fine tower, is richly decorated; its lower portion is formed of a projecting porch surmounted by pinnacles and adorned with elaborate sculpture.

The history of Vézelay is bound up with its Benedictine abbey, which was founded in the 9th century under the influence of the abbey of Cluny. This dependence was soon shaken off by the younger monastery, and the acquisition of the relics of St Magdalen, soon after its foundation, began to attract crowds of pilgrims, whose presence enriched both the monks and the town which had grown up round the abbey and acknowledged its supremacy. At the beginning of the 12th century the exactions of the abbot Artaud, who required money to defray the expense of the reconstruction of the church, and the refusal of the monks to grant political independence to the citizens, resulted in an insurrection in which the abbey was burnt and the abbot murdered. During the next fifty years three similar revolts occurred, fanned by the counts of Nevers, who wished to acquire the suzerainty over Vézelay for themselves. The monks were, however, aided by the influence both of the Pope and of Louis VII., and the townsmen were unsuccessful on each occasion. During the 12th century Vézelay was the scene of the preaching of the second crusade in 1146, and of the assumption of the cross in 1190 by Richard Cœur de Lion and Philip Augustus. The influence of the abbey began to diminish in 1280 when the Benedictines of St Maximin in Provence affirmed that the true body of St Magdalen had been discovered in their church; its decline was precipitated during the wars of religion of the 16th century, when Vézelay suffered great hardships.

VIANDEN, an ancient town in the grand duchy of Luxemburg, on the banks of the Our, close to the Prussian frontier. Pop. (1905) 2350. It possesses one of the oldest charters in Europe, granted early in the 14th century by Philip, count of Vianden, from whom the family of Nassau-Vianden sprang, and who was consequently the ancestor of William of Orange and Queen Wilhelmina of Holland. The semi-mythical foundress of this family was Bertha, "the White Lady" who figures in many German legends. The original name of Vianden was Viennensis or Vienna, and its probable derivation is from the Celtic *Vien* (rock). The extensive ruins of the ancient castle stand on an eminence of the little town, but the chapel which forms part of it was restored in 1849 by Prince Henry of the Netherlands. The size and importance of this castle in its prime may be gauged from the fact that the Knights' Hall could accommodate five hundred men-at-arms. A remarkable feature of the chapel is an hexagonal hole in the centre of the floor, opening upon a bare subterranean dungeon. This has been regarded as an instance of the "double chapel," but it seems to have been constructed by order of the crusader Count Frederick II. on the model of the Church of the Holy Sepulchre. In the neighbourhood of Vianden are other ruined castles, notably those of Stolzemburg and Falkenstein. The little town and its pleasant surroundings have been praised by many, among others by Victor Hugo, who resided here on several occasions. During his last visit he wrote his fine work *L'Année terrible*. In the time of the Romans the Vianden valley was covered with vineyards, but at the present day its chief source of wealth is derived from the rearing of pigs.

VIANNA DO CASTELLO, a seaport and the capital of the district of Vianna do Castello, Portugal; at the mouth of the river Limà, which is here crossed by the iron bridge of the Oporto-Valença do Minho railway. Pop. (1900) 10,000. Vianna do Castello has manufactures of lace and dairy produce. Its fisheries are important. Salmon and lampreys are exported, both fresh and preserved. The administrative district of Vianna do Castello coincides with the northern part of the ancient province of Entre Minho e Douro (*q.v.*). Pop. (1900) 215,267; area, 857 sq. m.

VIAREGGIO, a maritime town and sea-bathing resort of Tuscany, Italy, in the province of Lucca, on the Mediterranean, 13 m. N.W. of Pisa by rail, 7 ft. above sea-level. Pop. (1906) 14,863 (town); 21,557 (commune). Being sheltered by dense pine-woods on the north, and its malaria having been banished by drainage, it is frequented as a winter resort, and in summer by some thousands for its sea-bathing. In 1740 the population was only 300, and in 1841, 6549. The body of Shelley was burned on the shore near Viareggio after his death by drowning in 1822. The town possesses a school of navigation and a technical school, and carries on some shipbuilding.

VIATICUM (a Latin word meaning "provision for a journey"; Gr. τὰ ἐφόδια), is often used by early Christian writers to denote the sacrament of the Eucharist, and is sometimes also applied to baptism. Ultimately it came to be employed in a restricted sense to denote the last communion given to the dying. The 13th canon of the council of Nicaea is to the effect that "none, even of the lapsed, shall be deprived of the last and most necessary viaticum (ἐφοδίου)," and that the bishop, on examination, is to give the oblation to all who desire to partake of the Eucharist on the point of death. The same principle still rules the canon law, it being of course understood that penitential discipline, which in ordinary circumstances would have been due for their offence, is to be undergone by lapsed persons who have thus received the viaticum, in the event of recovery. In extreme cases it is lawful to administer the viaticum to persons not fasting, and the same person may receive it frequently if his illness be prolonged. The ritual to be observed in its administration does not differ from that laid down in the office for the communion of the sick, except in the words of the formula, which is "accipe, carissime frater (carissima soror), viaticum corporis nostri Jesu Christi, quod te custodiat ab hoste maligno, protegat te, et perducat te ad vitam aeternam. Amen." Afterwards the priest rinses his fingers in a little water, which the communicant drinks. The viaticum is given before extreme unction, a reversal of the medieval practice due to the importance of receiving the Eucharist while the mind is still clear. In the early centuries the sick, like those in health, generally received both kinds, though there are instances of the viaticum being given under one form only, sometimes the bread and sometimes, where swallowing was difficult, the wine. In times of persecution laymen occasionally carried the viaticum to the sick, a practice that persisted into the 9th century, and deacons continued to do so even after the Council of Ansa (near Lyons) in 900 restricted the function to priests.

VIBORG, a town of Denmark, capital of the *amt* (county) of its name, lying in the bleak midland district of Jutland, though the immediate situation, on the small Viborg lake, is picturesque. Pop. (1901) 8623. It has a station on the railway running east and west between Langaa and Vemb. The most notable building is the cathedral (1130–1169, restored 1864–1876). The Black Friars' church is of the 13th century, and the museum possesses specimens of the Stone, Bronze and Iron Ages, also medieval antiquities. The Borgevold Park borders the lake on the site of a former castle. The industries embrace distilleries, iron foundries and manufactures of cloth. The country to the south attains to a certain degree of beauty near Lake Hald, where the ground is slightly elevated.

VIBORG (Finnish *Viipuri*), capital of a province of the same name in Finland, is situated at the head of the Bay of Viborg in the Gulf of Finland, at the mouth of the Saima Canal and on the railway which connects St Petersburg with Helsingfors. Population of the town (1904) 34,672, of the province 458,269. The Saima Canal (37 m. long), a fine engineering work, connects with the sea Lake Saima—the principal lake of Finland, 249 ft. above sea-level—and a series of others, including Puruvesi, Orivesi, Höytiänen and Kallavesi, all of which are navigated by steamers, as far north as Iisalmi in 63° 30′ N. lat. Viborg is thus the seaport of Karelia and eastern Savolaks, with the towns of Vilmanstrand (2393 inhabitants in 1904), St Michel (3933), Myslott (2687), Kuopio (13,519) and Iisalmi, with their numerous saw-mills and iron-works. Viborg stands most picturesquely on the glaciated and dome-shaped granite hills surrounding the bay, which is protected at its entrance by the naval station of Björkö and at its head by several forts. The castle of Viborg, built in 1293 by Marshal Torkel Knutson, was the first centre for the spread of Christianity in Karelia, and for establishing the power of Sweden; it is now used as a prison. Its lofty and elegant tower has fallen into decay. The court-house (1839), the town-house, the gymnasium (1641; with an excellent library), and the museum are among the principal buildings of the city. There are also a lyceum and two higher schools for girls, a school of navigation and several primary schools, both public and private, a literary and an agricultural society, and several benevolent institutions. There are foundries, machine works and saw-mills, and a considerable export of timber and wood products. The coasting trade is also considerable.

The environs are most picturesque and are visited by many tourists in the summer. The park of Monrepos (Old Viborg), in a bay dotted with dome-shaped islands, is specially attractive. The scenery of the Saima Canal and of the Finnish lakes with the grand *ås* of Pungaharju; the Imatra rapids, by which the Vuoksen discharges the water of Lake Saima into Lake Ladoga, with the castle of Kexholm at its mouth; Serdobol and Valamo monastery on Lake Ladoga—all visited from Viborg—attract many tourists from St Petersburg as well as from other parts of Finland.

VIBURNUM, in medicine, the dried bark of the black haw or *Viburnum prunifolium*, grown in India and North America. The black haw contains viburnin and valerianic, tannic, gallic, citric and malic acids. The British Pharmacopoeial preparation is the *Extractum Viburni Prunifolii liquidum*; the United States preparation is the fluid extract prepared from the *Viburnum opulus*. The physiological action of viburnum is to lower the blood pressure. In overdose it depresses the motor functions of the spinal cord and so produces loss of reflex and paralysis. Therapeutically the drug is used as an antispasmodic in dysmenorrhoea and in menorrhagia.

VICAIRE, LOUIS GABRIEL CHARLES (1848–1900), French poet, was born at Belfort on the 25th of January 1848. He served in the campaign of 1870, and then settled in Paris to practise at the bar, which, however, he soon abandoned for literature. His work was twice "crowned" by the Academy, and in 1892 he received the cross of the Legion of Honour. Born in the Vosges, and a Parisian by adoption, Vicaire remained all his life an enthusiastic lover of the country to which his family belonged—La Bresse—spending much of his time at Ambérieu. His freshest and best work is his *Émaux bressans* (1884), a volume of poems full of the gaiety and spirit of the old French *chansons*. Other volumes followed: *Le Livre de la patrie*, *L'Heure enchantée* (1890), *À la bonne franquette* (1892), *Au bois joli* (1894) and *Le Clos des fées* (1897). Vicaire wrote in collaboration with Jules Truffier two short pieces for the stage, *Fleurs d'avril* (1890) and *La Farce du mari refondu* (1895); also the *Miracle de Saint Nicolas* (1888). With his friend Henri Beauclair he produced a parody of the Decadents entitled *Les Déliquescences* and signed Adoré Floupette. His fame rests on his *Émaux bressans* and on his Rabelaisian drinking songs; the religious and fairy poems charming as they often are, carry simplicity to the verge of affectation. The poet died in Paris, after a long and painful illness, on the 23rd of September 1900.

See Henri Corbel, *Un Poète, Gabriel Vicaire* (1902).

VICAR (Lat. *vicarius*, substitute), a title, more especially ecclesiastical, describing various officials acting in some special way for a superior. Cicero uses the name *vicarius* to describe an under-slave kept by another as part of his private property. The *vicarius* was an important official in the reorganized empire of Diocletian. It remained as a title of secular officials in the middle ages, being applied to persons appointed by the Roman emperor to judge cases in distant parts of the empire, or to wield power in certain districts, or, in the absence of the emperor, over the whole empire. The prefects of the city at Rome were called *Vicarii Romae*. In the early middle ages the term was applied to representatives of a count administering justice for him in the country or small towns and dealing with unimportant cases, levying taxes, &c. Monasteries and religious houses often employed a vicar to answer to their feudal lords for those of their lands which did not pass into mortmain.

The title of "vicar of Jesus Christ," borne by the popes, was introduced as their special designation during the 8th century, in place of the older style of "vicar of St Peter" (or *vicarius principis apostolorum*). In the early Church other bishops commonly described themselves as vicars of Christ (Du Cange gives an example as late as the 9th century from the capitularies of Charles the Bald); but there is no proof in their case, or indeed in that of "vicar of St Peter" given to the popes, that it was part of their formal style. The assumption of the style "vicar of Christ" by the popes coincided with a tendency on the part of the Roman chancery to insist on placing the pontiff's name before that of emperors and kings and to refuse to other bishops the right to address him as "brother" (Mas Latrie, s. "Sabinien," p. 1047). It was not till the 13th century that the alternative style "vicar of St Peter" was definitively forbidden, this prohibition thus coinciding with the extreme claims of the pope to rule the world as the immediate "vicar of God" (see INNOCENT III.).

All bishops were looked upon as in some sort vicars of the pope, but the title *vicarius sedis apostolicae* came especially to be applied as an alternative to *legatus sedis apostolicae* to describe papal legates to whom in certain places the pope delegated a portion of his authority. Pope Benedict XIV. tells us in his treatise *De synodo dioecesana* that the pope often names vicars-apostolic for the government of a particular diocese because the episcopal see is vacant or, being filled, the titular bishop cannot fulfil his functions. The Roman Catholic Church in England was governed by vicars-apostolic from 1685 until 1850, when Pope Pius IX. re-established the hierarchy. Vicars-apostolic at the present day are nearly always titular bishops taking their titles from places not acknowledging allegiance to the Roman Catholic Church. The title is generally given by the pope to bishops sent on Eastern missions.

A neighbouring bishop was sometimes appointed by the pope vicar of a church which happened to be without a pastor. A special vicar was appointed by the pope to superintend the spiritual affairs of Rome and its suburbs, to visit its churches, monasteries, &c., and to correct abuses. It became early a custom for the prebendaries and canons of a cathedral to employ "priest-vicars" or "vicars-choral" as their substitutes when it was their turn as hebdomedary to sing High Mass and conduct divine office. In the English Church these priest-vicars remain in the cathedrals of the old foundations as beneficed clergy on the foundation; in the cathedrals of the new foundation they are paid by the chapters. "Lay vicars" also were and are employed to sing those parts of the office which can be sung by laymen.

In the early Church the assistant bishops (*chorepiscopi*) were sometimes described as *vicarii episcoporum*. The employment of such vicars was by no means general in the early Church, but towards the 13th century it became very general for a bishop to employ a *vicar-general*, often to curb the growing authority of the archdeacons. In the middle ages there was not a very clear distinction drawn between the vicar and the official of the bishop. When the voluntary and contentious jurisdiction came to be distinguished, the former fell generally to the vicars, the latter to the officials. In the style of the Roman chancery, official documents are addressed to the bishops or their vicars for dioceses beyond the Alps, but for French dioceses to the bishops or their officials. The institution of *vicars-general* to help the bishops is now general in the Catholic Church, but it is not certain that a bishop is obliged to have such an official. He may have two. Such a vicar possesses an ordinary and not a delegated jurisdiction, which he exercises like the bishop. He cannot, however, exercise functions which concern the episcopal order, or confer benefices without express and particular commission. In the Anglican Church a vicar-general is employed by the archbishop of Canterbury and some other bishops to assist in such matters as ecclesiastical visitations. In the Roman Catholic Church bishops sometimes appoint lesser vicars to exercise a more limited authority over a limited district. They are called "vicars-forane" or rural deans. They are entrusted especially with the surveillance of the parish priests and other priests of their districts, and with matters of ecclesiastical discipline. They are charged especially with the care of sick priests and in case of death with the celebration of their funerals and the charge of their vacant parishes. In canon law priests doing work in place of the parish priest are called vicars. Thus in France the *curé* or head priest in a parish church is assisted by several *vicaires*.

Formerly, and especially in England, many churches were appropriated to monasteries or colleges of canons, whose custom it was to appoint one of their own body to perform divine service in such churches, but in the 13th century such corporations were obliged to appoint permanent paid vicars who were called *perpetual vicars*. Hence in England the distinction between rectors, who draw both the greater and lesser tithes, and vicars, who are attached to parishes of which the great tithes, formerly held by monasteries, are now drawn by lay rectors. (See APPROPRIATION.)

See Du Cange, *Glossarium mediae et infimae Latinitatis*, ed. L. Favre (Niort, 1883, &c.); Migne, *Encyclopédie théologique*, series i. vol. 10 (Droit Canon); Comte de Mas Latrie, *Trésor de chronologie* (Paris, 1889); and Sir R. J. Phillimore, *Ecclesiastical Law of the Church of England* (2nd ed. 1895). (E. O'N.)

VICE. (1) (Through Fr. from Lat. *vitium*), a fault, blemish, more specifically a moral fault, hence depravity, sin, or a particular form of depravity. In the medieval morality plays a special character who acted as an attendant on the devil was styled "the Vice," but sometimes took the name of specific vices such as Envy, Fraud, Iniquity and the like. He was usually dressed in the garb that is identified with that of the domestic fool or jester, and was armed with a wooden sword or dagger. (2) (M.E. *vyce*, *vise* or *vyse*; Fr. *vis*; Lat. *vitis*, a vine, or bryony, *i.e.* something that twists or winds), a portable or fixed tool or appliance which holds or grips an object while it is being worked; a special form of clamp. The tool consists essentially of movable jaws, either jointed by a hinge or moving on slides, and the closing motion is applied by a screw, whence the name, as of something which turns or winds, or by a lever, ratchet, &c. (see TOOLS). (3) (Lat. *vice*, in place of, abl. sing. of a noun not found in the nom.), a word chiefly used as a prefix in combination with names of office-holders, indicating a position subordinate or alternative to the chief office-holder, especially one who takes second rank or acts in default of his superior, *e.g.* vice-chairman, vice-admiral, &c.

VICE-CHANCELLOR, the deputy of a chancellor (*q.v.*). In the English legal system vice-chancellors in equity were formerly important officials. The first vice-chancellor was appointed in 1813 in order to lighten the work of the lord chancellor and the master of the rolls, who were at that time the sole judges in equity. Two additional vice-chancellors were appointed in 1841. The vice-chancellors sat separately from the lord chancellor and the lords justices, to whom there was an appeal from their decisions. By the Judicature Act 1873 they became judges of the High Court of Justice, retaining their titles, but it was enacted that on the death or retirement of any one his successor was to be styled "judge." Vice-chancellor Sir J. Bacon (1798–1895) was the last to hold the office, resigning in 1886.

Vice-chancellor is also the title given to the judge of the duchy court of Lancaster. For the vice-chancellor of a university, see CHANCELLOR.

VICENTE, GIL (1470–1540), the father of the Portuguese drama, was born at Guimarães, but came to Lisbon in boyhood and studied jurisprudence at the university without taking a degree. In 1493 we find him acting as master of rhetoric to the duke of Beja, afterwards King Manoel, a post which gave him admission to the court; and the *Cancioneiro Geral* contains some early lyrics of his which show that he took part in the famous *seroes do paco*. The birth of King John III. furnished the occasion for his first dramatic essay—*The Neatherd's Monologue*, which he recited on the night of the 7th–8th June 1502 in the queen's chamber in the presence of King Manoel and his court. It was written in Spanish out of compliment to the queen, a daughter of Ferdinand and Isabella, and because that language was then the fashionable medium with the higher classes. This manger-hymn, which was a novelty in Portugal, so pleased the king's mother, the infanta D. Beatriz, that she desired Gil Vicente to repeat it the following Christmas, but he composed instead the *Castilian Pastoral Auto*, a more developed piece in which he introduced six characters. The infanta, pleased again, required a further diversion for Twelfth Day, whereupon he produced the *Auto of the Wise Kings*. He had now established his reputation as a playwright, and for the next thirty years he entertained the courts of Kings Manoel and John III., accompanying them as they moved from place to place, and providing by his autos a distraction in times of calamity, and in times of rejoicing giving expression to the feelings of the people. Though himself both actor and author, Gil Vicente had no regular company of players, but it is probable that he easily found students and court servants willing to get up a part for a small fee, especially as the plays would not ordinarily run for more than one night. The *Auto of the Sybil Cassandra* (produced at the monastery of Euxobregas at Christmas 1503), the *Auto of St Martin* (played in the church at Caldas on the feast of Corpus Christi 1504), and a mystery play, the *Auto of the Four Seasons*, all belong, like their predecessors, to the religious drama, but in 1505 Gil Vicente wrote a comedy of real life, *Who has Bran to sell?* a title given it by the public. It is a clever farce depicting an amorous poor squire and his ill-paid servants, and opens a rich portrait-gallery in which the dramatist includes every type of Portuguese society, depicting the failings of each with the freedom of a Rabelais. The next three years saw no new play, but in 1506 Gil Vicente delivered before the court at Almeirim a sermon in verse on the theme *Non-volo, volo, et deficior*, in which he protested against the intolerance shown to the Jews, just as in 1531 he interfered to prevent a massacre of the "New Christians" at Santarem. The *Auto of the Soul*, a Catholic prototype of Goethe's *Faust*, containing some beautiful lyrics, appeared in 1508, and in 1509 the *Auto da India*, a farce which has the eastern enterprise of his countrymen for background, while the *Auto da Fama* (1516) and the *Exhortation to War* (1513) are inspired by the achievements that made Portugal a world-power. If the farce of *The Old Man of the Garden* (1514) breathes the influence and spirit of the *Celestina*, the popular trilogy of the *Boats of Hell, Purgatory and Glory* (1517, 1518, 1519) is at once a dance of death, full of splendid pageantry and caustic irony, and a kind of Portuguese *Divina Commedia*. The *Auto of the Fairies* (1516), the *Farce of the Doctors* (1519) and the *Comedy of Rubena* (1521) ridicule unchaste clerics and ignorant physicians with considerable freedom and a medieval coarseness of wit, and the *Farce of the Gipsies* is interesting as the first piece of the European theatre dealing professedly with that race. *Ignez Pereira*, usually held to be Gil Vicente's masterpiece, was produced in 1523 before King John III. at the convent of Christ at Thomar, and owed its origin to certain men of *bom saber*, perhaps envious partisans of the classical school. They pretended to doubt his authorship of the autos, and accordingly gave him as a theme for a fresh piece the proverb: "I prefer an ass that carries me to a horse that throws me." Gil Vicente accepted the challenge, and furnished a triumphant reply to his detractors in this comedy of ready wit and lively dialogue. *The Beira Judge* (1526), the *Forge of Love* (1525) and *The Beira Priest* (1526) satirize the maladministration of justice by ignorant magistrates and the lax morals of the regular clergy, and the *Farce of the Muleteers* (1526) dramatizes the type of poor nobleman described in Cleynart's *Letters*. The *Comedy of the Arms of the City of Coimbra* (1527) has a considerable antiquarian interest, and the facetious *Ship of Love* is full of quaint imagery, while the lengthy *Auto of the Fair* (1527), with its twenty-two characters, may be described as at once an indictment of the society of the time from the standpoint of a practical Christian and a telling appeal for the reform of the church. In an oft-quoted passage, Rome personified comes to the booth of Mercury and Time, and offers her indulgences, saying, "Sell me the peace of heaven, since I have power here below"; but Mercury refuses, declaring that Rome absolves the whole world and never thinks of her own sins. The play concludes with a dance and hymn to the Blessed Virgin. *The Triumph of Winter* (1529) exposes the unskilful pilots and ignorant seamen who cause the loss of ships and lives on the route to India, and the *Auto da Lusitania* (1532) portrays the household of a poor Jewish tailor, ending with a curious dialogue between "All the World" and "Nobody." *The Pilgrimage of the Aggrieved* (1533) is an attack on discontent and ambition, lay and clerical. After representing the *Auto da festa* for the Conde de Vimioso (1535), and dramatizing the romances of chivalry in *D. Duardos* and *Amadis de Gaula*, Gil Vicente ended his dramatic career in 1536 with a mirthful comedy, *The Garden of Deceptions*. He spent the evening of life in preparing his works for the press at the instance of King John III., and died in 1540, his wife Branca Bezerra having predeceased him. Four children were born of their union, and among them Paula Vicente attained distinction as a member of the group of cultured women who formed a sort of female academy presided over by the infanta D. Maria.

The forty-four pieces comprising the theatre of Gil Vicente fall from the point of view of language into three groups: (1) those in Portuguese only, numbering fourteen; (2) those in Spanish only, numbering eleven; and (3) the bilingual, being the remainder, nineteen in all. They are also from their nature divisible as follows: *a*. Works of a religious character or of devotion. Most of these are a development of the mystery or miracle play of the middle ages; and they may be subdivided into (1) Biblical pieces; (2) pieces founded on incidents in the life of a saint; and (3) religious allegories. In this department Gil Vicente reaches his highest poetical flights, and the *Auto of the Soul* is a triumph of elevation of idea and feeling allied to beauty of expression. *b*. Aristocratic works, or tragi-comedies, the composition of which was the result of his contact with the court; these, though often more spectacular than strictly dramatic, are remarkable for opulence of invention and sweetness of versification. *c*. The popular theatre, or comedies and farces. Gil Vicente's plays contain some evidence of his knowledge and appreciation of French poetry; *e.g.* *The Beira Judge* wears a general likeness to the products of the Clercs de la Basoche, and his *Testament of Maria Parda* is reminiscent of the better-known work of François Villon. Most of the plays are written in the national *redondilha* verse, and are preceded by initial rubrics stating the date when, the place where, in whose presence, and on what occasion each was first performed, and these make up the annals of the first thirty-four years of the Portuguese drama. Most of them were put on the stage at the different royal palaces; some, however, were played in hospitals, and, it is said, even in churches, though this is doubtful; those of which the subjects are liturgical at the great festivals of Christmas, Epiphany and Maundy Thursday, others on the happening of some event of importance to the royal family or the nation. Many of the plays contain songs, either written and set to music by the author, or collected by him from popular sources, while at the close the characters leave the stage singing and dancing, as was the custom in the medieval comedies.

Though so large a proportion of his pieces are in Spanish, they are all eminently national in idea, texture and subject. No other Portuguese writer reflects so faithfully the language, types, customs and colour of his age as Gil Vicente, and the rudest of his dramas are full of genuine comic feeling. If they never attain to perfect art, they possess the supreme gift of life. None of them are, strictly speaking, historical, and he never attempted to write a tragedy. Himself a man of the people, he would not imitate the products of the classical theatre as did Sá de Miranda and Ferreira, but though he remained faithful to the Old or Spanish school in form, yet he had imbibed the critical spirit and mental ferment of the Renaissance without its culture or erudition. Endowed by nature with acute observation and considerable powers of analysis, Gil Vicente possessed a felicity of phrase and an unmatched knowledge of popular superstitions, language and lore. Above all, he was a moralist, with satire and ridicule as his main weapons; but if his invective is often stinging it is rarely bitter, while more than one incident in his career shows that he possessed a kindly heart as well as an impartial judgment, and a well-balanced outlook on life. If he owed his early inspiration to Juan de Encina, he repaid the debt by showing a better way to the dramatists of the neighbouring country, so that he may truly be called the father of the rich Spanish drama, of Lope de Vega and Calderon. Much of his fame abroad is due to his position as an innovator, and, as Dr Garnett truly remarked, "One little corner of Europe alone possessed in the early 16th century a drama at once living, indigenous and admirable as literature."

Gil Vicente perhaps lacks psychological depth, but he possesses a breadth of mental vision and a critical acumen unknown in any medieval dramatist. In his attitude to religion he acts as the spokesman of the better men of his age and country. A convinced but liberal-minded Catholic, he has no sympathy with attacks on the unity of the Church, but he cries out for a reform of morals, pillories the corruption and ignorance of the clergy and laity, and pens the most bitter things of the popes and their court. He strove to take a middle course at a time when moderation was still possible, though, had he lived a few years longer, in the reign of religious fanaticism inaugurated by the Inquisition, his bold stand for religious toleration would have meant his imprisonment or exile, if not a worse fate. He is a great dramatist in embryo, who, if he had been born fifty years later and preserved his liberty of thought and expression, might with added culture have surpassed Calderon and taken his place as the Latin and Catholic rival of Shakespeare.

Some of the plays were printed in Gil Vicente's lifetime, but the first collected edition, which included his lyrics, was published after his death by his son Luiz (Lisbon, 1562), with a dedication to King Sebastian. A second edition appeared in 1586, with various omissions and alterations made at the instance of the Inquisition. A critical edition of the text in 3 vols. came out at Hamburg (1834), with a glossary and introductory essay on Vicente's life and writings, and a poor reprint of this edition is dated Lisbon 1852. He has never found a translator, doubtless because of the difficulty of rendering his form and explaining his wealth of topical allusions.

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VICENZA, a town and episcopal see of Venetia, Italy, capital of the province of Vicenza, 42 m. W. of Venice by rail, 131 ft. above sea-level. Pop. (1901) 32,200 (town); 47,558 (commune). It lies at the northern base of the Monti Berici, on both sides of the Bacchiglione, at its confluence with the Retrone. It was surrounded by 13th-century walls, once about 3 m. in circumference, but these are now in great part demolished. Though many of the streets are narrow and irregular, the town has a number of fine buildings, many of them the work of Andrea Palladio. The best of these is the town hall, otherwise known as the basilica, one of the finest works of the Renaissance period, of which Palladio himself said that it might stand comparison with any similar work of antiquity. It is especially noteworthy owing to the difficulty of the task the architect had to accomplish—that of transforming the exterior of the Palazzo della Ragione, a Gothic building of the latter half of the 15th century, which the colonnades of the basilica entirely enclose. It was begun in 1549, but not finished till 1614, long after his death. He also designed many of the fine palaces which give Vicenza its individuality; only two of them, the Barbarano and Chiericati palaces (the latter containing the picture gallery), have two orders of architecture, the rest having a heavy rustica basis with only one order above it. Many palaces, however, have been wrongly attributed to him which are really the work of Scamozzi and others of his successors. The famous Teatro Olimpico was begun by him, but only finished after his death; it is a remarkable attempt to construct a theatre in the ancient style, and the stage, with the representation of streets ascending at the back, is curious. The cathedral, which is Italian Gothic, dating mainly from the 13th century, consists of a nave with eight chapels on each side, and a very high Renaissance domed choir; it contains examples of the Montagnas and of Lorenzo da Venezia. The churches of S. Lorenzo (1280–1344) and S. Corona (1260–1300), both of brick, are better examples of Gothic than the cathedral; both contain interesting works of art—the latter a very fine "Baptism of Christ," by Giovanni Bellini. In S. Stefano is an imposing altar-piece by Palma Vecchio. The church of SS. Felice e Fortunato was restored in A.D. 975, but has been much altered, and was transformed in 1613. The portal is of 1154, and the Lombardesque square brick tower of 1160. Under it a mosaic pavement with the names of the donors, belonging to the original church of the Lombard period (?), was discovered in 1895 (see F. Berchet, *III. Relazione dell' Ufficio Regionale per la conservazione dei monumenti del Veneto*, Venice, 1895, p. 111). None of the churches of Vicenza is the work of Palladio. Of the Palladian villas in the neighbourhood, La Rotonda, or Villa Palladiana, 1½ m. S.E., deserves special mention. It is a square building with Ionic colonnades and a central dome, like an ancient temple, but curiously unlike a Roman villa. Vicenza also contains some interesting remains of the Gothic period besides the churches mentioned—the lofty tower of the town hall (1174–1311–1446; the Piazza contains two columns of the Venetian period, with S. Theodore and the Lion of S. Mark on them) and several palaces in the Venetian style. Among these may be especially noted the small Casa Pigafetta dating from 1481, but still half Gothic, prettily decorated. Some of these earlier houses had painted façades. The fine picture of "Christ bearing the Cross" (wrongly ascribed to Giorgione), according to Burckhardt once in the Palazzo Loschi, is now in the Gardner collection at Boston, U.S.A. The most important manufacture is that of silk, which employs a large proportion of the inhabitants. Great numbers of mulberry trees are grown in the neighbourhood. Woollen and linen cloth, leather, earthenware, paper, and articles in gold and silver are also made in Vicenza, and a considerable trade in these articles, as well as in corn and wine, is carried on.

Vicenza is the ancient *Vicetia*, an ancient town of Venetia. It was of less importance than its neighbours Venetia and Patavium, and we hear little of it in history. It no doubt acquired Roman citizenship in 49 B.C., and became a *municipium*; and is mentioned two years later apropos of a dispute between the citizens and their slaves. Remains of a theatre and of a late mosaic pavement with hunting scenes have been found, three of the bridges across the Bacchiglione and Retrone are of Roman origin, and arches of the aqueduct exist outside Porta S. Croce. A road diverged here to Opitergium (mod. Oderzo) from the main road between Verona and Patavium (Padua): see T. Mommsen in *Corp. Inscr. Latin.* v. (Berlin, 1883), p. 304. It suffered severely in the invasion of Attila, by whom it was laid waste, and in subsequent incursions. It was for some time during the middle ages an independent republic, but was subdued by the Venetians in 1405. Towards the end of the 15th century it became the seat of a school of painting strongly influenced by Mantegna, of which the principal representatives were, besides Bartolomeo Montagna, its founder, his son Benedetto Montagna, Giovanni Speranza and Giovanni Buonconsiglio. Good altar-pieces by the former exist in S. Bartolommeo, S. Corona, and the cathedral, and several pictures also in the picture gallery; while his son Benedetto had greater merits as an engraver than a painter. Some works by both of the last two exist at Vicenza—the best is a Pietà in tempera in the gallery by Buonconsiglio, by whom is also a good Madonna at S. Rocco. Andrea Palladio (1518–1580) was a native of Vicenza, as was also a contemporary, Vincenzo Scamozzi (1552–1616), who was largely dependent on him, but is better known for his work on architecture (*Architettura universale*, 1615). Palladio inaugurated a school of followers who continued to erect similar buildings in Vicenza even down to the French Revolution. (T. As.)

See G. Pettinà, *Vicenza* (Bergamo, 1905).

VICEROY (from O. Fr. *viceroy*, mod. *viceroi*, *i.e.* Lat *vice*, in place of, and *roy* or *roi*, king), the governor of a kingdom or colony to whom is delegated by his sovereign the power to exercise regal authority in his name. The lord-lieutenant of Ireland and the governor-general of India are frequently referred to as viceroys, but the title has no official recognition in British government.

VICH, a city of north-eastern Spain, in the province of Barcelona, on the river Gurri, a small right-hand tributary of the Ter, and on the Granollérs-Ripoll railway Pop (1900) 11,628 Vich is an ancient episcopal city, with narrow, ill-paved streets and many curious old houses irregularly built on the slope of a hill, which rises above one of the side valleys of the Ter basin. The cathedral, founded about 1040 and built chiefly in the 14th century, was to some extent modernized in 1803 Its Gothic cloisters (1340) are remarkable for the beautiful tracery in their windows, and there is a fine altar of sculptured marble. Some valuable manuscripts are preserved in the library of the chapter-house, and the museum contains an interesting archaeological collection, besides statuary, pictures, &c. The city is locally celebrated for the manufacture of sausages, other industries include tanning and the weaving of linen and woollen fabrics.

Vich, the Ausa of the ancient geographers, was the chief town of the Ausetani, in the middle ages it was called Ausona and Vicus Ausonensis, hence Vic de Osona, and simply Vich.

VICHY, a town of central France in the department of Allier, on the right bank of the Allier, 33 m. S. by E. of Moulins by rail. Pop. (1906) 14,520. Vichy owes its importance to its mineral waters, which were well known in the time of the Romans. They afterwards lost their celebrity and did not regain it till the 17th century, in the latter half of which they were visited and written of by Madame de Sévigné. Within the town or in its immediate vicinity there are between thirty and forty springs, twelve of which are state property, four of these having been tapped by boring. The waters of those which are outside the town are brought in by means of aqueducts. The most celebrated and frequented are the Grande Grille, L'Hôpital, the Célestins, and Lardy The most copious of all, the Puits Carré, is reserved for the baths. All these, whether cold or hot (maximum temperature, 113° F.), are largely charged with bicarbonate of soda, some also are chalybeate and tonic. The waters, which are limpid, have an alkaline taste and emit a slight odour of sulphuretted hydrogen. They are recommended in cases of stomachic and liver complaint, also for diabetes, gravel and gout. Large quantities are bottled and exported. A luxurious bathing establishment, the property of the state, was opened in 1903. In addition to this, Vichy has the hydropathic establishments of Lardy, Larbaud and L'Hôpital, and a large military hospital, founded in 1843. A fine casino and two public parks add to its attraction. The promenade commands a splendid view of the mountains of Auvergne. Cusset, about 1 m. distant, has similar mineral waters and a bathing establishment.

VICKSBURG, a city and the county-seat of Warren county, Mississippi, U.S.A., on the Mississippi and Yazoo rivers,[1] 44 m. by rail W. of Jackson, and 236 m. N. by W. of New Orleans. Pop. (1890) 13,373; (1900) 14,834, of whom 8147 were negroes; (1910 census) 20,814, being the second largest city in Mississippi. It is served by the Alabama & Vicksburg, the Vicksburg, Shreveport & Pacific, and the Yazoo & Mississippi Valley railways, and by steamboat lines. It is built among the Walnut Hills, which rise about 260 ft. above the river. Among the principal buildings and institutions are the court-house, standing on one of the highest hills, a fine Federal building, the city hall, a state charity hospital, an infirmary, a sanatorium, a public library, the medical college of the university of Mississippi, All Saints' Episcopal College (Protestant Episcopal, 1909) for girls, Saint Francis Xavier's Academy, and Saint Aloysius College (Roman Catholic). The Civil War battle-ground has been converted into a beautiful National Military Park, embracing 1283 acres and containing numerous markers, memorials and monuments, including one (1910) to Lieut.-General Stephen Dill Lee, who was superintendent of the Military Park from 1899 until his death in 1908. On the bluffs just beyond the northern limits of the city and adjoining the Military Park is the Vicksburg National Cemetery, in which are the graves of 16,892 Federal soldiers (12,769 unknown). The principal industry of Vicksburg is the construction and repair of rolling stock for steam railways. It has also a dry dock and cotton compresses; and among its manufactures are cottonseed oil and cake, hardwood lumber, furniture, boxes and baskets. In 1905 the factory products were valued at $1,887,924 The city has a large trade in long-staple cotton grown in the surrounding country. It is a port of entry but has practically no foreign trade.

The French built Fort St Peter near the site of Vicksburg early in the 18th century, and on the 2nd of January 1730 its garrison was murdered by the Yazoo Indians. As early as 1783 the Spanish erected Fort Nogales, and in 1798 this was taken by some United States troops and renamed Fort McHenry. The first permanent settlement in the vicinity was made about 1811 by Rev. Newell (or Newit) Vick (d. 1819), a Methodist preacher. In accordance with his will a town was laid out in 1824; and Vicksburg was incorporated as a town in 1825, and was chartered as a city in 1836. The campaigns of which it was the centre in 1862 and 1863 are described below. Vicksburg was the home of Seargent Smith Prentiss from 1832 to 1845.

See H. F., Simrall, "Vicksburg: the City on the Walnut Hills," in L. P. Powell's *Historic Towns of the Southern States* (New York, 1900).

Campaign of 1862–63.—Vicksburg is historically famous as being the centre of interest of one of the most important campaigns of the Civil War. The command of the Mississippi, which would imply the severance of the Confederacy into two halves, and also the reopening of free commercial navigation from St Louis to the sea, was one of the principal objects of the Western Union armies from the time that they began their southward advance from Illinois, Missouri and Kentucky in February 1862. A series of victories in the spring and summer carried them as far as the line Memphis-Corinth, but in the autumn they came to a standstill and were called upon to repulse the counter-advance of the Southern armies. These armies were accompanied by a flotilla of thinly armoured but powerful gunboats which had been built on the upper Mississippi in the autumn of 1861, and had co-operated with the army at Fort Donelson, Shiloh and Island No. 10, besides winning a victory on the water at Memphis.

At the same time a squadron of sea-going vessels under Flag-officer Farragut had forced the defences of New Orleans (*q.v.*) and, accompanied by a very small military force, had steamed up the great river. On reaching Vicksburg the heavy vessels again forced their way past the batteries, but both at Vicksburg and at Port Hudson they had to deal, no longer with low-sited fortifications, but with inconspicuous earthworks on bluffs far above the river-level, and they failed to make any impression. Farragut then returned to New Orleans. From Helena to Port Hudson the Confederates maintained complete control of the Mississippi, the improvised fortresses of Vicksburg, Port Hudson and Arkansas Post (near the mouth of Arkansas river) being the framework of the defence. It was to be the task of Grant's army around Corinth and the flotilla at Memphis to break up this system of defences, and, by joining hands with Farragut and clearing the whole course of the Mississippi, to cut the Confederacy in half.

The long and painful operations by which this was achieved group themselves into four episodes: (*a*) the Grenada expedition of Grant's force, (*b*) the river column under McClernand and Sherman, (*c*) the operations in the bayoux, and (*d*) the final "overland" campaign from Grand Gulf. The country in which these operations took place divides itself sharply into two zones, the upland east of the river, upon which it looks down from high bluffs, and the levels west of it, which are a maze of bayoux, backwaters and side channels, the intervening land being kept dry near the river itself by artificial banks (levees) but elsewhere swampy. At Vicksburg, it is important to observe, the bluffs trend away from the Mississippi to follow the course of the Yazoo, rejoining the great river at Memphis. Thus there are two obvious lines of advance for the Northern army, on the upland (Memphis and Grand Junction on Grenada-Jackson), and downstream through the bayou country (Memphis-Helena-Vicksburg). The main army of the defenders, who were commanded by Lieut.-General J C. Pemberton, between Vicksburg and Jackson and Grenada, could front either north against an advance by Grenada or west along the bluffs above and below Vicksburg.

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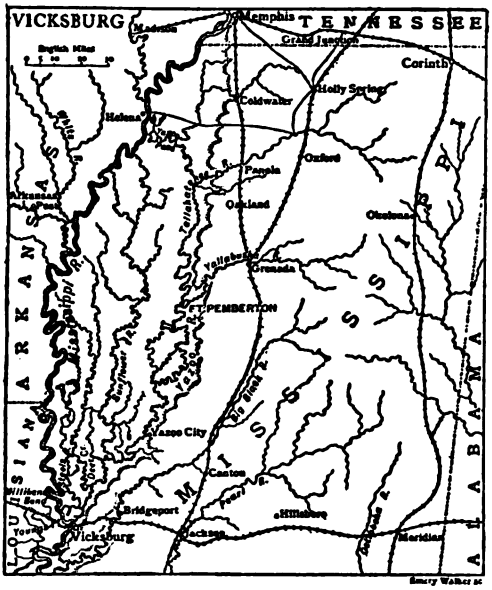
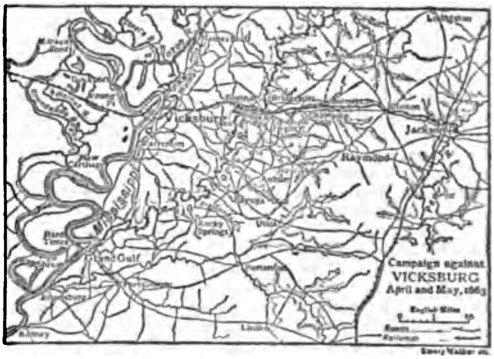
[1] The channel of the Mississippi has changed greatly: until 1876 the entire city was on the Mississippi, which made a bend forming a tongue of land opposite the city; in 1876 the river cut across the tongue and formed an island, making the northern part of the city front on the shallow "Lake Centennial." The Federal government, by turning the Yazoo through a canal across the upper end of the old channel, gave the city a river front once more.



Emery Walker sc.

The first advance was made at the end of November 1862 by two columns from Grand Junction and Memphis on Grenada. The Confederates in the field, greatly outnumbered, fell back without fighting. But Grant's line of supply was one long single-line, ill-equipped railway through Grand Junction to Columbus, and the opposing cavalry under Van Dorn swept round his flank and, by destroying one of his principal magazines (at Holly Springs), without further effort compelled the abandonment of the advance. Meantime one of Grant's subordinates, McClernand, was intriguing to be appointed to command an expedition by the river-line, and Grant meeting half-way an evil which he felt himself unable to prevent, had sent Sherman with the flotilla and some 30,000 men to attack Vicksburg from the water-side, while he himself should deal with the Confederate field army on the high ground. But the scheme broke down completely when Van Dorn cut Grant's line of supply, and the Confederate army was free to turn on Sherman. The latter, ignorant of Grant's retreat, attacked the Yazoo bluffs above Vicksburg (battle of Chickasaw Bayou) on December 29th; but a large portion of Pemberton's field army had arrived to help the Vicksburg garrison, and the Federals were easily repulsed with a loss of 2000 men. McClernand now appeared and took the command out of Sherman's hands, informing him at the same time of Grant's retreat. Sherman thereupon proposed, before attempting fresh operations against Vicksburg, to clear the country behind them by destroying the Confederate garrison at Arkansas Post. This expedition was completely successful. at a cost of about 1000 men the fort and its 5000 defenders were captured on the 11th of January 1863. McClernand, elated at his victory, would have continued to ascend the Arkansas, but such an eccentric operation would have been profitless if not dangerous, and Grant, authorized by the general-in-chief, Halleck, peremptorily ordered McClernand back to the Mississippi.



Emery Walker sc.

Retreating from the upland, Grant sailed down the river and joined McClernand and Sherman at Milliken's Bend at the beginning of February, and, superseding the resentful McClernand, assumed command of the three corps (XIII., McClernand; XV., Sherman; XVII., McPherson) available. He had already imagined the daring solution of his most difficult problem which he afterwards put into execution, but for the present he tried a series of less risky expedients to reach the high ground beyond Pemberton's flanks, without indeed much confidence in their success, yet desirous in these unhealthy flats of keeping up the spirits of his army by active work, and of avoiding, at a crisis in the fortunes of the war, any appearance of discouragement. Three such attempts were made in all, with the co-operation of the flotilla under Captain David D. Porter. First, Grant endeavoured to cut a canal across the bend of the Mississippi at Vicksburg, hoping thus to isolate the fortress, to gain a water connection with the lower river, and to land an army on the bluffs beyond Pemberton's left flank. This was unsuccessful. Next he tried to make a practicable channel from the Mississippi to the upper Yazoo, and so to turn Pemberton's right, but the Confederates, warned in time, constructed a fort at the point where Grant's advance emerged from the bayoux. Lastly, an advance through a maze of creeks (Steele's Bayou expedition), towards the middle Yazoo and Haines's Bluff, encountered the enemy, not on the bluffs, but in the low-lying woods and islands, and these so harassed and delayed the progress of the expedition that Grant recalled it. Shortly afterwards Grant determined on the manœuvre in rear of Vicksburg which established his reputation. The troops marched overland from Milliken's Bend to New Carthage, and on the 16th of April Porter's gunboat flotilla and the transports ran past the Vicksburg batteries. All this, which involved careful arrangement and hard work, was done by the 24th of April. General Banks, with a Union army from New Orleans, was now advancing up the river to invest Port Hudson, and by way of diverting attention from the Mississippi, a cavalry brigade under Benjamin Grierson rode from La Grange to Baton Rouge (600 m. in 16 days), destroying railways and magazines and cutting the telegraph wires *en route*. Sherman's XV. corps, too, made vigorous demonstrations at Haines's Bluff, and in the confusion and uncertainty Pemberton was at a loss.

On the 30th of April McClernand and the XIII. corps crossed the Mississippi 6 m. below Grand Gulf, followed by McPherson. The nearest Confederate brigades, attempting to oppose the advance at Port Gibson, were driven back. Grant had now deliberately placed himself in the middle of the enemy, and although his engineers had opened up a water-line for the barges carrying his supplies from Milliken's Bend to New Carthage, his long line of supply curving round the enemy's flank was very exposed. But his resolute purpose outweighed all text-book strategy. Having crossed the Mississippi, he collected wheeled transport for five days' rations, and on Sherman's arrival cut loose from his base altogether (May 7th). Free to move, he aimed north from the Big Black river, so as to interpose between the Confederate forces at Vicksburg and those at Jackson. A fight took place at Raymond on the 12th of May, and Jackson was captured just in time to forestall the arrival of reinforcements for Pemberton under General Joseph E. Johnston. The latter, being in supreme command of the Confederates, ordered Pemberton to come out of Vicksburg and attack Grant. But Pemberton did not do so until it was too late. On May 16th Grant, with all his forces well in hand, defeated him in the battle of Champion Hill with a loss of nearly 4000 men, and sharply pursuing him drove him into Vicksburg. By the 19th of May Vicksburg and Pemberton's army in it was invested by land and water. Grant promptly assaulted his works, but was repulsed with loss (May 19th); the assault was repeated on the 22nd of May with the same result, and Grant found himself compelled to resort to a blockade. Reinforcements were hurried up from all quarters, Johnston's force (east of Jackson), was held off by a covering corps under Blair (afterwards under Sherman), and though another unsuccessful assault was made on the 25th of June, resistance was almost at an end. On the 4th of July, the day after, far away in Pennsylvania, the great battle of Gettysburg had closed with Lee's defeat, the garrison of Vicksburg, 37,000 strong, surrendered.

VICO, GIOVANNI BATTISTA (1668–1744), Italian jurist and philosopher, was born at Naples on the 23rd of June 1668. At the university he made rapid progress, especially in jurisprudence, though preferring the study of history, literature, juridical science and philosophy. Being appointed tutor to the nephews of the bishop of Ischia, G. B. Rocca, he accompanied them to the castle of Vatolla, near Cilento, in the province of Salerno. There he passed nine studious years, chiefly devoted to classical reading, Plato and Tacitus being his favourite authors, because "the former described the ideal man, and the latter man as he really is." On his return to Naples he found himself out of touch with the prevailing Cartesianism, and lived quietly until in 1697 he gained the professorship of rhetoric at the university, with a scanty stipend of 100 scudi. On this he supported a growing family and gave himself to untiring study. Two authors exercised a weighty influence on his mind—Francis Bacon and Grotius. He was no follower of their ideas, indeed often opposed to them; but he derived from Bacon an increasing stimulus towards the investigation of certain great problems of history and philosophy, while Grotius proved valuable in his study of philosophic jurisprudence. In 1708 he published his *De ratione studiorum*, in 1710 *De antiquissima Italorum sapientia*, in 1720 *De universi juris uno principio et fine uno*, and in 1721 *De constantia jurisprudentis*. On the strength of these works he offered himself as a candidate for the university chair of jurisprudence, but as he had no personal or family influence was not elected. With calm courage he returned to his poverty and his favourite studies, and in 1725 published the first edition of the work that forms the basis of his renown, *Principii d' una scienza nuova*. In 1730 he produced a second edition of the *Scienza nuova*, so much altered in style and with so many substantial additions that it was practically a new work. In 1735 Charles III. of Naples marked his recognition of Vico's merits by appointing him historiographer-royal, with a yearly stipend of 100 ducats. Soon after his mind began to give way, but during frequent intervals of lucidity he made new corrections in his great work, of which a third edition appeard in 1744, prefaced by a letter of dedication to Cardinal Trojano Acquaviva. He died on the 20th of January of the same year. Fate seemed bent on persecuting him to the last. A fierce quarrel arose over his burial between the brotherhood of St Stephen, to which he had belonged, and the university professors, who desired to escort his corpse to the grave. Finally the canons of the cathedral, together with the professors, buried the body in the church of the Gerolimini.

Vico has been generally described as a solitary soul, out of harmony with the spirit of his time and often directly opposed to it. Yet a closer inquiry into the social conditions of Vico's time, and of the studies then flourishing, shows him to have been thoroughly in touch with them.

Owing to the historical past of Naples, and its social and economic condition at the end of the 17th century, the only study that really flourished there was that of law; and this soon penetrated from the courts to the university, and was raised to the level of a science. A great school of jurisprudence was thus formed, including many men of vast learning and great ability, although little known outside their immediate surroundings. Three men, however, obtained a wider recognition. By his exposition of the political history of the kingdom, based on a study of its laws and institutions and of the legal conflicts between the state and the court of Rome, Pietro Giannone was the initiator of what has been since known as civil history. Giovan Vincenzo Gravina wrote a history of Roman law, specially distinguished for its accuracy and elegance. Vico raised the problem to a higher plane, by tracing the origin of law in the human mind and explaining the historical changes of the one by those of the other. Thus he made the original discovery of certain ideas which constitute the modern psychologico-historic method. This problem he proceeded to develop in various works, until in his *Scienza nuova* he arrived at a more complete solution, which may be formulated as follows: If the principle of justice and law be one, eternal and immutable, why should there be so many different codes of legislation? These differences are not caused by difference of nationality only, but are to be noted in the history of the same people, even in that of the Romans. This problem is touched upon in his *Orations or Inaugural Addresses* (*Orazioni o Prolusioni*) and in his *Minor Works* (*Scritti minori*). Finally he applied himself to its solution in his *Universal Law* (*Diritto universale*), which is divided into two books. The first of these, *De uno et universi juris principio et fine uno*, was subdivided into two parts; so likewise was the second, with the respective titles of *De constantia philologiae* and *De constantia jurisprudentis*.

The following is the general idea derived from these researches. Vico held God to be the ruler of the world of nations, but ruling, not as the providence of the middle ages by means of continued miracles, but as He rules nature, by means of natural laws. If, therefore, the physicist seeks to discover the laws of nature by study of natural phenomena, so the philosopher must seek the laws of historical change by the investigation of human events and of the human mind. According to Vico, law emanates from the conscience of mankind, in whom God has infused a sentiment of justice and is therefore in close and continual relation with the human mind, and participates in its changes. This sentiment of justice is at first confused, uncertain and almost instinctive—is, as it were, a divine and religious inspiration instilled by Heaven into the primitive tribes of the earth. It is an unconscious, universal sentiment, not the personal, conscious and rational sentiment of the superior few. Hence the law to which it gives birth is enwrapped in religious forms which are likewise visible and palpable, inasmuch as primitive man is incapable of abstract, philosophical ideas. This law is not the individual work of any philosophical legislator, for no man was, or could be, a philosopher at that time. It is first displayed in the shape of natural and necessary usages consecrated by religion. The names of leading legislators, which we so often find recorded in the history of primitive peoples, are symbols and myths, merely serving to mark an historic period or epoch by some definite and personal denomination. For nations, or rather tribes, were then distinguished by personal names only. The first obscure and confused conception of law gradually becomes clearer and better defined. Its visible and religious forms then give way to abstract formulae, which in their turn are slowly replaced by the rational manifestation of the philosophic principles of law that gains the victory in the final stage of development, designated by Vico as that of civil and human law. This is the period of individual and philosophic legislators. Thus Roman law has passed through three great periods—the divine, the heroic and the human—which are likewise the three chief periods of the history of Rome, with which it is intimately and intrinsically connected. Nevertheless, on careful examination of these three successive stages, it will easily be seen that, in spite of the apparent difference between them, all have a common foundation, source and purpose. The human and civil philosophic law of the third period is assuredly very different in form from the primitive law; but in substance it is merely the abstract, scientific and philosophic manifestation of the same sentiment of justice and the same principles which were vaguely felt in primitive times. Hence one development of law may be easily translated into another. Thus in the varied manifestations of law Vico was able to discover a single and enduring principle (*De universi juris uno principio et fine uno*). On these grounds it has been sought to establish a close relation between Vico and Grotius. The latter clearly distinguished between a positive law differing in different nations and a natural law based on a general and unchanging principle of human nature, and therefore obligatory upon all. But Vico was opposed to Grotius, especially as regards his conception of the origin of society, and therefore of law. Grotius holds that its origin was not divine, but human, and neither collective, spontaneous nor unconscious, but personal, rational and conscious. He believed, moreover, that natural law and positive law moved on almost constant and immutable parallel lines. But Vico maintained that the one was continually progressing towards the other, positive law showing an increasing tendency to draw nearer to natural and rational law. Hence the conception that law is of necessity a spontaneous birth, not the creation of any individual legislator; and hence the idea that it necessarily proceeds by a natural and logical process of evolution constituting its history. Vico may have derived from Grotius the idea of natural law, but his discovery of the historic evolution of law was first suggested to him by his study of Roman law. He saw that the history of Roman jurisprudence was a continuous progress of the narrow, rigorous, primitive and almost iron law of the XII. Tables towards the wider, more general and more humane *jus gentium*. Having once derived this conception from Roman history, he was easily and indeed necessarily carried on to the next—that the positive law of all nations, throughout history, is a continual advance, keeping pace with the progress of civilization, towards the philosophic and natural law founded on the principles of human nature and human reason.

As already stated, the *Scienza nuova* appeared in three different editions. The third may be disregarded; but the first and second editions are almost distinct works. In the former the author sets forth the analytical process by which the laws he discovered were deduced from facts. In the second he not only enlarges his matter and gives multiplied applications of his ideas, but also follows the synthetic method, first expounding the laws he had discovered and then proving them by the facts to which they are applied. In this edition the fragmentary and jerky arrangement, the intricate style, and a peculiar and often purely conventional terminology seriously checked the diffusion of the work, which accordingly was little studied in Italy and remained almost unknown to the rest of Europe. Its fundamental idea consists in that which Vico, in his peculiar terminology, styles "poetical wisdom" (*sapienza poetica*) and "occult wisdom" (*sapienza riposta*), and in the historical process by which the one is merged in the other. He frequently declares that this discovery was the result of the literary labours of his whole life.

Vico was the first thinker who asked, Why have we a science of nature, but no science of history? Because our glance can easily be turned outwards and survey the exterior world; but it is far harder to turn the mind's eye inwards and contemplate the world of the spirit. All our errors in explaining the origin of human society arise from our obstinacy in believing that primitive man was entirely similar to ourselves, who are civilized, *i.e.* developed by the results of a lengthy process of anterior historic evolution. We must learn to issue from ourselves, transport ourselves back to other times, and become children again in order to comprehend the infancy of the human race. As in children, imagination and the senses prevailed in those men of the past. They had no abstract ideas; in their minds all was concrete, visible and tangible. All the phenomena, forces and laws of nature, together with mental conceptions, were alike personified. To suppose that all mythical stories are fables invented by the philosophers is to write history backwards and confound the instinctive, impersonal, poetic wisdom of the earliest times with the civilized, rational and abstract occult wisdom of our own day. But how can we explain the formation of this poetic wisdom, which, albeit the work of ignorant men, has so deep and intrinsic a philosophic value? The only possible reply is that already given when treating of the origin of law. Providence has instilled into the heart of man a sentiment of justice and goodness, of beauty and of truth, that is manifested differently at different times. The ideal truth within us, constituting the inner life that is studied by philosophers, becomes transmuted by the facts of history into assured reality. For Vico psychology and history were the two poles of the new world he discovered. After having extolled the work of God and proclaimed Him the source of all knowledge, he adds that a great truth is continually flashed on us and proved to us by history, namely, "that this world of nations is the work of man, and its explanation therefore only to be found in the mind of man." Thus poetical wisdom, appearing as a spontaneous emanation of the human conscience, is almost the product of divine inspiration. From this, by the aid of civilization, reason and philosophy, there is gradually developed the civil, occult wisdom. The continual, slow and laborious progress from the one to the other is that which really constitutes history, and man becomes civilized by rendering himself the conscious and independent possessor of all that in poetical wisdom remained impersonal, unconscious, that came, as it were, from without by divine *afflatus*.

Vico gives many applications of this fundamental idea. The religion of primitive peoples is no less mythical than their history, since they could only conceive of it by means of myths. On these lines he interprets the whole history of primitive Rome. One book of the second edition of the *Scienza nuova* is devoted to "The Discovery of the True Homer." Why all the cities of Greece dispute the honour of being his birthplace is because the *Iliad* and the *Odyssey* are not the work of one, but of many popular poets, and a true creation of the Greek people which is in every city of Greece. And because the primitive peoples are unconscious and self-ignorant Homer is represented as being blind. In all parts of history in which he was best versed Vico pursues a stricter and more scientific method, and arrives at safer conclusions. This is the case in Roman history, especially in such portions as related to the history of law. Here he sometimes attains, even in details, to divinations of the truth afterwards confirmed by new documents and later research. The aristocratic origin of Rome, the struggle between the patricians and the plebeians, the laws of the XII. Tables, not, as tradition would have it, imported from Greece, but the natural and spontaneous product of ancient Roman customs, and many other similar theories were discovered by Vico, and expounded with his usual originality, though not always without blunders and exaggerations.

Vico may be said to base his considerations on the history of two nations. The greater part of his ideas on poetical wisdom were derived from Greece. Nearly all the rest, more especially the transition from poetical to occult wisdom, was derived from Rome. Having once formulated his idea, he made it more general in order to apply it to the history of all nations. From the savage state, through the terror that gives birth to religions, through the creation of families by marriage, through burial rites and piety towards the dead, men approach civilization with the aid of poetic wisdom, and pass through three periods—the divine, heroic and human—in which they have three forms of government, language, literature, jurisprudence and civilization. The primary government is aristocratic. Patrician tyranny rouses the populace to revolt, and then democratic equality is established under a republic. Democratic excesses cause the rise of an empire, which, becoming corrupt, declines into barbarism, and, again emerging from it, retraces the same course. This is the *law of cycles*, constituting that which is designated by Vico as the "eternal ideal history, or rather course of humanity, invariably followed by all nations." It must not be held to imply that one nation imitates the course pursued by another, nor that the points of resemblance between them are transmitted by tradition from one to the other, but merely that all are subject to one law, inasmuch as this is based on the human nature common to all alike. Thus, while on the one hand the various cycles traced and retraced by all nations are similar and yet independent, on the other hand, being actually derived from Roman history, they become converted in the *Scienza nuova* into a bed of Procrustes, to which the history of all nations has to be fitted by force. And wherever Vico's historical knowledge failed he was led into increased error by this artificial and arbitrary effort.

It has been justly observed by many that this continuous cyclical movement entirely excludes the progress of humanity towards a better future. It has been replied that these cycles are similar without being identical, and that, if one might differ from another, the idea of progress was not necessarily excluded by the law of cycles. Vico undoubtedly considered the poetic wisdom of the Middle Ages to be different from that of the Greeks and Romans, and Christianity to be very superior to the pagan religion. But he never investigated the question whether, since there is a law of progressive evolution in the history of different nations, separately examined, there may not likewise be another law ruling the general history of these nations, every one of which must have represented a new period, as it were, in the history of humanity at large. Therefore, although the *Scienza nuova* cannot be said absolutely to deny the law of progress, it must be allowed that Vico not only failed to solve the problem but even shrank from attacking it.

Vico founded no school, and though during his lifetime and for a while after his death he had many admirers both in Naples and the northern cities, his fame and name were soon obscured, especially as the Kantian system dominated the world of thought. At the beginning of the 19th century, however, some Neapolitan exiles at Milan called attention to the merits of their great countryman, and his reinstatement was completed by Michelet, who in 1827 translated the *Scienza nuova* and other works with a laudatory introduction. Vico's writings suffer through their author's not having followed a regular course of studies, and his style is very involved. He was a deeply religious man, but his exemption of Jewish origins from the canons of historical inquiry which he elsewhere applied was probably due to the conditions of his age, which preceded the dawn of Semitic investigation and regarded the Old Testament and the Hebrew religion as *sui generis*.

For Vico's personal history see his autobiography, written at the request of the Conte di Porcia, and his letters; also Cantoni, *G. B. Vico, Studii Critici e Comparativi* (Turin, 1867); R. Flint, *Vico* (Edinburgh and London, 1884). For editions of Vico's own works, see *Opere*, ed. Giuseppe Ferrari, with introductory essay, "La Mente de Vico" (6 vols., Milan, 1834–35), and Michelet, *Œuvres Choisies de Vico* (2 vols., Paris, 1835). A full list is given in B. Croce, *Bibliografia Vichiana* (Naples, 1904). See also O. Klemm, *G. B. Vico als Geschichtsphilosoph und Völkerpsycholog* (Leipzig, 1906); M. H. Rafferty in *Journal of the Society of Comparative Legislation, New Series*, xvii., xx.

VICTOR, the name taken by three popes and two antipopes.

Victor I. was bishop of Rome from about 190 to 198. He submitted to the opinion of the episcopate in the various parts of Christendom the divergence between the Easter usage of Rome and that of the bishops of Asia. The bishops, particularly St Irenaeus of Lyons, declared themselves in favour of the usage of Rome, but refused to associate themselves with the excommunication pronounced by Victor against their Asiatic colleagues. At Rome Victor excommunicated Theodotus of Byzantium on account of his doctrine as to the person of Christ. St Jerome attributes to Victor some *opuscula* in Latin, which are believed to be recognized in certain apocryphal treatises of St Cyprian.

Victor II., the successor of Leo IX., was consecrated in St Peter's, Rome, on the 13th of April 1055. His father was a Swabian baron, Count Hartwig von Calw, and his own baptismal name was Gebhard. At the instance of Gebhard, bishop of Regensburg, uncle of the emperor Henry III., he had been appointed while still a young man to the see of Eichstädt; in this position his great talents soon enabled him to render important services to Henry, whose chief adviser he ultimately became. His nomination to the papacy by Henry, at Mainz, in September 1054, was made at the instance of a Roman deputation headed by Hildebrand, whose policy doubtless was to detach from the imperial interest one of its ablest supporters. In June 1055 Victor met the emperor at Florence, and held a council, which anew condemned clerical marriages, simony and the alienation of the estates of the church. In the following year he was summoned to Germany to the side of the emperor, and was with him when he died at Botfeld in the Harz on the 5th of October 1056. As guardian of Henry's infant son, and adviser of the empress Agnes, Victor now wielded enormous power, which he began to use with much tact for the maintenance of peace throughout the empire and for strengthening the papacy against the aggressions of the barons. He died shortly after his return to Italy, at Arezzo, on the 28th of July 1057. His successor was Stephen IX. (Frederick of Lorraine). (L. D.*)

Victor III. (Dauferius Epifani), pope from the 24th of May 1086 to the 16th of September 1087, was the successor of Gregory VII. He was a son of Landolfo V., prince of Benevento, and was born in 1027. After studying in various monasteries he became provost of St Benedict at Capua, and in 1055 obtained permission from Victor II. to enter the cloister at Monte Cassino, changing his name to Desiderius. He succeeded Stephen IX. as abbot in 1057, and his rule marks the golden age of that celebrated monastery; he promoted literary activity, and established an important school of mosaic. Desiderius was created cardinal priest of Sta Cecilia by Nicholas II. in 1059, and as papal vicar in south Italy conducted frequent negotiations between the Normans and the pope. Among the four men suggested by Gregory VII. on his death-bed as most worthy to succeed him was Desiderius, who was favoured by the cardinals because of his great learning, his connexion with the Normans and his diplomatic ability. The abbot, however, declined the papal crown, and the year 1085 passed without an election. The cardinals at length proclaimed him pope against his will on the 24th of May 1086, but he was driven from Rome by imperialists before his consecration was complete, and, laying aside the papal insignia at Terracina, he retired to his beloved monastery. As vicar of the Holy See he convened a synod at Capua on the 7th of March 1087, resumed the papal insignia on the 21st of March, and received tardy consecration at Rome on the 9th of May. Owing to the presence of the antipope, Clement III. (Guibert of Ravenna), who had powerful partisans, his stay at Rome was brief. He sent an army to Tunis, which defeated the Saracens and compelled the sultan to pay tribute to the papal see. In August 1087 he held a synod at Benevento, which renewed the excommunication of Guibert; banned Archbishop Hugo of Lyons and Abbot Richard of Marseilles as schismatics; and confirmed the prohibition of lay investiture. Falling ill at the synod, Vicar returned to Monte Cassino, where he died on the 16th of September 1087. He was buried at the monastery and is accounted a saint by the Benedictine order. His successor was Urban II.

Victor III., while abbot of Monte Cassino contributed personally to the literary activity of the monastery. He wrote *Dialogi de miraculis S. Benedicti*, which, along with his *Epistolae*, are in J. P. Migne, *Patrol. Lat.* vol. 149, and an account of the miracles of Leo IX. (in *Acta Sanctorum*, 19th of April). The chief sources for his life are the "Chronica monasterii Casinensis," in the *Mon. Germ. hist. Script.* vii., and the Vitae in J. P. Migne, *Patrol. Lat.* vol. 149, and in J. M. Watterich, *Pontif. Roman. Vitae*.

See J. Langen, *Geschichte der römischen Kirche von Gregor VII. bis Innocenz III.* (Bonn, 1893); F. Gregorovius, *Rome in the Middle Ages*, vol. 4, trans. by Mrs G. W. Hamilton (London, 1900–2); K. J. von Hefele, *Conciliengeschichte* (2nd ed., 1873–90), vol. 5; Hirsch, "Desiderius von Monte Cassino als Papst Victor III.," in *Forschungen zur deutschen Geschichte*, vol. 7 (Göttingen, 1867); H. H. Milman, *History of Latin Christianity*, vol. 3 (repub. London, 1899).

Victor IV. was a title taken by two antipopes. (1) Gregorio Conti, cardinal priest of Santi Dodici Apostoli, was chosen by a party opposed to Innocent II. in succession to the antipope Anacletus II., on the 15th of March 1138, but through the influence of Bernard of Clairvaux he was induced to make his submission on the 29th of May. (2) Octavian, count of Tusculum and cardinal deacon of St Nicola in carcere Tulliano, the Ghibelline antipope, was elected at Rome on the 7th of September 1159, in opposition to Alexander III., and supported by the emperor Frederick Barbarossa. Consecrated at Farfa on the 4th of October, Victor was the first of the series of antipopes supported by Frederick against Alexander III. Though the excommunication of Frederick by Alexander in March 1160 made only a slight impression in Germany, this pope was nevertheless able to gain the support of the rest of western Europe, because since the days of Hildebrand the power of the pope over the church in the various countries had increased so greatly that the kings of France and of England could not view with indifference a revival of such imperial control of the papacy as had been exercised by the emperor Henry III. He died at Lucca on the 20th of April 1164 and was succeeded by the antipope Paschal III. (1164–1168).

See M. Meyer, *Die Wahl Alexanders III. und Victors IV. 1159* (Göttingen, 1871); and A. Hauck, *Kirchengeschichte Deutschlands*, Band iv. (C. H. Ha.)

VICTOR, GAIUS JULIUS (4th cent. A.D.), Roman writer on rhetoric, possibly of Gallic origin. His extant manual (in C. Halm's *Rhetores Latini Minores*, 1863) is of some importance as facilitating the textual criticism of Quintilian, whom he closely follows in many places.

VICTOR, SEXTUS AURELIUS, prefect of Pannonia about 360 (Amm. Marc. xxi. 10), possibly the same as the consul (jointly with Valentinian) in 373 and as the prefect of the city who is mentioned in an inscription of the time of Theodosius. Four small historical works have been ascribed to him on more or less doubtful grounds—(1) *Origo Gentis Romanae*, (2) *De Viribus Illustribus Romae*, (3) *De Caesaribus*, (4) *De Vita et Moribus Imperatorum Romanorum excerpta ex Libris Sex. Aur. Victoris*. The four have generally been published together under the name *Historia Romana*, but the fourth piece is a *réchauffé* of the third. The second was first printed at Naples about 1472, in 4to, under the name of Pliny (the younger), and the fourth at Strassburg in 1505.

The first edition of all four was that of A. Schottus (8vo, Antwerp, 1579). The most recent edition of the *De Caesaribus* is by F. Pichlmayr (Munich, 1892).

VICTOR AMEDEUS II. (1666–1732), duke of Savoy and first king of Sardinia, was the son of Duke Charles Emmanuel II. and Jeanne de Savoie-Nemours. Born at Turin, he lost his father in 1675, and spent his youth under the regency of his mother, known as "Madama Reale" (madame royale), an able but ambitious and overbearing woman. He assumed the reins of government at the age of sixteen, and married Princess Anne, daughter of Philip of Orleans and Henrietta of England, and niece of Louis XIV., king of France. That sovereign was determined to dominate the young duke of Savoy, who from the first resented the monarch's insolent bearing. In 1685 Victor was forced by Louis to persecute his Waldensian subjects, because they had given shelter to the French Huguenot refugees after the revocation of the edict of Nantes. With the unwelcome help of a French army under Marshal Catinat, he invaded the Waldensian valleys, and after a difficult campaign, characterized by great cruelty, he subjugated them. Nevertheless, he became more anxious than ever to emancipate himself from French thraldom, and his first sign of independence was his visit to Venice in 1687, where he conferred on political affairs with Prince Eugène of Savoy and other personages, without consulting Louis. About this time the duke plunged into a whirl of dissipation, and chose the beautiful but unscrupulous Contessa di Verrua as his mistress, neglecting his faithful and devoted wife. Louis having discovered Victor's intrigues with the emperor, tried to precipitate hostilities by demanding his participation in a second expedition against the Waldensians. The duke unwillingly complied, but when the French entered Piedmont and demanded the cession of the fortresses of Turin and Verrua, he refused, and while still professing to negotiate with Louis, joined the league of Austria, Spain and Venice. War was declared in 1690, but at the battle of Staffarda (18th of August 1691), Victor, in spite of his great courage and skill, was defeated by the French under Catinat. Other reverses followed, but the attack on Cuneo was heroically repulsed by the citizens. The war dragged on with varying success, until the severe defeat of the allies at Marsiglia and their selfish neglect of Victor's interests induced him to open negotiations with France once more. Louis agreed to restore most of the fortresses he had captured and to make other concessions; a treaty was signed in 1696, and Victor appointed generalissimo of the Franco-Piedmontese forces in Italy operating against the imperialists. By the treaty of Ryswick (1697) a general peace was concluded. On the outbreak of the war of the Spanish Succession in 1700 the duke was again on the French side, but the insolence of Louis and of Philip V. of Spain towards him induced him, at the end of the two years for which he had bound himself to them, to go over to the imperialists (1704). At first the French were successful and captured several Piedmontese fortresses, but after besieging Turin, which was skilfully defended by the duke, for several months, they were completely defeated by Victor and Prince Eugène of Savoy (1706), and eventually driven out of the other towns they had captured. By the peace of Utrecht (1713) the Powers conferred the kingdom of Sicily on Victor Amedeus, whose government proved efficient and at first popular. But after a brief stay in the island he returned to Piedmont and left his new possessions to a viceroy, which caused much discontent among the Sicilians; and when the Quadruple Alliance decreed in 1718 that Sicily should be restored to Spain, Victor was unable to offer any opposition, and had to content himself with receiving Sardinia in exchange.

The last years of Victor Amedeus's life were saddened by domestic troubles. In 1715 his eldest son died, and in 1728 he lost his queen. After her death, much against the advice of his remaining son and heir, Carlino (afterwards Charles Emmanuel III.), he married the Contessa di San Sebastiano, whom he created Marchesa di Spigno, abdicated the crown and retired to Chambéry to end his days (1730). But his second wife, an ambitious *intrigante*, soon tired of her quiet life, and induced him to return to Turin and attempt to revoke his abdication. This led to a quarrel with his son, who with quite unnecessary harshness, partly due to his minister the Marquis d'Ormea, arrested his father and confined him at Rivoli and later at Moncalieri; there Victor, overwhelmed with sorrow, died on the 31st of October 1732.

Victor Amedeus, although accused not without reason of bad faith in his diplomatic dealings and of cruelty, was undoubtedly a great soldier and a still greater administrator. He not only won for his country a high place in the council of nations, but he doubled its revenues and increased its prosperity and industries, and he also emphasized its character as an Italian state. His infidelity to his wife and his harshness towards his son Carlino are blemishes on a splendid career, but he more than expiated these faults by his tragic end.

See D. Carutti, *Storia del Regno di Vittorio Amedeo II.* (Turin, 1856); and E. Parri, *Vittorio Amedeo II. ed Eugenio di Savoia* (Milan, 1888). The Marchesa Vitelleschi's work, *The Romance of Savoy* (2 vols., London, 1905), is based on original authorities, and is the most complete monograph on the subject.

VICTOR EMMANUEL II. (1820–1878), king of Sardinia and first king of Italy, was born at Turin on the 14th of March 1820, and was the son of Charles Albert, prince of Savoy-Carignano, who became king of Sardinia in 1831. Brought up in the bigoted and chilling atmosphere of the Piedmontese court, he received a rigid military and religious training, but little intellectual education. In 1842 he was married to Adelaide, daughter of the Austrian Archduke Rainer, as the king desired at that time to improve his relations with Austria. The young couple led a somewhat dreary life, hidebound by court etiquette, which Victor Emmanuel hated. He played no part in politics during his father's lifetime, but took an active interest in military matters. When the war with Austria broke out in 1848, he was delighted at the prospect of distinguishing himself, and was given the command of a division. At Goito he was slightly wounded and displayed great bravery, and after Custozza defended the rearguard to the last (25th of July 1848). In the campaign of March 1849 he commanded the same division. After the disastrous defeat at Novara on the 23rd of March, Charles Albert, having rejected the peace terms offered by the Austrian field-marshal Radetzky, abdicated in favour of his son, and withdrew to a monastery in Portugal, where he died a few months later. Victor Emmanuel repaired to Radetzky's camp, where he was received with every sign of respect, and the field-marshal offered not only to waive the claim that Austria should occupy a part of Piedmont, but to give him an extension of territory, provided he revoked the constitution and substituted the old blue Piedmontese flag for the Italian tricolour, which savoured too much of revolution. But although the young king had not yet sworn to observe the charter, and in any case the other Italian princes had all violated their constitutional promises, he rejected the offer. Consequently he had to agree to the temporary Austrian occupation of the territory comprised within the Po, the Sesia and the Ticino, and of half the citadel of Alessandria, to disband his Lombard, Polish and Hungarian volunteers, and to withdraw his fleet from the Adriatic; but he secured an amnesty for all the Lombards compromised in the recent revolution, having even threatened to go to war again if it were not granted. It was the maintenance of the constitution in the face of the overwhelming tide of reaction that established his position as the champion of Italian freedom and earned him the sobriquet of *Rè Galantuomo* (the honest king). But the task entrusted to him was a most difficult one: the army disorganised, the treasury empty, the people despondent if not actively disloyal, and he himself reviled, misunderstood, and, like his father, accused of treachery. Parliament having rejected the peace treaty; the king dissolved the assembly; in the famous proclamation from Moncalieri he appealed to the people's loyalty, and the new Chamber ratified the treaty (9th of January 1850). This same year, Cavour (*q.v.*) was appointed minister of agriculture in D'Azeglio's cabinet, and in 1852, after the fall of the latter, he became prime minister, a post which with brief interruptions he held until his death.

In having Cavour as his chief adviser Victor Emmanuel was most fortunate, and but for that statesman's astounding diplomatic genius the liberation of Italy would have been impossible. The years from 1850 to 1859 were devoted to restoring the shattered finances of Sardinia, reorganizing the army and modernizing the antiquated institutions of the kingdom. Among other reforms the abolition of the *foro ecclesiastico* (privileged ecclesiastical courts) brought down a storm of hostility from the Church both on the king and on Cavour, but both remained firm in sustaining the prerogatives of the civil power. When the Crimean War broke out, the king strongly supported Cavour in the proposal that Piedmont should join France and England against Russia so as to secure a place in the councils of the great Powers and establish a claim on them for eventual assistance in Italian affairs (1854). The following year Victor Emmanuel was stricken with a threefold family misfortune; for his mother, the Queen Dowager Maria Teresa, his wife, Queen Adelaide, and his brother Ferdinand, duke of Genoa, died within a few weeks of each other. The clerical party were not slow to point to this circumstance as a judgment on the king for what they deemed his sacrilegious policy. At the end of 1855, while the allied troops were still in the East, Victor Emmanuel visited Paris and London, where he was warmly welcomed by the emperor Napoleon III. and Queen Victoria, as well as by the peoples of the two countries.

Victor Emmanuel's object now was the expulsion of the Austrians from Italy and the expansion of Piedmont into a North Italian kingdom, but he did not regard the idea of Italian unity as coming within the sphere of practical politics for the time being, although a movement to that end was already beginning to gain ground. He was in communication with some of the conspirators, especially with La Farina, the leader of the *Società Nazionale*, an association the object of which was to unite Italy under the king of Sardinia, and he even communicated with Mazzini and the republicans, both in Italy and abroad, whenever he thought that they could help in the expulsion of the Austrians from Italy. In 1859 Cavour's diplomacy succeeded in drawing Napoleon III. into an alliance against Austria, although the king had to agree to the cession of Savoy and possibly of Nice and to the marriage of his daughter Clothilde to Prince Napoleon. These conditions were very painful to him, for Savoy was the hereditary home of his family, and he was greatly attached to Princess Clothilde and disliked the idea of marrying her to a man who gave little promise of proving a good husband. But he was always ready to sacrifice his own personal feelings for the good of his country. He had an interview with Garibaldi and appointed him commander of the newly raised volunteer corps, the *Cacciatori delle Alpi*. Even then Napoleon would not decide on immediate hostilities, and it required all Cavour's genius to bring him to the point and lead Austria into a declaration of war (April 1859). Although the Franco-Sardinian forces were successful in the field, Napoleon, fearing an attack by Prussia and disliking the idea of a too powerful Italian kingdom on the frontiers of France, insisted on making peace with Austria, while Venetia still remained to be freed. Victor Emmanuel, realizing that he could not continue the campaign alone, agreed most unwillingly to the armistice of Villafranca. When Cavour heard the news he hurried to the king's headquarters at Monzambano, and in violent, almost disrespectful language implored him to continue the campaign at all hazards, relying on his own army and the revolutionary movement in the rest of Italy. But the king on this occasion showed more political insight than his great minister and saw that by adopting the heroic course proposed by the latter he ran the risk of finding Napoleon on the side of the enemy, whereas by waiting all might be gained. Cavour resigned office, and by the peace of Zürich (10th of November 1859) Austria ceded Lombardy to Piedmont but retained Venetia; the central Italian princes who had been deposed by the revolution were to be reinstated, and Italy formed into a confederation of independent states. But this solution was most unacceptable to Italian public opinion, and both the king and Cavour determined to assist the people in preventing its realization, and consequently entered into secret relations with the revolutionary governments of Tuscany, the duchies and of Romagna. As a result of the events of 1859–60, those provinces were all annexed to Piedmont, and when Garibaldi decided on the Sicilian expedition Victor Emmanuel assisted him in various ways. He had considerable influence with Garibaldi, who, although in theory a republican, was greatly attached to the bluff soldier-king, and on several occasions restrained him from too foolhardy courses. When Garibaldi having conquered Sicily was determined to invade the mainland possessions of Francis II. of Naples, Victor Emmanuel foreseeing international difficulties wrote to the chief of the red shirts asking him not to cross the Straits; but Garibaldi, although acting throughout in the name of His Majesty, refused to obey and continued his victorious march, for he knew that the king's letter was dictated by diplomatic considerations rather than by his own personal desire. Then, on Cavour's advice, King Victor decided to participate himself in the occupation of Neapolitan territory, lest Garibaldi's entourage should proclaim the republic or create anarchy. When he accepted the annexation of Romagna offered by the inhabitants themselves the pope excommunicated him, but, although a devout Catholic, he continued in his course undeterred by ecclesiastical thunders, and led his army in person through the Papal States, occupying the Marches and Umbria, to Naples. On the 29th of October he met Garibaldi, who handed over his conquests to the king. The whole peninsula, except Rome and Venice, was now annexed to Piedmont, and on the 18th of February 1861 the parliament proclaimed Victor Emmanuel king of united Italy.

The next few years were occupied with preparations for the liberation of Venice, and the king corresponded with Mazzini, Klapka, Türr and other conspirators against Austria in Venetia itself, Hungary, Poland and elsewhere, keeping his activity secret even from his own ministers. The alliance with Prussia and the war with Austria of 1866, although fortune did not favour Italian arms, added Venetia to his dominions.

The Roman question yet remained unsolved, for Napoleon, although he had assisted Piedmont in 1859 and had reluctantly consented to the annexation of the central and southern provinces, and of part of the Papal States, would not permit Rome to be occupied, and maintained a French garrison there to protect the pope. When war with Prussia appeared imminent he tried to obtain Italian assistance, and Victor Emmanuel was very anxious to fly to the assistance of the man who had helped him to expel the Austrians from Italy, but he could not do so unless Napoleon gave him a free hand in Rome. This the emperor would not do until it was too late. Even after the first French defeats the chivalrous king, in spite of the advice of his more prudent councillors, wished to go to the rescue, and asked Thiers, the French representative who was imploring him for help, if with 100,000 Italian troops France could be saved, but Thiers could give no such undertaking and Italy remained neutral. On the 20th of September 1870, the French troops having been withdrawn, the Italian army entered Rome, and on the 2nd of July 1871 Victor Emmanuel made his solemn entry into the Eternal City, which then became the capital of Italy.

The pope refused to recognize the new kingdom even before the occupation of Rome, and the latter event rendered relations between church and state for many years extremely delicate. The king himself was anxious to be reconciled with the Vatican, but the pope, or rather his entourage, rejected all overtures, and the two sovereigns dwelt side by side in Rome until death without ever meeting. Victor Emmanuel devoted himself to his duties as a constitutional king with great conscientiousness, but he took more interest in foreign than in domestic politics and contributed not a little to improving Italy's international position. In 1873 he visited the emperor Francis Joseph at Vienna and the emperor William at Berlin. He received an enthusiastic welcome in both capitals, but the visit to Vienna was never returned in Rome, for Francis Joseph as a Catholic sovereign feared to offend the pope, a circumstance which served to embitter Austro-Italian relations. On the 9th of January 1878, Victor Emmanuel died of fever in Rome, and was buried in the Pantheon. He was succeeded by his son Humbert.

Bluff, hearty, good-natured and simple in his habits, yet he always had a high idea of his own kingly dignity, and his really statesmanlike qualities often surprised foreign diplomats, who were deceived by his homely exterior. As a soldier he was very brave, but he did not show great qualities as a military leader in the campaign of 1866. He was a keen sportsman and would spend many days at a time pursuing chamois or steinbock in the Alpine fastnesses of Piedmont with nothing but bread and cheese to eat. He always used the dialect of Piedmont when conversing with natives of that country, and he had a vast fund of humorous anecdotes and proverbs with which to illustrate his arguments. He had a great weakness for female society, and kept several mistresses; one of them, the beautiful Rosa Vercellone, he created Countess Mirafiori e Fontanafredda and married morganatically in 1869; she bore him one son.

BIBLIOGRAPHY.—Besides the general works on Italy and Savoy see V. Bersezio, *Il Regno di Vittorio Emanuele II.* (8 vols., Turin, 1869); G. Massari, *La Vita ed il Regno di Vittorio Emanuele II.* (2 vols., Milan, 1878); N. Bianchi, *Storia della Diplomazia Europea in Italia* (8 vols., Turin, 1865). (L. V.*)

VICTOR EMMANUEL III. (1869–   ), king of Italy, son of King Humbert I. and Queen Margherita of Savoy, was born at Naples on the 11th of November 1869. Carefully educated by his mother and under the direction of Colonel Osio, he outgrew the weakness of his childhood and became expert in horsemanship and military exercises. Entering the army at an early age he passed through the various grades and, soon after attaining his majority, was appointed to the command of the Florence Army Corps. During frequent journeys to Germany he enlarged his military experience, and upon his appointment to the command of the Naples Army Corps in 1896 displayed sound military and administrative capacity. A keen huntsman, and passionately fond of the sea, he extended his yachting and hunting excursions as far east as Syria and as far north as Spitsbergen. As representative of King Humbert he attended the coronation of Tsar Nicholas II. in 1896, the Victorian Jubilee celebrations of 1897, and the festivities connected with the coming of age of the German crown prince in 1900. The prince's intellectual and artistic leanings were well known; in particular, he has made a magnificent collection of historic Italian coins, on which subject he became a recognized authority. At the time of the assassination of his father, King Humbert (the 29th of July 1900), he was returning from a yachting cruise in the eastern Mediterranean. Landing at Reggio di Calabria he hastened to Monza, where he conducted with firmness and tact the preparations for the burial of King Humbert and for his own formal accession, which took place on the 9th and 11th of August 1900. On the 24th of October 1896 he married Princess Elena of Montenegro, who, on the 1st of June 1901, bore him a daughter named Yolanda Margherita, on the 19th of November 1902 a second daughter named Mafalda, and on the 15th of September 1904 a son, Prince Humbert.

VICTORIA [ALEXANDRINA VICTORIA], Queen of the United Kingdom of Great Britain and Ireland, Empress of India (1819–1901), only child of Edward, duke of Kent, fourth son of King George III., and of Princess Victoria Mary Louisa of Saxe-Coburg-Gotha (widow of Prince Emich Karl of Leiningen, by whom she already had two children), was born at Kensington Palace on the 24th of May 1819. The duke and duchess of Kent had been living at Amorbach, in Franconia, owing to their straitened circumstances, but they returned to London on purpose that their child should be born in England. In 1817 the death of Princess Charlotte (only child of the prince regent, afterwards George IV., and wife of Prince Leopold of Saxe-Coburg-Gotha, afterwards king of the Belgians), had left the ultimate succession to the throne of England, in the younger generation, so uncertain that the three unmarried sons of George III., the dukes of Clarence (afterwards William IV.), Kent and Cambridge, all married in the following year, the two elder on the same day. All three had children, but the duke of Clarence's two baby daughters died in infancy, in 1819 and 1821; and the duke of Cambridge's son George, born on the 26th of March 1819, was only two months old when the birth of the duke of Kent's daughter put her before him in the succession. The question as to what name the child should bear was not settled without bickerings. The duke of Kent wished her to be christened Elizabeth, and the prince regent wanted Georgiana, while the tsar Alexander I., who had promised to stand sponsor, stipulated for Alexandrina. The baptism was performed in a drawing-room of Kensington Palace on the 24th of June by Dr Manners Sutton, archbishop of Canterbury. The prince regent, who was present, named the child Alexandrina; then, being requested by the duke of Kent to give a second name, he said, rather abruptly, "Let her be called Victoria, after her mother, but this name must come after the other."[1] Six weeks after her christening the princess was vaccinated, this being the first occasion on which a member of the royal family underwent the operation.

In January 1820 the duke of Kent died, five days before his brother succeeded to the throne as George IV. The widowed duchess of Kent was now a woman of thirty-four, handsome, homely, a German at heart, and with little liking for English ways. But she was a woman of experience, and shrewd; and fortunately she had a safe and affectionate adviser in her brother, Prince Leopold of Coburg, afterwards (1831) king of the Belgians, who as the husband of the late Princess Charlotte had once been a prospective prince consort of England. His former doctor and private secretary, Baron Stockmar (*q.v.*), a man of encyclopaedic information and remarkable judgment, who had given special attention to the problems of a sovereign's position in England, was afterwards to play an important rôle in Queen Victoria's life; and Leopold himself took a fatherly interest in the young princess's education, and contributed some thousands of pounds annually to the duchess of Kent's income. Prince Leopold still lived at this time at Claremont, where Princess Charlotte had died, and this became the duchess of Kent's occasional English home; but she was much addicted to travelling, and spent several months every year in visits to watering-places. It was said at court that she liked the demonstrative homage of crowds; but she had good reason to fear lest her child should be taken away from her to be educated according to the views of George IV. Between the king and his sister-in-law there was little love, and when the death of the duke of Clarence's second infant daughter Elizabeth in 1821 made it pretty certain that Princess Victoria would eventually become queen, the duchess felt that the king might possibly obtain the support of his ministers if he insisted that the future sovereign should be brought up under masters and mistresses designated by himself. The little princess could not have received a better education than that which was given her under Prince Leopold's direction. Her uncle considered that she ought to be kept as long as possible from the knowledge of her position, which might raise a large growth of pride or vanity in her and make her unmanageable; so Victoria was twelve years old before she knew that she was to wear a crown. Until she became queen she never slept a night away from her mother's room, and she was not allowed to converse with any grown-up person, friend, tutor or servant without the duchess of Kent or the Baroness Lehzen, her private governess, being present. Louise Lehzen, a native of Coburg, had come to England as governess to the Princess Feodore of Leiningen, the duchess of Kent's daughter by her first husband, and she became teacher to the Princess Victoria when the latter was five years old. George IV. in 1827 made her a baroness of Hanover, and she continued as lady-in-attendance after the duchess of Northumberland was appointed official governess in 1830, but actually performed the functions first of governess and then of private secretary till 1842, when she left the court and returned to Germany, where she died in 1870. The Rev. George Davys, afterwards bishop of Peterborough, taught the princess Latin; Mr J. B. Sale, music; Mr Westall, history; and Mr Thomas Steward, the writing master of Westminster School, instructed her in penmanship.

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[1] The question of her name, as that of one who was to be queen, remained even up to her accession to the throne a much-debated one. In August 1831, in a discussion in parliament upon a grant to the duchess of Kent, Sir M. W. Ridley suggested changing it to Elizabeth as "more accordant to the feelings of the people"; and the idea of a change seems to have been powerfully supported. In 1836 William IV. approved of a proposal to change it to Charlotte; but, to the princess's own delight, it was given up.

In 1830 George IV. died, and the duke of York (George III.'s second son) having died childless in 1827, the duke of Clarence became king as William IV. Princess Victoria now became the direct heir to the throne. William IV. cherished affectionate feelings towards his niece; unfortunately he took offence at the duchess of Kent for declining to let her child come and live at his court for several months in each year, and through the whole of his reign there was strife between the two; and Prince Leopold was no longer in England to act as peacemaker.

In the early hours of the 20th of June 1837, William IV. died. His thoughts had dwelt often on his niece, and he repeatedly said that he was sure she would be "a good woman and a good queen. It will touch every sailor's heart to have a girl queen to fight for. They'll be tattooing her face on their arms, and I'll be bound they'll all think she was christened after Nelson's ship." Dr Howley, archbishop of Canterbury, and the marquis of Conyngham, bearing the news of the king's death, started in a landau with four horses for Kensington, which they reached at five o'clock. Their servants rang, knocked and thumped; and when at last admittance was gained, the primate and the marquis were shown into a lower room and there left to wait. Presently a maid appeared and said that the Princess Victoria was "in a sweet sleep and could not be disturbed." Dr Howley, who was nothing if not pompous, answered that he had come on state business, to which everything, even sleep, must give place. The princess was accordingly roused, and quickly came downstairs in a dressing-gown, her fair hair flowing loose over her shoulders. Her own account of this interview, written the same day in her journal (*Letters*, i. p. 97), shows her to have been quite prepared.

The privy council assembled at Kensington in the morning; and the usual oaths were administered to the queen by Lord Chancellor Cottenham, after which all present did homage. There was a touching incident when the queen's uncles, the dukes of Cumberland and Sussex, two old men, came forward to perform their obeisance. The queen blushed, and descending from her throne, kissed them both, without allowing them to kneel. By the death of William IV., the duke of Cumberland had become King Ernest of Hanover, and immediately after the ceremony he made haste to reach his kingdom. Had Queen Victoria died without issue, this prince, who was arrogant, ill-tempered and rash, would have become king of Great Britain; and, as nothing but mischief could have resulted from this, the young queen's life became very precious in the sight of her people. She, of course, retained the late king's ministers in their offices, and it was under Lord Melbourne's direction that the privy council drew up their declaration to the kingdom. This document described the queen as Alexandrina Victoria, and all the peers who subscribed the roll in the House of Lords on the 20th of June swore allegiance to her under those names. It was not till the following day that the sovereign's style was altered to Victoria simply, and this necessitated the issuing of a new declaration and a re-signing of the peers' roll. The public proclamation of the queen took place on the 21st at St James's Palace with great pomp.

The queen opened her first parliament in person, and in a well-written speech, which she read with much feeling, adverted to her youth and to the necessity which existed for her being guided by enlightened advisers. When both houses had voted loyal addresses, the question of the Civil List was considered, and a week or two later a message was brought to parliament requesting an increase of the grant formerly made to the duchess of Kent. Government recommended an addition of £30,000 a year, which was voted, and before the close of the year a Civil List Bill was passed, settling £385,000 a year on the queen.

The duchess of Kent and her brothers, King Leopold and the duke of Saxe-Coburg-Gotha, had always hoped to arrange that the queen should marry her cousin, Albert (*q.v.*) of Saxe-Coburg-Gotha, and the prince himself had been made acquainted with this plan from his earliest years. In 1836 Prince Albert, who was born in the same year as his future wife, had come on a visit to England with his father and with his brother, Prince Ernest, and his handsome face, gentle disposition and playful humour had produced a favourable impression on the princess. The duchess of Kent had communicated her projects to Lord Melbourne, and they were known to many other statesmen, and to persons in society; but the gossip of drawing-rooms during the years 1837–38 continually represented that the young queen had fallen in love with Prince This or Lord That, and the more imaginative babblers hinted at post-chaises waiting outside Kensington Gardens in the night, private marriages and so forth.

The coronation.

The coronation took place on the 28th of June 1838. No more touching ceremony of the kind had ever been performed in Westminster Abbey. Anne was a middle-aged married woman at the time of her coronation; she waddled and wheezed, and made no majestic appearance upon her throne. Mary was odious to her Protestant subjects, Elizabeth to those of the unreformed religion, and both these queens succeeded to the crown in times of general sadness; but the youthful Queen Victoria had no enemies except a few Chartists, and the land was peaceful and prosperous when she began to reign over it. The cost of George IV.'s coronation amounted to £240,000; that of William IV. had amounted to £50,000 only; and in asking £70,000 the government had judged that things could be done with suitable luxury, but without waste. The traditional banquet in Westminster Hall, with the throwing down of the glove by the king's champion in armour, had been dispensed with at the coronation of William IV., and it was resolved not to revive it. But it was arranged that the sovereign's procession to the abbey through the streets should be made a finer show than on previous occasions; and it drew to London 400,000 country visitors. Three ambassadors for different reasons became objects of great interest on the occasion. Marshal Soult, Wellington's old foe, received a hearty popular welcome as a military hero; Prince Esterhazy, who represented Austria, dazzled society by his Magyar uniform, which was encrusted all over, even to the boots, with pearls and diamonds; while the Turkish ambassador, Sarim Effendi, caused much diversion by his bewilderment. He was so wonder-struck that he could not walk to his place, but stood as if he had lost his senses, and kept muttering, "All this for a woman!"

The "Bedchamber Plot."

Within a year the court was brought into sudden disfavour with the country by two events of unequal importance, but both exciting. The first was the case of Lady Flora Hastings. In February 1839 this young lady, a daughter of the marquis of Hastings, and a maid of honour to the duchess of Kent, was accused by certain ladies of the bedchamber of immoral conduct. The charge having been laid before Lord Melbourne, he communicated it to Sir James Clark, the queen's physician, and the result was that Lady Flora was subjected to the indignity of a medical examination, which, while it cleared her character, seriously affected her health. In fact, she died in the following July, and it was then discovered that the physical appearances which first provoked suspicion against her had been due to enlargement of the liver. The queen's conduct towards Lady Flora was kind and sisterly from the beginning to the end of this painful business; but the scandal was made public through some indignant letters which the marchioness of Hastings addressed to Lord Melbourne praying for the punishment of her daughter's traducers, and the general opinion was that Lady Flora had been grossly treated at the instigation of some private court enemies. While the agitation about the affair was yet unappeased, the political crisis known as the "Bedchamber Plot" occurred. The Whig ministry had introduced a bill suspending the Constitution of Jamaica because the Assembly in that colony had refused to adopt the Prisons Act passed by the Imperial Legislature. Sir Robert Peel moved an amendment, which, on a division (6th May), was defeated by a majority of five only in a house of 583, and ministers thereupon resigned. The duke of Wellington was first sent for, but he advised that the task of forming an administration should be entrusted to Sir Robert Peel. Sir Robert was ready to form a cabinet in which the duke of Wellington, Lords Lyndhurst, Aberdeen and Stanley, and Sir James Graham would have served; but he stipulated that the mistress of the robes and the ladies of the bedchamber appointed by the Whig administration should be removed, and to this the queen would not consent. On the 10th of May she wrote curtly that the course proposed by Sir Robert Peel was contrary to usage and repugnant to her feelings; the Tory leader then had to inform the House of Commons that, having failed to obtain the proof which he desired of her majesty's confidence, it was impossible for him to accept office. The ladies of the bedchamber were so unpopular in consequence of their behaviour to Lady Flora Hastings that the public took alarm at the notion that the queen had fallen into the hands of an intriguing coterie; and Lord Melbourne, who was accused of wishing to rule on the strength of court favour, resumed office with diminished prestige. The Tories thus felt aggrieved; and the Chartists were so prompt to make political capital out of the affair that large numbers were added to their ranks. On the 14th of June Mr Attwood, M.P. for Birmingham, presented to the House of Commons a Chartist petition alleged to have been signed by 1,280,000 people. It was a cylinder of parchment of about the diameter of a coach-wheel, and was literally rolled up on the floor of the house. On the day after this curious document had furnished both amusement and uneasiness to the Commons, a woman, describing herself as Sophia Elizabeth Guelph Sims, made application at the Mansion House for advice and assistance to prove herself the lawful child of George IV. and Mrs Fitzherbert; and this incident, trumpery as it was, added fuel to the disloyal flame then raging. Going in state to Ascot the queen was hissed by some ladies as her carriage drove on to the course, and two peeresses, one of them a Tory duchess, were openly accused of this unseemly act. Meanwhile some monster Chartist demonstrations were being organized, and they commenced on the 4th of July with riots at Birmingham. It was an untoward coincidence that Lady Flora Hastings died on the 5th of July, for though she repeated on her deathbed, and wished it to be published, that the queen had taken no part whatever in the proceedings which had shortened her life, it was remarked that the ladies who were believed to have persecuted her still retained the sovereign's favour. The riots at Birmingham lasted ten days, and had to be put down by armed force. They were followed by others at Newcastle, Manchester, Bolton, Chester and Macclesfield.

The queen's marriage.

These troublous events had the effect of hastening the queen's marriage. Lord Melbourne ascertained that the queen's dispositions towards her cousin, Prince Albert, were unchanged, and he advised King Leopold, through M. Van der Weyer, the Belgian minister, that the prince should come to England and press his suit. The prince arrived with his brother on a visit to Windsor on the 10th of October 1839. On the 12th the queen wrote to King Leopold: "Albert's beauty is most striking, and he is so amiable and unaffected—in short, very fascinating." On the 15th all was settled; and the queen wrote to her uncle, "I love him more than I can say." The queen's public announcement of her betrothal was enthusiastically received. But the royal lovers still had some parliamentary mortifications to undergo. The government proposed that Prince Albert should receive an annuity of £50,000, but an amendment of Colonel Sibthorp—a politician of no great repute—for making the annuity £30,000 was carried against ministers by 262 votes to 158, the Tories and Radicals going into the same lobby, and many ministerialists taking no part in the division. Prince Albert had not been described, in the queen's declaration to the privy council, as a Protestant prince; and Lord Palmerston was obliged to ask Baron Stockmar for assurance that Prince Albert did not belong to any sect of Protestants whose rules might prevent him from taking the Sacrament according to the ritual of the English Church. He got an answer couched in somewhat ironical terms to the effect that Protestantism owed its existence in a measure to the house of Saxony, from which the prince descended, seeing that this house and that of the landgrave of Hesse had stood quite alone against Europe in upholding Luther and his cause. Even after this certain High Churchmen held that a Lutheran was a "dissenter," and that the prince should be asked to subscribe to the Thirty-Nine Articles.

The queen was particularly concerned by the question of the prince's future status as an Englishman. It was impracticable for him to receive the title of king consort; but the queen naturally desired that her husband should be placed by act of parliament in a position which would secure to him precedence, not only in England, but in foreign courts. Lord Melbourne sought to effect this by a clause introduced in a naturalization bill; but he found himself obliged to drop the clause, and to leave the queen to confer what precedence she pleased by letters-patent. This was a lame way out of the difficulty, for the queen could only confer precedence within her own realms, whereas an act of parliament bestowing the title of prince consort would have made the prince's right to rank above all royal imperial highnesses quite clear, and would have left no room for such disputes as afterwards occurred when foreign princes chose to treat Prince Albert as having mere courtesy rank in his wife's kingdom. The result of these political difficulties was to make the queen more than ever disgusted with the Tories. But there was no other flaw in the happiness of the marriage, which was solemnized on the 10th of February 1840 in the Chapel Royal, St James's. It is interesting to note that the queen was dressed entirely in articles of British manufacture. Her dress was of Spitalfields silk; her veil of Honiton lace; her ribbons came from Coventry; even her gloves had been made in London of English kid—a novel thing in days when the French had a monopoly in the finer kinds of gloves.

Public affairs.

From the time of the queen's marriage the crown played an increasingly active part in the affairs of state. Previously, ministers had tried to spare the queen all disagreeable and fatiguing details. Lord Melbourne saw her every day, whether she was in London or at Windsor, and he used to explain all current business in a benevolent, chatty manner, which offered a pleasant contrast to the style of his two principal colleagues, Lord John Russell and Lord Palmerston. A statesman of firmer mould than Lord Melbourne would hardly have succeeded so well as he did in making rough places smooth for Prince Albert. Lord John Russell and Lord Palmerston were naturally jealous of the prince's interference—and of King Leopold's and Baron Stockmar's—in state affairs; but Lord Melbourne took the common-sense view that a husband will control his wife whether people wish it or not. Ably advised by his private secretary, George Anson, and by Stockmar, the prince thus soon took the *de facto* place of the sovereign's private secretary, though he had no official status as such; and his system of classifying and annotating the queen's papers and letters resulted in the preservation of what the editors of the *Letters of Queen Victoria* (1907) describe as "probably the most extraordinary collection of state documents in the world"—those up to 1861 being contained in between 500 and 600 bound volumes at Windsor. To confer on Prince Albert every honour that the crown could bestow, and to let him make his way gradually into public favour by his own tact, was the advice which Lord Melbourne gave; and the prince acted upon it so well, avoiding every appearance of intrusion, and treating men of all parties and degrees with urbanity, that within five months of his marriage he obtained a signal mark of the public confidence. In expectation of the queen becoming a mother, a bill was passed through parliament providing for the appointment of Prince Albert as sole regent in case the queen, after giving birth to a child, died before her son or daughter came of age.

Attempts on the queen's life.

The Regency Bill had been hurried on in consequence of the attempt of a crazy pot-boy, Edward Oxford, to take the queen's life. On 10th June 1840, the queen and Prince Albert were driving up Constitution Hill in an open carriage, when Oxford fired two pistols, the bullets from which flew, it is said, close by the prince's head. He was arrested on the spot, and when his lodgings were searched a quantity of powder and shot was found, with the rules of a secret society, called "Young England," whose members were pledged to meet, "carrying swords and pistols and wearing crape masks." These discoveries raised the surmise that Oxford was the tool of a widespread Chartist conspiracy—or, as the Irish pretended, of a conspiracy of Orangemen to set the duke of Cumberland on the throne; and while these delusions were fresh, they threw well-disposed persons into a paroxysm of loyalty. Even the London street dogs, as Sydney Smith said, joined with O'Connell in barking "God save the Queen." Oxford seems to have been craving for notoriety; but it may be doubted whether the jury who tried him did right to pronounce his acquittal on the ground of insanity. He feigned madness at his trial, but during the forty years of his subsequent confinement at Bedlam he talked and acted like a rational being, and when he was at length released and sent to Australia he earned his living there as a house painter, and used to declare that he had never been mad at all. His acquittal was to be deprecated as establishing a dangerous precedent in regard to outrages on the sovereign. It was always Prince Albert's opinion that if Oxford had been flogged the attempt of Francis on the queen in 1842 and of Bean in the same year would never have been perpetrated. After the attempt of Bean—who was a hunchback, really insane—parliament passed a bill empowering judges to order whipping as a punishment for those who molested the queen; but somehow this salutary act was never enforced. In 1850 a half-pay officer, named Pate, assaulted the queen by striking her with a stick, and crushing her bonnet. He was sentenced to seven years' transportation; but the judge, Baron Alderson, excused him the flogging. In 1869 an Irish lad, O'Connor, was sentenced to eighteen months' imprisonment and a whipping for presenting a pistol at the queen, with a petition, in St James's Park; but this time it was the queen herself who privately remitted the corporal punishment, and she even pushed clemency to the length of sending her aggressor to Australia at her own expense. The series of attempts on the queen was closed in 1882 by Maclean, who fired a pistol at her majesty as she was leaving the Great Western Railway station at Windsor. He, like Bean, was a genuine madman, and was relegated to Broadmoor.

Birth of the princess royal.

The birth of the princess royal, on the 21st of November 1840, removing the unpopular King Ernest of Hanover from the position of heir-presumptive to the British crown, was a subject of loud congratulations to the people. A curious scare was occasioned at Buckingham Palace, when the little princess was a fortnight old, by the discovery of a boy named Jones concealed under a bed in the royal nursery. Jones had a mania for palace-breaking. Three times he effected a clandestine entry into the queen's residence, and twice he managed to spend several days there. By day he concealed himself in cupboards or under furniture, and by night he groped his way into the royal kitchen to eat whatever he could find. After his third capture, in March 1841, he coolly boasted that he had lain under a sofa, and listened to a private conversation between the queen and Prince Albert. This third time he was not punished, but sent to sea, and turned out very well. The incident strengthened Prince Albert's hands in trying to carry out sundry domestic reforms which were being stoutly resisted by vested interests. The royal residences and grounds used to be under the control of four different officials—the lord chamberlain, the lord steward, the master of the horse and the commissioners of woods and forests. Baron Stockmar, describing the confusion fostered by this state of things, said—

> "The lord steward finds the fuel and lays the fire; the lord chamberlain lights it. The lord chamberlain provides the lamps; the lord steward must clean, trim and light them. The inside cleaning of windows belongs to the lord chamberlain's department, but the outer parts must be attended to by the office of woods and forests, so that windows remain dirty unless the two departments can come to an understanding."

It took Prince Albert four years of firmness and diplomacy before in 1845 he was able to bring the queen's home under the efficient control of a master of the household.

Sir Robert Peel's ministry.

At the general election of 1841 the Whigs returned in a minority of seventy-six, and Lord Melbourne was defeated on the Address and resigned. The queen was affected to tears at parting with him; but the crisis had been fully expected and prepared for by confidential communications between Mr Anson and Sir Robert Peel, who now became prime minister (see *Letters of Queen Victoria*, i. 341 et seq.). The old difficulty as to the appointments to the royal household was tactfully removed, and Tory appointments were made, which were agreeable both to the queen and to Peel. The only temporary embarrassment was the queen's continued private correspondence with Lord Melbourne, which led Stockmar to remonstrate with him; but Melbourne used his influence sensibly; moreover, he gradually dropped out of politics, and the queen got used to his not being indispensable. On Prince Albert's position the change had a marked effect, for in the absence of Melbourne the queen relied more particularly on his advice, and Peel himself at once discovered and recognized the prince's unusual charm and capacity. One of the Tory premier's first acts was to propose that a royal commission should be appointed to consider the best means for promoting art and science in the kingdom, and he nominated Prince Albert as president. The International Exhibition of 1851, the creation of the Museum and Science and Art Department at South Kensington, the founding of art schools and picture galleries all over the country, the spread of musical taste and the fostering of technical education may be attributed, more or less directly, to the commission of distinguished men which began its labours under Prince Albert's auspices.

Birth of the prince of Wales.

The queen's second child, the prince of Wales (see EDWARD VII.), was born on the 9th of November 1841; and this event "filled the measure of the queen's domestic happiness," as she said in her speech from the throne at the opening of the session of 1842. It is unnecessary from this point onwards to go *scriatim* through the domestic history of the reign, which is given in the article ENGLISH HISTORY. At this time there was much political unrest at home, and serious difficulties abroad. As regards internal politics, it may be remarked that the queen and Prince Albert were much relieved when Peel, who had come in as the leader of the Protectionist party, adopted Free Trade and repealed the Corn Laws, for it closed a dangerous agitation which gave them much anxiety. When the country was in distress, the queen felt a womanly repugnance for festivities; and yet it was undesirable that the court should incur the reproach of living meanly to save money. There was a conversation between the queen and Sir Robert Peel on this subject in the early days of the Tory administration, and the queen talked of reducing her establishment in order that she might give away larger sums in charities. "I am afraid the people would only say that your majesty was returning them change for their pounds in halfpence," answered Peel. "Your majesty is not perhaps aware that the most unpopular person in the parish is the relieving officer, and if the queen were to constitute herself a relieving officer for all the parishes in the kingdom she would find her money go a very little way, and she would provoke more grumbling than thanks." Peel added that a sovereign must do all things in order, not seeking praise for doing one particular thing well, but striving to be an example in all respects, even in dinner-giving.

The court and the country.

Meanwhile the year 1842 was ushered in by splendid fêtes in honour of the king of Prussia, who held the prince of Wales at the font. In the spring there was a fancy-dress ball at Buckingham Palace, which remained memorable owing to the offence

The queen's first railway journey.

which it gave in France. Prince Albert was costumed as Edward III., the queen as Queen Philippa, and all the gentlemen of the court as knights of Poitiers. The French chose to view this as an unfriendly demonstration, and there was some talk of getting up a counter-ball in Paris, the duke of Orleans to figure as William the Conqueror. In June the queen took her first railway journey, travelling from Windsor to Paddington on the Great Western line. The master of the horse, whose business it was to provide for the queen's ordinary journeys by road, was much put out by this innovation. He marched into the station several hours before the start to inspect the engine, as he would have examined a steed; but greater merriment was occasioned by the queen's coachman, who insisted that, as a matter of form, he ought to make-believe to drive the engine. After some dispute, he was told that he might climb on to the pilot engine which was to precede the royal train; but his scarlet livery, white gloves and wig suffered so much from soot and sparks that he made no more fuss about his rights in after trips. The motion of the train was found to be so pleasant that the queen readily trusted herself to the railway for a longer journey a few weeks later, when she paid her first visit to Scotland. A report by Sir James Clark led to the queen's visiting Balmoral in 1848, and to the purchase of the Balmoral estate in 1852, and the queen's diary of her journeys in Scotland shows what constant enjoyment she derived from her Highland home. Seven years before this the estate of Osborne had been purchased in the Isle of Wight, in order that the queen might have a home of her own. Windsor she considered too stately, and the Pavilion at Brighton too uncomfortable. The first stone of Osborne House was laid in 1845, and the royal family entered into possession in September 1846.

Relations with foreign sovereigns.

In August 1843 the queen and Prince Albert paid a visit to King Louis Philippe at the château d'Eu. They sailed from Southampton for Tréport in a yacht, and, as it happened to be raining hard when they embarked, the loyal members of the Southampton Corporation remembered Raleigh, and spread their robes on the ground for the queen to walk over. In 1844 Louis Philippe returned the visit by coming to Windsor. It was the first visit ever paid by a king of France to a sovereign of England, and Louis Philippe was much pleased at receiving the Order of the Garter. He said that he did not feel that he belonged to the "Club" of European sovereigns until he received this decoration. As the father of King Leopold of Belgium's consort, the queen was much interested in his visit, which went off with great success and goodwill. The tsar Nicholas had visited Windsor earlier that year, in which also Prince Alfred, who was to marry the tsar's grand-daughter, was born.

In 1846 the affair of the "Spanish marriages" seriously troubled the relations between the United Kingdom and France. Louis Philippe and Guizot had planned the marriage of the duke of Montpensier with the infanta Louisa of Spain, younger sister of Queen Isabella, who, it was thought at the time, was not likely ever to have children. The intrigue was therefore one for placing a son of the French king on the Spanish throne. (See SPAIN, *History*.) As to Queen Victoria's intervention on this question and on others, these words, written by W. E. Gladstone in 1875, may be quoted:—

> "Although the admirable arrangements of the Constitution have now shielded the sovereign from personal responsibility, they have left ample scope for the exercise of direct and personal influence in the whole work of government. . . . The sovereign as compared with her ministers has, because she is the sovereign, the advantage of long experience, wide survey, elevated position and entire disconnexion from the bias of party. Further, personal and domestic relations with the ruling families abroad give openings in delicate cases for saying more, and saying it at once more gently and more efficaciously, than could be ventured in the formal correspondence and rude contacts of government. We know with how much truth, fulness and decision, and with how much tact and delicacy, the queen, aided by Prince Albert, took a principal part on behalf of the nation in the painful question of the Spanish marriages."

The [illegible] shook so many continental thrones, left that of the United Kingdom unhurt. Revolutions broke out in Paris, Vienna, Berlin, Madrid, Rome, Naples, Venice, Munich, Dresden and Budapest. The queen and Prince Albert were affected in many private ways by the events abroad. Panic-stricken princes wrote to them for political assistance or pecuniary aid. Louis Philippe abdicated and fled to England almost destitute, being smuggled over the Channel by the cleverness of the British consul at Havre, and the queen employed Sir Robert Peel as her intermediary for providing him with money to meet his immediate wants. Subsequently Claremont was assigned to the exiled royal family of France as a residence. During a few weeks of 1848 Prince William of Prussia (afterwards German emperor) found an asylum in England.

Irish trip, 1849.

In August 1849 the queen and Prince Albert, accompanied by the little princess royal and the prince of Wales, paid a visit to Ireland, landing at the Cove of Cork, which from that day was renamed Queenstown. The reception was enthusiastic, and so was that at Dublin. "Such a day of jubilee," wrote *The Times*, "such a night of rejoicing, has never been beheld in the ancient capital of Ireland since first it arose on the banks of the Liffey." The queen was greatly pleased and touched. The project of establishing a royal residence in Ireland was often mooted at this time, but the queen's advisers never urged it with sufficient warmth. There was no repugnance to the idea on the queen's part, but Sir Robert Peel thought unfavourably of it as an "empirical" plan, and the question of expense was always mooted as a serious consideration. There is no doubt that the absence of a royal residence in Ireland was felt as a slur upon the Irish people in certain circles.

During these years the queen's family was rapidly becoming larger. Princess Alice (afterwards grand duchess of Hesse) was born on the 25th of April 1843; Prince Alfred (afterwards duke of Edinburgh and duke of Saxe-Coburg-Gotha) on the 6th of August 1844; Princess Helena (Princess Christian) on the 25th of May 1846; Princess Louise (duchess of Argyll) on the 18th of March 1848; and Prince Arthur (duke of Connaught) on the 1st of May 1850.

The queen and Lord Palmerston.

At the end of 1851 an important event took place, which ended a long-standing grievance on the part of the queen, in Lord Palmerston's dismissal from the office of foreign secretary on account of his expressing approval of Louis Napoleon's *coup d'état* in Paris. The circumstances are of extreme interest for the light they throw on the queen's estimate of her constitutional position and authority. Lord Palmerston had never been *persona grata* at court. His Anglo-Irish nature was not sympathetic with the somewhat formal character and German training of Prince Albert; and his views of ministerial independence were not at all in accord with those of the queen and her husband. The queen had more than once to remind her foreign secretary that his despatches must be seen by her before they were sent out, and though Palmerston assented, the queen's complaint had to b continually repeated. She also protested to the prime minist (Lord John Russell) in 1848, 1849 and 1850, against variou instances in which Palmerston had expressed his own persona opinions in matters of foreign affairs, without his despatche being properly approved either by herself or by the cabinet Lord John Russell, who did not want to offend his popula and headstrong colleague, did his best to smooth things over but the queen remained exceedingly sore, and tried hard to ge Palmerston removed, without success. On the 12th of Augus 1850 the queen wrote to Lord John Russell the followin important memorandum, which followed in its terms a privat memorandum drawn up for her by Stockmar a few month earlier (*Letters*, ii. 282):—

> "With reference to the conversation about Lord Palmersto which the queen had with Lord John Russell the other day, an Lord Palmerston's disavowal that he ever intended any disrespec to her by the various neglects of which she has had so long and s often to complain, she thinks it right, in order to avoid any mi takes for the future, to explain what it is she expects from th foreign secretary.

"She requires—

"1. That he will distinctly state what he proposes in a given case, in order that the queen may know as distinctly to what she has given her royal sanction.

"2. Having given her sanction to a measure, that it be not arbitrarily altered or modified by the minister. Such an act she must regard as failing in sincerity to the crown, and justly to be visited by the exercise of her constitutional right of dismissing that minister. She expects to be kept informed of what passes between him and the foreign ministers, before important decisions are taken, based upon that intercourse; to receive the foreign despatches in good time, and to have the drafts for her approval sent her in sufficient time to make herself acquainted with their contents before they must be sent off. The queen thinks it best that Lord John Russell should show this letter to Lord Palmerston."

Lord Palmerston took a copy of this letter, and promised to attend to its direction. But the queen thoroughly distrusted him, and in October 1851 his proposed reception of Kossuth nearly led to a crisis. Then finally she discovered (December 13) at the time of the *coup d' état*, that he had, of his own initiative, given assurances of approval to Count Walewski, which were not in accord with the views of the cabinet and with the "neutrality which had been enjoined" by the queen. This was too much even for Lord John Russell, and after a short and decisive correspondence Lord Palmerston resigned the seals of office.

Death of the duke of Wellington; Prince Albert's position.

The death of the duke of Wellington in 1852 deeply affected the queen. The duke had acquired a position above parties, and was the trusted adviser of all statesmen and of the court in emergencies. The queen sadly needed such a counsellor, for Prince Albert's position was one full of difficulty, and party malignity was continually putting wrong constructions upon the advice which he gave, and imputing to him advice which he did not give. During the Corn Law agitation offence was taken at his having attended a debate in the House of Commons, the Tories declaring that he had gone down to overawe the House in favour of Peel's measures. After Palmerston's enforced resignation, there was a new and more absurd hubbub. A climax was reached when the difficulties with Russia arose which led to the Crimean War; the prince was accused by the peace party of wanting war, and by the war party of plotting surrender; and it came to be publicly rumoured that the queen's husband had been found conspiring against the state, and had been committed to the Tower. Some said that the queen had been arrested too, and the prince wrote to Stockmar: "Thousands of people surrounded the Tower to see the queen and me brought to it." This gave infinite pain to the queen, and at length she wrote to Lord Aberdeen on the subject. Eventually, on 31st January 1854, Lord John Russell took occasion to deny most emphatically that Prince Albert interfered unduly with foreign affairs, and in both houses the statesmen of the two parties delivered feeling panegyrics of the prince, asserting at the same time his entire constitutional right to give private advice to the sovereign on matters of state. From this time it may be said that Prince Albert's position was established on a secure footing. He had declined (1850) to accept the post of commander-in-chief at the duke of Wellington's suggestion, and he always refused to let himself be placed in any situation which would have modified ever so slightly his proper relations with the queen. The queen was very anxious that he should have the title of "King Consort," and that the crown should be jointly borne as it was by William III. and Mary; but he himself never spoke a word for this arrangement. It was only to please the queen that he consented to take the title of Prince Consort (by letters patent of June 25, 1857), and he only did this when it was manifest that statesmen of all parties approved the change.

The Crimean War.

For the queen and royal family the Crimean War time was a very busy and exciting one. Her majesty personally superintended the committees of ladies who organized relief for the wounded; she helped Florence Nightingale in raising bands of trained nurses; she visited the crippled soldiers in the hospitals, and it was through her resolute complaints of the utter insufficiency of the hospital accommodation that Netley Hospital was built. The distribution of medals to the soldiers and the institution of the Victoria Cross (February 1857) as a reward for individual instances of merit and valour must also be noted among the incidents which occupied the queen's time and thoughts. In 1855 the emperor and empress of the French visited the queen at Windsor Castle, and the same year her majesty and the prince consort paid a visit to Paris.

The queen and her family.

The queen's family life was most happy. At Balmoral and Windsor the court lived in virtual privacy, and the queen and the prince consort saw much of their children. Countless entries in the queen's diaries testify to the anxious affection with which the progress of each little member of the household was watched. Two more children had been born to the royal pair, Prince Leopold (duke of Albany) on the 7th of April 1853, and on the 14th of April 1857 their last child, the princess Beatrice (Princess Henry of Battenberg), bringing the royal family up to nine—four sons and five daughters. Less than a year after Princess Beatrice's birth the princess royal was married to Prince Frederick William of Prussia, afterwards the emperor Frederick. The next marriage after the princess royal's was that of the princess Alice to Prince Louis (afterwards grand duke) of Hesse-Darmstadt in 1862. In 1863 the prince of Wales married the princess Alexandra of Denmark. In 1866 the princess Helena became the wife of Prince Christian of Schleswig-Holstein. In 1871 the princess Louise was wedded to the marquis of Lorne, eldest son of the duke of Argyll. In 1874 Prince Alfred, duke of Edinburgh, married Princess Marie Alexandrovna, only daughter of the tsar Alexander II. The duke of Connaught married in 1879 the princess Louise of Prussia, daughter of the soldier-prince Frederick Charles. In 1882 Prince Leopold, duke of Albany, wedded the princess Helen of Waldeck-Pyrmont. Finally came the marriage of Princess Beatrice in 1885 with Prince Henry of Battenberg.

On the occasion of the coming of age of the queen's sons and the marriages of her daughters parliament made provision. The prince of Wales, in addition to the revenues of the duchy of Cornwall, had £40,000 a year, the princess £10,000, and an addition of £36,000 a year for their children was granted by parliament in 1889. The princess royal received a dowry of £40,000 and £8000 a year for life, the younger daughters £30,000 and £6000 a year each. The dukes of Edinburgh, Connaught and Albany were each voted an income of £15,000, and £10,000 on marrying.

The American Civil War.

The dispute with the United States concerning the "Trent" affair of 1861 will always be memorable for the part played in its settlement by the queen and the prince consort. In 1861 the accession of Abraham Lincoln to the presidency of the United States of America caused the Southern States of the Union to revolt, and the war began. During November the British West India steamer "Trent" was boarded by a vessel of the Federal Navy, the "San Jacinto," and Messrs Slidell and Mason, commissioners for the Confederate States, who were on their way to England, were seized. The British government were on the point of demanding reparation for this act in a peremptory manner which could hardly have meant anything but war, but Prince Albert insisted on revising Lord Russell's despatch in a way which gave the American government an opportunity to concede the surrender of the prisoners without humiliation. The memorandum from the queen on this point was the prince consort's last political draft.

Death of the prince consort.

The year 1861 was the saddest in the queen's life. On 16th March, her mother, the duchess of Kent, died, and on 14th December, while the dispute with America about the "Trent" affair was yet unsettled, the prince consort breathed his last at Windsor. His death left a void in the queen's life which nothing could ever fill. She built at Frogmore a magnificent mausoleum where she might be buried with him.

Never again during her reign did the queen live in London, and Buckingham Palace was only used for occasional visits of a few days.

Marriage of the prince of Wales.

At the time of the prince consort's death the prince of Wales was in his twenty-first year. He had spent several terms at each of the two universities of Oxford and Cambridge, and he had already travelled much, having visited most of Europe, Egypt and the United States. His marriage was solemnized at Windsor on the 10th of March 1863. The queen witnessed the wedding from the private pew or box of St George's Chapel, Windsor, but she wore the deep mourning which she was never wholly to put off to the end of her life, and she took no part in the festivities of the wedding.

Austro-Prussian War.

In foreign imperial affairs, and in the adjustment of serious parliamentary difficulties, the queen's dynastic influence abroad and her position as above party at home, together with the respect due to her character, good sense and experience, still remained a powerful element in the British polity, as was shown on more than one occasion. In 1866 the Austro-Prussian War broke out, and many short-sighted people were tempted to side with France when, in 1867, Napoleon III. sought to obtain a "moral compensation" by laying a claim to the duchy of Luxemburg. A conference met in London, and the difficulty was settled by neutralizing the duchy and ordering the evacuation of the Prussian troops who kept garrison there. But this solution, which averted an imminent war, was only arrived at through Queen Victoria's personal intercession. In the words of a French writer—

> "The queen wrote both to the king of Prussia and to the emperor Napoleon. Her letter to the emperor, pervaded with the religious and almost mystic sentiments which predominate in the queen's mind, particularly since the death of Prince Albert, seems to have made a deep impression on the sovereign who, amid the struggles of politics, had never completely repudiated the philanthropic theories of his youth, and who, on the battlefield of Solferino, covered with the dead and wounded, was seized with an unspeakable horror of war."

Disraeli and Gladstone.

Moreover, Disraeli's two premierships (1868, 1874–80) did a good deal to give new encouragement to a right idea of the constitutional function of the crown. Disraeli thought that the queen ought to be a power in the state. His notion of duty—at once a loyal and chivalrous one—was that he was obliged to give the queen the best of his advice, but that the final decision in any course lay with her, and that once she had decided, he was bound, whatever might be his own opinion, to stand up for her decision in public. The queen, not unnaturally, came to trust Disraeli implicitly, and she frequently showed her friendship for him. At his death she paid an exceptional tribute to his "dear and honoured memory" from his "grateful and affectionate sovereign and friend." To something like this position Lord Salisbury after 1886 succeeded. A somewhat different conception of the sovereign's functions was that of Disraeli's great rival, Gladstone, who, though his respect for the person and office of the sovereign was unbounded, not only expected all people, the queen included, to agree with him when he changed his mind, but to become suddenly enthusiastic about his new ideas. The queen consequently never felt safe with him. Nor did she like his manner—he spoke to her (she is believed to have said) as if she were a public meeting. The queen was opposed to the Disestablishment of the Irish Church (1869)—the question which brought Gladstone to be premier—and though she yielded with good grace, Gladstone was fretful and astonished because she would not pretend to give a hearty assent to the measure. Through her secretary, General Grey, the queen pointed out that she had not concealed from Gladstone "how deeply she deplored" his having felt himself under the necessity of raising the question, and how apprehensive she was of the possible consequences of the measure; but, when a general election had pronounced on the principle, when the bill had been carried through the House of Commons by unvarying majorities, she did not see what good could be gained by rejecting it in the Lords. Later, when through the skilful diplomacy of the primate the Lords had passed the second reading by a small but sufficient majority (179 to 146), and after amendments had been adopted, the queen herself wrote—

> "The queen . . . is very sensible of the prudence and, at the same time, the anxiety for the welfare of the Irish Establishment which the archbishop has manifested during the course of the debates, and she will be very glad if the amendments which have been adopted at his suggestion lead to a settlement of the question; but to effect this, concessions, the queen believes, will have to be made on *both* sides. The queen must say that she cannot view without alarm possible consequences of another year of agitation on the Irish Church, and she would ask the archbishop seriously to consider, in case the concessions to which the government may agree should not go so far as he may himself wish, whether the postponement of the settlement for another year may not be likely to result in worse rather than in better terms for the Church. The queen trusts, therefore, that the archbishop will himself consider, and, as far as he can, endeavour to induce the others to consider, any concessions that may be offered by the House of Commons in the most conciliatory spirit."

The correspondence of which this letter forms a part is one of the few published witnesses to the queen's careful and active interest in home politics during the latter half of her reign; but it is enough to prove how wise, how moderate and how steeped in the spirit of the Constitution she was. Another instance is that of the County Franchise and Redistribution Bills of 1884–85. There, again, a conflict between the two houses was imminent, and the queen's wish for a settlement had considerable weight in bringing about the curious but effective conference of the two parties, of which the first suggestion, it is believed, was due to Lord Randolph Churchill.

"Empress of India."

In 1876 a bill was introduced into parliament for conferring on the queen the title of "Empress of India." It met with much opposition, and Disraeli was accused of ministering simply to a whim of the sovereign, whereas, in fact, the title was intended to impress the idea of British suzerainty forcibly upon the minds of the native princes, and upon the population of Hindustan. The prince of Wales's voyage to India in the winter of 1875–76 had brought the heir to the throne into personal relationship with the great Indian vassals of the British crown, and it was felt that a further demonstration of the queen's interest in her magnificent dependency would confirm their loyalty.

Private life.

The queen's private life during the decade 1870–80 was one of quiet, broken only by one great sorrow when the Princess Alice died in 1878. In 1867 her majesty had started in authorship by publishing *The Early Days of the Prince Consort*, compiled by General Grey; in 1869 she gave to the world her interesting and simply written diary entitled *Leaves from the Journal of our Life in the Highlands*, and in 1874 appeared the first volume of *The Life and Letters of the Prince Consort* (2nd vol. in 1880), edited by Sir Theodore Martin. A second instalment of the Highland journal appeared in 1885. These literary occupations solaced the hours of a life which was mostly spent in privacy. A few trips to the Continent, in which the queen was always accompanied by her youngest daughter, the Princess Beatrice, brought a little variety into the home-life, and aided much in keeping up the good health which the queen enjoyed almost uninterruptedly. So far as public ceremonies were concerned, the prince and princess of Wales were now coming forward more and more to represent the royal family. People noticed meanwhile that the queen had taken a great affection for her Scottish man-servant, John Brown, who had been in her service since 1849; she made him her constant personal attendant, and looked on him more as a friend than as servant. When he died in 1883 the queen's grief was intense.

The Jubilee.

From 1880 onwards Ireland almost monopolised the field of domestic politics. The queen was privately opposed to Gladstone's Home Rule policy; but she observed in public a constitutional reticence on the subject. In the year, however, of the Crimes Act 1887, an event took place which was of more intimate personal concern to the queen, and of more attractive import to the country and the empire at large. June 20th was the fiftieth anniversary of her accession to the throne, and on the following day, for the second time in English history, a great Jubilee celebration was held to commemorate so happy an event. The country threw itself into the celebration with unchecked enthusiasm; large sums of money were everywhere subscribed; in every city, town and village something was done both in the way of rejoicing and in the way of establishing some permanent memorial of the event. In London the day itself was kept by a solemn service in Westminster Abbey, to which the queen went in state, surrounded by the most brilliant, royal, and princely escort that had ever accompanied a British sovereign, and cheered on her way by the applause of hundreds of thousands of her subjects. The queen had already paid a memorable visit to the East End, when she opened the People's Palace on the 14th of May. On the 2nd of July she reviewed at Buckingham Palace some 28,000 volunteers of London and the home counties. On the 4th of July she laid the foundation stone of the Imperial Institute, the building at Kensington to which, at the instance of the prince of Wales, it had been determined to devote the large sum of money collected as a Jubilee offering, and which was opened by the queen in 1893. On the 9th of July the queen reviewed 60,000 men at Aldershot; and, last and chief of all, on the 23rd of July, one of the most brilliant days of a brilliant summer, she reviewed the fleet at Spithead.

The queen and Bismarck.

The year 1888 witnessed two events which greatly affected European history; and in a minor, though still marked, degree the life of the English court. On the 9th of March the emperor William I. died at Berlin He was succeeded by his son, the emperor Frederick III., regarded with special affection in England as the husband of the princess royal. But at the time he was suffering from a malignant disease of the throat, and he died on the 15th of June, being succeeded by his eldest son, the emperor William II., the grandson of the queen. Meanwhile Queen Victoria spent some weeks at Florence at the Villa Palmieri, and returned home by Darmstadt and Berlin. In spite of the illness of the emperor Frederick a certain number of court festivities were held in her honour, and she had long conversations with Prince Bismarck, who was deeply impressed by her majesty's personality. Just before, the prince, who was still chancellor, had taken a very strong line with regard to a royal marriage in which the queen was keenly interested—the proposal that Prince Alexander of Battenberg, lately ruler of Bulgaria, and brother of the queen's son-in-law, Prince Henry, should marry Princess Victoria, the eldest daughter of the emperor Frederick. Prince Bismarck, who had been anti-Battenberg from the beginning, vehemently opposed this marriage, on the ground that for reasons of state policy it would never do for a daughter of the German emperor to marry a prince who was personally disliked by the tsar This affair caused no little agitation in royal circles, but in the end state reasons were allowed to prevail and the chancellor had his way.

1888-89.

The queen had borne so well the fatigue of the Jubilee that during the succeeding years she was encouraged to make somewhat more frequent appearances among her subjects. In May 1888 she attended a performance of Sir Arthur Sullivan's *Golden Legend* at the Albert Hall, and in August she visited Glasgow to open the magnificent new municipal buildings, remaining for a couple of nights at Blythswood, the seat of Sir Archibald Campbell. Early in 1889 she received at Windsor a special embassy, which was the beginning of a memorable chapter of English history: two Matabele chiefs were sent by King Lobengula to present his respects to the "great White Queen," as to whose very existence, it was said, he had up till that time been sceptical. Soon afterwards her majesty went to Biarritz, and the occasion was made memorable by a visit which she paid to the queen-regent of Spain at San Sebastian, the only visit that an English reigning sovereign had ever paid to the Peninsula.

The relations between the court and the country formed matter in 1889 for a somewhat sharp discussion in parliament and in the press. A royal message was brought by Mr W. H. Smith on the 2nd of July, expressing, on the one hand, the queen's desire to provide for Prince Albert Victor of Wales, and, on the other, informing the house of the intended marriage of the prince of Wales's daughter, the Princess Louise, to the earl (afterwards duke) of Fife. On the proposal of Mr Smith, seconded by Gladstone, a select committee was appointed to consider these messages and to report to the house as to the existing practice and as to the principles to be adopted for the future. The evidence laid before the committee explained to the country for the first time the actual state of the royal income, and on the proposal of Gladstone, amending the proposal of the government, it was proposed to grant a fixed addition of £36,000 per annum to the prince of Wales, out of which he should be expected to provide for his children without further application to the country. Effect was given to this proposal in a bill called "The Prince of Wales's Children's Bill," which was carried in spite of the persistent opposition of a small group of Radicals.

Parliamentary grant to the prince of Wales's children.

1890-91.

In the spring of 1890 the queen visited Aix-les-Bains in the hope that the waters of that health resort might alleviate the rheumatism from which she was now frequently suffering. She returned as usual by way of Darmstadt, and shortly after her arrival at Windsor paid a visit to Baron Ferdinand Rothschild at Waddesdon Manor. In February she launched the battleship "Royal Sovereign" at Portsmouth; a week later she visited the Horse Show at Islington. Her annual spring visit to the South was this year paid to the little town of Grasse.

Death of the duke of Clarence.

At the beginning of 1892 a heavy blow fell upon the queen in the death of the prince of Wales's eldest son Albert Victor, duke of Clarence and Avondale. He had never been of a robust constitution, and after a little more than a week's illness from pneumonia following influenza, he died at Sandringham. The pathos of his death was increased by the fact that only a short time before it had been announced that the prince was about to marry his second cousin, Princess May, daughter of the duke and duchess of Teck.

1893.

The death of the young prince threw a gloom over the country, and caused the royal family to spend the year in such retirement as was possible. The queen this year paid a visit to Costebelle, and stayed there for some quiet weeks. In 1893 the country, on the expiration of the royal mourning, began to take a more than usual interest in the affairs of the royal family. On the 19th of February the queen left home for a visit to Florence, and spent it in the Villa Palmieri. She was able to display remarkable energy in visiting the sights of the city, and even went as far afield as San Gimignano; and her visit had a notable effect in strengthening the bonds of friendship between the United Kingdom and the Italian people. On 28th April she arrived home, and a few days later the prince of Wales's second son, George, duke of York (see George V.), who by his brother's death had been left in the direct line of succession to the throne, was betrothed to the Princess May, the marriage being celebrated on 6th July in the Chapel Royal of St James's Palace.

1894.

In 1894 the queen stayed for some weeks at Florence, and on her return she stopped at Coburg to witness the marriage between two of her grandchildren, the grand duke of Hesse and the Princess Victoria Melita of Coburg. On the next day the emperor William officially announced the betrothal of the Cesarevitch (afterwards the tsar Nicholas II.) to the princess Alix of Hesse, a granddaughter whom the queen had always regarded with special affection. After a few weeks in London the queen went northwards and stopped at Manchester, where she opened the Ship Canal. Two days afterwards she celebrated her seventy-fifth birthday in quiet at Balmoral. A month later (June 23) took place the birth of a son to the duke and duchess of York, the child receiving the thoroughly English name of Edward.

In 1895 the queen lost her faithful and most efficient private secretary, General Sir Henry Ponsonby, who for many years

Death of Prince Henry of Battenberg.

had helped her in the management of her most private affairs and had acted as an intermediary between her and her ministers with singular ability and success. His successor was Sir Arthur Bigge. The following year, 1896, was marked by a loss which touched the queen even more nearly and more personally. At his own urgent request Prince Henry of Battenberg, the queen's son-in-law, was permitted to join the Ashanti expedition, and early in January the prince was struck down with fever. He was brought to the coast and put on board her majesty's ship "Blonde," where, on the 20th, he died.

The Diamond Jubilee.

In September 1896 the queen's reign had reached a point at which it exceeded in length that of any other English sovereign; but by her special request all public celebrations of the fact were deferred until the following June, which marked the completion of sixty years from her accession. As the time drew on it was obvious that the celebrations of this Diamond Jubilee, as it was popularly called, would exceed in magnificence those of the Jubilee of 1887. Mr Chamberlain, the secretary for the colonies, induced his colleagues to seize the opportunity of making the jubilee a festival of the British empire. Accordingly, the prime ministers of all the self-governing colonies, with their families, were invited to come to London as the guests of the country to take part in the Jubilee procession; and drafts of the troops from every British colony and dependency were brought home for the same purpose. The procession was, in the strictest sense of the term, unique. Here was a display, not only of Englishmen, Scotsmen, Irishmen, Welshmen, but of Mounted Rifles from Victoria and New South Wales, from the Cape and from Natal, and from the Dominion of Canada. Here were Hausas from the Niger and the Gold Coast, coloured men from the West India regiments, zaptiehs from Cyprus, Chinamen from Hong Kong, and Dyaks—now civilized into military police—from British North Borneo. Here, most brilliant sight of all, were the Imperial Service troops sent by the native princes of India; while the detachments of Sikhs who marched earlier in the procession received their full meed of admiration and applause. Altogether the queen was in her carriage for more than four hours, in itself an extraordinary physical feat for a woman of seventy-eight. Her own feelings were shown by the simple but significant message she sent to her people throughout the world: "From my heart I thank my beloved people. May God bless them." The illuminations in London and the great provincial towns were magnificent, and all the hills from Ben Nevis to the South Downs were crowned with bonfires. The queen herself held a great review at Aldershot; but a much more significant display was the review by the prince of Wales of the fleet at Spithead on Saturday, the 26th of June. No less than 165 vessels of all classes were drawn up in four lines, extending altogether to a length of 30 m.

The two years that followed the Diamond Jubilee were, as regards the queen, comparatively uneventful. Her health remained good, and her visit to Cimiez in the spring of 1898 was as enjoyable and as beneficial as before. In May 1899, after another visit to the Riviera, the queen performed what proved to be her last ceremonial function in London: she proceeded in "semi-state" to South Kensington, and laid the foundation stone of the new buildings completing the Museum—henceforth to be called the Victoria and Albert Museum—which had been planned more than forty years before by the prince consort.

The queen's last year.

Griefs and anxieties encompassed the queen during the last year of her life. But if the South African War proved more serious than had been anticipated, it did more to weld the empire together than years of peaceful progress might have accomplished. The queen's frequent messages of thanks and greeting to her colonies and to the troops sent by them, and her reception of the latter at Windsor, gave evidence of the heartfelt joy with which she saw the sons of the empire giving their lives for the defence of its integrity; and the satisfaction which she showed in the Federation of the Australian colonies was no less keen. The reverses of the first part of the Boer campaign, together with the loss of so many of her officers and soldiers, caused no small part of that "great strain" of which the *Court Circular* spoke in the ominous words which first told the country that she was seriously ill. But the queen faced the new situation with her usual courage, devotion and strength of will. She reviewed the departing regiments; she entertained the wives and children of the Windsor soldiers who had gone to the war; she showed by frequent messages her watchful interest in the course of the campaign and in the efforts which were being made throughout the whole empire; and her Christmas gift of a box of chocolate to every soldier in South Africa was a touching proof of her sympathy and interest. She relinquished her annual holiday on the Riviera, feeling that at such a time she ought not to leave her country. Entirely on her own initiative, and moved by admiration for the fine achievements of "her brave Irish" during the war, the queen announced her intention of paying a long visit to Dublin; and there, accordingly, she went for the month of April 1900, staying in the Viceregal Lodge, receiving many of the leaders of Irish society, inspecting some 50,000 school children from all parts of Ireland, and taking many a drive amid the charming scenery of the neighbourhood of Dublin. She went even further than this attempt to conciliate Irish feeling, and to show her recognition of the gallantry of the Irish soldiers she issued an order for them to wear the shamrock on St Patrick's Day, and for a new regiment of Irish Guards to be constituted.

Death of the queen.

In the previous November the queen had had the pleasure of receiving, on a private visit, her grandson, the German Emperor, who came accompanied by the empress and by two of their sons. This visit cheered the queen, and the successes of the army which followed the arrival of Lord Roberts in Africa occasioned great joy to her, as she testified by many published messages. But independently of the public anxieties of the war, and of those aroused by the violent and unexpected outbreak of fanaticism in China, the year brought deep private griefs to the queen. In 1899 her grandson, the hereditary prince of Coburg, had succumbed to phthisis, and in 1900 his father, the duke of Coburg, the queen's second son, previously known as the duke of Edinburgh, also died (July 30). Then Prince Christian Victor, the queen's grandson, fell a victim to enteric fever at Pretoria; and during the autumn it came to be known that the empress Frederick, the queen's eldest daughter, was very seriously ill. Moreover, just at the end of the year a loss which greatly shocked and grieved the queen was experienced in the sudden death, at Windsor Castle, of the Dowager Lady Churchill, one of her oldest and most intimate friends. These losses told upon the queen at her advanced age. Throughout her life she had enjoyed excellent health, and even in the last few years the only marks of age were rheumatic stiffness of the joints, which prevented walking, and a diminished power of eyesight. In the autumn of 1900, however, her health began definitely to fail, and though arrangements were made for another holiday in the South, it was plain that her strength was seriously affected. Still she continued the ordinary routine of her duties and occupations. Before Christmas she made her usual journey to Osborne, and there on the 2nd of January she received Lord Roberts on his return from South Africa and handed to him the insignia of the Garter. A fortnight later she commanded a second visit from the field-marshal; she continued to transact business, and until a week before her death she still took her daily drive. A sudden loss of power then supervened, and on Friday evening, the 18th of January, the *Court Circular* published an authoritative announcement of her illness. On Tuesday, the 22nd of January 1901, she died.

Queen Victoria was a ruler of a new type. When she ascended the throne the popular faith in kings and queens was on the decline. She revived that faith; she consolidated her throne; she not only captivated the affections of the multitude, but won the respect of thoughtful men; and all this she achieved by methods which to her predecessors would have seemed impracticable—methods which it required no less shrewdness to discover than force of character and honesty of heart to adopt steadfastly. Whilst all who approached the queen bore witness to her candour and reasonableness in relation to her ministers, all likewise proclaimed how anxiously she considered advice that was submitted to her before letting herself be persuaded that she must accept it for the good of her people.

Though richly endowed with saving common sense, the queen was not specially remarkable for high development of any specialized intellectual force. Her whole life, public and private, was an abiding lesson in the paramount importance of character. John Bright said of her that what specially struck him was her absolute truthfulness. The extent of her family connexions, and the correspondence she maintained with foreign sovereigns, together with the confidence inspired by her personal character, often enabled her to smooth the rugged places of international relations; and she gradually became in later years the link between all parts of a democratic empire, the citizens of which felt a passionate loyalty for their venerable queen.

By her long reign and unblemished record her name had become associated inseparably with British institutions and imperial solidarity. Her own life was by choice, and as far as her position would admit, one of almost austere simplicity and homeliness; and her subjects were proud of a royalty which involved none of the mischiefs of caprice or ostentation, but set an example alike of motherly sympathy and of queenly dignity. She was mourned at her death not by her own country only, nor even by all English-speaking people, but by the whole world. The funeral in London on the 1st and 2nd of February, including first the passage of the coffin from the Isle of Wight to Gosport between lines of warships, and secondly a military procession from London to Windsor, was a memorable solemnity: the greatest of English sovereigns, whose name would in history mark an age, had gone to her rest.

There is a good bibliographical note at the end of Mr Sidney Lee's article in the *National Dictionary of Biography*. See also the *Letters of Queen Victoria* (1907), and the obituary published by *The Times*, from which some passages have been borrowed above. (H. Ch.)

VICTORIA (or Vittoria), **TOMMASO LUDOVICO DA** (c. 1540–c. 1613), Spanish musical composer, was born at Avila (unless, as Haberl conjectures, his title of *Presbyter Abulensis* refers not to his birthplace but to his parish as priest, so that his name would indicate that he was born at Vittoria). In 1573 he was appointed as Maestro di Cappella to the Collegium Germanicum at Rome, where he had probably been trained. Victoria left Rome in 1589, being then appointed vice-master of the Royal Chapel at Madrid, a post which he held until 1602. In 1603 he composed for the funeral of the empress Maria the greatest requiem of the Golden Age, which is his last known work, though in 1613 a contemporary speaks of him as still living. He was not ostensibly Palestrina's pupil; but Palestrina had the main influence upon his art, and the personal relations between the two were as intimate as were the artistic. The work begun by Morales and perfected by Palestrina left no stumbling-blocks in Victoria's path and he was able from the outset to express the purity of his ideals of religious music without having to sift the good from the bad in that Flemish tradition which had entangled Palestrina's path while it enlarged his style. From Victoria's first publication in 1572 to his last requiem (the *Officium Defunctorum* of 1605) there is practically no change of style, all being pure church music of unswerving loftiness and showing no inequality except in concentration of thought. Like his countryman and predecessor Morales, he wrote no secular music;[1] yet he differs from Morales, perhaps more than can be accounted for by his later date, in that his devotional spirit is impulsive rather than ascetic. His work is the crown of Spanish music: music which has been regarded as not constituting a special school, since it absorbed itself so thoroughly in the Rome of Palestrina. Yet, as has been aptly pointed out in the admirable article "Vittoria" in Grove's *Dictionary of Music and Musicians*, Roman music owes so much to that Spanish school which produced Guerrero, Morales and Victoria, that it might fairly be called the Hispano-Roman school. In spite of the comparative smallness of Victoria's output as compared with that of many of his contemporaries, there is no mistaking his claim to rank with Palestrina and Orlando di Lasso in the triad of supreme 16th-century masters. In any extensive anthology of liturgical polyphony such as the *Musica Divina* of Proske, his work stands out as impressively as Palestrina's and Lasso's; and the style, in spite of a resemblance to Palestrina which amounts to imitation, is as individual as only a successful imitator of Palestrina can be. That is to say, Victoria's individuality is strong enough to assert itself by the very act of following Palestrina's path. When he is below his best his style does not become crabbed or harsh, but over-facile and thin, though never failing in euphony. If he seldom displays an elaborate technique it is not because he conceals it, or lacks it. His mastery is unfailing, but his methods are those of direct emotional effect; and the intellectual qualities that strengthen and deepen this emotion are themselves innate and not sought out. The emotion is reasonable and lofty, not because he has trained himself to think correctly, but because he does not know that any one can think otherwise.

His works fill eight volumes in the complete edition of Messrs Breitkopf and Härtel. (D. F. T.)

VICTORIA, a British colonial state, occupying the south-eastern corner of Australia. Its western boundary is in 140° 58′ E.; on the east it runs out to a point at Cape Howe, in 150° E. long., being thus rudely triangular in shape; the river Murray constitutes nearly the whole of the northern boundary, its most northerly point being in 34° S. lat.; the southern boundary is the coast-line of the Southern Ocean and of Bass Strait, the most southerly point is Wilson's Promontory in 39° S. lat. The greatest length east and west is about 480 m.; the greatest width, in the west, is about 250 m. The area is officially stated to be 87,884 sq. m.

The coast-line may be estimated at about 800 m. It begins about the 141st meridian with bold but not lofty sandstone cliffs, worn into deep caves and capped by grassy undulations, which extend inland to pleasant park-like lands. Capes Bridgewater and Nelson form a peninsula of forest lands, broken by patches of meadow. To the east of Cape Nelson lies the moderately sheltered inlet of Portland Bay, consisting of a sweep of sandy beach flanked by bold granite rocks. Then comes a long unbroken stretch of high cliffs, which, owing to insetting currents, have been the scene of many calamitous wrecks. Cape Otway is the termination of a wild mountain range that here abuts on the coast. Its brown cliffs rise vertically from the water; and the steep slopes above are covered with dense forests of exceedingly tall timber and tree-ferns. Eastwards from this cape the line of cliffs gradually diminishes in height to about 20 to 40 ft. at the entrance to Port Phillip. Next comes Port Phillip Bay, at the head of which stands the city of Melbourne. When the tide recedes from this bay through the narrow entrance it often encounters a strong current just outside; the broken and somewhat dangerous sea thus caused is called "the Rip." East of Port Phillip Bay the shores consist for 15 m. of a line of sandbanks; but at Cape Schanck they suddenly become high and bold. East of this comes Western Port, a deep inlet more than half occupied by French Island and Phillip Island. Its shores are flat and uninteresting, in some parts swampy. The bay is shallow and of little use for navigation. The coast continues rocky round Cape Liptrap. Wilson's Promontory is a great rounded mass of granite hills, with wild and striking scenery, tree-fern gullies and gigantic gum-trees, connected with the mainland by a narrow sandy isthmus. At its extremity lie a multitude of rocky islets, with steep granite edges. North of this cape, and

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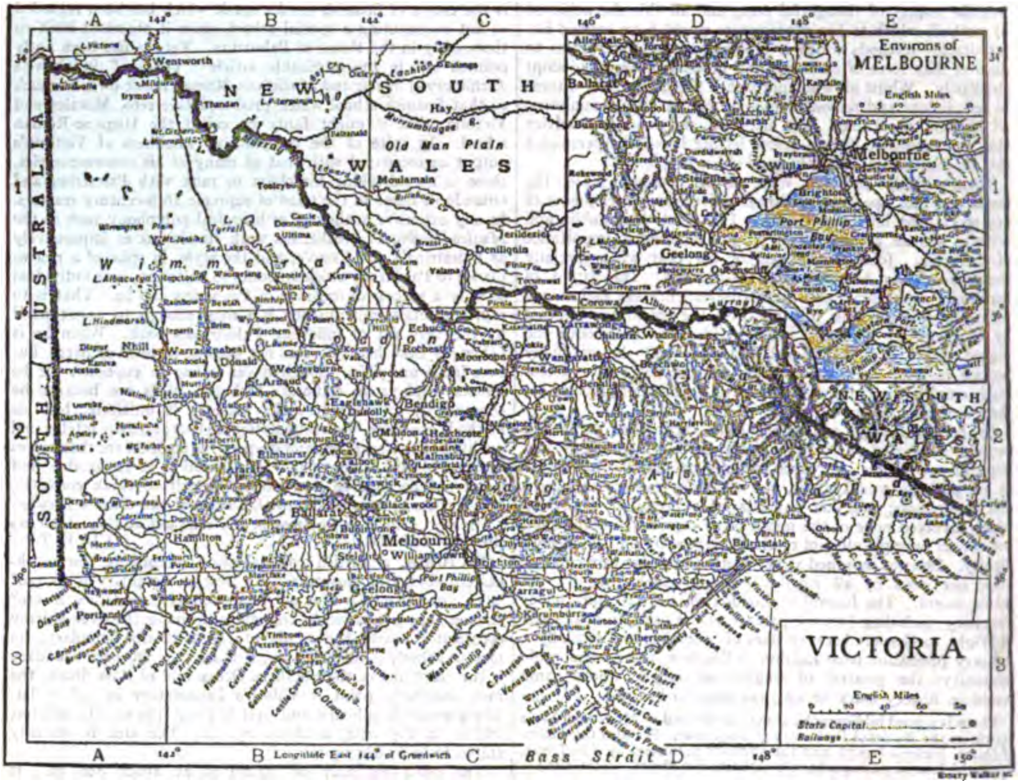
[1] One French song is mentioned by Hawkins, but no secular music appears in the prospectus of the modern complete edition of his works published by Breitkopf and Härtel.



opening to the east, lies Corner Inlet, which is dry at low water. The coast now continues low to the extremity of the colony. The slight bend northward forms a sort of bight called the Ninety Mile Beach, but it really exceeds that length. It is an unbroken line of sandy shore, backed by low sandhills, on which grows a sparse dwarf vegetation. Behind these hills comes a succession of lakes, surrounded by excellent land, and beyond these rise the soft blue outlines of the mountain masses of the interior. The shores on the extreme east are somewhat higher, and occasionally rise in bold points. They terminate in Cape Howe, off which lies Gabo Island, of small extent but containing an important lighthouse and signalling station.

The western half of Victoria is level or slightly undulating, and as a rule tame in its scenery, exhibiting only thinly timbered grassy lands, with all the appearance of open parks. The north-west corner of the colony, equally flat, is dry and sometimes sandy, and frequently bare of vegetation, though in one part some seven or eight millions of acres are covered with the dense brushwood known as "mallee scrub." This wide western plain is slightly broken in two places. In the south the wild ranges of Cape Otway are covered over a considerable area with richly luxurious but almost impassable forests. This district has been reserved as a state forest and its coast forms a favourite holiday resort, the scenery being very attractive. The middle of the plain is crossed by a thin line of mountains, known as the Australian Pyrenees, at the western extremity of which there are several irregularly placed transverse ranges, the chief being the Grampians, the Victoria Range and the Sierra Range. Their highest point is Mount William (3600 feet). The eastern half of the colony is wholly different. Though there is plenty of level land, it occurs in small patches, and chiefly in the south, in Gippsland, which extends from Corner Inlet to Cape Howe. But a great part of this eastern half is occupied with the complicated mass of ranges known collectively as the Australian Alps. The whole forms a plateau averaging from 1000 to 2000 ft. high, with many smaller tablelands ranging from 3000 to 5000 ft. in height. The highest peak, Bogong, is 6508 ft. in altitude. The ranges are so densely covered with vegetation that it is extremely difficult to penetrate them. About fifteen peaks over 5000 ft. in height have been measured. Along the ranges grow the giant trees for which Victoria is famous. The narrow valleys and gullies contain exquisite scenery, the rocky streams being overshadowed by groves of graceful tree-ferns, from amid whose waving fronds rise the tall smooth stems of the white gums. Over ten millions of acres are thus covered with forest-clad mountains which in due time will become a very valuable asset of the state. The Australian Alps are connected with the Pyrenees by a long ridge called the Dividing Range (1500 to 3000 ft. high).

Rivers.

Victoria is fairly well watered, but its streams are generally too small to admit of navigation. This, however, is not the case with the Murray river (*q.v.*). The Murray for a distance of 670 m. (or 1250 m. if its various windings be followed) forms the boundary between New South Wales and Victoria; it receives a number of tributaries from the Victorian side. The Mitta Mitta, which rises in the heart of the Australian Alps, is 150 m. long. The Ovens, rising among the same mountains, is slightly shorter. The Goulburn (340 m.) flows almost entirely through well-settled agricultural country, and is deep enough to be used in its lower part for navigation. The valley of this river is a fertile grain-producing district. The Campaspe (150 m.) has too little volume of water to be of use for navigation; its valley is also agricultural, and along its banks there lie a close succession of thriving townships. The Loddon (over 200 m.) rises in the Pyrenees. The upper part flows through a plain, to the right agricultural and to the left auriferous, containing nearly forty thriving towns, including Bendigo (formerly named Sandhurst) and Castlemaine. In the lower part of the valley the soil is also fertile, but the rainfall is small. To the west of the Loddon is the Avoca river with a length of 140 m.; it is of slight volume, and though it flows towards the Murray it loses itself in marshes and salt lagoons before reaching that river.

The rivers which flow southwards into the ocean are numerous. The Snowy river rises in New South Wales, and in Victoria flows entirely through wild and almost wholly unoccupied territory.

The Tambo (120 m. long), which rises in the heart of the Australian Alps, crosses the Gippsland plains and falls into Lake King, one of the Gippsland lakes; into the same lake falls the Mitchell river, rising also in the Australian Alps. The Mitchell is navigated for a short distance. The Latrobe empties itself into Lake Wellington after a course of 135 m.; it rises at Mount Baw Baw. The Yarra Yarra rises in the "Black Spur" of the Australian Alps. Emerging in a deep valley from the ranges, it follows a sinuous course through the undulating plains called the "Yarra Flats," which are wholly enclosed by hills, on whose slopes are some of the best vineyards of Australia; it finds its way out of the Flats between high and precipitous but well-wooded banks, and finally reaches Port Phillip Bay below Melbourne. Owing to its numerous windings its course through that city and its suburbs is at least thirty miles. Nearer to the sea its waterway, formerly available for vessels drawing 16 ft., has now been deepened so as to be available for vessels drawing 20 ft. The Barwon, farther west, is a river of considerable length but little volume, flowing chiefly through pastoral lands. The Hopkins and Glenelg (280 m.) both water the splendid pastoral lands of the west, the lower course of the former passing through the fertile district of Warrnambool, well known throughout Australia as a potato-growing region.

In the west there are Lakes Corangamite and Colac, due north of Cape Otway. The former is intensely salt; the latter is fresh, having an outlet for its waters. Lakes Tyrrell and Hindmarsh lie in the plains of the north-west. In summer they are dried up, and in winter are again formed by the waters of rivers that have no outlet. In the east are the Gippsland lakes, formed by the waters of the Latrobe, Mitchell and Tambo, being dammed back by the sandhills of the Ninety Mile Beach. They are connected with Bass Strait by a narrow and shifting channel through a shallow bar; the government of Victoria has done a great deal of late years to deepen the entrance and make it safer. The upper lake is called Lake Wellington; a narrow passage leads into Lake Victoria, which is joined to a wider expanse called Lake King. These are all fresh-water lakes and are visited by tourists, being readily accessible from Melbourne. (T. A. C.)

Geology.—Victoria includes a more varied and complete geological sequence than any other area of equal size in Australia. Its geological foundation consists of a band of Archean and Lower Palaeozoic rocks, which forms the backbone of the state. The sedimentary rocks in this foundation have been thrown into folds, of which the axes trend approximately north and south. The Lower Palaeozoic and Archean rocks build up the Highlands of Victoria, which occupy the whole width of the state at its eastern end, extending from the New South Wales border on the north to the shore of the Southern Ocean on the south. These Highlands constitute the whole of the mountainous country of Gippsland and the north-eastern districts. They become narrower to the west, and finally, beyond the old plateau of Dundas, disappear beneath the recent loams of the plains along the South Australian border. The Lower Palaeozoic and Archean rocks bear upon their surface some Upper Palaeozoic rocks, which occur in belts running north and south, and have been preserved by infolding or faulting; such are the Grampian Sandstones in the west; the Cathedral Mountain Sandstones to the north-east of Melbourne; the belt of Devonian and Lower Carboniferous rocks that extends across eastern Victoria, through Mount Wellington to Mansfield; and finally, far to the east, is the belt of the Snowy river porphyries, erupted by a chain of Lower Devonian volcanoes. Further Upper Palaeozoic rocks and the Upper Carboniferous glacial beds occur in basins on both northern and southern flanks of the Highlands. The Mesozoic rocks are confined to southern Victoria; they build up the hills of southern Gippsland and the Otway Ranges; and farther west, hidden by later rocks, they occur under the coast of the western district. Between the southern mountain chain and the Victorian Highlands occurs the Great Valley of Victoria, occupied by sedimentary and volcanic rocks of Kainozoic age. The North-Western Plains, occurring between the northern foot of the Highlands and the Murray, are occupied by Kainozoic sediments.

Victoria has a fairly complete geological sequence, though it is poorer than New South Wales in the Upper Carboniferous and Lower Mesozoic. The Archean rocks form two blocks of gneisses and granites, which build up the Highlands of Dundas in the west, and of the north-eastern part of Victoria. They were originally described as metamorphosed Silurian rocks, but must be of Archean age. Another series of Archean rocks is more widely developed, and forms the old framework upon which the geology of Victoria has been built up. They are known as the Heathcotian series, and consist of phyllites, schists and amphibolites; while their most characteristic feature is the constant association of foliated diabase and beds of jasperoids. Volcanic agglomerates occur in the series at the typical locality of Heathcote. The Heathcotian rocks form the Colbinabbin Range, which runs for 40 m. northward and southward, east of Bendigo. They are also exposed on the surface at the eastern foot of the Grampian Range, and at Dookie, and on the southern coast in Waratah Bay; they have been proved by bores under Rushworth, and they apparently underlie parts of the Gippsland coalfields. The Cambrian rocks have so far only been definitely proved near Mansfield. Mr A. M. Howitt has there collected some fragmentary remains of *Olenellus* and worm tubes of the Cambrian genus *Salterella*. These beds at Mansfield contain phosphatic limestones and wavellite.

The Ordovician system is well developed. It consists of slates and quartzites; and some schists around the granites of the western district, and in the Pyrenees, are regarded as metamorphic Ordovician. The Ordovician has a rich graptolitic fauna, and they have been classified into the following divisions:—

Upper Ordovician . .	Darriwill Series
Lower Ordovician . .	Castlemaine Series Bendigo Series Lancefield Series

The Ordovician beds are best developed in a band running north-north-west and south-south-east across Victoria, of which the eastern boundary passes through Melbourne. This Ordovician band begins on the south with the block forming the plateau of Arthur's Seat and Mornington Peninsula, as proved by Ferguson. This outlier is bounded to the north by the depression of Port Phillip and the basalt plains west of Melbourne. It reappears north of them at Lancefield, whence it extends along the Highlands, past Ballarat, with southern outliers as far as Steiglitz. It forms the whole of the Ballarat Plateau, and is continued northward through the goldfields of Castlemaine, Bendigo and the Pyrenees, till it dips under the North-Western Plains. Certain evidence as to the age of the rocks in the Pyrenees has not yet been collected, and they may be pre-Ordovician. Some Upper Ordovician rocks occur in the mountains of eastern Gippsland, as near Woods Point, and in north-eastern Victoria, in Wombat Creek.

The Silurian system consists of two divisions: the lower or Melbournian, and the upper or Yeringian. Both consist in the main of sandstones, quartzites and shales; but the upper series includes lenticular masses of limestone, at Lillydale, Loyola and along the Thomson river. The limestones are rich in typical Silurian corals and bryozoa, and the shales and sandstones contain brachiopods and trilobites. The Silurian rocks are well exposed in sections near Melbourne; they occur in a belt running from the southern coast at Waratah Bay, west of Wilson's Promontory, north-north-westward across Victoria, and parallel to the Ordovician belt, which underlies them on the west. The Silurian rocks include the goldfields of the Upper Yarra, Woods Point, Walhalla and Rushworth, while the limestones are worked for lime at Lillydale and Waratah Bay. The Devonian system includes representatives of the lower, middle and upper series. The Lower Devonian series includes the porphyries and their associated igneous rocks, along the valley of the Snowy river. They represent the remains of an old chain of volcanoes which once extended north and south across Victoria. The Middle Devonian is mainly formed of marine sandstones, and limestones in eastern Gippsland. It is best developed in the valleys of the Mitchell, the Tambo and the Snowy rivers. The Upper Devonian rocks include sandstones, shales and coarse conglomerates. At the close of Middle Devonian times there were intense crustal disturbances, and the granitic *massifs*, which formed the primitive mountain axis of Victoria, were then intruded.

The Carboniferous system begins with the Avon river sandstones, containing *Lepidodendron*, and the red sandstones, with Lower Carboniferous fish, collected by Mr Geo. Sweet near Mansfield. Probably the Grampian Sandstone, the Cathedral Mountain Sandstone, and some in the Mount Wellington district belong to the same period. The Upper Carboniferous includes the famous glacial deposits and boulder clays, by which the occurrence of a Carboniferous glaciation in the Southern Hemisphere was first demonstrated. These beds occur at Heathcote, Bendigo, the Loddon Valley, southern Gippsland and the North-Eastern district. The beds comprise boulder clay, containing ice-scratched boulders, and sometimes rest upon ice-scratched, moutonné surfaces, and some lake deposits, similar to those laid down in glacial lakes. The glacial beds are overlain by sandstones containing *Gangamopteris*, and Kitson's work in Northern Tasmania leaves no doubt that they are on the horizon of the Greta or Lower Coal Measures of New South Wales.

The Mesozoic group is represented only by Jurassic rocks, which form the mountains of southern Gippsland and include its coalfields. The rocks contain fossil land plants, occasional fish remains and the claw of a dinosaur, &c. The coal is of excellent quality. The mudstones, which form the main bulk of this series, are largely composed of volcanic debris, which decomposes to a fertile soil. These rocks trend south-westward along the Bass Range, which reaches Western Port. They skirt the Mornington Peninsula, underlie part of Port Phillip and the Bellarine Peninsula, and are exposed in the Barrabool Hills to the south-west of Geelong; thence they extend into the Otway Ranges, which are wholly built of these rocks and contain some coal seams. Farther west they disappear below the recent sediments and volcanic rocks of the Warrnambool district. They are exposed again in the Portland Peninsula, and rise again to form the Wannon Hills, to the south of Dundas.

The Kainozoic beds include three main series: lacustrine, marine and volcanic. The main lacustrine series is probably of Oligocene age, and is important from its thick beds of brown coal, which are thickest in the Great Valley of Victoria in southern Gippsland. A cliff face on the banks of the Latrobe, near Morwell, shows 90 ft. of it, and a bore near Morwell is recorded as having passed through 850 ft. of brown coal. Its thickness, at least in patches, is very great. The brown coals occur to the south-east of Melbourne, under the basalts between it and Geelong. Brown coal is also abundant under the Murray plains in north-western Victoria. The Kainozoic marine rocks occur at intervals along the southern coast and in the valleys opening from it. The most important horizon is apparently of Miocene age. The rocks occur at intervals in eastern Victoria, along the coast and up the river valleys, from the Snowy river westward to Alberton. At the time of the deposition of these beds Wilson's Promontory probably extended south-eastward and joined Tasmania; for the mid-Kainozoic marine deposits do not occur between Alberton and Flinders, to the west of Western Port. They extend up the old valley of Port Phillip as far as Keilor to the north of Melbourne, and are widely distributed under the volcanic rocks of the Western Plains. They are exposed on the floors of the volcanic cauldrons, and have been found by mining operations under the volcanic rocks of the Ballarat plateau near Pitfield. The Miocene sea extended up the Glenelg valley, round the western border of the Dundas Highlands, and spread over the Lower Murray Basin into New South Wales; its farthest south-eastern limit was in a valley at Stawell. Some later marine deposits occur at the Lakes Entrance in eastern Gippsland, and in the valley of the Glenelg.

The volcanic series begins with a line of great dacite domes including the geburite-dacite of Macedon, which is associated with sölvsbergites and trachy-dolerites. The eruption of these domes was followed by that of sheets of basalt of several different ages, and the intrusion of some trachyte dykes. The oldest basalts are associated with the Oligocene lake deposits; and fragments of the large lava sheets of this period form some of the table-topped mountains in the Highlands of eastern Victoria. The river gravels below the lavas have been worked for gold, and land plants discovered in the workings. At Flinders the basalts are associated with Miocene limestones. The largest development of the volcanic rocks are a series of confluent sheets of basalt, forming the Western Plains, which occupy over 10,000 sq. m. of south-western Victoria. They are crossed almost continuously by the South-Western railway for 166 m. from Melbourne to Warrnambool. The volcanic craters built up by later eruptions are well preserved: such are Mount Elephant, a simple breached cone; Mount Noorat, with a large primary crater and four secondary craters on its flanks; Mount Warrenheip, near Ballarat, a single cone with the crater breached to the north-west. Mount Franklin, standing on the Ordovician rocks north of Daylesford, is a weathered cone breached to the south-east. In addition to the volcanic craters, there are numerous volcanic cauldrons formed by subsidence, such as Bullenmerri and Gnotuk near Camperdown, Keilembete near Terang, and Tower Hill near Port Fairy. Tower Hill consists of a large volcanic cauldron, and rising from an island in a lake on its floor is a later volcanic crater.

The Pleistocene, or perhaps Upper Pliocene, deposits of most interest are those containing the bones of giant marsupials, such as the *Diprotodon* and *Palorchestes*, which have been found near Geelong, Castlemaine, Lake Kolungulak, &c.; at the last locality *Diprotodon* and various extinct kangaroos have been found in association with the dingo. There is no trace in these deposits of the existence of man, and J. W. Gregory has reasserted the striking absence of evidence of man's residence in Victoria, except for a very limited period. There is no convincing evidence of Pleistocene glacial deposits in Victoria. Of the many records, the only one that can still be regarded as at all probable is that regarding Mount Bogong.

The chief literature on the geology of Victoria is to be found in the maps and publications of the Geological Survey—a branch of the Mines Department. A map of the State, on the scale of eight inches to the mile, was issued in 1902. The Survey has published numerous quarter-sheet maps, and maps of the gold fields and parishes. The geology is described in the Reports, Bulletins and Memoirs of the Survey, and in the Quarterly Reports of the Mining Registrars. Statistics of the mining industry are stated in the Annual Report of the Secretary for Mines. See also the general summary of the geology of Victoria, by R. Murray, issued by the Mines Department in 1887 and 1895. Numerous papers on the geology of the State are contained in the *Trans. R. Soc. Victoria*, and on its mining geology in the *Trans. of the Austral. Inst. Min. Engineers*. The physical geography has been described by J. W. Gregory in the *Geography of Victoria* (1903). (J. W. G.)

Flora.—The native trees belong chiefly to the Myrtaceae, being largely composed of *Eucalypti* or gum trees. There are several hundred species, the most notable being *Eucalyptus amygdalina*, a tree with tall white stem, smooth as a marble column, and without branches for 60 or 70 ft. from the ground. It is singularly beautiful when seen in groves, for these have all the appearance of lofty pillared cathedrals. These trees are among the tallest in the world, averaging in some districts about 300 ft. The longest ever measured was found prostrate on the Black Spur: it measured 470 ft. in length; it was 81 ft. in girth near the root. *Eucalyptus globulus* or blue gum has broad green leaves, which yield the eucalyptus oil of the pharmacopoeia. *Eucalyptus rostrata* is extensively used in the colony as a timber, being popularly known as red gum or hard wood. It is quite unaffected by weather, and almost indestructible when used as piles for piers or wharves. Smaller species of eucalyptus form the common "bush." Melaleucas, also of Myrtacea kind, are prominent objects along all the coasts, where they grow densely on the sand-hills, forming "ti-tree" scrub. *Eucalyptus dumosa* is a species which grows only 6 to 12 ft. high, but with a straight stem; the trees grow so close together that it is difficult to penetrate the scrub formed by them. Eleven and a half million acres of the Wimmera district are covered with this "mallee scrub," as it is called. Recent legislation has made this land easy of acquisition, and the whole of it has been taken up on pastoral leases. Five hundred thousand acres have recently been taken up as an irrigation colony on Californian principles and laid out in 40-acre farms and orchards. The Leguminosae are chiefly represented by acacias, of which the wattle is the commonest. The black wattle is of considerable value, its gum being marketable and its bark worth from £5 to £10 a ton for tanning purposes. The golden wattle is a beautiful tree, whose rich yellow blossoms fill the river-valleys in early spring with delicious scent. The Casuarinae or she-oaks are gloomy trees, of little use, but of frequent occurrence. Heaths, grass-trees and magnificent ferns and fern-trees are also notable features in Victorian forests. But European and subtropical vegetation has been introduced into the colony to such an extent as to have largely altered the characters of the flora in many districts.

Fauna.—The indigenous animals belong almost wholly to the Marsupialia. Kangaroos are tolerably abundant on the grassy plains, but the process of settlement is causing their extermination. A smaller species of almost identical appearance called the wallaby is still numerous in the forest lands. Kangaroo rats, opossums, wombats, native bears, bandicoots and native cats all belong to the same class. The wombat forms extensive burrows in some districts. The native bear is a frugivorous little animal, and very harmless. Bats are numerous, the largest species being the flying fox, very abundant in some districts. Eagles, hawks, turkeys, pigeons, ducks, quail, snipe and plover are common; but the characteristic denizens of the forest are vast flocks of parrots, parakeets and cockatoos, with sulphur-coloured or crimson crests. The laughing jackass (giant kingfisher) is heard in all the country parts, and magpies are numerous everywhere. Snakes are numerous, but less than one-fourth of the species are venomous, and they are all very shy. The deaths from snake-bite do not average two per annum. A great change is rapidly taking place in the fauna of the country, owing to cultivation and acclimatization. Dingoes have nearly disappeared, and rabbits, which were introduced only a few years ago, now abound in such numbers as to be a positive nuisance. Deer are also rapidly becoming numerous. Sparrows and swallows are as common as in England. The trout, which has also been acclimatized, is taking full possession of some of the streams.

Climate.—Victoria enjoys an exceptionally fine climate. Roughly speaking, about one-half of the days in the year present a bright, cloudless sky, with a bracing and dry atmosphere, pleasantly warm but not relaxing. These days are mainly in the autumn and spring. During forty-eight years, ending with 1905, there have been on an average 132 days annually on which rain has fallen more or less (chiefly in winter, but rainy days do not exceed thirty in the year. The average yearly rainfall was 25·61 in. The disagreeable feature of the Victorian climate is the occurrence of north winds, which blow on an average about sixty days in the year. In winter they are cold and dry, and have a slightly depressing effect; but in summer they are hot and dry, and generally bring with them disagreeable clouds of dust. The winds themselves blow for periods of two or three days at a time, and if the summer has six or eight such periods it becomes relaxing and produces languor. These winds cease with extraordinary suddenness, being replaced in a minute or two by a cool and bracing breeze from the south. The temperature often falls 40° or 50° F. in an hour. The maximum shade temperature at Melbourne in 1905 was 108·5°, and the minimum 32°, giving a mean of 56·1°. The temperature never falls below freezing-point, except for an hour or two before sunrise in the coldest month. Snow has been known to fall in Melbourne for a few minutes two or three times during a long period of years. It is common enough, however, on the plateau; Ballarat, which is over 1000 ft. high, always has a few snowstorms, and the roads to Omeo among the Australian Alps lie under several feet of snow in the winter. The general healthiness of the climate is shown by the fact that the average death-rate for the last five years has been only 12·71 of the population.

Population.—As regards population, Victoria maintained the leading position among the Australasian colonies until the end of 1891, when New South Wales overtook it. The population in 1905 was 1,218,571, the proportion of the sexes being nearly equal. In 1860 the population numbered 537,847; in 1870, 710,599; in 1880, 860,067; and in 1890, 1,133,266. The state had gained little, if anything, by immigration during these years, for the excess of immigration over emigration from 1861 to 1870 and from 1881 to 1890 was counterbalanced by the excess of departures during the period 1871 to 1880 and from 1891 to 1905. The mean population of Melbourne in 1905 was 511,900.

The births in 1905 numbered 30,107 and the deaths 14,676, representing respectively 24·83 and 12·10 per 1000 of the population. The birth-rate has fallen markedly since 1875, as the following statement of the averages arranged in quinquennial periods shows:—

Period.	Births per 1000 of Population.	Period.	Births per 1000 of Population.
1861–65	43·30	1881–85	30·76
1866–70	39·27	1886–90	32·72
1871–75	35·69	1891–95	31·08
1876–80	31·43	1896–1900	26·20
		1901–1905	24·97

The number of illegitimate births during 1905 was 1689, which gives a proportion of 5·61 to every 100 births registered. The death-rate has greatly improved. Arranged in quinquennial periods the death-rates were:—

Period.	Deaths per 1000 of Population.	Period.	Deaths per 1000 of Population.
1861–65	17·36	1881–85	14·65
1866–70	16·52	1886–90	16·07
1871–75	15·64	1891–95	14·10
1876–80	14·92	1896–1900	13·67
		1901–1905	12·71

The marriages in 1905 numbered 8774, which represents a rate of 7·24 per 1000 persons. This was the highest number reached during a period of fourteen years, and was 564 more than in 1904 and 1169 more than in 1903. In the five years 1871–75 the marriage-rate stood at 6·38 per 1000; in 1876–80, 6·02; in 1881–85, 7·37; in 1886–90, 8·13; in 1901–5, 6·86.

Outside Melbourne and suburbs, the most important towns are Ballarat (49,648), Bendigo (43,666), Geelong (26,642), Castlemaine (7063), Warrnambool (6600), Maryborough (6000) and Stawell (5200).

Religion.—The Church of England, as disclosed at the census of 1901, had 432,704 adherents; the Roman Catholic Church came next with 263,710; the Presbyterians had 190,725; Wesleyans and Methodists, 180,272; Congregationalists, 17,141; Baptists, 31,648; Lutherans, 13,935; Jews, 5907; and the Salvation Army, whose Australian headquarters are in Melbourne, 8830.

Education.—There were in 1905 1930 state schools, in which there were 210,200 children enrolled, the teachers numbering 4689. There were also 771 private schools with 2289 teachers and a net enrolment of 43,014 children; the majority of them being connected with one or other of the principal religious denominations. The total cost of primary instruction in 1905 was £676,238, being 11s. 2d. per head of population and £4, 14s. 4d. per head of scholars in average attendance. Melbourne University maintains its high position as a teaching body. In 1905 the number of matriculants was 493 and the graduates 118.

Crime is decreasing. In 1905 the number of persons brought before the magistrates was 48,345. Drunkenness accounted for 14,458, which represents 11·92 per 1000 of the population; in 1901 the proportion was 14·43. Charges against the person numbered 1932, and against property 4032.

Administration.—As one of the six states of the Commonwealth, Victoria returns six senators and twenty-three representatives to the federal parliament. The local legislative authority is vested in a parliament of two chambers, both elective—the Legislative Council, composed of thirty-five members, and the Legislative Assembly, composed of sixty-eight members. One-half of the members of the Council retire every three years. The members of the Assembly are elected by universal suffrage for the term of three years, but the chamber can be dissolved at any time by the Governor in council. Members of the Assembly are paid £300 a year.

The whole of Victoria in 1905 was under the control of municipalities, with the exception of about 600 sq. m. in the mountainous part of Wonnangatta, and 64 sq. m. in French Island. The number of municipalities in that year was 206; they comprised 11 cities, 11 towns, 38 boroughs and 146 shires.

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Finance.—[illegible] that of the [illegible] per head [illegible] which also [illegible] inhabitant. The [illegible] was: 1880, [illegible] 1895, £6,712,451 [illegible] revenue in 1905 [illegible] other taxation, [illegible] lands, £408,836; [illegible] expenditure were: [illegible] public instruction, [illegible] £1,884,208; other services, [illegible] the public debt of the state [illegible] per inhabitant. The great [illegible] to the construction of [illegible] millions sterling being otherwise [illegible]

Up to 1905 the state had alienated [illegible] domain, and had 17,994,233 acres [illegible] alienated nor leased amounted to [illegible]

The capital value of properties as [illegible] in 1905 was £210,920,174, and the [illegible] 1884 the values were 104 millions and [illegible] 203 millions and £13,734,000; the year [illegible] highest point of inflation in land values, and [illegible] years there was a vast reduction, both in [illegible] values, the lowest point touched being in 1895; [illegible] improvement has taken place, and there is every [illegible] improvement will continue. The revenues of [illegible] derived chiefly from rates, but the rates are largely [illegible] by fees and licences, and contributions for services [illegible] cluding government endowments and special grants, [illegible] 1905 amounted to £90,572, the revenues of the municipalities [illegible] the years named were: 1880, £616,132; 1885, £789,[illegible]; [illegible] £1,273,855; 1895, £1,038,720; 1900, £1,036,497; 1905, £1,[illegible] In addition to the municipalities there are other local bodies empowered to levy rates; these and their revenues in 1905 were: Melbourne Harbour Trust, £189,983; Melbourne and Metropolitan Board of Works, £390,441; Fire Boards, £53,279. The Board of Works is the authority administering the metropolitan water and sewerage works. Excluding revenue from services rendered, the amount of taxation levied in Victoria reached in 1905 £4,621,608; of this the federal government levied £2,488,843, the state government £979,029, the municipalities £986,009, and the Melbourne Harbour Trust £167,727.

Productions and Industry: Minerals.—About 25,400 persons find employment in the goldfields, and the quantity of gold won in 1905 was 810,050 oz., valued at £3,173,744, a decrease of 10,967 oz. as compared with 1904. The dividends paid by gold-mining companies in 1905 amounted to £454,431, which, although about the average of recent years, showed a decline of £168,956 as compared with the sum distributed in 1904. Up to the close of 1905 the total value of gold won from the first discovery in 1851 was £273,236,500. No other metallic minerals are systematically worked, although many valuable deposits are known to exist. Brown coal, or lignite, occurs extensively, and attempts have frequently been made to use the mineral for ordinary fuel purposes, but without much success. Black coal is now being raised in increasingly large quantities. The principal collieries are the Outrim Howitt, the Coal Creek Proprietary, the Jumbunna and the Korumburra, all in the Gippsland district. The production of coal in 1905 was 155,185 tons, valued at £79,060; £4100 worth of silver and £11,159 worth of tin were raised; the value of other minerals produced was £93,392, making a total mineral production (exclusive of gold) of £187,711.

Agriculture.—Judged by the area under tillage, Victoria ranks first among the states of the Australian group. The area under crop in 1905 was 4,269,877 acres, compared with 2,116,000 acres in 1891 and 1,435,000 acres in 1881. Wheat-growing claims the chief attention, 2,070,517 acres being under that cereal in 1905. The areas devoted to other crops were as follows: maize, 11,785 acres; oats, 312,052 acres; barley, 40,938 acres; other cereals, 14,212 acres; hay, 591,771 acres; potatoes, 44,670 acres; vines, 26,402 acres; green foliage, 34,041 acres; other tillage, 73,574 acres; land in fallow comprised 1,049,915 acres. Victorian wheat is of exceptionally fine quality, and usually commands a high price in the London market. The average yield per acre in 1905 was 11·31 bushels; except for the year 1903, the total crop and the average per acre in 1905 were the highest ever obtained. The yield of oats was 23·18 bushels per acre, of barley 25·95, and of potatoes 2·58 tons. Great progress has been made in the cultivation of the grape vine, and Victoria now produces more than one-third of the wine made in Australia.

Live Stock.—The number of sheep in 1905 was 11,455,115. The quality of the sheep is steadily improving. Systematic attention to stock has brought about an improvement in the weight of the fleece, and careful observations show that between 1861 and 1871 the average weight of wool per sheep increased about one-third; between 1871 and 1881 about one pound was added to the weight per fleece, and there has been a further improvement since the year named. The following were the number of sheep depastured at the dates named: 1861, 6,240,000; 1871, 10,002,000; 1881, 10,267,000; 1891, 12,928,000; 1901, 10,841,790. The horses number 385,513, the swine 273,682, and the horned cattle 1,737,690; of these last, 649,100 were dairy cows. Butter-making has greatly increased since 1890, and a fairly large export trade has arisen. In 1905, 57,606,821 ℔ of butter were made, 4,297,350 ℔ of cheese and 16,433,665 ℔ of bacon and hams.

Manufactures.—There has been a good deal of fluctuation in the amount of employment afforded by the factories, as the following figures show: hands employed, 1885, 49,297; 1890, 56,639; 1893, 39,473; 1895, 46,095; 1900, 64,207; 1905, 80,235. Of the hands last named, 52,925 were males and 27,310 females. The total number of establishments was 4264, and the horse-power of machinery actually used, 43,492. The value of machinery was returned at £6,187,919, and of land and buildings £7,771,238. The majority of the establishments were small; those employing from 50 to 100 hands in 1905 were 161, and upwards of 100 hands, 124.

Commerce.—Excluding the coastal trade, the tonnage of vessels entering Victorian ports in 1905 was 3,989,903, or about 3¼ tons per inhabitant. The imports in the same year were valued at £22,337,886, and the exports at £22,758,828. These figures represent £18, 8s. 5d. and £18, 15s. 6d. per inhabitant respectively. The domestic produce exported was valued at £14,276,961; in 1891 the value was £13,026,426; and in 1881, £12,480,567. The comparatively small increase over the period named is due mainly to the large fall in prices of the staple articles of local production. There has, however, been some loss of trade due to the action of the New South Wales government in extending its railways into districts formerly supplied from Melbourne. The principal articles of local production exported during 1905 with their values were as follows: butter and cheese, £1,576,189; gold (coined and bullion), £1,078,560; wheat, £1,835,204; frozen mutton, £275,195; frozen and preserved rabbits and hares, £220,940; skins and hides, £535,086; wool, £2,501,990; horses, £278,033; cattle, £293,241; sheep, £326,526; oats, £165,585; flour, £590,297; hay and chaff, £97,471; bacon and ham, £89,943; jams and jellies, £73,233; fruit (dried and fresh), £125,330. The bulk of the trade passes through Melbourne, the imports in 1905 at that port being £18,112,528.

Defence.—The Commonwealth defence forces in Victoria number about 5700 men, 4360 being partially paid militia and 1000 unpaid volunteers. There are also 18,400 riflemen belonging to rifle clubs. Besides these there are 200 naval artillerymen, capable of being employed either as a light artillery land force, or on board war vessels. The total expenditure in 1905 for purposes of defence in the state was £291,577.

Railways.—The railways have a total length of 3394 m., and the cost of their construction and equipment up to the 30th of June 1905 was £41,259,387; this sum was obtained by raising loans, mostly in London, on the security of the general revenues of the state. In 1905 the gross railway earnings were £3,582,266, and the working expenses £2,222,279; so that the net earnings were £1,359,987, which sum represents 3·30% on the capital cost.

Posts and Telegraphs.—Victoria had a length of 6338 m. of telegraph line in operation in 1905; there were 969 stations, and the business done was represented by 2,256,482 telegrams. The post-offices, properly so-called, numbered 1673; during that year 119,689,000 letters and postcards and 59,024,000 newspapers and packets passed through them. The postal service is carried on at a profit; the revenue in 1905 was £708,369, and the expenditure £627,735. Telephones are widely used; in 1905 the length of telephone wire in use was 28,638 m., and the number of telephones 14,134; the revenue from this source for the year was £102,396.

Banking.—At the end of 1905 the banks of issue in Victoria, eleven in number, had liabilities to the extent of £36,422,844, and assets of £40,511,335. The principal items among the liabilities were: notes in circulation, £835,499; deposits bearing interest, £23,055,743; and deposits not bearing interest, £12,068,153. The chief assets were: coin and bullion, £8,056,666; debts due, £29,918,226; property, £1,919,230; other assets, £617,213. The money in deposit in the savings banks amounted to £10,896,741, the number of depositors being 447,382. The total sum on deposit in the state in 1905 was, therefore, £46,020,637, which represents £37, 15s. 4d. per head of population.

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(T. A. C.)

Early days.

History.—The first discoverer of Victoria was Captain Cook, in command of H.M.S. "Endeavour," who sighted Cape Everard, about half-way between Cape Howe and the mouth of the Snowy river, on the 19th of April 1770, a few days prior to his arrival at Botany Bay. The first persons to land in Victoria were the supercargo and a portion of the crew of the merchant ship "Sydney Cove," which was wrecked at the Furneaux Islands in Bass Strait on the 9th of February 1797. In the same year, Mr Bass, a surgeon in the navy, discovered the strait which bears his name and separates Victoria from Tasmania. Lieut. Grant in the "Lady Nelson" surveyed the south coast in 1800, and in 1801 Port Phillip was for the first time entered by Lieut. Murray. In 1802 that harbour was surveyed by Captain Flinders, and in the same year Mr Grimes, the surveyor-general of New South Wales, explored the country in the neighbourhood of the present site of Melbourne. In 1804 Lieut.-Colonel Collins, who had been sent from England, formed a penal settlement on the shores of Port Phillip, but after remaining a little more than three months near Indented Head, he removed his party to Van Diemen Land. Victoria was visited in 1824 by two sheep farmers named Hume and Hovell, who rode overland from Lake George, New South Wales, to the shores of Corio Bay. In 1826 a convict establishment was attempted by the government of New South Wales at Settlement Point, near French Island, Western Port Bay, but it was abandoned shortly afterwards. In 1834 Messrs Edward and Francis Henty, who had taken part in the original expedition to Swan river, West Australia, and afterwards migrated to Van Diemen Land, crossed Bass Strait, established a shore whaling station at Portland Bay, and formed sheep and cattle stations on the river Wannon and Wando rivulet, near the site of the present towns of Merino, Casterton and Coleraine. In 1835 a number of flock owners in Van Diemen Land purchased through Batman from the aborigines a tract of 700,000 acres on the shores of Port Phillip. The sale was repudiated by the British government, which regarded all unoccupied land in any part of Australia as the property of the crown, and did not recognize the title of the aborigines. Batman, however, remained at Port Phillip, and commenced farming within the boundaries of the present city of Melbourne. He was followed by John Pascoe Fawkner and other settlers from Van Diemen Land, who occupied the fertile plains of the new territory. In 1836 Captain Lonsdale was sent to Melbourne by the government of New South Wales to act as resident magistrate in Port Phillip. The first census taken in 1838 showed that the population was 3511, of whom 3080 were males and 431 females. In 1839 Mr Latrobe was appointed superintendent of Port Phillip, and a resident judge was nominated for Melbourne, with jurisdiction over the territory which now forms the state of Victoria. The years 1840 and 1841 were periods of depression owing to the decline in the value of all descriptions of live stock, for which the first settlers had paid high prices; but there was a steady immigration from Great Britain of men with means, attracted by the profits of sheep-farming, and of labourers and artisans who obtained free passages under the provisions of the Wakefield system, under which half the proceeds from the sale and occupation of crown lands were expended upon the introduction of workers. The whole district was occupied by sheep and cattle graziers, and in 1841 the population had increased to 11,738. Melbourne was incorporated as a town in 1842, and was raised to the dignity of a city in 1847. In that same year the first Anglican was ordained, and in 1848 the first Roman Catholic bishop. The third census (taken in 1846) showed a population of 32,870.

The elective element was introduced into the Legislative Council of New South Wales in 1842, in the proportion of twenty-four members to twelve nominated by the crown, and the district of Port Phillip, including Melbourne, returned six members. But the colonists were not satisfied with government from and by Sydney; an agitation in favour of separation commenced, and in 1851 Victoria was formed into a separate colony with an Executive Council appointed by the crown, and a Legislative Council, partly elective and partly nominated, on the same lines as that of New South Wales. The population at that date was 77,435. Gold was discovered a few weeks after the colony had entered upon its separate existence, and a large number of persons were attracted to the mines, first from the neighbouring colonies—some of which, such as South Australia, Van Diemen's Land and West Australia, were almost denuded of able-bodied men and women—and subsequently from Europe and America. Notwithstanding the difficulties with which the local government had to contend, the task of maintaining law and order was fairly grappled with; the foundations of a liberal system of primary, secondary and university education were laid; roads, bridges and telegraphs were constructed, and Melbourne was provided with an excellent supply of water.

Local self-government.

Local self-government was introduced in 1853, and the Legislature found time to discuss a new Constitution, which not only eliminated the nominee element from the Legislature, but made the executive government responsible to the people. The administration of the gold-fields was not popular, and the miners were dissatisfied at the amount charged for permission to mine for gold, and at there being no representation for the gold-fields in the local Legislature. The discontent culminated, at Ballarat in December 1854, in riots in which there was a considerable loss of life both amongst the miners and the troops. Eventually, an export duty on gold was substituted for the licence fee, but every miner had to take out a right which enabled him to occupy a limited area of land for mining, and also for residence. The census taken in 1854 showed a population of 236,778. The new Constitution was proclaimed in 1855, and the old Executive Council was gazetted as the first responsible ministry. It held office for about sixteen months, and was succeeded by an administration formed from the popular party. Several changes were made in the direction of democratizing the government, and vote by ballot, manhood suffrage and the abolition of the property qualification followed each other in rapid succession. To several of these changes there was strenuous opposition, not so much in the Assembly which represented the manhood, as in the Council in which the property of the colony was supreme. The crown lands were occupied by graziers, termed locally "squatters," who held them under a licence renewable annually at a low rental. These licences were very valuable, and the goodwill of a grazing farm or "run" commanded a high price. Persons who desired to acquire freeholds for the purpose of tillage could only do so by purchasing the land at auction, and the local squatters, unwilling to be deprived of any portion of a valuable property, were generally willing to pay a price per acre with which no person of small means desirous of embarking upon agricultural pursuits could compete. The result was that although the population had increased in 1861 to 540,322, the area of land under crop had not grown proportionately, and Victoria was dependent upon the neighbouring colonies and even more distant countries for a considerable portion of its food. A series of Land Acts was passed, the first in 1860, with the view of encouraging a class of small freeholders. The principle underlying all these laws was that residence by landowners on their farms, and their cultivation, were more important to the state than the sum realized by the sale of the land. The policy was only partially successful, and by a number of ingenious evasions a large proportion of the best land in the colony passed into the possession of the original squatters. But a sufficient proportion was purchased by small farmers to convert Victoria into a great agricultural country, and to enable it to export large quantities of farm and dairy produce.

The greater portion of the revenue was raised by the taxation through the customs of a small number of products, such as spirits, tobacco, wine, tea, coffee, &c. But an agitation arose in favour of such an adjustment of the import duties as would protect the manufactures which at that time were being commenced. A determined opposition to this policy was made by a large minority in the Assembly, and by a large majority in the Council, but by degrees the democratic party triumphed. The victory was not gained without a number of political crises which shook the whole fabric of society to its foundations. The Assembly tacked the tariff to the Appropriation Bill, and the Council threw out both. The result was that there was no legal means of paying either the civil servants or the contractors, and the government had recourse to an ingenious though questionable system by which advances were made by a bank which was recouped through the crown "confessing" that it owed the money, whereupon the governor issued his warrant for its payment without any recourse to parliament. Similar opposition was made by the Council to payment of members, and to a grant made to Lady Darling, the wife of Governor Sir Charles Darling, who had been recalled by the secretary of state on the charge of having shown partiality to the democratic party. Indeed on one occasion the dispute between the government and the Council was so violent that the former dismissed all the police, magistrates, county court judges and other high officials, on the ground that no provision had been made by the Council, which had thrown out the Appropriation Bill, for the payment of salaries.

Notwithstanding these political struggles, the population of the colony steadily increased, and the Legislature found time to pass some measures which affected the social life and the commercial position of the colonies. State aid to religion was abolished, and divorce was made comparatively easy. A system of free, compulsory and secular primary education was introduced. The import duties were increased and the transfer of land was simplified. In 1880 a fortnightly mail service via Suez between England and Melbourne was introduced, and in 1880 the first International Exhibition ever held in Victoria was opened. In the following year the census showed a population of 862,346, of whom 452,083 were males and 410,263 females. During the same year the lengthy dispute between the two houses of parliament, which had caused so much inconvenience, so many heartburnings and so many political crises, was brought to an end by the passage of an act which reduced the qualifications for members and the election of the Legislative Council, shortened the tenure of their seats, increased the number of provinces to fourteen and the number of members to forty-two. In 1883 a coalition government, in which the Liberal or protectionist and the Conservative or free-trade party were represented, took office, and with some changes remained in power for seven years. During this political truce several important changes were made in the Constitution. An act for giving greater facilities for divorce was passed, and with some difficulty obtained the royal assent. The Victorian railways were handed over to the control of three commissioners, who to a considerable extent were made independent of the government, and the civil service was placed under the supervision of an independent board. In 1887 the representatives of Victoria met those of the other British colonies and of the United Kingdom in London, under the presidency of Lord Knutsford, in order to discuss the questions of defence, postal and telegraphic communication, and the contribution of Australia to the Imperial navy. In 1888 a weekly mail service was established via Suez by the steamers of the P. & O. and the Orient Companies, and the second Victorian International Exhibition was opened. In 1890 all the Australian colonies, including New South Wales and New Zealand, sent representatives to a conference at Melbourne, at which resolutions were passed in favour of the establishment of a National Australian Convention empowered to consider and report upon an adequate scheme for the Federal Constitution. This Convention met in Sydney in 1891 and took the first step towards federation (see AUSTRALIA).

In 1891 the coalition government resigned and a Liberal administration was formed. An act passed in that year placed the railways again under the control of the government. Measures of a democratic and collectivist tendency have since obtained the assent of the Legislature. The franchise of property-holders not resident in an electorate was abolished and the principle of "one man one vote" was established. Acts have been passed sanctioning Old Age Pensions; prohibiting shops, except those selling perishable goods, from keeping open more than eight hours; compelling the proprietors to give their assistants one half-holiday every six days; preventing persons from working more than forty-eight hours a week; and appointing for each trade a tribunal composed of an equal number of employers and employed to fix a minimum wage. (See AUSTRALIA.)

Victoria enjoyed a large measure of prosperity during the later 'eighties and earlier 'nineties, and its financial prosperity enabled the government to expend large sums in extending railway communication to almost every locality and to commence a system of irrigation. The soil of Victoria is on the whole more fertile than in any other colony on the mainland of Australia, and in no portion of the continent is there any locality equal in fertility to the western district and some parts of Gippsland. The rainfall is more equable than in any portion of Australia, but the northern and north-western districts, which are the most remote from the sea and the Dividing Range, are subject to droughts, which, although not so severe or so frequent as in the interior of the continent, are sufficiently disastrous in their effects. The results of the expenditure upon irrigation have not been so successful as was hoped. Victoria has no mountains covered with snow, which in Italy and South America supply with water the rivers at the season of the year when the land needs irrigation, and it was necessary to construct large and expensive reservoirs. The cost of water is therefore greater than the ordinary agriculturist who grows grain or breeds and fattens stock can afford to pay, although the price may not be too high for orchardists and vine-growers. In 1892 the prosperity of the colony was checked by a great strike which for some months affected production, but speculation in land continued for some time longer, especially in Melbourne, which at that time contained nearly half the population, 500,000 out of a total of 1,140,105. There does not seem to have been any other reasons for this increase in land values, for there was no immigration, and the value of every description of produce had fallen—except that the working classes were prosperous and well paid, and that the purchase of small allotments in the suburbs was a popular mode of investment. In 1893 there was a collapse. The value of land declined enormously, hundreds of persons believed to be wealthy were ruined, and there was a financial panic which caused the suspension of all the banks, with the exception of the Australasia, the Union of Australia, and the New South Wales. Most of them resumed payment, but three went into liquidation. It was some years before the normal condition of prosperity was restored, but the great resources of the colony and the energy of its people discovered new markets, and new products for them, and enabled them materially to increase the export trade. (G. C. L.)

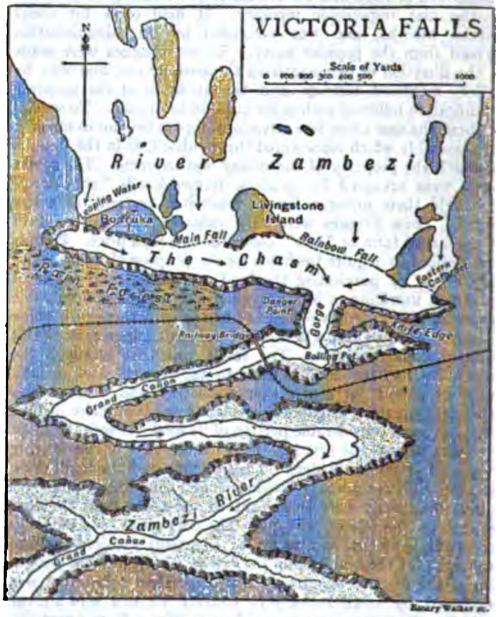
Crisis of 1892.

VICTORIA, a city and port of Brazil, capital of the state of Espirito Santo, on the W. side of an island at the head of the Bay of Espirito Santo, 270 m. N.E. of Rio de Janeiro, in lat. 20° 18′ S., long. 40° 20′ W. Pop. (1902, estimated) 9000. The city occupies the beach and talus at the base of a high, wooded mountain. The principal streets follow the water-line, rising in terraces from the shore, and are crossed by narrow, steep, roughly paved streets. The buildings are old and of the colonial type. The governor's residence is an old convent, with its church at one side. The entrance to the bay is rather tortuous and difficult, but is sufficiently deep for the largest vessels. It is defended by five small forts. The harbour is not large, but is safe and deep, being completely shut in by hills. A large quay, pier, warehouses, &c., facilitate the handling of cargoes, which were previously transported to and from the anchorage by lighters. Victoria is a port of call for coasting steamers and a shipping port in the coffee trade. The other exports are sugar, rice and mandioca (manioc) to home ports.

Victoria was founded in 1535 by Vasco Fernando Coutinho, on the S. side and nearer the entrance to the bay, and received the name of Espirito Santo. The old site is still occupied, and is known as Villa Velha (Old Town). The name of Victoria was adopted in 1558 in commemoration of a crushing defeat inflicted by Fernando da Sa on the allied tribes of the Aimorés, Tapininguins and Goitacazes in that year. It was attacked (1592) by the freebooter Cavendish, who was repelled by one of the forts at the entrance to the bay.

VICTORIA, the capital of British Columbia and the principal city of Vancouver Island, in the S.E. corner of which it is finely situated (48° 25′ 20″ N., 123° 22′ 24″ W.), on a small arm of the sea, its harbour, however, only admitting vessels drawing 18 ft. Pop. (1906) about 25,000. It is the oldest city in the province. It has fine streets, handsome villas and public buildings, government offices and churches. The high school is affiliated with McGill University, in Montreal. Victoria is connected with the mainland by cable, and is a favourite tourist resort for the whole west coast of North America. Till 1858 Victoria was a post of the Hudson's Bay Company. The city was incorporated in 1862, and according to the census of 1886 the population was 14,000, including Chinese and Indians, spread over an area of 4 sq. m. Until the redistribution of the fleet in 1905, the headquarters of the British Pacific squadron was at Esquimalt, a fine harbour about 3 m. W. of Victoria. This harbour, though spacious, is not much used by merchant vessels. It is provided with a large dry-dock and is defended by fortifications of a modern type.

VICTORIA FALLS, the greatest waterfall in the world, forming the most remarkable feature of the river Zambezi, Central Africa. The falls are about midway in the course of the Zambezi in 17° 51′ S., 25° 41′ E. For a considerable distance above the falls the river flows over a level sheet of basalt, its valley bounded by low and distant sandstone hills. Its clear blue waters are dotted with numerous tree-clad islands. These islands increase in number as the river, without quickening its current, approaches the falls, whose nearness is indicated only by a veil of spray. At the spot where the Zambezi is at its widest—over 1860 yds.—it falls abruptly over the edge of an almost vertical chasm with a roar as of continuous thunder,



Emery Walker sc.

sending up vast columns of vapour. Hence the native name *Mosi-oa-tunya*, "Smoke does sound there." The chasm extends the whole breadth of the river and is more than twice the depth of Niagara, varying from 256 ft. at the right bank to 343 ft. in the centre. Unlike Niagara the water does not fall into an open basin but is arrested at a distance of from 80 to 240 ft. by the opposite wall of the chasm. Both walls are of the same height, so that the falls appear to be formed by a huge crack in the bed of the river The only outlet is a narrow channel cut in the barrier wall at a point about three-fifths from the western end of the chasm, and through this gorge, not more than 100 ft. wide, the whole volume of the river pours for 130 yds. before emerging into an enormous zigzag trough (the Grand Cañon) which conducts the river past the basalt plateau. The tremendous pressure to which the water is subjected in the confinement of the chasm causes the perpetual columns of mist which rise over the precipice.

The fall is broken by islands on the lip of the precipice into four parts. Close to the right bank is a sloping cataract 36 yds. wide, called the Leaping Water, then beyond Boaruka Island, about 300 yds. wide, is the Main Fall, 473 yds. broad, and divided by Livingstone Island from the Rainbow Fall 535 yds. wide. At both these falls the rock is sharp cut and the river maintains its level to the edge of the precipice. At the left bank of the river is the Eastern Cataract, a millrace resembling the Leaping Water. From opposite the western end of the falls to Danger Point, which overlooks the entrance of the gorge, the escarpment of the chasm is covered with great trees known as the Rain Forest, looking across the gorge the eastern part of the wall (the Knife Edge) is less densely wooded.

At the end of the gorge the river has hollowed out a deep pool, named the Boiling Pot. It is some 500 ft. across, its surface, smooth at low water, is at flood-time troubled by slow, enormous swirls and heavy boilings. Thence the channel turns sharply westward, beginning the great zigzag mentioned. This grand and gloomy cañon is over 40 m. long. Its almost perpendicular walls are over 400 ft. high, the level of the escarpment being that of the lip of the falls. A little below the Boiling Pot, and almost at right angles to the falls, the cañon is spanned by a bridge (completed in April 1905) which forms a link in the Cape to Cairo railway scheme. This bridge, 650 ft. long, with a main arch of 500 ft. span, is slightly below the top of the gorge. The height from low-water level to the rails is 420 ft.

The volume of water borne over the falls varies greatly, the level of the river in the cañon sinking as much as 60 ft. between the full flood of April and the end of the dry season in October. When the river is high the water rolls over the main falls in one great unbroken expanse; at low water (when alone it is possible to look into the grey depths of the great chasm) the falls are broken by crevices in the rock into numerous cascades.

The falls are in the territory of Rhodesia. They were discovered by David Livingstone on the 17th of November 1855, and by him named after Queen Victoria of England. Livingstone approached them from above and gained his first view of the falls from the island on its lip now named after him. In 1860 Livingstone, with Dr (afterwards Sir John) Kirk, made a careful investigation of the falls, but until the opening of the railway from Bulawayo (1905) they were rarely visited. The land in the vicinity of the falls is preserved by the Rhodesian government as a public park.

See Livingstone's *Missionary Travels and Researches in South Africa* (London, 1857) for the story of the discovery of the falls, and the *Popular Account of Dr Livingstone's Expedition to the Zambesi and its Tributaries 1858–1864* (London, 1894) for a fuller description of the falls and a theory as to their origin. *How I crossed Africa*, by Major Serpa Pinto (English trans., London, 1881), contains a graphic account of the visit paid to the falls by the Portuguese explorer. In the *Geographical Journal* for January 1905 is an article by A. J. C. Molyneux on "The Physical History of the Victoria Falls." The article is illustrated by excellent photographs and gives a bibliography. Consult also "The Gorge and Basin of the Zambesi below the Victoria Falls," by G. W. Lamplugh in the *Geog. Jour* (1908), vol. xxxi. (F. R. C.)

VICTORIA NYANZA, the largest lake in Africa and chief reservoir of the Nile, lying between 0° 20′ N to 3° S and 31° 40′ to 34° 52′ E. Among the fresh-water lakes of the world it is exceeded in size by Lake Superior only and has an area of over 26,000 sq. m., being nearly the size of Scotland. In shape it is an irregular quadrilateral, but its shores, save on the west, are deeply indented. Its greatest length, taking into account the principal gulfs, N. to S. is 250 m., its greatest breadth 200 m. Its coast-line exceeds 2000 m. It fills a depression in the central part of the great plateau which stretches between the western (Albertine) and eastern rift-valleys (see AFRICA, § 1), and has an elevation of about 3720 ft. above the sea[1] Its greatest ascertained depth is some 270 ft, which compares with soundings of 2000 ft. on Tanganyika and 2500 ft. on Nyasa. Victoria Nyanza is remarkable for the severe and sudden storms which sweep across it, rendering navigation dangerous. It contains many groups of islands, the majority being near the coast-line. The lake is full of reefs, many just below the surface of the water, which is clear and very fresh. It is abundantly stocked with fish. Geological research shows that the land surrounding the lake consists of gneiss, quartz and schistose rocks, covered, in the higher regions, with marl and red clay, and in the valleys with a rich black loam.

Shores and Islands.—The shores of the lake present varied aspects. The western coast, which contains no large indentations, is, in its southern part, backed by precipices of 300 or more ft. high, behind which rise downs to thrice the height of the cliffs. Going north the hills give way to papyrus and ambach swamps, which mark the delta of the Kagera. Beyond the mouth of that river the hills reappear, and increase in height, till on reaching the N W. corner of the nyanza they rise some 500 ft. above the water. This western shore is marked by a continuous fault line which runs parallel to the lake at a short distance inland. The northern coast of the lake is very deeply indented and is marked throughout its length by rocky headlands jutting into the waters This high land is very narrow, and the streams which rise on its northern face within a mile or two of the nyanza drain north away from the lake. On a promontory about 30 m east of the Katonga (see below) is Entebbe, the port of Uganda and seat of the British administration. The chief indentations on the north side are Murchison Bay and Napoleon Gulf, the entrance to the last named being partly filled by the triangular-shaped island of Buvuma or Uvuma (area 160 sq m.). Napoleon Gulf itself is deeply indented, one bay, that of Jinja, running N.W. and being the outlet of the Nile, the water here forcing its way through the rock-bound shore of the lake. The north-east corner of the lake is flat and bare. A narrow channel, partly masked by islands, leads into Kavirondo Gulf, which, with an average width of 6 m., extends 45 m. E. of the normal coast-line—a fact taken advantage of in building the railway from Mombasa to the lake. A promontory, 174 ft. above lake-level, jutting into the small bay of Ugowe, at the north-east end of Kavirondo Gulf, is the point where the railway terminates. The station is known as Port Florence. On the south side of the gulf tall hills approach, and in some cases reach, the water's edge, and behind them towers the rugged range of Kasagunga with its saw-like edge. Proceeding south the shore trends generally south-west and is marked with many deep inlets, the coast presenting a succession of bold bluffs, while inland the whole district is distinctly mountainous. At the S.E. corner of the lake Speke Gulf projects eastward, and at the S.W. corner Emin Pasha Gulf pushes southward. Here the coast is barren and hilly, while long ridges of rock run into the lake.

The largest island in the lake, Ukerewe, on the S.E. coast, immediately north of Speke Gulf, is almost a peninsula, but the strip of land connecting it with the shore is pierced by two narrow channels about ¾ of a mile long. Ukerewe is 25 m. long, and 12 broad at its greatest width. It is uninhabited, wooded and hilly, rising 650 ft. above the lake. At the N.W. corner of the nyanza is the Sessé archipelago, consisting of sixty-two islands. The largest island in this group, namely, Bugala, is narrow, resembling the letter S in shape, and is almost cut in two in the middle. Most of these islands are densely forested, and some of them attain considerable elevation. Their scenery is of striking beauty. Forty-two were inhabited.[2] Buvuma Island, at the entrance of Napoleon Gulf, has already been mentioned. Between it and as far as the mouth of Kavirondo Gulf are numerous other islands, of which the chief are Bugaia, Lolui, Rusunga and Mfwanganu. In general characteristics and the beauty of their scenery these islands resemble those of the Sessé archipelago. The islands are of ironstone formation overlying quartzite and crystalline schists.

Rivers—The Kagera, the largest and most important of the lake affluents, which has its rise in the hill country east of Lake Kivu, and enters the west side of the nyanza just north of 1° S., is described in the article NILE, of which it is the most remote head-stream. The other rivers entering Victoria Nyanza from the west are the Katonga and Ruizi, both north of the Kagera. The Katonga rises in the plateau east of the Dweru branch of Albert Edward Nyanza, and after a sluggish course of 155 m. enters Victoria Nyanza in a wide swamp at its N.W. corner. The Ruizi (180 m.) is a deep, wide and swift stream with sinuous course flowing in part through great gorges and in part through large swamps. It rises in the Ankole district and reaches the nyanza a little north of the Kagera. Between the Katonga and the Nile outlet, the rivers which rise close to the lake drain away northward, the watershed being the lake shore. On the N.E. side of the nyanza, however, several considerable streams reach the lake—notably the Sio, Nzoia and Lukos (or Yala). The Nzoia (150 m.), the largest of the three, rises in the foothills of the Elgeyo escarpment and flows swiftly over a rocky bed in a south-westerly direction, emptying into the lake south of Berkeley Bay. On the east side the Mara Dabagh enters the lake between 1° and 2° S. It is, next to the Kagera, the largest of the lake tributaries. All the rivers mentioned are perennial, and most of them bring down a considerable volume of water, even in the dry season. On the S., S.E. and S.W. shores a number of short rivers drain into the lake. They traverse a treeless and arid region, have but an intermittent flow, and are of little importance in the hydrography of the district. The only outlet of the lake is the Nile (*q.v.*).

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[1] For the altitude see *Geog. Jour.*, March 1907 and July 1908.

[2] To prevent the spread of sleeping sickness the inhabitants were removed to the mainland (1909).

Drainage Area, Rainfall and Lake Level.—The very important part played by the Victoria Nyanza in the Nile system has led to careful study of its drainage basin and rainfall and the perplexing variations in the level of the lake. The area drained by the lake covers, with the lake itself, 92,240 sq. m. In part it is densely forested, part consists of lofty mountains, and a considerable portion is somewhat arid tableland. According to the calculations of Sir William Garstin the rainfall over the whole area averages 50 in. a year. Allowing that as much as 25% of this amount enters the lake, this is equivalent to a total of 138,750,000,000 cub. metres in a year. Measurements at the Ripon Falls show that 18,000,000,000, or some 13% of this amount, is taken off by the Nile, and when allowance has been made for the annual rise and fall of the lake-level it is apparent that by far the greater part of the water which enters the nyanza is lost by evaporation; in fact, that the amount drawn off by the river plays a comparatively small part in the annual oscillation of the water surface. Rain falls more or less in every month, but is heaviest during March, April, May and again in September, October and November. The level of the lake is chiefly affected by the autumn rains and generally reaches its maximum in July. The annual rise and fall is on an average from 1 to 3 ft., but between November 1900 and June 1901 a difference of 42 in. was recorded. Considerable speculation was caused by the fact that whereas in 1878–79 the lake-level was high, from 1880 to 1890 the level was falling, and that after a few years (1892–95) of higher level there was, from 1896 to 1902, again a steady fall, amounting in seven years to 30 in. in the average levels of the lake. In 1903, however, the level rose and everywhere the land gained from the lake in the previous years was flooded. These variations are attributed by Sir William Garstin to deficiency or excess of rainfall. Any secular shrinking of the lake in common with the lakes of Central Africa generally must be so gradual as to have no practical importance. It must also be remembered that in such a vast sheet of water as is the nyanza the wind exercises an influence on the level, tending to pile up the water at different parts of the lake. The winds may also be the cause of the daily variation of level, which on Speke Gulf has been found to reach 20 in.; but this may also partake of the character of a "seiche." Currents setting towards the north or north-west have been observed in various parts of the lake.

Discovery and Exploration.—The quest for the Nile sources led to the discovery of the lake by J. H. Speke in 1858, and it was by him named Victoria in honour of the queen of England. In 1862 Speke and his companion, J. A. Grant, partially explored the N.W. shore, leaving the lake at the Nile outlet. Great differences of opinion existed as to its size until its circumnavigation in 1874 by H. M. Stanley, which proved it to be of vast extent. The invitation sent by King Mtesa of Uganda through Stanley to the Christian missionaries led to the despatch from England in 1876 of the Rev. C. T. Wilson, to whom we owe our first detailed knowledge of the nyanza. Mr Wilson and Lieut. Shergold Smith, R.N., made, in 1877, the first voyage across the nyanza. Lieut. Smith and a Mr O'Neill, both members of the Church Missionary Society, were in the same year murdered on Ukerewe Island. In 1889 Stanley further explored the lake, discovering Emin Pasha Gulf, the entrance to whi [illegible] several islands. In 1890 the ownership of t [illegible] y Great Britain and Germany, the first degree of south latitude being taken as the boundary line. The southern portion, which fell to Germany, was visited and described by scientists of that nation, whose objects, however, were not primarily geographic. At the instance of the British Foreign Office a survey of the northern shores of the lake was carried out in 1899–1900 by Commander B. Whitehouse, R.N. The same officer, in 1903, undertook, in agreement with the German government, a survey of the southern shores. Commander Whitehouse's work led to considerable modification of the previously accepted maps. He discovered numerous islands and bays whose existence had previously been unknown.

Previously to 1896 navigation was confined to Arab dhows, which trade between the south end of the lake and Uganda, and to canoes. In the year named a small steamer (the "Ruwenzori") was launched on the lake by a Zanzibar firm, while in 1900 a somewhat larger steamer (the "William Mackinnon"), built in Glasgow at the instance of Sir W. Mackinnon, and afterwards taken over by the British government, made her first trip on the lake. In 1903, the year in which the railway from Mombasa to the lake was completed, a steamer of 600 tons burden was launched at Port Florence. Since that date trade has considerably increased.

See NILE and UGANDA and the British Blue-book Egypt No. 2 (1904), which is a *Report by Sir Wm. Garstin upon the Basin of the Upper Nile*. This report, besides giving (pp. 4–24) much original information upon the Victoria Nyanza, summarizes the information of previous travellers, whose works are quoted. In 1908 the British Admiralty published a chart of the lake (scale 4 in. to the mile) from the surveys of Commander Whitehouse. Non-official books which deal with the lake include: C. T. Wilson, *Uganda and the Soudan* (London, 1882); (Sir) F. D. Lugard, *The Rise of our East African Empire*, vol. ii. (London, 1893); Franz Stuhlmann, *Mit Emin Pasha*, &c. (Berlin, 1894); Paul Kollmann, *The Victoria Nyanza* (English translation: London, 1899); E. G. Ravenstein, "The Lake-level of the Victoria Nyanza," *Geographical Journal*, October 1901; Sir H. H. Johnston, *The Uganda Protectorate* (London, 1902). In most of these publications the descriptions of the lake occupy but a small part. (W. E. G.; F. R. C.)

VICTORINUS, GAIUS MARIUS (4th century A.D.), Roman grammarian, rhetorician and neo-Platonic philosopher, an African by birth (whence his surname Afer), lived during the reign of Constantius II. He taught rhetoric at Rome (one of his pupils being Jerome), and in his old age became a convert to Christianity. His conversion is said to have greatly influenced that of Augustine. When Julian published an edict forbidding Christians to lecture on polite literature, Victorinus closed his school. A statue was erected in his honour as a teacher in the Forum Trajanum.

His translations of platonic writers are lost, but the treatise *De Definitionibus* (ed. T. Stangl in *Tulliana et Mario-Victoriniana*, Munich, 1888) is probably by him and not by Boëtius, to whom it was formerly attributed. His manual of prosody, in four books, taken almost literally from the work of Aphthonius, is extant (H. Keil, *Grammatici Latini*, vi.). It is doubtful whether he is the author of certain other extant treatises attributed to him on metrical and grammatical subjects, which will be found in Keil. His commentary on Cicero's *De Inventione* (in Halm's *Rhetores Latini Minores*, 1863) is very diffuse, and is itself in need of commentary. His extant theological writings, which will be found in J. P. Migne, *Cursus Patrologiae Latinae*, viii., include commentaries on *Galatians*, *Ephesians* and *Philippians*; *De Trinitate contra Arium*; *Ad Justinum Manichaeum de Vera Carne Christi*; and a little tract on "The Evening and the Morning were one day" (the genuineness of the last two is doubtful). Some Christian poems under the name of Victorinus are probably not his.

See G. Geiger, *C. Marius Victorinus Afer, ein neuplatonischer Philosoph* (Metten, 1888); G. Koffmann, *De Mario Victorino philosopho Christiano* (Breslau, 1880); R. Schmid, *Marius Victorinus Rhetor und seine Beziehungen zu Augustin* (Kiel, 1895); Gore in *Dictionary of Christian Biography*, iv.; M. Schanz, *Geschichte der römischen Litteratur*, iv. 1 (1904); Teuffel, *Hist. of Roman Literature* (Eng. tr., 1900), 408.

VICTOR-PERRIN, CLAUDE, DUKE OF BELLUNO (1764–1841), marshal of France, was born at La Marche (Vosges) on the 7th of December 1764. In 1781 he entered the army as a private soldier, and after ten years' service he received his discharge and settled at Valence. Soon afterwards he joined the local volunteers, and distinguishing himself in the war on the Alpine frontier, in less than a year he had risen to the command of a battalion. For his bravery at the siege of Toulon in 1793 he was raised to the rank of general of brigade. He afterwards served for some time with the army of the Eastern Pyrenees, and in the Italian campaign of 1796–97 he so acquitted himself at Mondovi, Roveredo and Mantua that he was promoted to be general of division. After commanding for some time the forces in the department of La Vendée, he was again employed in Italy, where he did good service against the papal troops, and he took a very important part in the battle of Marengo. In 1802 he was governor of the colony of Louisiana for a short time, in 1803 he commanded the Batavian army, and afterwards he acted for eighteen months (1805–6) as French plenipotentiary at Copenhagen. On the outbreak of hostilities with Prussia he joined the V. army corps (Marshal Lannes) as chief of the general staff. He distinguished himself at Saalfeld and Jena, and at Friedland he commanded the I. corps in such a manner that Napoleon gave him the marshalate. After the peace of Tilsit he became governor of Berlin, and in 1808 he was created duke of Belluno. In the same year he was sent to Spain, where he took a prominent part in the Peninsular War (especially at Espinosa, Talavera, Barrosa and Cadiz), until his appointment in 1812 to a corps command in the invasion of Russia. Here his most important service was in protecting the retreating army at the crossing of the Beresina. He took an active part in the wars of 1813–14, till in February of the latter year he had the misfortune to arrive too late at Montereau-sur-Yonne. The result was a scene of violent recrimination and his supersession by the emperor, who transferred his command to Gérard. Thus wounded in his amour-propre, Victor now transferred his allegiance to the Bourbon dynasty, and in December 1814 received from Louis XVIII. the command of the second military division. In 1815 he accompanied the king to Ghent, and on the second restoration he was made a peer of France. He was also president of a commission which inquired into the conduct of the officers during the Hundred Days, and dismissed Napoleon's sympathizers. In 1821 he was appointed war minister and held this office for two years. In 1830 he was major-general of the royal guard, and after the revolution of that year he retired altogether into private life. His death took place at Paris on the 1st of March 1841.

His papers for the period 1793–1800 have been published (Paris, 1846).

VICTUAL, food, provisions, most commonly in the plural, "victuals." The word and its pronunciation came into English from the O. Fr. *vitaille*. The modern French and English spelling are due to a pedantic approximation to the Latin original, *victualia*, a neuter plural substantive formed from *victualis*, *victus*, nourishment, provisions (*vivere*, to live). The most familiar use of the term is in "licensed victualler," to which the Licensing Act 1872 (§ 27) has applied the wide significance of any person selling any intoxicating liquor under a licence from a justice of the peace. Properly a "victualling house" is one where persons are provided with food and drink but not lodgings, and is thus distinct from an inn, which also provides the last.

Head of Vicugña.

VICUGÑA, one of the two wild living South American representatives of the camel-tribe, a *Camelidae* (see TYLOPODA). From its relative the guanaco the vicugña (*Lama vicunia*) differs by its inferior stature, more slender build and shorter head, as well as by the absence of bare patches or callosities on the hind limbs. The general colour of the woolly coat is orange-red. Vicugñas live in herds on the bleak and elevated parts of the mountain range bordering the region of perpetual snow, amidst rocks and precipices, occurring in various parts of Peru, in the southern part of Ecuador, and as far south as the middle of Bolivia. The wool is extremely delicate and soft, and highly valued for the purposes of weaving, but the quantity which each animal produces is not great.

VIDA, MARCO GIROLAMO (*c.* 1489–1566), Italian scholar and Latin poet, was born at Cremona shortly before the year 1490. He received the name of Marcantonio in baptism, but changed this to Marco Girolamo when he entered the order of the Canonici Regolari Lateranensi. During his early manhood he acquired considerable fame by the composition of two didactic poems in the Latin tongue, on the *Game of Chess* (*Scacchiae Ludus*) and on the *Silkworm* (*Bombyx*). This reputation induced him to seek the papal court in Rome, which was rapidly becoming the headquarters of polite learning, the place where students might expect advancement through their literary talents. Vida reached Rome in the last years of the pontificate of Julius II. Leo X., on succeeding to the papal chair (1513), treated him with marked favour, bestowed on him the priory of St Sylvester at Frascati, and bade him compose a heroic Latin poem on the life of Christ. Such was the origin of the *Christiad*, Vida's most celebrated, if not his best, performance. It did not, however, see the light in Leo's lifetime. Between the years 1520 and 1527 Vida produced the second of his masterpieces in Latin hexameters, a didactic poem on the *Art of Poetry* (see Baldi's edition, Würzburg, 1881). Clement VII. raised him to the rank of apostolic protonotary, and in 1532 conferred on him the bishopric of Alba. It is probable that he took up his residence in this town soon after the death of Clement; and here he spent the greater portion of his remaining years. Vida attended the council of Trent, where he enjoyed the society of Cardinals Cervini, Pole and Del Monte, together with his friend the poet Flaminio. A record of their conversations may be studied in Vida's Latin dialogue *De Republica*. Among his other writings should be mentioned three eloquent orations in defence of Cremona against Pavia, composed upon the occasion of some dispute as to precedency between those two cities. Vida died at Alba on the 27th of September 1566.

See the *Life* by Lancetti (Milan, 1840).

VIDAME (Lat. *vice-dominus*), a French feudal title. The vidame was originally, like the avoué (*advocatus*), an official chosen by the bishop of the diocese, with the consent of the count (see ADVOCATE). Unlike the advocate, however, the *vice-dominus* was at the outset an ecclesiastic, who acted as the bishop's lieutenant (*locum tenens*) or vicar. But the causes that changed the character of the *advocatus* operated also in the case of the vidame. During the Carolingian epoch, indeed, *advocatus* and *vice-dominus* were interchangeable terms, and it was only in the 11th century that they became generally differentiated: the title of avoué being commonly reserved for nobles charged with the protection of an abbey, that of vidame for those guarding an episcopal see. With the crystallization of the feudal system in the 12th century the office of vidame, like that of avoué, had become an hereditary fief. As a title, however, it was much less common and also less dignified than that of avoué. The *advocati* were often great barons who added their function of protector of an abbey to their own temporal sovereignty, whereas the vidames were usually petty nobles, who exercised their office in strict subordination to the bishop. Their chief functions were: to protect the temporalities of the see, to represent the bishop at the count's court of justice, to exercise the bishop's temporal jurisdiction in his name (*placitum* or *curia vice-domini*) and to lead the episcopal levies to war. In return they usually had a house near the episcopal palace, a domain within and without the city, and sometimes the right to levy certain dues on the city. The vidames usually took their title from the see they represented, but not infrequently they styled themselves, not after their official fief, but after their private *seigneuries*. Thus the vidame de Picquigny was the representative of the bishop of Amiens, the vidame de Gerberoy of the bishop of Beauvais. In many sees there were no vidames, their function being exercised by viscounts or châtelains. With the growth of the central power and of that of the municipalities the vidames gradually lost all importance, and the title became merely honorary

See A. Luchaire, *Manuel des institutions françaises* (Paris, 1892); Du Cange, *Glossarium* (ed. Niort, 1887), s. "Vice-dominus"; A. Mallet, "Étude hist. sur les avoués et les vidames," in *Position des thèses de l'École des chartes* (an. 1870–72).

VIDIN (formerly written Widin or Widdin), a fortified river-port and the capital of a department in the extreme N.E. of Bulgaria; on the right bank of the river Danube, near the Servian frontier and 151 m. W.N.W. of Sofia. Pop. (1906) 16,168, including about 3000 Turks and 1500 Spanish Jews—descendants of the refugees who fled hither from the Inquisition in the 16th century. Vidin is an episcopal see and the headquarters of a brigade; it was formerly a stronghold of some importance, and was rendered difficult to besiege by the surrounding marshes, formed where the Topolovitza and other streams join the Danube. A steam ferry connects it with Calafat, on the Rumanian bank of the Danube, and there is a branch railway to Mezdra, on the main line Sofia-Plevna. The city consists of three divisions—the modern suburbs extending beside the Danube, the citadel and the old town, still surrounded by walls, though only four of its nine towers remain standing. The old town, containing several mosques and synagogues and a bazaar, preserves its oriental appearance; the citadel is used as a military magazine. There are a modern cathedral, a school of viticulture and a high school, besides an ancient clock-tower and the palace (*Konak*) formerly occupied by the Turkish pashas. Vidin exports cereals and fruit, and is locally celebrated for its gold and silver filigree. It has important fisheries and manufactures of spirits, beer and tobacco.

Vidin stands on the site of the Roman town of Bononia in Moesia Superior, not to be confounded with the Pannonian Bononia, which stood higher up the Danube to the north of Sirmium. Its name figures conspicuously in the military annals of medieval and recent times; and it is specially memorable for the overthrow of the Turks by the imperial forces in 1689 and for the crushing defeat of the hospodar Michael Sustos by Pasvan Oglu in 1801. It was again the scene of stirring events during the Russo-Turkish Wars of 1854–55 and 1877–78, and successfully resisted the assaults of the Servians in the Servo-Bulgarian War of 1886–87.

VIDOCQ, FRANÇOIS EUGÈNE (1775–1857), French detective, was born at Arras in 1775 (or possibly 1773). After an adventurous youth he joined the French army, where he rose to be lieutenant. At Lille he was imprisoned as the result of a quarrel with a brother officer, and while in gaol became involved, possibly innocently, in the forgery of an order for the release of another prisoner. He was sentenced to eight years' hard labour, and sent to the galleys at Brest, whence he escaped twice but was recaptured. For the third time he succeeded in getting free, and lived for some time in the company of thieves and other criminals in Paris and elsewhere, making a careful study of their methods. He then offered his services as a spy to the Paris police (1809). The offer was accepted, on condition that he should extend his knowledge of the criminal classes by himself serving a further term in prison in Paris, and subsequently Vidocq was made chief of the reorganized detective department of the Paris police, with a body of ex-convicts under his immediate command. In this capacity Vidocq was extremely successful, for he possessed unbounded energy and a real genius for hunting down criminals. In 1827, having saved a considerable sum of money, he retired from his post and started a paper-mill, the work-people in which were drawn entirely from ex-convicts. The venture, however, was a failure, and in 1832 Vidocq re-entered the police service and was employed mainly in political work, though given no special office. Anxious to get back to his old detective post he himself foolishly organized a daring theft. The authorities were unable to trace the thieves, who at the proper moment were "discovered" by Vidocq. His real part in the matter became known, however, and he was dismissed from service. He subsequently started a private inquiry agency, which was indifferently successful, and was finally suppressed. Vidocq died in great poverty in 1857. Several volumes have been published under his name, the best known of which is *Mémoires de Vidocq* (1828). It is, however, extremely doubtful whether he wrote any of them.

See Charles Ledru, *La Vie, la mort et les derniers moments de Vidocq* (Paris, 1857).

VIDYASAGAR, ISWAR CHANDRA (1820–1891), writer and social reformer of Bengal, was born at Birsinha in the Midnapur district in 1820, of a Kulin Brahman family. He was removed to Calcutta at the age of nine, was admitted into the Sanskrit College, and carried on his studies in the midst of privations and extreme poverty. In 1839 he obtained the title of *Vidyasagar* (="Ocean of learning") after passing a brilliant examination, and in 1850 was appointed head pandit of Fort William College. In 1846 appeared his first work in Bengali prose, *The Twenty-Five Tales of a Betal*. This was succeeded by his *Sakuntala* in 1855, and by his greatest work, *The Exile of Sita*, in 1862. These are marked by a grace and beauty which Bengali prose had never known before. The literature of Bengal, previous to the 19th century, was entirely in verse. Ram Mohan Roy, the religious reformer of Bengal, created the literary prose of Bengal early in the 19th century by his numerous translations and religious tracts; and Iswar Chandra Vidyasagar and his fellow-worker, Akhay Kumar Datta, added to its power and beauty about the middle of that century. These three writers are generally recognized as the fathers of Bengali prose literature. As a social reformer and educationist, too, Iswar Chandra made his mark. He associated himself with Drinkwater Bethune in the cause of female education; and the management of the girls' school, called after Bethune, was entrusted to him in 1851. And when Rosomoy Datta resigned the post of secretary to the Sanskrit College of Calcutta, a new post of principal was created, and Iswar Chandra was appointed to it. Iswar Chandra's influence in the education department was now unbounded. He simplified the method of learning Sanskrit, and thus spread a knowledge of that ancient tongue among his countrymen. He was consulted in all educational matters by Sir Frederick Halliday, the first lieutenant-governor of Bengal. And when the great scheme of education under Sir Charles Wood's despatch of 1854 was inaugurated in India, Iswar Chandra established numerous aided schools under that scheme in the most advanced districts of Bengal. In 1858 he resigned his appointment under government, and shortly afterwards became manager of the Metropolitan Institution, a private college at Calcutta. But a greater task than literary work or educational reforms claimed his attention. He had discovered that the ancient Hindu scriptures did not enjoin perpetual widowhood, and in 1855 he startled the Hindu world by his work on the *Remarriage of Hindu Widows*. Such a work, from a learned and presumably orthodox Brahman, caused the greatest excitement, but Iswar Chandra remained unmoved amidst a storm of indignation. Associating himself with the most influential men of the day, like Prosonno Kumar Tagore and Ram Gopal Ghosh, he appealed to the British government to declare that the sons of remarried Hindu widows should be considered legitimate heirs. The British government responded; the act was passed in 1856, and some years after Iswar Chandra's own son was married to a widow. In the last years of his life Iswar Chandra wrote works against Hindu polygamy. He was as well known for his charity and wide philanthropy as for his educational and social reforms. His large income, derived from the sale of school-books, was devoted almost entirely to the succour of the needy; hundreds of young men owed their education to him; hundreds of widows depended on him for their daily bread. The Indian government made him a Companion of the Indian Empire in 1880. He died on the 29th of July 1891. (R. C. D.)

VIEIRA, ANTONIO (1608–1697), Portuguese Jesuit and writer, the "prince of Catholic pulpit-orators of his time," was born in Lisbon on the 6th of February 1608. Accompanying his parents to Brazil in 1615 he received his education at the Jesuit college at Bahia. He entered the Jesuit novitiate in 1625, and two years later pronounced his first vows. At the age of eighteen he was teaching rhetoric, and a little later dogmatic theology, at the college of Olinda, besides writing the "annual letters" of the province. In 1635 he received the priesthood. He soon began to distinguish himself as an orator, and the three patriotic sermons he delivered at Bahia (1638–40) are remarkable for their imaginative power and dignity of language. The sermon for the success of the arms of Portugal against Holland was considered by the Abbé Raynal to be "perhaps the most extraordinary discourse ever heard from a Christian pulpit." When the revolution of 1640 placed John IV. on the throne of Portugal, Brazil gave him its allegiance, and Vieira was chosen to accompany the viceroy's son to Lisbon to congratulate the new king. His talents and aptitude for affairs impressed John IV. so favourably that he appointed him royal preacher, gave him free access to the palace and constantly consulted him on the business of the state. Possessed of great political sagacity and knowledge of the lessons of history, Vieira used the pulpit as a tribune from which he propounded measures for improving the general and particularly the economic condition of Portugal. His pen was as busy as his voice, and in four notable pamphlets he advocated the creation of companies of commerce, the abolition of the distinction between Old and New Christians, the reform of the procedure of the Inquisition and the admission of Jewish and foreign traders, with guarantees for their security from religious persecution. Moreover, he did not spare his own estate, for in his Sexagesima sermon he boldly attacked the current style of preaching, its subtleties, affectation, obscurity and abuse of metaphor, and declared the ideal of a sermon to be one which sent men away "not contented with the preacher, but discontented with themselves." In 1647 Vieira began his career as a diplomat, in the course of which he visited England, France, Holland and Italy. In his *Papel Forte* he urged the cession of Pernambuco to the Dutch as the price of peace, while his mission to Rome in 1650 was undertaken in the hope of arranging a marriage between the heir to the throne of Portugal and the only daughter of King Philip IV. of Spain. His success, freedom of speech and reforming zeal had made him enemies on all sides, and only the intervention of the king prevented his expulsion from the Company of Jesus, so that prudence counselled his return to Brazil.

In his youth he had vowed to consecrate his life to the conversion of the negro slaves and native Indians of his adopted country, and arriving in Maranhão early in 1653 he recommenced his apostolic labours, which had been interrupted during his stay of fourteen years in the Old World. Starting from Pará, he penetrated to the banks of the Tocantins, making numerous converts to Christianity and civilization among the most savage tribes; but after two years of unceasing labour, during which every difficulty was placed in his way by the colonial authorities, he saw that the Indians must be withdrawn from the jurisdiction of the governors, to prevent their exploitation, and placed under the control of the members of a single religious society. Accordingly in June 1654 he set sail for Lisbon to plead the cause of the Indians, and in April 1655 he obtained from the king a series of decrees which placed the missions under the Company of Jesus, with himself as their superior, and prohibited the enslavement of the natives, except in certain specified cases. Returning with this charter of freedom, he organized the missions over a territory having a coast-line of 400 leagues, and a population of 200,000 souls, and in the next six years (1655–61) the indefatigable missionary set the crown on his work. After a time, however, the colonists, attributing the shortage of slaves and the consequent diminution in their profits to the Jesuits, began actively to oppose Vieira, and they were joined by members of the secular clergy and the other Orders who were jealous of the monopoly enjoyed by the Company in the government of the Indians. Vieira was accused of want of patriotism and usurpation of jurisdiction, and in 1661, after a popular revolt, the authorities sent him with thirty-one other Jesuit missionaries back to Portugal. He found his friend King John IV. dead and the court a prey to faction, but, dauntless as ever in the pursuit of his ambition, he resorted to his favourite arm of preaching, and on Epiphany Day, 1662, in the royal chapel, he replied to his persecutors in a famous rhetorical effort, and called for the execution of the royal decrees in favour of the Indians. Circumstances were against him, however, and the count of Castelmelhor, fearing his influence at court, had him exiled first to Oporto and then to Coimbra; but in both these places he continued his work of preaching, and the reform of the Inquisition also occupied his attention. To silence him his enemies then denounced him to that tribunal, and he was cited to appear before the Holy Office at Coimbra to answer points smacking of heresy in his sermons, conversations and writings. He had believed in the prophecies of a 16th-century shoemaker poet, Bandarra, dealing with the coming of a ruler who would inaugurate an epoch of unparalleled prosperity for the church and for Portugal, and in the *Quinto Imperio* or *Clavis Prophetarum* he had endeavoured to prove the truth of his dreams from passages of Scripture. As he refused to submit, the Inquisitors kept him in prison from October 1665 to December 1667, and finally imposed a sentence which prohibited him from teaching, writing or preaching. It was a heavy blow for the Company, and though Vieira recovered his freedom and much of his prestige shortly afterwards on the accession of King Pedro II., it was determined that he should go to Rome to procure the revision of the sentence, which still hung over him though the penalties had been removed. During a six years' residence in the Eternal City Vieira won his greatest triumphs. Pope Clement X. invited him to preach before the College of Cardinals, and he became confessor to Queen Christina of Sweden and a member of her literary academy. At the request of the pope he drew up a report of two hundred pages on the Inquisition in Portugal, with the result that after a judicial inquiry Pope Innocent XI. suspended it for five years (1676–81). Ultimately Vieira returned to Portugal with a papal bull exempting him from the jurisdiction of the grand inquisitor, and in January 1681 he embarked for Brazil. He resided in Bahia and occupied himself in revising his sermons for publication, and in 1687 he became superior of the province. A false accusation of complicity in an assassination, and the intrigues of members of his own Company, clouded his last months, and on the 18th of July 1697 he passed away.

His works form perhaps the greatest monument of Portuguese prose. Two hundred discourses exist to prove his fecundity, while his versatility is shown by the fact that he could treat the same subject differently on half a dozen occasions. His letters, simple and conversational in style, have a deep historical and political interest, and form documents of the first value for the history of the period. As a man, Vieira would have made a nobler figure if he had not been so great an egotist and so clever a courtier, and the readiness with which he sustained directly opposite opinions at short intervals with equal warmth argues a certain lack of sincerity. His name, however, is identified with great causes, justice to the Jews and humanity to the Indians, and the fact that he was in advance of his age led to many of his troubles, while his disinterestedness in money matters is deserving of all praise.

Principal works: *Sermoes* (Sermons) (15 vols., Lisbon, 1679–1748), there are many subsequent editions, but none complete; translations exist in Spanish, Italian, German and French, which have gone through several editions. *Historia do Futuro* (Lisbon, 1718; 2nd ed., ibid., 1755); this and the *Quinto Imperio* and the *Clavis Prophetarum* seem to be in essence one and the same book in different redactions. *Cartas* (Letters) (3 vols., Lisbon, 1735–46) *Noticias reconditas do modo de proceder a Inquisicão de Portugal com os seus presos* (Lisbon, 1821). The *Arte de Furtar* published under Vieira's name in many editions is now known not to be his. A badly edited edition of the works of Vieira in 27 volumes appeared in Lisbon, 1854–58. There are unpublished MSS. of his in the British Museum in London, and in the Bibliothèque Nationale in Paris. A bibliography of Vieira will be found in Sommervogel, *Bibliothèque de la compagnie de Jésus*, viii. 653–85.

Authorities.—André de Barros, *Vida* (Lisbon, 1746)—a panegyric by a member of the same society; D. Francisco Alexandre Lobo, bishop of Vizeu, "Historical and Critical Discourse," *Obras* (Lisbon, 1849), vol. ii.—a valuable study; João Francisco Lisboa, *Vida* (5th ed., Rio, 1891)—he is unjust to Vieira, but may be consulted to check the next writer; Abbé E. Carel, *Vieira, sa vie et ses œuvres* (Paris, 1879); Luiz Cabral, *Vieira, biog., caractère, éloquence* (Paris, 1900); idem, *Vieira pregador* (2 vols., Oporto, 1901); Sotero dos Reis, *Curso de litteratura Portugueza e Brazileira*, iii. 121–244. (E. Pr.)

VIÉLÉ-GRIFFIN, FRANCIS (1864–   ), French poet, was born at Norfolk, Virginia, U.S.A., on the 26th of May 1864. He was educated in France, dividing his time between Paris and Touraine. His volumes include *Cueille d'avril* (1885); *Les Cygnes* (1887; new series, 1892); *La Chevauchée d'Yeldis* (1893); *Swanhilde*, a dramatic poem (1894); *Laus Veneris* (1895), a volume of translations from Swinburne; *Poèmes et Poésies* (1895), a collection containing much of his earlier work; *Phocas le jardinier* (1898); and *La Légende ailée de Wieland le Forgeron* (1899), a dramatic poem. M. Viélé-Griffin is one of the most successful writers of the *vers libre*, the theory of which he expounded, in conjunction with MM. Paul Adam and Bernard Lazare, in the pages of a periodical entitled *Entretiens politiques et littéraires* (1890–92). He is at his best in the adaptation of the symbolism of old legend to modern uses.

VIELLE, *viole, vièle*, a French term, derived from Lat. *fidicula*, embracing two distinct types of instruments: (1) from the 12th to the beginning of the 15th century bowed instruments having a box-soundchest with ribs, (2) from the middle or end of the 15th century, the hurdy-gurdy (*q.v.*). The medieval word *vielle* or *vièle* has often been incorrectly applied to the latter instrument by modern writers when dealing with the 13th and 14th centuries. The instruments included under the name of vielle, whatever form their outline assumed, always had the box-soundchest consisting of back and belly joined by ribs, which experience has pronounced the most perfect construction for bowed instruments. The most common shape given to the earliest vielles in France was an oval, which with its modifications remained in favour until the guitar-fiddle, the Italian lyra, asserted itself as the finest type, from which also the violin was directly evolved. (K. S.)

VIEN, JOSEPH MARIE (1716–1809), French painter, was born at Montpellier on the 18th of June 1716. Protected by Comte de Caylus, he entered at an early age the studio of Natoire, and obtained the *grand prix* in 1745. He used his time at Rome in applying to the study of nature and the development of his own powers all that he gleaned from the masterpieces around him; but his tendencies were so foreign to the reigning taste that on his return to Paris he owed his admission to the academy for his picture "Daedalus and Icarus" (Louvre) solely to the indignant protests of Boucher. When in 1776, at the height of his established reputation, he became director of the school of France at Rome, he took David with him amongst his pupils. After his return, five years later, his fortunes were wrecked by the Revolution; but he undauntedly set to work, and at the age of eighty (1796) carried off the prize in an open government competition. Bonaparte acknowledged his merit by making him a senator. He died at Paris on the 27th of March 1809, leaving behind him several brilliant pupils, amongst whom were Vincent, Regnault, Suvée, Ménageot, Taillasson and others of high merit; nor should the name of his wife, Marie Thérèse Reboul (1728–1805), herself a member of the academy, be omitted from this list. Their son, Marie Joseph, born in 1761, also distinguished himself as a painter.

VIENNA (Ger. *Wien*; Lat. *Vindobona*), the capital of the Austrian empire, the largest city in the Austro-Hungarian monarchy, and the fourth city in Europe as regards population. It is situated on the right bank of the Danube, at the base of the Wiener Wald, and at the beginning of the great plain which separates the Alps from the Carpathians. This plain is continued on the opposite bank of the Danube by the valley of the March, which constitutes the easiest access to the north. Thus Vienna forms a junction of natural ways from south to north, and from west to east. It also lies on the frontier which separates from one another three races, the German, the Slavonic and the Hungarian.

Curiously enough, Vienna has for a long time turned its back, so to speak, on the magnificent waterway of the Danube, the city being built about 1½ m. away from the main stream. Only an arm of the river, the Danube Canal, so called because it was regulated and widened in 1598, passes through the city, dividing it into two unequal parts. It is true that the river forms at this point several arms, and the adjoining districts were subjected to periodical inundations, while navigation was by no means easy here. But in 1870 works for the regulation of the river were started with the object of making it quite safe for navigation, and of avoiding the dangers of inundation. By these magnificent works of regulation the new bed was brought nearer to the town, and the new river channel has an average width of 915 ft. and a depth of 10 ft. On its left bank stretches the so-called inundation region, 1525 ft. wide, while on the right bank quays have been constructed with numerous wharfs and warehouses. By these works of regulation over 2400 acres of ground were gained for building purposes. This new bed of the Danube was completed in 1876. In conjunction with this work the entire Danube Canal has been transformed into a harbour by the construction of a lock at its entrance, while increased accommodation for shipping has also been provided at the other end of the canal known as the winter harbour. Into the Danube Canal flows the small stream, called Wien, now arched over almost in its entirety. Vienna extends along the right bank of the Danube from the historic and legendary Kahlenberg to the point where the Danube Canal rejoins the main stream, being surrounded on the other side by a considerable stretch of land which is rather rural than suburban in character.

Vienna is officially divided into twenty-one districts or *Bezirke*. Until 1892 it contained only ten of the present districts; in that year nine outlying districts were incorporated with the town; in 1900 Brigittenau was created out of part of the old district of Leopoldstadt, and in 1905 the Floridsdorf district was made up by the incorporation of the following former suburbs: Aspern-an-der-Donau, Donaufeld, Floridsdorf, Gross Jedlersdorf, Hirschstetten, Jedlesee, Kagran, Leopoldau, Lobau-Insel and Stadlau. By the incorporation of the suburbs in 1892, the area of Vienna was more than trebled, namely, from 21½ sq. m. to 69 sq. m.; while a new increase of about one-fifth of its total area was added by the incorporation of 1902. A feature of the new city is the unusually large proportion of woods and arable land within its bounds. These form nearly 60% of its total area, private gardens, parks and open spaces occupying a further 13%. While from the standpoint of population it takes the fourth place among European capitals, Vienna covers about three times as much ground as Berlin, which occupies the third place. But the bulk of its inhabitants being packed into a comparatively small portion of this area, the working classes suffer greatly from overcrowding, and all sections of the community from high rents.

The inner city, or Vienna proper, was formerly separated from the other districts by a circle of fortifications, consisting of a rampart, fosse and glacis. These, however, were removed in 1858–60, and the place of the glacis has been taken by a magnificent boulevard, the Ring-Strasse, 2 m. in length, and about 150 ft. in average width. Another series of works, consisting of a rampart and fosse, were constructed in 1704 to surround the whole city at that time, *i.e.* the first ten districts of modern Vienna. This second girdle of fortifications was known as the Lines (*Linien*), and a second wide boulevard (Gürtel-Strasse) follows their course round the city. This second or outer girdle of fortifications formed the boundary between the city and the outlying suburbs, but was removed in 1892, when the incorporation of the suburbs took place.

The inner town, which lies almost exactly in the centre of the others, is still, unlike the older parts of most European towns, the most aristocratic quarter, containing the palaces of the emperor and of many of the nobility, the government offices, many of the embassies and legations, the opera house and the principal hotels. Leopoldstadt which together with Brigittenau are the only districts on the left bank of the Danube Canal, is the chief commercial quarter, and is inhabited to a great extent by Jews. Mariahilf, Neubau and Margarethen are the chief seats of manufacturing industry. Landstrasse may be described as the district of officialism; here too are the British and German embassies. Alsergrund, with the enormous general hospital, the military hospital and the municipal asylum for the insane, is the medical quarter.

Near the centre of the inner city, most of the streets in which are narrow and irregular, is the cathedral of St Stephen, the most important medieval building in Vienna, dating in its present form mainly from the 14th and 15th centuries, but incorporating a few fragments of the original 12th-century edifice. Among its most striking features are the fine and lofty tower (450 ft.), rebuilt in 1860–64; the extensive catacombs, in which the emperors were formerly interred; the sarcophagus (1513) of Frederick III.; the tombs of Prince Eugene of Savoy; thirty-eight marble altars; and the fine groined ceiling. A little to the south-west of the cathedral is the Hofburg, or imperial palace, a huge complex of buildings of various epochs and in various styles, enclosing several courtyards. The oldest part of the present edifice dates from the 13th century, and extensive additions have been made since 1887. In addition to private rooms and state apartments, the Hofburg contains a library of about 800,000 volumes, 7000 incunabula and 24,000 MSS., including the celebrated "Papyrus Rainer"; the imperial treasury, containing the family treasures of the house of Habsburg-Lorraine, and other important collections.

In the old town are the two largest of the Höfe, extensive blocks of buildings belonging to the great abbeys of Austria, which are common throughout Vienna. These are the Schottenhof (once belonging to the "Scoti," or Irish Benedictines) and the Mölkerhof, adjoining the open space called the Freiung, each forming a little town of itself. As in most continental towns, the custom of living in flats is prevalent in Vienna, where few except the richer nobles occupy an entire house. Of late the so-called "Zinspaläste" ("tenement palaces") have been built on a magnificent scale, often profusely adorned without and within with painting and sculpture. Other notable buildings within the line of the old fortifications are the Gothic Augustine church, built in the 14th century, and containing a fine monument of Canova; the Capuchin church, with the burial vault of the Habsburgs; the church of Maria-Stiegen, an interesting Gothic building of the 14th century, restored in 1820; the handsome Greek church, by T. Hansen (1813–1891), finished in 1858; the Minorite church, a Gothic edifice of the 14th century, containing an admirable mosaic of Leonardo da Vinci's "Last Supper" by Raffaeli, executed in 1806–14 by order of Napoleon and placed here in 1846. Other churches worth mentioning are the Schottenkirche, built in the 13th century, reconstructed in the 17th and restored by H. von Ferstel (1828–1883), containing the tombs of the count of Starhemberg, the defender of Vienna against the Turks in 1683, and of Duke Heinrich Jasomirgott (d. 1177); the church of St Peter, reconstructed by Fischer von Erlach in 1702–13, and the University church, erected by the Jesuits in 1625–31, both in the baroque style with rich frescoes; lastly, the small church of St Ruprecht, the oldest church in Vienna, first built in 740, and several times reconstructed; and the old *Rathaus*. At the corner of the Graben, one of the busiest thoroughfares, containing the most fashionable shops in Vienna, is the *Stock im Eisen*, the stump of a tree, said to be the last survivor of a holy grove round which the original settlement of Vindomina sprang up. It is full of nails driven into it by travelling journeymen.

The Ring-Strasse ranks as one of the most imposing achievements of modern street architecture. Opposite the Hofburg, the main body of which is separated from the Ring-Strasse by the Hofgarten and Volksgarten, rise the handsome monument of the empress Maria Theresa (erected 1888) and the imperial museums of art and natural history, two extensive Renaissance edifices with domes (erected 1870–89), matching each other in every particular and grouping finely with the new part of the palace. Hans Makart's painted dome in the natural history museum is the largest pictorial canvas in the world. Adjoining the museums to the west is the palace of justice (1881), and this is closely followed by the houses of parliament (1883), in which the Grecian style has been successfully adapted to modern requirements. Beyond the houses of parliament stands the new *Rathaus*, an immense and lavishly decorated Gothic building, erected in 1873–83. It was designed by Friedrich Schmidt (1825–1891), who may be described as the chief exponent of the modern Gothic tendency as T. Hansen and G Semper, the creators respectively of the parliament house and the museums, are the leaders of the Classical and Renaissance styles which are so strongly represented in Viennese architecture. Opposite the *Rathaus*, on the inner side of the Ring, is the new court theatre, another specimen of Semper's Renaissance work, finished in 1889. To the north stands the new building of the university, a Renaissance structure by H. von Ferstel, erected in 1873–84 and rivalling the *Rathaus* in extent. Near the university, and separated from the Ring by a garden, stands the votive church in Alsergrund, completed in 1879, and erected to commemorate the emperor's escape from assassination in 1853, one of the most elaborate and successful of modern Gothic churches (Ferstel). The other important buildings of the Ring-Strasse include the magnificent opera house, built 1861–69, by E. Van der Nüll (1812–1868) and A. von Siccardsburg (1813–1868), the sumptuous interior of which vies with that of Paris; the academy of art, built in 1872–76; the exchange, built in 1872–77, both by Hansen; and the Austrian museum of art and industry, an Italian Renaissance building erected by Ferstel in 1868–71. On the north side the Ring-Strasse gives place to the spacious Franz Josef's quay, flanking the Danube Canal. The municipal districts outside the Ring also contain numerous handsome modern buildings. Vienna possesses both in the inner city and the outlying districts numerous squares adorned with artistic monuments. One of the finest squares in the world for the beauty of the buildings which encircle it is the Rathausplatz, adjoining the Ring-Strasse.

Vienna is the intellectual as well as the material capital of Austria—emphatically so in regard to the German part of the empire. Its university, established in 1365, is now attended by nearly 6000 students, and the medical faculty enjoys a world-wide reputation. Its scientific institutions are headed by the academy of science. The academy of art was founded in 1707.

Museums.—In the imperial art-history museum are stored the extensive art-collections of the Austrian imperial family, which were formerly in the Hofburg, in the Belvedere, and in other places. It contains a rich collection of Egyptian, Greek, Roman and Etruscan antiquities; of coins and medals, and of industrial art. The last contains valuable specimens of the industrial art of the middle ages and of the Renaissance period in gold, silver, bronze, glass, enamel, ivory, iron and wood. The famous salt-cellar (*saliera*) of Benvenuto Cellini, executed in 1539–43 for Francis I. of France, is here. Then comes the collection of weapons and armour, including the famous Ambras collection, so called after the castle of Ambras near Innsbruck, where it was for a long time stored. The picture gallery, which contains the collection formerly preserved in the Belvedere palace, contains masterpieces of almost every school in the world, but it is unsurpassed for its specimens of Rubens, Dürer and the Venetian masters. Next come the imperial treasury at the Hofburg, already mentioned; the famous collection of drawings and engravings known as the Albertina in the palace of the archduke Frederick, which contains over 200,000 engravings and 16,000 drawings; the picture gallery of the academy of art; the collection of the Austrian museum of art and industry; the historical museum of the city of Vienna; and the military museum at the arsenal.

Besides, there are in Vienna a number of private picture galleries of great importance. The largest is that belonging to Prince Liechtenstein, containing about 800 paintings, and specially rich in important works by Rubens and Van Dyck; the picture gallery of Count Harrach, with over 400 paintings, possessing numerous examples of the later Italian and French schools; that of Count Czernin, with over 340 paintings; and that of Count Schönborn, with 110 pictures. The imperial natural history museum contains a mineralogical, geological and zoological section, as well as a prehistoric and ethnographical collection. Its botanic collection contains the famous Vienna herbarium, while to the university is attached a fine botanical garden. Besides the Hofburg library, there are important libraries belonging to the university and other societies, the corporation and the various monastic orders.

Parks, &c.—The Prater, a vast expanse (2000 acres) of wood and park on the east side of the city, between the Danube and the Danube Canal, is greatly frequented by all classes. The exhibition of 1873 was held in this park, and several of its buildings, including the large rotunda, have been left standing. Other parks are the Hofgarten, the Volksgarten and the Town Park, all adjoining the Ring-Strasse; the Augarten in the Leopoldstadt, the Belvedere Park in the Landstrasse, the Esterházy Park in Mariahilf, and the Türkenschanz Park in Döbling. Among the most popular resorts are the parks and gardens belonging to the imperial châteaux of Schönbrunn and Laxenburg.

Government and Administration.—Vienna is the residence of the emperor of Austria, the seat of the Austrian ministers, of the Reichsrat and of the Diet of Lower Austria. It is also the seat of the common ministries for the Austro-Hungarian monarchy, of the foreign ambassadors and general consuls and the meeting-place, alternately with Budapest, of the Austro-Hungarian delegations. It contains also the highest judicial, financial, military and administrative official authorities of Austria, and is the see of a Roman Catholic archbishop. Vienna enjoys autonomy for communal affairs, but is under the control of the governor and the Diet of Lower Austria, while the election of the chief burgomaster requires the sanction of the sovereign, advised by the prime minister. The municipal council is composed of 158 members elected for a period of six years. The long struggle between the municipality and the Austrian ministry arising out of the refusal to sanction the election (1895) of Dr Lueger, the anti-Semitic leader and champion, recalls in some respects the Wilkes incident in London. In this instance the ultimate success of the corporation greatly strengthened the Obscurantist and reactionary element throughout Austria.

The cost of the transformation of Vienna, which has been in progress since 1858, cannot be said to have fallen heavily on the population. Great part of the burden has been borne throughout by the "City Extension Fund," realized from the utilization of the ground formerly occupied by the fortifications and glacis. The subsequent regulation of the former suburbs has to a large extent covered its own expenses through the acquisition by the town of the improved area. The municipal finance has on the whole been sound, and notwithstanding the extra burdens assumed on the incorporation of the suburbs, the equilibrium of the communal budget was maintained up to the fall of the Liberal administration. In spite of shortsighted parsimony in the matter of schools, &c., and increased resources through the allocation to the municipality of a certain percentage of new state and provincial taxation, their anti-Semitic successors have been unable to avoid a deficit, and have been obliged to increase the rates. But the direct damage done in this and other ways would seem to be less than that produced by the mistrust they inspired for a time among the propertied classes, and the consequent paralysing of enterprise. Their violent anti-Magyar attitude has driven away a certain amount of Hungarian custom, and helped to increase the political difficulties of the cis-Leithan government.

Vienna is situated at an altitude of 550 ft. above the level of the sea, and possesses a healthy climate. The mean annual temperature is 48·6° F., and the range between January and July is about 40° F. The climate is rather changeable, and rapid falls of temperature are not uncommon. Violent storms occur in spring and autumn, and the rainfall, including snow, amounts to 25 in. a year. Vienna has one of the best supplies of drinking water of any European capital. The water is brought by an aqueduct direct from the Alps, viz. from the Schneeberg, a distance of nearly 60 m. to the south-west. These magnificent waterworks were opened in 1873, and their sanitary influence was soon felt, in the almost complete disappearance of typhoid fever, which had numerous victims before.

Great enlargements, by tapping new sources of supply, were made in 1891–93, while since 1902 works have been in progress for bringing a new supply of pure water from the region of the Salza, a distance of nearly 150 m. Another sanitary work of great importance was the improvement carried out in the drainage system, and the regulation of the river Wien. This river, which, at ordinary times, was little more than an ill-smelling brook at one side of an immense bed, was occasionally converted into a formidable and destructive torrent. Now half the bed of the river has been walled over for the metropolitan railway, while the other half has been deepened, and the portion of it within the town has been arched over. A beginning was thus made for a new and magnificent avenue in the neighbourhood of the Ring-Strasse.

Population.—In 1800 the population of the old districts was 231,050; in 1840, 356,870; in 1857, 476,222 (or with suburbs, 587,235); in 1869, 607,514 (with suburbs, 842,951); in 1880, 704,756 (with suburbs, 1,090,119); in 1890, town and suburbs, 1,364,548; and in 1900, 1,662,269, including the garrison of 26,629 men. Owing to the peculiarities of its situation, the population of Vienna is of a very cosmopolitan and heterogeneous character. Its permanent population (some 45·5% are born in the city) is recruited from all parts of Austria, and indeed of the entire monarchy. The German element is, of course, the most numerous, but there are also a great number of Hungarians, Czechs and other Slavs.

Previous to the loss of the Italian provinces, a considerable proportion came from Italy (30,000 in 1859), including artists, members of the learned professions and artisans who left their mark on Viennese art and taste. The Italian colony now numbers about 2500 (chiefly navvies and masons), in addition to some 1400 Austrian subjects of that nationality. At present the largest and most regular contributions to the population of Vienna come from the Czech provinces of Bohemia and Moravia, next in importance being those from Lower Austria and Styria. This steady and increasing influx of Czechs is gradually infusing a large proportion of Slav blood in what Bismarck (in 1864) described as the German capital of a Slav empire. Formerly the Czech labourers, artisans and domestic servants who came to Vienna were somewhat ashamed of their mother-tongue, and anxious to conceal that evidence of their origin as speedily as possible. The revival of the nationality agitation has produced a marked change in this respect. The Czech immigrants, attracted to Vienna as to other German towns by the growth of industry, are now too numerous for easy absorption, which is further retarded by their national organization, and the provision of separate institutions, churches, schools (thus far private) and places of resort. The consequence is that they take a pride in accentuating their national characteristics, a circumstance which threatens to develop into a new source of discord. In 1900 the population included 1,386,115 persons of German nationality, 102,974 Czechs and Slovaks, 4346 Poles, 805 Ruthenians, 1329 Slovenes, 271 Serbo-Croatians, and 1368 Italians, all Austrian subjects. To these should be added 133,144 Hungarians, 21,733 natives of Germany (3782 less than in 1890), 2506 natives of Italy, 1703 Russians, 1176 French, 1643 Swiss, &c. Of this heterogeneous population 1,461,891 were Roman Catholics, the Jews coming next in order with 146,926. Protestants of the Augsburg and Helvetic Confessions numbered 54,364; members of the Church of England, 490; Old Catholics, 975; members of the Greek Orthodox Church, 3674; Greek Catholics, 2521; and Mahommedans, 889.

As a general rule, the Viennese are gay, pleasure-loving and genial. The Viennese women are justly celebrated for their beauty and elegance; and dressing as a fine art is cultivated here with almost as great success as in Paris. As a rule, the Viennese are passionately fond of dancing; and the city of Strauss, J. F. K. Lanner (1801–1843) and J. Gungl (1810–1889) gives name to a "school" of waltz and other dance music. Opera, especially in its lighter form, flourishes, and the actors of Vienna maintain with success a traditional reputation of no mean order. Its chief place in the history of art Vienna owes to its musicians, among whom are counted Haydn, Mozart, Beethoven and Schubert. The Viennese school of painting is of modern origin; but some of its members, for instance, Hans Makart (1840–1884), have acquired a European reputation.

Trade.—Vienna is the most important commercial and industrial centre of Austria. For a long time the Austrian government, by failing to keep the Danube in a proper state for navigation, let slip the opportunity of making the city the great Danubian metropolis which its geographical position entitles it to be. But during the last quarter of the 19th century active steps were taken to foster the economic interests of the city. The regulation of the Danube, mentioned above, the conversion of the entire Danube Canal into a harbour, the construction of the navigable canal Danube-March-Oder—all gave a new impetus to the trade of Vienna. The fast-growing activity of the port of Trieste and the new and shorter railway line constructed between it and Vienna also contribute to the same effect. Vienna carries on an extensive trade in corn, flour, cattle, wine, sugar and a large variety of manufactured articles. Besides the Danube it is served by an extensive net of railways, which radiate from here to every part of the empire.

The staple productions are machinery, railway engines and carriages, steel, tin and bronze wares, pottery, bent and carved wood furniture, textiles and chemicals. In the number and variety of its leather and other fancy goods Vienna rivals Paris, and is also renowned for its manufacture of jewelry and articles of precious metals, *objets d'art*, musical instruments, physical chemicals and optical instruments, and artistic products generally. Its articles of clothing, silk goods and millinery also enjoy a great reputation for the taste with which they are manufactured. Books, artistic publications, paper and beer are amongst the other principal products. The building trade and its allied trades are also active.

History.—For several centuries Vienna filled an important rôle as the most advanced bulwark of Western civilization and Christianity against the Turks, for during the whole of the middle ages Hungary practically retained its Asiatic character. The story of Vienna begins in the earliest years of the Christian era, with the seizure of the Celtic settlement of *Vindomina* by the Romans, who changed its name to *Vindobona*, and established a fortified camp here to command the Danube and protect the northern frontier of the empire. The fortress grew in importance, and was afterwards made a municipium; and here Marcus Aurelius died in 180. On the decline of the Roman empire Vindobona became the prey of successive barbarian invaders. Attila and his Huns were among the temporary occupants of the place (5th century), and in the following century it came into the possession of the Avars, after which its name disappears from history until towards the close of the 8th century, when Charlemagne expelled the Avars and made the district between the Enns and the Wiener Wald the boundary of his empire. In the time of Otho II. (976) this "East Mark" (Ostmark, Oesterreich, Austria) was granted in fief to the Babenbergers, and in the reign of Frederick Barbarossa (1156) it was advanced to the rank of a duchy. There is no certain record that the site of Vindobona was occupied at the time of the formation of the Ostmark, though many considerations make it probable. It is not likely that the Avars, living in their "ring" encampments, destroyed the Roman municipium; and Becs, the Hungarian name for Vienna to this day, is susceptible of a Slavonic interpretation only, and would seem to indicate that the site had been occupied in Slavonic times. The frequent mention of "Wiene" in the oldest extant version of the *Nibelungenlied* points in the same direction. Passing over a doubtful mention of "Vwienni" in the annals of 1030, we find the "civitas" of Vienna mentioned in a document of 1130, and in 1156 it became the capital and residence of Duke Heinrich Jasomirgott. In 1237 Vienna received a charter of freedom from Frederick II., confirmed in 1247. In the time of the crusades Vienna increased so rapidly, in consequence of the traffic that flowed through it, that in the days of Ottacar II. of Bohemia (1251–76), the successor of the Babenbergers, it had attained the dimensions of the present inner town. A new era of power and splendour begins in 1276, when it became the capital of the Habsburg dynasty, after the defeat of Ottacar by Rudolph of Habsburg. From this time on it has shared the fortunes of the house of Austria. In 1477 Vienna was besieged unsuccessfully by the Hungarians, and in 1485 it was taken by Matthew Corvinus. Of more importance were the two sieges by the Turks (1529 and 1683), when the city was saved on the first occasion by the gallant defence of Count Niclas von Salm (1459–1530), and on the second by Rüdiger von Starhemberg (1638–1701), who held out until the arrival of the Poles and Germans under John Sobieski of Poland. The suburbs, however, were destroyed on both occasions. In 1805, and again in 1809, Vienna was for a short time occupied by the French. In 1814–15 it was the meeting-place of the congress which settled the political affairs of Europe after the overthrow of Napoleon. In 1848 the city was for a time in the hands of the revolutionary party; but it was bombarded by the imperial forces and compelled to surrender on 30th October of the same year. Vienna was not occupied by the Prussians in the war of 1866, but the invaders marched to within sight of its towers. In 1873 a great international exhibition took place here.

While Berlin and Budapest have made the most rapid progress of all European cities, having multiplied their population by nine in the period 1800–90, Vienna—even including the extensive annexations of 1892—only increased sevenfold. Many causes conspired to this end, but most of them date from the years 1859, 1866 and 1867. The combined effect of these successive blows, aggravated by the long period of decentralizing policy from Taaffe to Badeni, is still felt in the Kaiserstadt. The gaiety of Vienna had for centuries depended on the brilliancy of its court, recruited from all parts of Europe, including the nobility of the whole empire, and on its musical, light-hearted and contented population. Even before it fell from its high estate as the social centre of the German-speaking world, it had suffered severely by the crushing defeats of 1859 and the consequent exodus of the Austrian nobles. These were held responsible for the misfortunes of the army, and to escape the atmosphere of popular odium retired to their country seats and the provincial capitals. They have never since made Vienna their home to the same extent as before. The change thus begun was confirmed by the exclusion of Austria from the German Confederation and the restoration of her Constitution to Hungary, events which gave an immense impetus to the two rival capitals. Thus within eight years the range of territory from which Vienna drew its former throngs of wealthy pleasure-seeking visitors and more or less permanent inhabitants—Italian, German and Hungarian—was enormously restricted. Since then Vienna has benefited largely by the enlightened efforts of its citizens and the exceptional opportunities afforded by the removal of the fortifications. But a decline of its importance, similar to that within the larger sphere which it influenced prior to 1859, has continued uninterruptedly within the Habsburg dominions up to the present day. Its commercial classes constantly complain of the increasing competition of the provinces, and of the progressive industrial emancipation of Hungary. The efforts of the Hungarians to complete their social and economic, no less than their political, emancipation from Austria and Vienna have been unremittingly pursued. The formal recognition of Budapest as a royal residence and capital in 1892, and the appointment of independent Hungarian court functionaries in November 1893, mark new stages in its progress. It would no longer be correct to speak of Vienna as the capital of the dual monarchy. It merely shares that distinction with Budapest.

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VIENNA, CONGRESS OF (1814–1815). The fall of Napoleon was only achieved by the creation of a special alliance between Great Britain, Austria, Russia and Prussia. By the Treaty of Chaumont of March 10, 1814, these four powers bound themselves together in a bond which was not to be dissolved when peace was concluded. When Napoleon had been beaten, France conceded to these allies by a secret article of the first Treaty of Paris of May 30, 1814, the disposition of all countries which Napoleon's fall had freed from French suzerainty. This stupendous task was reserved for a general congress, and it was agreed to meet at Vienna. The visit of the allied sovereigns to England and the pressing engagements of the emperor Alexander and Lord Castlereagh delayed the congress until the autumn, when all Europe sent its representatives to accept the hospitality of the impoverished but magnificent Austrian court.

Metternich, though he had not yet completely established his position, acted as chief Austrian representative, and he was naturally in his capacity as host the president of the congress. Friedrich v. Gentz acted as secretary both to him and the congress and did much of the routine work. Alexander of Russia directed his own diplomacy, and round him he had gathered a brilliant body of men who could express but not control their master's desires. Of these the chief were foreigners, according to the traditions of Russian diplomacy. Capo d'Istria, Nesselrode, Stein, Pozzo di Borgo were perhaps the best men in Europe to manage the Russian policy, while Czartoriski represented at the imperial court the hope of Polish nationality. Frederick William III. of Prussia was a weaker character and, as will be seen, his policy was largely determined by his ally. Prince von Hardenberg, who by no means shared all the views of his master but was incapacitated by his growing infirmities, was first Prussian plenipotentiary, and assisting him was Baron von Humboldt. Great Britain was represented by Lord Castlereagh, and under him were the British diplomats who had been attached to the foreign armies since 1813, Clancarty, Stewart and Cathcart. Castlereagh brought with him decided views, which however were not altogether those of his cabinet, and his position was weakened by the fact that Great Britain was still at war with the United States, and that public opinion at home cared for little but the abolition of the slave trade. When parliamentary duties called Castlereagh home in February 1815, the duke of Wellington filled his place with adequate dignity and statesmanship until the war broke out.

France sent Prince Talleyrand to conduct her difficult affairs. No other man was so well fitted for the task of maintaining the interests of a defeated country. His rare diplomatic skill and supreme intellectual endowments were to enable him to play a deciding part in the coming congress. All the minor powers of Europe were represented, for all felt that their interests were at stake in the coming settlement. Gathered there also were a host of publicists, secretaries and courtiers, and never before had Europe witnessed such a collection of rank and talent. From the first the social side of the congress impressed observers with its wealth and variety, nor did the statesmen disdain to use the dining-table or the ballroom as the instruments of their diplomacy.

All Europe awaited with eager expectation the results of so great an assembly. The fate of Poland and Saxony hung in the balance; Germany awaited an entirely new reorganization; Italy was again ready for dismemberment; rumours went that even the pope and the sultan might be largely affected. Some there were who hoped that so great an opportunity would not be lost, but that the statesmen would initiate such measures of international disarmament as would perpetuate the blessings of that peace which Europe was again enjoying after twenty years of warfare.

It was not long, however, before the allies displayed their intention of keeping the management of affairs entirely in their own hands. At an informal meeting on the 22nd of September the four great powers agreed that all subjects of general interest were to be settled by a committee consisting of Austria, Russia, Prussia and Great Britain together with France and Spain. At the same time, however, it was decided by a secret protocol that the four powers should first settle among themselves the distribution of the conquered territories, and that France and Spain should only be consulted when their final decision was announced.

This was the situation which Talleyrand had to face when he arrived on the 24th of September. His first step when he was admitted to the European committee, which was in the plans of the allies to act so colourless a part, was to ignore the position of the Four and to assert that only the congress as a whole could give the committee full powers. This would have meant an almost indefinite delay, for how was it possible [illegible]act rights of all the different states to a voice in affairs? After some heated discussion a compromise was arrived at. The opening of the congress was postponed, and Sweden and Portugal were added to the European committee, but the Four still persisted in the informal meetings which were to decide the important questions. Meanwhile separate committees were formed for the discussion of special problems. Thus a special committee was appointed consisting of the five German powers to discuss the constitution which was to replace the Holy Roman Empire, another to settle that of Switzerland, and others for other minor questions. Talleyrand had, however, already shaken the position of the allies. He had posed as the defender of the public rights of Europe and won to his side the smaller powers and much of the public opinion of Europe, while the allies were beginning to be regarded more in the light of rapacious conquerors than as disinterested defenders of the liberties of Europe.

Had the Four remained united in their views they would still have been irresistible. But they were gradually dividing into two unreconcilable parties upon the Saxon-Polish question. Alexander, exaggerating the part he had played in the final struggle, and with some vague idea of nationality in his brain, demanded that the whole of Poland should be added to the Russian dominions. Austria was to be compensated in Italy, while Prussia was to receive the whole of Saxony, whose unfortunate monarch had been the most faithful of Napoleon's vassals.

It was Castlereagh that led the opposition to these almost peremptory demands of Alexander. A true disciple of Pitt, he came to the congress with an overwhelming distrust of the growing power of Russia, which was only second to his hatred of revolutionary France. He considered that the equilibrium of Europe would be irretrievably upset were the Russian boundaries to be pushed into the heart of Germany. Thus while willing, even anxious that Prussia should receive Saxony, in order that she might be strong to meet the danger from the East, he was prepared to go to any lengths to resist the claims of Russia. For Austria Saxony was really of more vital interest than Poland, but Castlereagh, despite a vigorous resistance from a section of the Austrian court, was able to win Metternich over to his views. He hoped to gain Prussia also to his side, and by uniting the German powers to force Alexander to retire from the position he had so uncompromisingly laid down. With the Prussian statesmen he had some success, but he could make no impression on Frederick William. Alexander used to the utmost that influence over the mind of the Prussian monarch which he had been preparing since the beginning of 1813. Against Castlereagh he entered the lists personally, and memorandum after memorandum was exchanged. Despite the warning letters of the British cabinet which, dismayed at the long continuance of the American War, counselled caution on a question in which England had no immediate interest, Castlereagh yielded no inch of his ground. But Metternich wavered on the question of Saxony, and December saw the allies hopelessly at difference. It seemed by no means unlikely that the armies which had conquered Napoleon would soon be engaged in conflict with one another.

It was Talleyrand's opportunity. As Castlereagh and Metternich began to regard the position as hopeless they began to look upon him as a possible ally. Talleyrand had constantly defended the rights of France's old ally Saxony in the name of the principle which his master Louis XVIII. represented. His passionate appeal on behalf of "legitimacy" was particularly adapted to the necessities of the situation. Alexander was driven into transports of rage by this championship of the *ancien régime* by one who had been a servant of its bitterest foe. But Castlereagh saw that war could only be avoided if one party was made stronger than the other. The reluctant consent of the British cabinet was obtained and Talleyrand was approached as an equal. He came boldly to the front in the middle of December as the champion of Saxony: and, as Russia and Prussia were still obstinate, Metternich and Castlereagh demanded the admission of France to the secret council. This was refused, and on the 3rd of January

1815 a secret treaty of defensive alliance was signed between France, Austria and Great Britain. For some time affairs hung in the balance, but Alexander could not mistake the tone of his opponents. Gradually a compromise was arranged, and by the end of the month all danger was past. Eventually Austria and Prussia retained most of their Polish dominions, and the latter power only received about two-fifths of Saxony. The rest of Poland was incorporated as a separate kingdom in the Russian dominions with a promise of a constitution of its own. Talleyrand had rescued France from its humiliating position, and set it as an equal by the side of the allies. Henceforward he made no effort for the rights of the whole congress.

Meanwhile other affairs had been progressing more harmoniously under the direction of special committees, which included representatives of the powers specially interested. Switzerland was given a constitution which led it in the direction of its later federalism. In Italy Austria retained her hold on Lombardy and Venetia, Genoa was assigned to the kingdom of Sardinia, while Parma went to Marie Louise, the legitimate heir, Carlo Ludivico, having to be content with the reversion after her death, the congress meanwhile assigning Lucca to him as a duchy; the claims of the young Napoleon to succeed his mother in Parma were only destroyed by the efforts of France and England. The other petty monarchs were restored, and Murat's rash attempt, after Napoleon's return from Elba, to make himself king of united Italy, gave back Naples to the Bourbons, an event which would have been brought about in any case in the course of the next few years (see MURAT, JOACHIM). Holland was confirmed in the possession of Belgium and Luxemburg, Limburg and Liége were added to her dominions. Sweden, who had sacrificed Finland to Russia, obtained Norway.

German affairs, however, proved too complicated for complete solution. It was difficult enough to decide the claims of the states in the scramble for territory. Eventually, however, by methods of compromise, this was adjusted fairly satisfactorily. The greater states gained largely, especially Prussia, who was given large accessions of territory on the Rhine, partly as a compensation for her disappointment in the matter of Saxony, partly that she might act as a bulwark against France. Some disputes between Baden and Bavaria remained unsettled, and many questions arising out of the new federal constitution of Germany, which had been hurriedly patched together under the influence of the news of Napoleon's return, had to be postponed for further discussion, and were not settled until the Final Act agreed upon by the conference of German statesmen at Vienna in 1821.

Other more general objects, such as the free navigation of international rivers and the regulation of the rights of precedence among diplomatists (see DIPLOMACY), were managed with much address. Castlereagh's great efforts were rewarded by a declaration that the slave trade was to be abolished, though each power was left free to fix such a date as was most convenient to itself. The Final Act, embodying all the separate treaties, was signed on the 9th of June 1815, a few days before the battle of Waterloo.

Before the work of the congress was completed Napoleon was again at Paris, and the closing stages were hurried and ill-considered. One negotiation of supreme importance was cut short for this reason. Castlereagh had left Vienna with the hope that the powers would solemnly guarantee their territorial settlement and promise to make collective war on whoever dared to disturb it. This guarantee was to include the Ottoman dominions, in whose interests, indeed, it had been brought forward. Alexander made no objection provided that the Porte would submit all outstanding claims to arbitration. The distance of Constantinople from Vienna and the obstinacy of the sultan would probably have prevented a settlement, but the return of Napoleon rendered all such proposals almost absurd, and the scheme was dropped.

Thus the congress of Vienna failed to institute any new system for securing the stability of the European polity, nor did it recognize those new forces of liberty and nationality which had really caused Napoleon's downfall. Following the tradition of all preceding congresses, it was mainly a scramble for territory and power. Territories were distributed among the powers with no consideration for the feelings of their inhabitants, and in general the right of the strongest prevailed. For this reason it has often met with a condemnation that has perhaps been unmerited. It is true that the map of Europe shows to-day but little trace of its influence; but much of its work was determined by conditions over which statesmen had little control. Europe was not ready for the recognition of nationality and liberalism. What it wanted most of all was peace, and by establishing something like a territorial equilibrium the congress did much to win that breathing space which was the cardinal need of all.

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VIENNE, a river of central France, a left-hand tributary of the Loire, watering the departments of Corrèze, Haute-Vienne, Charente, Vienne and Indre-et-Loire. Length, 219 m.; area of basin, 8286 sq. m. Rising on the plateau of Millevaches 14 m. N.W. of Ussel (department of Corrèze) at a height of 2789 ft., the Vienne flows westward, between the highlands of Limousin on the south and the plateau of Gentioux and the Blond mountains on the north. The first large town on its banks is Limoges (Haute-Vienne), below its confluence with the Taurion: in this part of its course the river supplies motive power to paper-mills and other factories. The river next reaches St Junien, below which it turns abruptly northwards to Confolens (Charente). Flowing through a picturesque and now wider valley, and passing in its course the churches and châteaux of Chauvigny, the river proceeds to the confluence of the Clain just above Châtellerault. Below that town it receives the Creuse (rising on the plateau of Millevaches and reaching the Vienne after a course of 159 m.), and turns north-west, uniting with the Loire below the historic town of Chinon. There is little river-traffic on the Vienne, and that only below its confluence with the Creuse (30 m.).

VIENNE, a department of west-central France, formed in 1790 out of Poitou (four-fifths of its present area), Touraine (one-seventh) and Berry, and bounded by Deux-Sèvres on the W., Charente on the S., Haute-Vienne on the S.E., Indre on the E., Indre-et-Loire on the N.E. and N., and Maine-et-Loire on the N.W. Pop. (1906) 333,621. Area, 2719 sq. m. The river Vienne, which gives its name to the department, with its tributaries the Creuse (subtributary the Gartempe) on the east and the Clain on the west, flows from south to north. The general slope of the department is in the same direction, the highest point (764 ft.) being in the south-east and the lowest (115 ft.) at the junction of the Vienne and the Creuse. In the south the Charente, on the north-west the Dive, and in the west some streams belonging to the basin of the Sèvre-Niortaise drain small portions of the department. The average temperature is 54° F. The prevailing winds are from the south-west and west. The annual rainfall is 24 in.

Wheat, oats and barley are the principal cereals cultivated, other important crops being lucerne, sainfoin, clover, mangel-wurzels and potatoes. Colza and hemp are grown to a limited extent. The district of Poitiers grows good red wine, and the white wine of Trois-Moutiers near Loudun is well known. The breeding of live stock in all its branches is fairly active. Poitou is famous for its mules, and the geese and turkeys of the department are highly esteemed. Oak, ash, alder and birch are the principal forest trees, and among the fruit trees are the chestnut, walnut and almond. Freestone is quarried. The most important industrial establishments are the national arms manufactory at Châtellerault and the cutlery works near that town. In other parts of the department are wool-spinning mills, hemp-spinning mills, manufactories of serges and coarse cloth, vinegar, candles, goose and goat skins, leather, tiles and pottery, paper-works, breweries, distilleries, lime-kilns and numerous flour-mills. Corn, wine, brandy, vegetables, fruit, chestnuts, fodder, cattle, stone, cutlery, arms and dressed hides are exported; butcher's beasts, colonial produce and coals are imported. The department is served by the Ouest-État and Orleans railways. Vienne forms part of the diocese of Poitiers, has its court of appeal and educational centre at Poitiers, and belongs to the region of the IX. army corps. The capital is Poitiers, and the department is divided for purposes of administration into 5 arrondissements (Poitiers, Châtellerault, Civray, Loudun, Montmorillon), 31 cantons and 300 communes. The more noteworthy towns are Poitiers, Châtellerault, Loudun, Montmorillon and Chauvigny, these being separately treated. Other places of interest are St Maurice, Civray and St Savin, which have Romanesque churches, the abbey church of St Savin being remarkable for its mural paintings; Ligugé, with an abbey church of the 15th and 16th centuries; Charroux, which has a Romanesque octagonal tower and other remains of a famous abbey; and Sanxay, near which there are ruins of a theatre and other Gallo-Roman remains. Vienne is rich in megalithic monuments.

VIENNE, the chief town of an arrondissement of the department of the Isère, France. Historically the first, it is by population (24,619 in 1901) the second city of the department of the Isère, after Grenoble; and the third, after Valence, of the Dauphiné. It is situated on the left bank of the Rhone just below the junction of the Gère with the Rhone, and about 20 m. by rail S. of Lyons. On the N., E. and S. the town is sheltered by low hills, the Rhone flowing along its western side. Its site is an immense mass of ancient *débris*, which is constantly yielding interesting antiquities. On the bank of the Gère are traces of the ramparts of the old Roman city, and on the Mont Pipet (E. of the town) are the remains of an amphitheatre, while the ruined castle there was built in the 13th century on Roman substructures. Several of the ancient aqueducts (one only is now actually in use) are still to be seen, while in the neighbourhood of the city some bits of the old Roman roads may still be found.

The streets of the town are narrow and tortuous, but it possesses two Roman monuments of the first class. One is the temple of Augusta and Livia, a rectangular building of the Corinthian order, erected by the emperor Claudius, and inferior only to the Maison Carrée at Nîmes. From the 5th century to 1793 it was a church (Notre Dame de Vie), and the "festival of reason" was celebrated in it at the time of the Revolution. The other, in the more modern part of the town, is the *Plan de l'Aiguille*, a truncated quadrangular pyramid about 52 ft. in height and resting on a portico with four arches. Many theories have been advanced as to what this singular structure really was (some imagine that it was the tomb of Pontius Pilatus, who, according to the legend, died at Vienne), but it is now generally believed to have been part of the *spina* of a large circus, the outlines of which have been traced. The church of St Peter belonged to an ancient Benedictine abbey and was rebuilt in the 9th century. It is in the earliest Romanesque style, and forms a basilica, with tall square piers, reminding one of Lucca, while the two ranges of windows in the aisles, with their coupled marble columns, recall Ravenna from within and the Basse Œuvre of Beauvais from without. The porch is in the earliest Romanesque style. This church has of late years been completely restored, and since 1895 shelters the magnificent *Musée Lapidaire* (formerly housed in the temple of Augusta and Livia). The former cathedral church (primatial as well as metropolitan) of St Maurice contains some of the best forms of the true N. Gothic, and was constructed at various periods between 1052 and 1533. It is a basilica, with three aisles, but no apse or transepts. It is 315 ft. in length, 118 ft. wide and 89 in height. The most striking portion is the W. front (1533), which rises majestically from a terrace overhanging the Rhone. But the statuary was much injured by the Protestants in 1562. The church of St André le Bas was the church of a second Benedictine monastery, and later the chapel of the earlier kings of Provence. It was rebuilt in 1152, in the later Romanesque style. The town library and art museum are now in the corn hall, which has been reconstructed for that purpose. A suspension bridge leads from the city to the right bank of the Rhone, where the industrial quarter of Ste Colombe now occupies part of the ancient city. Here is a tower, built in 1349 by Philip of Valois to defend the French bank of the Rhone, as distinguished from the left bank, which, as part of the kingdom of Provence, was dependent on the Holy Roman Empire. This state of things is also recalled by the name of the village, St Romain en Gal, to the N.W. of Ste Colombe.

The Gère supplies the motive power to numerous factories. The most important are those which produce cloth (about 30 factories, turning out daily about 15,000 yds. of cloth). There are numerous other industrial establishments (paper mills, iron foundries, brick works, refining furnaces, &c.).

Vienne was originally the capital of the Allobroges, and became a Roman colony about 47 B.C. under Caesar, who embellished and fortified it. A little later these colonists were expelled by the Allobroges; the exiles then founded the colony of Lyons (Lugdunum). It was not till the days of Augustus and Tiberius that Vienne regained all its former privileges as a Roman colony. Later it became the capital of the Provincia Viennensis. In 257 Postumus was proclaimed emperor here, and for a few years from that day onwards Vienne was the capital of a short-lived provincial empire. It is said to have been converted to Christianity by Crescens, the disciple of St Paul. Certainly there were Christians here in 177, as in the Greek letter (preserved to us by Eusebius) addressed at that date by the churches of Vienne and Lyons to those of Asia and Phrygia mention is made of "the" deacon of Vienne. The first bishop certainly known is Verus, who was present at the Council of Arles in 314. About 450 Vienne became an archbishopric and continued one till 1790, when the see was suppressed. The archbishops disputed with those of Lyons the title of "Primate of All the Gauls." Vienne was conquered by the Burgundians in 438, and in 534 was taken by the Franks. Sacked in 558 by the Lombards and in 737 by the Saracens, the government of the district was given by Charles the Bald in 869 to a certain Count Boso, who in 879 was proclaimed king of Provence, and was buried on his death in 887 in the cathedral church of St Maurice. Vienne then continued to form part of the kingdom of Provence or Arles till in 1032 it reverted to the Holy Roman Empire. The sovereigns of that kingdom, as well as the emperors in the 12th century (in particular Frederick Barbarossa in 1153), recognized the rights of the archbishops as the rulers (in the name of the emperor) of Vienne. But the growing power of the counts of Albon, later Dauphins of the neighbouring county of the Viennois, was the cause of many disputes between them and the archbishops. In 1349 the reigning Dauphin sold his Dauphiné to France, but the town of Vienne was not included in this sale, and the archbishops did not give up their rights over it to France till 1449, when it first became French. In 1311–12 the fifteenth General Council was held at Vienne, when Clement V. abolished the order of the Knights Templar. Vienne was sacked in 1562 by the Protestants under the baron des Adrets, and was held for the Ligue 1590–95, when it was taken in the name of Henri IV. by Montmorency. The fortifications were demolished between 1589 and 1636. In 1790 the archbishopric was abolished, the title "Primate of All the Gauls" being attributed to the archbishops of Lyons. Among famous natives of Vienne may be mentioned St Julian (3rd century) and Nicholas Chorier (1612–1692), the historian of the Dauphiné, while Gui de Bourgogne, who was archbishop 1090–1119, became pope in 1119 as Calixtus II. (d. 1124).

See A. Allmer et A. de Terrebasse, *Inscriptions antiques et du moyen âge de Vienne en Dauphiné* (6 vols., Vienne, 1875–76); Cl. Charvet, *Fastes de la ville de Vienne* (Vienne, 1869); U. Chevalier, *Collection des Cartulaires Dauphinois*, in vol. i. (Vienne, 1869), is that of St André le Bas, and in vol. ii. (1891) a description of that of St Maurice; N. Chorier, *Recherches sur les antiquités de la ville de Vienne* (Vienne, 1658); E. A. Freeman, Article in the *Saturday Review* for Feb. 6, 1875; F. Raymond, *Le Guide Viennois* (Troyes, 1897). (W. A. B. C.)

VIENNE, COUNCIL OF, an ecclesiastical council, which in the Roman Catholic Church ranks as the fifteenth ecumenical synod. It met from October 16, 1311, to May 6, 1312, under the presidency of Pope Clement V. The transference of the Curia from Rome to Avignon (1309) had brought the papacy under the influence of the French crown; and this position Philip the Fair of France now endeavoured to utilize by demanding from the pope the dissolution of the powerful and wealthy order of the Temple, together with the introduction of a trial for heresy against the late Pope Boniface VIII. To evade the second claim, Clement gave way on the first. Legal trials and acts of violence against the Templars had begun as early as the year 1307 (see TEMPLARS); and the principal object of the council was to secure a definite decision on the question of their continuance or abolition. In the committee appointed for preliminary consultation, one section was for the immediate condemnation of the order, and declined to allow it any opportunity of defence, on the ground that it was now superfluous and simply a source of strife. The majority of the members, however, regarded the case as non-proven, and demanded that the order should be heard on its own behalf; while at the same time they held that its dissolution was unjustifiable. Under pressure from the king, who was himself present in Vienne, the pope determined that, as the order gave occasion for scandal but could not be condemned as heretical by a judicial sentence (*de jure*), it should be abolished *per modum provisionis vel ordinationis apostolicae*; in other words, by an administrative ruling based on considerations of the general welfare. To this procedure the council agreed, and on the 22nd of March the order of the Temple was suppressed by the bull *Vox clamantis*; while further decisions as to the treatment of the order and its possessions followed later.

In addition to this the discussions announced in the opening speech, regarding measures for the reformation of the Church and the protection of her liberties, took place; and a part of the Constitutions found in the *Clementinum*, published in 1317 by John XXII., were probably enacted by the council. Still it is impossible to say with certainty what decrees were actually passed at Vienne. Additional decisions were necessitated by the violent disputes which raged within the Franciscan order as to the observance of the rules of St Francis of Assisi, and by the multitude of subordinate questions arising from this. Resolutions were also adopted on the Beguines and their mode of life (see BEGUINES), the control of the hospitals, the institution of instructors in Hebrew, Arabic and Chaldaic at the universities, and on numerous details of ecclesiastical discipline and law.

See Mansi, *Collectio Conciliorum*, vol. xxv.; Hefele, *Conciliengeschichte*, vol. vi. pp. 532-54.

VIERGE, DANIEL (1851–1904), Spanish painter and draughtsman, was born in Madrid in 1851. He went to Paris in 1867 to seek his fortune, fired by the vivid energy of his national temperament. He became attached to the *Monde illustré* in 1870, just before the Franco-Prussian War broke out, and, like other artists in the paper, came under the powerful influence of Edmond Morin, the first newspaper draughtsman in France who sought to impart to drawings for journals the character of a work of art. Vierge's earlier drawings, therefore, partake greatly of Morin's style; such are, "The Shooting in the Rue de la Paix," "The Place d'Armes at Versailles," "The Loan," "The Great School-Fête of Lyons," "Anniversary of the Fight of Aydes" and "Souvenir of Coulmiers." Vierge lost no time in proving the extraordinary vigour and picturesqueness of his art. Apart from the contribution of his own original work, he was required by his paper to redraw upon the wood, for the engraver, the sketches sent in by artist-correspondents, such as Luc Ollivier Merson in Rome and Samuel Urrabieta (Vierge's brother) in Spain. From 1871 to 1878 his individuality became more and more pronounced, and he produced, among his best-known drawings, "Christmas in Spain," "The Republican Meeting in Trafalgar Square," "Attack on a Train in Andalusia," "Feast of St Rosalia in Palermo," "In the Jardin d'Acclimatation," "The Burning of the Library of the Escurial, 1872," "Grasshoppers in Algiers," "Brigandage in Sicily," "Night Fête in Constantinople," "Episode of the Civil War in Spain," "Marriage of the King of Spain" and "The Bull Fight." About this time he illustrated with remarkable dash and skill Victor Hugo's *Année terrible* (Michel Lévy, 1874, and Hugues, 1879), "*1813*" (Hugues, 1877) and *Les Misérables* (1882). His masterpiece of illustration is Michelet's *History of France* (1876), consisting of 26 volumes containing 1000 drawings. In 1879 he was drawing for *La Vie moderne*, and then proceeded to illustrate *Pablo de Segovia*. While engaged upon this work he was attacked by paralysis in the right arm, but with characteristic energy and courage he set himself to acquire the necessary skill in drawing with the left, and calmly proceeded with the illustrations to the book. In 1891 he illustrated *L'Espagnole*, by Bergerat, and in 1895 *Le Cabaret des trois vertus*. In 1898 he held, at the Pelletan Gallery in Paris, an exhibition of his drawings for Chateaubriand's *Le Dernier Abencérage* ("The Last of the Abencerrages"), and in the following year a comprehensive exhibition of his work (including the illustrations to *Don Quixote*) at the Art Nouveau Gallery, also in Paris. In 1898 Vierge contributed to *L'Image*, a magazine devoted to the encouragement of engraving upon wood; and two years later, at the International Exhibition at Paris, he was awarded a *grand prix*. In 1902 he exhibited at the New Salon a scene from the Franco-Prussian War. He died at Boulogne-sur-Seine in May 1904.

See Roger Marx, *L'Image* (1898); Béraldi, *La Gravure au 19ᵉ siècle*.

VIERSEN, a town of Germany, in the Prussian Rhine province, 11 m. by rail S.W. from Crefeld, and at the junction of lines to München-Gladbach, Venlo, &c. Pop. (1905) 27,577. It has an evangelical and four Roman Catholic churches, among the latter the handsome parish church dating from the 15th century, and various educational establishments. Viersen is one of the chief seats in the lower Rhine country for the manufacture of velvets, silks (especially umbrella covers) and plush.

VIERZON, a town of central France, in the department of Cher, 20 m. N.W. of Bourges by rail. The Cher and the Yèvre unite at the foot of the hill on which lie Vierzon-Ville (pop. (1906) town, 11,812) and Vierzon-Village (pop. town, 2026; commune, 9710); Vierzon-Bourgneuf (pop. town, 1482) is on the left bank of the Cher. The town has a port on the canal of Berry and is an important junction on the Orléans railway; there are several large manufactories for the production of agricultural machines, also foundries, porcelain, brick and tile works and glass works. A technical school of mechanics and a branch of the Bank of France are among the institutions of the town.

VIETA (or VIÈTE), **FRANÇOIS**, SEIGNEUR DE LA BIGOTIÈRE (1540–1603), more generally known as FRANCISCUS VIETA, French mathematician, was born in 1540 at Fontenay-le-Comte, in Poitou. According to F. Ritter,[1] Vieta was brought up as a Catholic, and died in the same creed; but there can be no doubt that he belonged to the Huguenots for several years. On the completion of his studies in law at Poitiers Vieta began his career as an advocate in his native town. This he left about 1567, and somewhat later we find him at Rennes as a councillor of the parlement of Brittany. The religious troubles drove him thence, and Rohan, the well-known chief of the Huguenots, took him under his special protection. He recommended him in 1580 as a "maître des requêtes" (master of requests); and Henry of Navarre, at the instance of Rohan, addressed two letters to Henry III. of France on the 3rd of March and the 26th of April 1585, to obtain Vieta's restoration to his former office, but without result. After the accession of Henry of Navarre to the throne of France, Vieta filled in 1589 the position of councillor of the parlement at Tours. He afterwards became a royal privy councillor, and remained so till his death, which took place suddenly at Paris in February 1603, but in what manner we do not know; Anderson, the editor of his scientific writings, speaks only of a "praeceps et immaturum autoris fatum."

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[1] *Bolletino Boncompagni* (Rome, 1868), vol. i. p. 227, n. 1.

We know of one important service rendered by Vieta as a royal officer. While at Tours he discovered the key to a Spanish cipher, consisting of more than 500 characters, and thenceforward all the despatches in that language which fell into the hands of the French could be easily read. His fame now rests, however, entirely upon his achievements in mathematics. Being a man of wealth, he printed at his own expense the numerous papers which he wrote on various branches of this science, and communicated them to scholars in almost every country of Europe. An evidence of the good use he made of his means, as well as of the kindliness of his character, is furnished by the fact that he entertained as a guest for a whole month a scientific adversary, Adriaan van Roomen, and then paid the expenses of his journey home. Vieta's writings thus became very quickly known; but, when Franciscus van Schooten issued a general edition of his works in 1646, he failed to make a complete collection, although probably nothing of very great value has perished.

The form of Vieta's writings is their weak side. He indulged freely in flourishes; and in devising technical terms derived from the Greek he seems to have aimed at making them as unintelligible as possible. None of them, in point of fact, has held its ground, and even his proposal to denote unknown quantities by the vowels A, E, I, O, U, Y—the consonants B, C, &c., being reserved for general known quantities—has not been taken up. In this denotation he followed, perhaps, some older contemporaries, as Ramus, who designated the points in geometrical figures by vowels, making use of consonants, R, S, T, &c., only when these were exhausted. Vieta is wont to be called the father of modern algebra. This does not mean, what is often alleged, that nobody before him had ever thought of choosing symbols different from numerals, such as the letters of the alphabet, to denote the quantities of arithmetic, but that he made a general custom of what until his time had been only an exceptional attempt. All that is wanting in his writings, especially in his *Isagoge in artem analyticam* (1591), in order to make them look like a modern school algebra, is merely the sign of equality—a want which is the more striking because Robert Recorde had made use of our present symbol for this purpose since 1557, and Xylander had employed vertical parallel lines since 1575. On the other hand, Vieta was well skilled in most modern artifices, aiming at a simplification of equations by the substitution of new quantities having a certain connexion with the primitive unknown quantities. Another of his works, *Recensio canonica effectionum geometricarum*, bears a stamp not less modern, being what we now call an algebraic geometry—in other words, a collection of precepts how to construct algebraic expressions with the use of rule and compass only. While these writings were generally intelligible, and therefore of the greatest didactic importance, the *principle of homogeneity*, first enunciated by Vieta, was so far in advance of his times that most readers seem to have passed it over without adverting to its value. That principle had been made use of by the Greek authors of the classic age; but of later mathematicians only Hero, Diophantus, &c., ventured to regard lines and surfaces as mere numbers that could be joined to give a new number, their sum. It may be that the study of such sums, which he found in the works of Diophantus, prompted him to lay it down as a principle that quantities occurring in an equation ought to be homogeneous, all of them lines, or surfaces, or solids, or supersolids—an equation between mere numbers being inadmissible. During the three centuries that have elapsed between Vieta's day and our own several changes of opinion have taken place on this subject, till the principle has at last proved so far victorious that modern mathematicians like to make homogeneous such equations as are not so from the beginning, in order to get values of a symmetrical shape. Vieta himself, of course, did not see so far as that; nevertheless the merit cannot be denied him of having indirectly suggested the thought. Nor are his writings lacking in actual inventions. He conceived methods for the general resolution of equations of the second, third and fourth degrees different from those of Ferro and Ferrari, with which, however, it is difficult to believe him to have been unacquainted. He devised an approximate numerical solution of equations of the second and third degrees, wherein Leonardo of Pisa must have preceded him, but by a method every vestige of which is completely lost. He knew the connexion existing between the positive roots of an equation (which, by the way, were alone thought of as roots) and the coefficients of the different powers of the unknown quantity. He found out the formula for deriving the sine of a multiple angle, knowing that of the simple angle with due regard to the periodicity of sines. This formula must have been known to Vieta in 1593. In that year Adriaan van Roomen gave out as a problem to all mathematicians an equation of the 45th degree, which, being recognized by Vieta as depending on the equation between sin ϕ and sin $\phi/45$, was resolved by him at once, all the twenty-three positive roots of which the said equation was capable being given at the same time (see TRIGONOMETRY). Such was the first encounter of the two scholars. A second took place when Vieta pointed to Apollonius's problem of taction as not yet being mastered, and Adriaan van Roomen gave a solution by the hyperbola. Vieta, however, did not accept it, as there existed a solution by means of the rule and the compass only, which he published himself in his *Apollonius Gallus* (1600). In this paper Vieta made use of the centre of similitude of two circles. Lastly he gave an infinite product for the number π (see CIRCLE, SQUARING OF).

Vieta's collected works were issued under the title of *Opera Mathematica* by F. van Schooten at Leiden in 1646. (M. CA.)

VIEUXTEMPS, HENRI (1820–1881), Belgian violinist and composer, was born at Verviers, on the 20th of February 1820. Until his seventh year he was a pupil of Lecloux, but when De Bériot heard him he adopted him as his pupil, taking him to appear in Paris in 1828. From 1833 onwards he spent the greater part of his life in concert tours, visiting all parts of the world with uniform success. He first appeared in London at a Philharmonic concert on the 2nd of June 1834, and in the following year studied composition with Reicha in Paris, and began to produce a long series of works, full of formidably difficult passages, though also of pleasing themes and fine musical ideas, which are consequently highly appreciated by violinists. From 1846 to 1852 he was solo violinist to the tsar, and professor in the conservatorium in St Petersburg. From 1871 to 1873 he was teacher of the violin class in the Brussels Conservatoire, but was disabled by an attack of paralysis in the latter year, and from that time could only superintend the studies of favourite pupils. He died at Mustapha, in Algiers, on the 6th of June 1881. He had a perfect command of technique, faultless intonation and a marvellous command of the bow. His staccato was famous all over the world, and his tone was exceptionally rich and full.

VIGAN, a town and the capital of the province of Ilocos Sur, Luzon, Philippine Islands, at the mouth of the Abra river, about 200 m. N. by W. of Manila. Pop. of the municipality (1903) 14,945; after the census of 1903 was taken there were united to Vigan the municipalities of Bantay (pop. 7020), San Vicente (pop. 5060), Santa Catalina (pop. 5625) and Caoayan (pop. 6201), making the total population of the municipality 38,851. Vigan is the residence of the bishop of Nueva Segovia and has a fine cathedral, a substantial court-house, other durable public buildings and a monument to Juan de Salcedo, its founder. It is engaged in farming, fishing, the manufacture of brick, tile, cotton fabrics and furniture, and the building of boats. The language is Ilocano.

VIGÉE-LEBRUN, MARIE-ANNE ELISABETH (1755–1842), French painter, was born in Paris, the daughter of a painter, from whom she received her first instruction, though she benefited more by the advice of Doyen, Greuze, Joseph Vernet and other masters of the period. When only about twenty years of age she had already risen to fame with her portraits of Count Orloff and the duchess of Orleans, her personal charm making her at the same time a favourite in society. In 1776 she married the painter and art-critic J. B. P. Lebrun, and in 1783 her picture of "Peace bringing back Abundance" (now at the Louvre) gained her the membership of the Academy. When the Revolution broke out in 1789 she escaped first to Italy, where she worked at Rome and Naples. At Rome she painted the portraits of Princesses Adelaide and Victoria, and at Naples the "Lady Hamilton as a Bacchante" now in the collection of Mr Tankerville Chamberlayne; and then journeyed to Vienna, Berlin and St Petersburg. She returned to Paris in 1781, but went in the following year to London, where she painted the portraits of Lord Byron and the prince of Wales, and in 1808 to Switzerland. Her numerous journeys, and the vogue she enjoyed wherever she went, account for the numerous portraits from her brush that are to be found in the great collections of many countries. Having returned to France from Switzerland, she lived first at her country house near Marly and then in Paris, where she died at the age of eighty-seven, in 1842, having been widowed for twenty-nine years. She published her own memoirs under the title of *Souvenirs* (Paris, 1835–37). Among her many sitters was

Marie Antoinette, of whom she painted over twenty portraits between 1779 and 1789. A portrait of the artist is in the hall of the painters at the Uffizi, and another at the National Gallery. The Louvre owns two portraits of Mme Lebrun and her daughter, besides five other portraits and an allegorical composition.

A full account of her eventful life is given in the artist's *Souvenirs*, and in C. Pillet's *Mme Vigée-Le Brun* (Paris, 1890). The artist's autobiography has been translated by Lionel Strachey, *Memoirs of Mme Vigée-Lebrun* (New York, 1903), fully illustrated.

VIGEVANO, a town and episcopal see of Lombardy, Italy, in the province of Pavia, on the right bank of the Ticino, 24 m. by rail S.W. from Milan on the line to Mortara, 381 ft. above sea-level. Pop. (1901) 18,043 (town); 23,560 (commune). It is a medieval walled town, with an arcaded market-place, a cathedral, the Gothic church of S. Francesco, and a castle of the Sforza family, dating from the 14th century and adorned with a loggia by Bramante and a tower imitating that of Filarete in the Castello Sforzesco at Milan. It is a place of some importance in the silk trade and also produces excellent macaroni. There is a steam tramway to Novara.

VÍGFÚSSON, GÚDBRANDR (1828–1889), the foremost Scandinavian scholar of the 19th century, was born of a good and old Icelandic family in Breiðafjord in 1828. He was brought up, till he went to a tutor's, by his kinswoman, Kristín Vígfussdottir, to whom, he records, he "owed not only that he became a man of letters, but almost everything." He was sent to the old and famous school at Bessastad and (when it removed thither) at Reykjavik; and in 1849, already a fair scholar, he came to Copenhagen University as a *bursarius* in the Regense College. He was, after his student course, appointed *stipendiarius* by the Arna-Magnaean trustees, and worked for fourteen years in the Arna-Magnaean Library till, as he said, he knew every scrap of old vellum and of Icelandic written paper in that whole collection. During his Danish life he twice revisited Iceland (last in 1858), and made short tours in Norway and South Germany with friends. In 1866, after some months in London, he settled down in Oxford, which he made his home for the rest of his life, only quitting it for visits to the great Scandinavian libraries or to London (to work during two or three long vacations with his fellow-labourer, F Y Powell), or for short trips to places such as the Isle of Man, the Orkneys and Shetlands, the old mootstead of the West Saxons at Downton, the Roman station at Pevensey, the burial-place of Bishop Brynjulf's ill-fated son at Yarmouth, and the like He held the office of Reader in Scandinavian at the university of Oxford (a post created for him) from 1884 till his death. He was a Jubilee Doctor of Upsala, 1877, and received the Danish order of the Dannebrog in 1885. Vígfússon died of cancer on the 31st of January 1889, and was buried in St Sepulchre's Cemetery, Oxford, on the 3rd of February He was an excellent judge of literature, reading most European languages well and being acquainted with their classics. His memory was remarkable, and if the whole of the Eddic poems had been lost, he could have written them down from memory. He spoke English well and idiomatically, but with a strong Icelandic accent. He wrote a beautiful, distinctive and clear hand, in spite of the thousands of lines of MS. copying he had done in his early life.

By his *Tímatál* (written between October 1854 and April 1855) he laid the foundations for the chronology of Icelandic history, in a series of conclusions that have not been displaced (save by his own additions and corrections), and that justly earned the praise of [illegible] Grimm. His editions of Icelandic classics (1858–68), *Biskopa Sögur*, *Bardar Saga*, *Forn Sögur* (with Möbius), *Eyrbyggia Saga* and *Flateyar-bók* (with Unger) opened a new era of Icelandic scholarship, and can only fitly be compared to the Rolls Series editions of chronicles by Dr Stubbs for the interest and value of their prefaces and texts. Seven years of constant and severe toil (1866–73) were given to the Oxford Icelandic-English Dictionary, incomparably the best guide to classic Icelandic, and a monumental example of single-handed work. His later series of editions (1874–85) included *Sturlunga* and *Hákonar Saga*, the great and complex mass of [illegible] historical sagas, known as *Sturlunga*, and the *Corpus Poeticum Boreale*, in which he edited the whole body of classic Scandinavian poetry. As an introduction to the *Sturlunga*, he wrote a complete though concise history of the classic Northern literature and its sources. In the introduction to the *Corpus*, he laid the foundations of a critical history of the Eddic poetry and Court poetry of the North in a series of brilliant, original and well-supported theories that are gradually being accepted even by those who were at first inclined to reject them. His little Icelandic *Prose Reader* (with F. York Powell) (1879) furnishes the English student with a pleasant and trustworthy path to a sound knowledge of Icelandic. The *Grimm Centenary Papers* (1886) give good examples of the range of his historic work, while his Appendix on Icelandic currency to Sir G. W. Dasent's *Burnt Njal* is a model of methodical investigation into an intricate and somewhat important subject. As a writer in his own tongue he at once gained a high position by his excellent and delightful *Relations of Travel in Norway and South Germany*. In English, as his "Visit to Grimm" and his powerful letters to *The Times* show, he had attained no mean skill. His life is mainly a record of well-directed and efficient labour in Denmark and Oxford. (F. Y. P.)

VIGIL (Lat. *vigilia*, "watch"), in the Christian Church, the eve of a festival. The use of the word is, however, late, the *vigiliae* (pernoctationes, παννυχίδες) having originally been the services, consisting of prayers, hymns, processions and sometimes the eucharist, celebrated on the preceding night in preparation for the feast. The oldest of the vigils is that of Easter Eve, those of Pentecost and Christmas being instituted somewhat later. With the Easter vigil the eucharist was specially associated, and baptism with that of Pentecost (see WHITSUNDAY). The abuses connected with nocturnal vigils[1] led to their being attacked, especially by Vigilentius of Barcelona (*c.* 400), against whom Jerome fulminated in this as in other matters. The custom, however, increased, vigils being instituted for the other festivals, including those of saints.

In the middle ages the nocturnal *vigilia* were, except in the monasteries, gradually discontinued, matins and vespers on the preceding day, with fasting, taking their place. In the Roman Catholic Church the vigil is now usually celebrated on the morning of the day preceding the festival, except at Christmas, when a midnight mass is celebrated, and on Easter Eve. These vigils are further distinguished as privileged and unprivileged. The former (except that of the Epiphany) have special offices; in the latter the vigil is merely commemorated.

The Church of England has reverted to early custom in so far as only "Easter Even" is distinguished by a special collect, gospel and epistle. The other vigils are recognized in the calendar (including those of the saints) and the rubric directs that "the collect appointed for any Holy-day that hath a Vigil or Eve, shall be said at the Evening Service next before."

VIGILANCE COMMITTEE, in the United States, a self-constituted judicial body, occasionally organized in the western frontier districts for the protection of life and property. The first committee of prominence bearing the name was organized in San Francisco in June 1851, when the crimes of desperadoes who had immigrated to the gold-fields were rapidly increasing in numbers and it was said that there were venal judges, packed juries and false witnesses. At first this committee was composed of about 200 members, afterwards it was much larger. The general committee was governed by an executive committee and the city was policed by sub-committees. Within about thirty days four desperadoes were arrested, tried by the executive committee and hanged, and about thirty others were banished. Satisfied with the results, the committee then quietly adjourned, but it was revived five years later Similar committees were common in other parts of California and in the mining districts of Idaho and Montana. That in Montana exterminated in 1863–64 a band of outlaws organized under Henry Plummer, the sheriff of Montana City; twenty-four of the outlaws were hanged within a few months. Committees or societies of somewhat the same nature were formed in the Southern states during the Reconstruction period (1865–72) to protect white families from negroes and "carpet-baggers," and besides these there were the Ku-Klux-Klan (*q.v.*) and its branches, the Knights of the White Camelia, the Pale Faces, and the Invisible Empire of the South, the principal object of which was to control the negroes by striking them with terror.

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[1] The 35th canon of the council of Elvira (305) forbids women to attend them.

See H. H. Bancroft, *Popular Tribunals* (2 vols., San Francisco, 1887); and T. J. Dimsdale, *The Vigilantes of Montana* (Virginia City, 1866).

VIGILANTIUS (fl. *c.* 400), the presbyter, celebrated as the author of a work, no longer extant, against superstitious practices, which called forth one of the most violent and scurrilous of Jerome's polemical treatises, was born about 370 at Calagurris in Aquitania (the modern Cazères or perhaps Saint Bertrand de Comminges in the department of Haute-Garonne), where his father kept a "statio" or inn on the great Roman road from Aquitania to Spain. While still a youth his talent became known to Sulpicius Severus, who had estates in that neighbourhood, and in 395 Sulpicius, who probably baptized him, sent him with letters to Paulinus of Nola, where he met with a friendly reception. On his return to Severus in Gaul he was ordained; and, having soon afterwards inherited means through the death of his father, he set out for Palestine, where he was received with great respect by Jerome at Bethlehem. The stay of Vigilantius lasted for some time; but, as was almost inevitable, he was dragged into the dispute then raging about Origen, in which he did not see fit wholly to adopt Jerome's attitude. On his return to the West he was the bearer of a letter from Jerome to Paulinus, and at various places where he stopped on the way he appears to have expressed himself about Jerome in a manner that when reported gave great offence to that father, and provoked him to write a reply (*Ep.* 61). Vigilantius now settled for some time in Gaul, and is said by one authority (Gennadius) to have afterwards held a charge in the diocese of Barcelona. About 403, some years after his return from the East, Vigilantius wrote his celebrated work against superstitious practices, in which he argued against relic worship, as also against the vigils in the basilicas of the martyrs, then so common, the sending of alms to Jerusalem, the rejection of earthly goods and the attribution of special virtue to the unmarried state, especially in the case of the clergy. He thus covers a wider range than Jovinian, whom he surpasses also in intensity. He was especially indignant at the way in which spiritual worship was being ousted by the adoration of saints and their relics. All that is known of his work is through Jerome's treatise *Contra Vigilantium*, or, as that controversialist would seem to prefer saying, "Contra Dormitantium." Notwithstanding Jerome's exceedingly unfavourable opinion, there is no reason to believe that the tract of Vigilantius was exceptionally illiterate, or that the views it advocated were exceedingly "heretical." Soon, however, the great influence of Jerome in the Western Church caused its leaders to espouse all his quarrels, and Vigilantius gradually came to be ranked in popular opinion among heretics, though his influence long remained potent both in France and Spain, as is proved by the polemical tract of Faustus of Rhegium (d. *c.* 490).

VIGILIUS, pope from 537 to 555, succeeded Silverius and was followed by Pelagius I. He was ordained by order of Belisarius while Silverius was still alive; his elevation was due to Theodora, who, by an appeal at once to his ambition and, it is said, to his covetousness, had induced him to promise to disallow the council of Chalcedon, in connexion with the "three chapters" controversy. When, however, the time came for the fulfilment of his bargain, Vigilius declined to give his assent to the condemnation of that council involved in the imperial edict against the three chapters, and for this act of disobedience he was peremptorily summoned to Constantinople, which he reached in 547. Shortly after his arrival there he issued a document known to history as his *Judicatum* (548), in which he condemned indeed the three chapters, but expressly disavowed any intentions thereby to disparage the council of Chalcedon. After a good deal of trimming (for he desired to stand well with his own clergy, who were strongly orthodox, as well as with the court), he prepared another document, the *Constitutum ad Imperatorem*, which was laid before the so-called fifth "oecumenical" council in 553, and led to his condemnation by the majority of that body, some say even to his banishment. Ultimately, however, he was induced to assent to and confirm the decrees of the council, and was allowed after an enforced absence of seven years to set out for Rome. He died, however, at Syracuse, before he reached his destination, on the 7th of June 555.

VIGINTISEXVIRI, in Roman history, the collective name given in republican times to "twenty-six" magistrates of inferior rank. They were divided into six boards, two of which were abolished by Augustus. Their number was thereby reduced to twenty and their name altered to VIGINTIVIRI ("the twenty"). They were originally nominated by the higher magistrates, but subsequently elected in a body at a single sitting of the *comitia tributa*; under the empire they were chosen by the senate. The following are the names of the six boards: (1) *Tresviri capitales* (see TRESVIRI); (2) *Tresviri monetales*; (3) *Quatuorviri viis in urbe purgandis*, who had the care of the streets and roads inside the city; (4) *Duoviri viis extra urbem purgandis* (see DUOVIRI), abolished by Augustus; (5) *Decemviri stlitibus judicandis* (see DECEMVIRI); (6) *Quatuor praefecti Capuam Cumas*, abolished by Augustus. The members of the last-named board were appointed by the *praetor urbanus* of Rome to administer justice in ten Campanian towns (list in Mommsen), and received their name from the two most important of these. They were subsequently elected by the people under the title of *quatuorviri jure dicundo*, but the date is not known.

See Mommsen, *Römisches Staatsrecht*, ii. (1887), p. 592.

VIGLIUS, the name taken by WIGLE VAN AYTTA VAN ZUICHEM (1507–1577), Dutch statesman and jurist, a Frisian by birth, who was born on the 19th of October 1507. He studied at various universities—Louvain, Dôle and Bourges among others—devoting himself mainly to the study of jurisprudence, and afterwards visited many of the principal seats of learning in Europe. His great abilities attracted the notice of Erasmus and other celebrated men, and his renown was soon wide and general. Having lectured on law at the universities of Bourges and Padua, he accepted a judicial position under the bishop of Münster which he resigned in 1535 to become assessor of the imperial court of justice (*Reichskammergericht*). He would not, however, undertake the post of tutor to Philip, son of the emperor Charles V.; nor would he accept any of the many lucrative and honourable positions offered him by various European princes, preferring instead to remain at the university of Ingolstadt, where for five years he occupied a professorial chair. In 1542 the official connexion of Viglius with the Netherlands began. At the emperor's invitation he became a member of the council of Mechlin, and some years later president of that body. Other responsible positions were entrusted to him, and he was soon one of the most trusted of the ministers of Charles V., whom he accompanied during the war of the league of Schmalkalden in 1546. His rapid rise in the emperor's favour was probably due to his immense store of learning, which was useful in asserting the imperial rights where disputes arose between the empire and the estates. He was generally regarded as the author of the edict against toleration issued in 1550; a charge which he denied, maintaining, on the contrary, that he had vainly tried to induce Charles to modify its rigour. When the emperor abdicated in 1555 Viglius was anxious to retire also, but at the instance of King Philip II. he remained at his post and was rewarded by being made coadjutor abbot of St Bavon, and in other ways In 1559, when Margaret, duchess of Parma, became regent of the Netherlands, Viglius was an important member of the small circle who assisted her in the work of government. He was president of the privy council, member, and subsequently president, of the state council, and a member of the committee of the state council called the *consulta*. But his desire to resign soon returned. In 1565 he was allowed to give up the presidency of the state council, but was persuaded to retain his other posts. However, he had lost favour with Margaret, who accused him to Philip of dishonesty and simony, while his orthodoxy was suspected. When the duke of Alva arrived in the Netherlands Viglius at first assisted him, but he subsequently opposed the duke's scheme of extortion, and sought to induce Philip himself to visit the Low Countries. His health was now impaired and his work was nearly over. Having suffered a short imprisonment with the other members of the state council in 1576, he died at Brussels on the 5th of May 1577, and was buried in the abbey of St Bavon.

Viglius was an advocate of peace and moderation, and as such could not expect support or sympathy from men engaged in a life-and-death struggle for liberty, or from their relentless enemies. He was undoubtedly avaricious, and accumulated great wealth, part of which he left to found a hospital at his native place, Zwichem, and a college at the university of Louvain. He married a rich lady, Jacqueline Damant, but had no children.

He wrote a *Tagebuch des Schmalkaldischen Donaukriegs*, edited by A. von Druffel (Munich, 1877), and some of his lectures were published under the title *Commentarii in decem Institutionum titulos* (Lyons, 1564). His *Vita et opera historica* are given in the *Analecta Belgica* of C. P. Hoynck van Papendrecht (the Hague, 1743). See L. P. Gachard, *Correspondance de Philippe II. sur les affaires des Pays-Bas* (Brussels, 1848–79); and *Correspondance de Marguerite d'Autriche, duchesse de Parme, avec Philippe II.* (Brussels, 1867–81); and E. Poullet, *Correspondance de cardinal de Granvelle* (Brussels, 1877–81).

VIGNE, PAUL DE (1843–1901), Belgian sculptor, was born at Ghent. He was trained by his father, a statuary, and began by exhibiting his "Fra Angelico da Fiesole" at the Ghent Salon in 1868. In 1872 he exhibited at the Brussels Salon a marble statue, "Heliotrope" (Ghent Gallery), and in 1875, at Brussels, "Beatrix" and "Domenica." He was employed by the government to execute caryatides for the conservatoire at Brussels. In 1876 at the Antwerp Salon he had busts of E. Hiel and W. Wilson, which were afterwards placed in the communal museum at Brussels. Until 1882 he lived in Paris, where he produced the marble statue "Immortality" (Brussels Gallery), and "The Crowning of Art," a bronze group on the façade of the Palais des Beaux-Arts at Brussels. His monument to the popular heroes, Jean Breydel and Pierre de Coninck, was unveiled at Bruges in 1887. At his death he left unfinished his principal work, the Anspach monument, which was erected at Brussels under the direction of the architect Janlet with the co-operation of various sculptors. Among other notable works by De Vigne may be mentioned "Volumnia" (1875); "Poverella" (1878); a bronze bust of "Psyche" (Brussels Gallery), of which there is an ivory replica; the marble statue of Marnix de Ste Aldegonde in the Square du Sablon, Brussels; the Metdepenningen monument in the cemetery at Ghent; and the monument to Canon de Haerne at Courtrai.

See E. L. Detage, *Les Artistes Belges contemporains* (Brussels), and O. G. Destrée, *The Renaissance of Sculpture in Belgium* (London, 1895).

VIGNETTE (Fr. for "little vine"), in architecture, a running ornament, representing, as its name imports, a little vine, with branches, leaves and grapes. It is common in the Tudor period, and runs or *roves* in a large hollow or *casement*. It is also called *trayle*. From the transference of the term to book-illustration resulted the sense of a small picture, vanishing gradually at the edge.

VIGNY, ALFRED DE (1797–1863), French poet, was born at Loches (Indre-et-Loire) on the 27th of March 1797. Sainte-Beuve, in the rather ill-natured essay which he devoted to Vigny after his death, expresses a doubt whether the title of count which the poet bore was well authenticated, and hints that no very ancient proofs of the nobility of the family were forthcoming; but it is certain that in the 18th century persons of the name occupied positions which were not open to any but men of noble birth. For generations the ancestors of Alfred de Vigny had been soldiers, and he himself joined the army, with a commission in the Household Troops, at the age of sixteen. But the Revolutionary and Napoleonic wars were over, and after twelve years of life in barracks he retired, preserving, however, a very high estimate of the duties and career of the soldier. While still serving he had made his mark, if as yet unrecognized, by the publication in 1822 of a volume of poems, and in 1826 by another, together with the famous prose romance of *Cinq-Mars*. Sainte-Beuve asserts that the poet antedated some of his most remarkable work. This may or may not be the case; he certainly could not antedate the publication. And it so happens that some of his most celebrated pieces—*Eloa*, *Dolorida*, *Moïse*—appeared (1822–23) before the work of younger members of the Romantic school whose productions strongly resemble these poems. Nor is this originality limited to the point which he himself claimed in the Preface to his collected *Poems* in 1837—that they were "the first of their kind in France, in which philosophic thought is clothed in epic or dramatic form." Indeed this claim is disputable in itself, and has misled not a few of Vigny's recent critics. It is in *poetic*, not *philosophic* quality, that his idiosyncrasy and precursorship are most remarkable. It is quite certain that the other Alfred—Alfred de Musset—felt the influence of his elder namesake, and an impartial critic might discern no insignificant marks of the same effect in the work of Hugo himself. Even Lamartine, considerably Vigny's elder and his predecessor in poetry, seems rather to have been guided by Vigny than Vigny by him. No one can read *Dolorida* or *Le Cor* without seeing that the author had little to learn from any of his French contemporaries and much to teach them. At the same time Vigny, from whatever cause, hardly made any further public appearance in poetry proper during the more than thirty years of his life, and his entire poems, including posthumous fragments, form but one very small pocket volume. *Cinq-Mars*, which at least equalled the poems in popularity, will hardly stand the judgment of posterity so well. It had in its favour the support of the Royalist party, the immense vogue of the novels of Walter Scott, on which it was evidently modelled, the advantages of an exquisite style, and the taste of the day for the romance as opposed to the novel of analysis. It therefore gained a great name both in France and abroad. But any one who has read it critically must acknowledge it to be disappointing. The action is said to be dramatic; if it be so, it can only be said that this proves very conclusively that the action of drama and the action of the novel are two quite different things. To the reader who knows Scott or Dumas the story is singularly uninteresting (far less interesting than as told in history); the characters want life; and the book generally stagnates.

Its author, though always as a kind of outsider (the phrase constantly applied to him in French literary essays and histories being that he shut himself up in a *tour d'ivoire*), attached himself more or less to the Romantic movement of 1830 and the years immediately preceding and following it, and was stimulated by this movement both to drama and to novel-writing. In the year before the revolution of July he produced at the Théâtre Français a translation, or rather paraphrase, of *Othello*, and an original piece, *La Maréchale d'Ancre*. In 1832 he published the curious book *Stello*, containing studies of unlucky youthful poets—Gilbert, Chatterton, Chénier—and in 1835 he brought out his drama of *Chatterton*, which, by the hero's suicide, shocked French taste even after five years of Romantic education, but had a considerable success. The same year saw the publication of *Servitude et grandeur militaires*, a singular collection of sketches rather than a connected work in which Vigny's military experience, his idea of the soldier's duties, and his rather poetical views of history were all worked in. The subjects of *Chatterton* and *Othello* naturally suggest a certain familiarity with English, and in fact Alfred de Vigny knew English well, lived in England for some time and married in 1828 an Englishwoman, Lydia Bunbury. His father-in-law was, according to French gossip, so conspicuous an example of insular eccentricity that he never could remember his son-in-law's name or anything about him, except that he was a poet. By this fact, and the kindness of casual Frenchmen who went through the list of the chief living poets of their country, he was sometimes able to discover his daughter's husband's designation. In 1845 Alfred de

Vigny was elected to the Academy, but made no compromise in his "discourse of reception," which was unflinchingly Romantic. Still, he produced nothing save a few scraps; and, beyond the work already enumerated, little has to be added except his *Journal d'un poëte* and the poems called *Les Destinées*, edited, with a few fragments, by Louis Ratisbonne after his death. Among his dramatic work, however, should be mentioned *Quitte pour la peur* and an adaptation of the *Merchant of Venice* called *Shylock*. *Les Destinées* excited no great admiration in France, but they contain some exceedingly beautiful poetry of an austere kind, such as the magnificent speech of Nature in "La Maison du berger" and the remarkable poem entitled "La Colère de Samson." Vigny died at Paris on the 17th of September 1863.

His later life was almost wholly uneventful, and for the most part, as has been said, spent in retirement. His reputation, however, is perfectly secure. It may, and probably will, rest only on his small volume of poems, though it will not be lessened, as far as qualified literary criticism is concerned, should the reader proceed to the rest of the work. The whole of his non-dramatic verse does not amount to 5000 lines; it may be a good deal less. But the range of subject is comparatively wide, and extraordinary felicity of execution, not merely in language, but in thought, is evident throughout. Vigny, as may be seen in the speech of Nature referred to above, had the secret—very uncommon with French poets—of attaining solemnity without grandiosity, by means of an almost classical precision and gravity of form. The defect of volubility, of never leaving off, which mars to some extent his great contemporary Hugo, is never present in him, and he is equally free from the looseness and disorders of form which are sometimes blemishes in Musset, and from the effeminacy of Lamartine, while once more his nobility of thought and plentifulness of matter save him from the reproach which has been thought to rest on the technically perfect work of Théophile Gautier. The dramatic work is, perhaps, less likely to interest English than French readers, the local colour of *Chatterton* being entirely false, the sentiment conventional in the extreme, and the real pathos of the story exchanged for a commonplace devotion on the poet's part to his host's wife. In the same way, the finest passages of *Othello* simply disappear in Vigny's version. In his remaining works the defect of skill in managing the plot and characters of prose fiction, which has been noticed in *Cinq-Mars*, reappears, together (in the case of the *Journal d'un poëte* and elsewhere) with signs of the fastidious and slightly affected temper which was Vigny's chief fault as a man. In his poems proper none of these faults appears, and he is seen wholly at his best. It should be said that of his posthumous work not a little had previously appeared piecemeal in the *Revue des deux mondes*, to which he was an occasional contributor. The prettiest of the complete editions of his works (of which there are several) is to be found in what is called the *Petite bibliothèque Charpentier*. For many years the critical attention paid to him was not great. Recently there has been a revival of interest as shown by monographs: M. Paléologue's "Alfred de Vigny" in the *Grands écrivains français* (1891); L. Dorison's *Alfred de Vigny, poète-philosophe* (1892) and *Un symbole social* (1894); G. Asse's *Alfred de Vigny et les éditions originales de sa poésie* (1895); E. Dupuy's *La Jeunesse des Romantiques* (1905); and E. Lauvrière's *Alfred de Vigny* (Paris, 1910). But in most of these rather excessive attention has been paid to the "philosophy" of a pessimistic kind which succeeded Vigny's early Christian Romanticism. This, though not unnoteworthy, is separable from his real poetical quality, and concentration on it rather obscures the latter, which is of the rarest kind. It should be added that an interesting sidelight has been thrown on Vigny by the publication (1905) of his *Fragments inédits sur P. et T. Corneille*. (G. Sa.)

VIGO, a seaport and naval station of north-western Spain, in the province of Pontevedra; on Vigo Bay (Ria de Vigo) and on a branch of the railway from Tuy to Corunna. Pop. (1900) 23,259. Vigo Bay, one of the finest of the Galician fjords, extends inland for 19 m., and is sheltered by low mountains and by the islands (Islas de Cies, ancient *Insulae Siccae*) at its mouth. The town is built on the south-eastern shore, and occupies a hilly site dominated by two obsolete forts. The older streets are steep, narrow and tortuous, but there is also a large modern quarter. Vigo owes its importance to its deep and spacious harbour, and to its fisheries. It is a port of call for many lines trading between Western Europe and South America. Shipbuilding is carried on, and large quantities of sardines are canned for export. In 1909, 2041 ships of 2,710,691 tons (1,153,564 being British) entered at Vigo; the imports in that year, including tin and tinplate, coal, machinery, cement, sulphate of copper and foodstuffs, were valued at £481,752; the exports, including sardines, mineral waters and eggs, were valued at £554,824. The town contains flour, paper and sawmills, sugar and petroleum refineries, tanneries, distilleries and soap works; it has also a large agricultural trade and is visited in summer for sea-bathing.

Vigo was attacked by Sir Francis Drake in 1585 and 1589. In 1702 a combined British and Dutch fleet under Sir George Rooke and the duke of Ormonde destroyed a Franco-Spanish fleet in the bay, and captured treasure to the value of about £1,000,000; numerous attempts have been made to recover the larger quantity of treasure which was supposed, on doubtful evidence, to have been sunk during the battle. In 1719 Vigo was captured by the British under Viscount Cobham.

VIJAYANAGAR, or Bijanagar ("the city of victory"), an ancient Hindu kingdom and ruined city of southern India. The kingdom lasted from about 1336 to 1565, forming during all that period a bulwark against Mahommedan invasion from the north. Its foundation, and even great part of its history, is obscure; but its power and wealth are attested by more than one European traveller, and also by the character of the existing ruins. At the beginning of the 14th century Mahommedan raiders had effectually destroyed every Hindu principality throughout southern India, but did not attempt to occupy the country permanently. In this state of desolation Hindu nationality rose again under two brothers, named Harihara and Bukka, of whom little more can be said than that they were Kanarese by race. Hence their kingdom was afterwards known as the Carnatic. At its widest extent, it stretched across the peninsula from sea to sea, from Masulipatam to Goa; and every Hindu prince in the south acknowledged its supremacy. The site of the capital was chosen, with strategic skill, on the right bank of the river Tungabhadra, which here runs through a rocky gorge. Within thirty years the Hindu Rayas of Vijayanagar were able to hold their own against the Bahmani sultans, who had now established their independence of Delhi in the Deccan proper. Warfare with the Mahommedans across the border in the Raichur doab was carried on almost unceasingly, and with varying result. Two, or possibly three, different dynasties are believed to have occupied the throne of Vijayanagar as time went on; and its final downfall may be ascribed to the domestic dissensions thus produced. This occurred in 1565, when the confederate sultans of Bijapur, Ahmednagar and Golconda, who had divided amongst themselves the Bahmani dominions, overwhelmed the Vijayanagar army in the plain of Talikota, and sacked the defenceless city. The Raya fled south to Penukonda, and later to Chandragiri, where one of his descendants granted to the English the site of Fort St George or Madras. The city has ever since remained a wilderness of immense ruins, which are now conserved by the British government.

See R. Sewell, *A Forgotten Empire* (1900); and B. S. Row, *History of Vijayanagar* (Madras, 1906).

VIKING. The word "Viking," in the sense in which it is used to-day, is derived from the Icelandic (Old Norse) *Vikingr* (m.), signifying simply a sea-rover or pirate. There is also in Icelandic the allied word *viking* (f.), a predatory voyage. As a loan-word *viking* occurs in A.S. poetry (*vicing* or *wicing*), *e.g.* in *Widsith*, *Byrnoth*, *Exodus*. During the Saga Age (900–1050), in the beginning of Norse literature, *vikingr* is not as a rule used to designate any class of men. Almost every young Icelander of sufficient means and position, and a very large number of young Norsemen, made one or more viking expeditions. We read of such a one that he went "a-viking" (*fara i viking*, *vera i viking*, or very often *fara*, &c., *sestan i viking*). The procedure was almost a recognized part of education, and was analogous to the grand tour made by our great-grandfathers in the 18th century. But the use of *vikingr* in a more generic sense is still to be found in the Saga Age. If the designation of this or that personage as *mikill vikingr* or *raude vikingr* (red viking) be not reckoned an instance of such use, we have it at all events in the name of a small quasi-nationality, the Jómsvíkingar, settled at Jómsborg on the Baltic (in modern Pomerania), to whom a saga is dedicated: who possessed rather peculiar institutions evidently the relic of what is now called the Viking Age, that preceded the Saga Age by a century. Another instance of such more generic use occurs in the following typical passage from the *Landnámabók* (Sturlabók), where it is recorded how Harald *Fairhair* harried the vikings of the Scottish isles—that famous harrying which led to most of the settlement of Iceland and the birth of Icelandic literature:—

> "Haraldr en harfari herjaði vestr am haf . . . Hann lagði "undir sig allar Sudreyjar. . . . En er hann fór vestann slogust "i eyjernar víkingar ok Skotar ok Irar ok herjuðu ok ræntu "víða" (*Landn.*, ed. Jónsson, 1906, p. 135).

It is in this more generic sense that the word "viking" is now generally employed. Historians of the north have distinguished as the "Viking Age" (*Vikingertiden*) the time when the Scandinavian folk first by their widespread piracies brought themselves forcibly into the notice of all the Christian peoples of western Europe. We cannot to-day determine the exact homes or *provenance* of these freebooters, who were a terror alike to the Frankish empire, to England and to Ireland and west Scotland, who only came into view when their ships anchored in some Christian harbour, and who were called now *Normanni*, now *Dacii*, now Danes, now *Lochlannoch*; which last, the Irish name for them, though etymologically "men of the lakes or bays," might as well be translated "Norsemen," seeing that *Lochlann* was the Irish for Norway. The exact etymology of *víkingr* itself is not certain: for we do not know whether *vík* is used in a general sense (bay, harbour) in this connexion, or in a particular sense as the Vík, the Skagerrack and Christiania Fjord. The reason for using "viking" in a more generic sense than is warranted by the actual employment of the word in Old Norse literature rests on the fact that we have no other word by which to designate the early Scandinavian pirates of the 9th and the beginning of the 10th century. We cannot tell for the most part whether they came from Denmark or Norway, so that we cannot give them a national name. "Normanner" is used by some Scandinavian writers (as by Steenstrup in his classical work *Normannerne*). But "Normans" has for us quite different associations. And even those who have preferred not generally to use the word "vikings" to designate the pirates and invaders, have adhered to the term "Viking Age" for the period in which they were most active (cf. Munch, *Det Norske Folks Historie*, Deel I. Bd. i. p. 356; Steenstrup and others, *Danmarks Riges Historie*, bk. ii. &c.). At the same time, the significance which the word "viking" has had in our language is due in part to a false etymology, connecting the word with "king"; the effect of which still remains in the customary pronunciation vi-king instead of vik-ing, now so much embedded in the language that it is a pedantry to try and change it.

We may fairly reckon the "Viking Age" to lie between the date of the first recorded appearance of a northern pirate fleet (A.D. 789) and the settlement of the Normans in Normandy by the treaty of St Clair-sur-Epte, A.D. 911 or 912[1] For a few years previous to that date our chief authority for the history of the piracies and raids in the Frankish empire fails us[2] we know that the Norsemen had a few years before that date been driven in great numbers out of Ireland; and England had been in a sense pacified through the concession of a great part of the island to the invaders by the peace of Wedmore, A.D. 878. Although, outside the information we get from Christian chroniclers, this age is for the people of the north one of complete obscurity, it is evident that the Viking Age corresponds with some universal disturbance or unrest among the Scandinavian nations, strictly analogous to the unrest among more southern Teutonic nations which many centuries before had heralded the break-up of the Roman empire, an epoch known as that of the Folk-wanderings (*Völkerwanderungen*). We judge this because we can dimly see that the impulse which was driving part of the Norse and Danish peoples to piracies in the west was also driving the Swedes and perhaps a portion of the Danes to eastward invasion, which resulted in the establishment of a Scandinavian kingdom (Garðaríki) in what is now Russia, with its capital first at Novgorod, afterwards at Kiev.[3] This was, in fact, the germ of the Russian empire. If we could know the Viking Age from the other, the Scandinavian side, it would doubtless present far more interest than in the form in which the Christian chroniclers present it. But from knowledge of this sort we are almost wholly cut off. We have to content ourselves with what is for the greater part of this age a mere catalogue of embarkations and plunderings along all the coasts of western Europe without distinctive characteristics.

The Viking Raids.—The detail of these raids is quite beyond the compass of the present article, and a summary or synopsis must suffice. For all record which we have, the Viking Age was inaugurated in A.D. 789 by the appearance in England on our Dorset coast of three pirate ships "from Haerethaland" (Hardeland or Hardyssel in Denmark or Hördeland in Norway), which are said in the *Anglo-Saxon Chronicle* to be "the first ships of the Danish men" who sought the land of England. They killed the port-reeve, took some booty and sailed away. Other pirates appeared in 793 on a different coast, Northumbria, attacked a monastery on Lindisfarne (Holy Island), slaying and capturing the monks; the following year they attacked and burnt Jarrow; after that they were caught in a storm, and all perished by shipwreck or at the hands of the countrymen. In 795 a fleet appeared off Glamorganshire. They attacked Man in 798 and Iona in 802. But after this date for the lifetime of a generation the chief scene of viking exploits was Ireland, and probably the western coasts and islands of Scotland.

The usual course of procedure among the northern adventurers remains the same to whatever land they may direct their attacks, or during whatever years of the 9th century these attacks may fall. They begin by more or less desultory raids, in the course of which they seize upon some island, which they generally use as an arsenal or *point d'appui* for attacks on the mainland. At first the raids are made in the summer: the *first wintering* in any new scene of plunder forms an epoch so far as that country or region is concerned. Almost always for a period all power of resistance on the part of the inhabitants seems after a while and for a limited time to break down, and the plunderers to have free course wherever they go. Then they show an ambition to settle in the country, and some sort of division of territory takes place. After that the northerners assimilate themselves more or less to the other inhabitants of the country, and their history merges to a less or greater extent in that of the country at large. This course is followed in the history of the viking attacks on Ireland, the earliest of their continuous series of attacks. Thus they begin by seizing the island of Rechru (now Lambay) in Dublin Bay (A.D. 795); in the course of about twenty years we have notice of them on the northern, western and southern coasts; by A.D. 825 they have already ventured raids to a considerable distance inland. And in A.D. 832 comes a large fleet ("a great royal fleet," say the Irish annals) of which the admiral's name is given, Turgesius (Thorgeis or Thorgisl?). The new invader, though with a somewhat chequered course, extended his conquests till in A.D. 842 one-half of Ireland (called Lethcuinn, or Con's Half) seems to have submitted to him; and we have the curious picture of Turgesius establishing his wife Ota as a sort of *völva*, or priestess, in what had been one of Ireland's most famous and most literary monasteries, Clonmacnoise. Turgesius was, however, killed very soon after this (in 845); and though in A.D. 853 Olaf the White was over-king of Ireland, the vikings' power on the whole diminished. In the end, territory was—if by no formal treaty—ceded to their influence, and the (Irish) kingdoms of Dublin and Waterford were established on the island.

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[1] W. Vogel gives the former date; 912 is that more commonly accepted.

[2] The *Annales Vedastini.*

[3] The word *garðr* (fort) is preserved in the "*gorod*" of Novgorod.

This brief sketch may be taken as the prototype of viking invasion of any region of western Christendom which was the object of their continuous attacks. Of such regions we may distinguish five. Almost simultaneously with the attacks on Ireland came others, probably also from Norway, on the western regions (coasts and islands) of Scotland. Plunderings of Iona are mentioned in A.D. 802, 806. In the course of a generation almost all the monastic communities in western Scotland had been destroyed. But details of these viking plunderings are wanting. On the continent there were three distinct regions of attack. First the mouth of the Scheldt. There the Danes very early settled on the island of Walcheren, which had in fact been given by the emperor Louis the Pious in fief to a Danish fugitive king, Harald by name, who sought the help of Louis, and adopted Christianity. After the partition of the territory of Charlemagne's empire among the sons of Louis the Pious, Walcheren and the Scheldt-mouth fell within the possessions of the emperor Lothair, and in the region subsequently distinguished as Lotharingia. From this centre, the Scheldt, the viking raids extended on either side; sometimes eastward as far as the Rhine, and so into Germany proper, the territory assigned to Louis the German; at other times westward to the Somme, and thus into the territory of Charles the Bald, the future kingdom of France. In the event, toward the end of the 9th century all Frisia between Walcheren and the German Ocean seems to have become the permanent possession of the invaders. In like fashion was it with the next district, that of the Seine, only that here no important island served the pirates for their first arsenal and winter quarters. The serious attacks of the pirates in any part of the empire distant from their own lands begin about the time of the battle of Fontenoy between Louis' sons (A.D. 841). The first wintering of the vikings in the Seine territory (A.D. 850) was in "Givoldi fossa," the tomb of one Givoldus, not far from the mouth of the river, but no longer exactly determinable. Their first attack on Paris was in A.D. 845: a much more important but unsuccessful one took place in A.D. 885–87, unsuccessful that is so far as the city itself was concerned; but the invaders received an indemnity for raising the siege and leave to pass beyond Paris into Burgundy. The settlement of Danes under Rollo or Rolf on the lower Seine, *i.e.* in Normandy, dates from the treaty of St Clair-sur-Epte, A.D. 912 (or 911).

The third region is the mouth of the Loire. Here the island *point d'appui* was Noirmoutier, an island with an abbey at the Loire mouth. The northmen wintered there in A.D. 843. No region was more often ravaged than that of the lower Loire, so rich in abbeys—St Martin of Tours, Marmoutiers, St Benedict, &c. But the country ceded to the vikings under Hasting at the Loire mouth was insignificant and not in permanent occupation.

Near the end of the 9th century, however, the plundering expeditions which emanated from these three sources became so incessant and so widespread that we can signalize no part of west France as free from them, at the same time that the vikings wrought immense mischief in the Rhine country and in Burgundy. The defences of west France seem quite to have broken down, as did the Irish when Turgesius took "Con's half," or when in A.D. 853 Olaf the White became over-king of Ireland. Unfortunately at this point our best authority ceases; and we cannot well explain the changes which brought about the Christianization of the Normans and their settlement in Normandy as vassals, though recalcitrant ones, of the West Frankish kings.

For the viking attacks in the 5th (or 6th) territory, our own country, the course of events is much clearer. As a part of English history it is, however, sufficiently known, and the briefest summary thereof must suffice. That will show how in its general features it follows the normal course. The first appearance of the vikings in England we saw was in A.D. 789. The first serious attacks do not begin till 838. The island of Sheppey, however, was attacked in 835, and in the following year the vikings entrenched themselves there. The first wintering of the pirates in England was on the contiguous island of Thanet in A.D. 850. The breakdown of the English defences in all parts of the country save Wessex dates from 868: in Wessex that occurs in 877–88. But the position is suddenly recovered by Alfred in 878, by the battle of Aethandune, as suddenly though not so unaccountably as it was later in West Francia. As Rollo was to do in 912, the Danish leader Guthorm received baptism, taking the name of Aethelstan, and settled in his assigned territory, East Anglia, according to the terms of the peace of Wedmore. But the forces which Alfred defeated at Aethandune represented but half of the viking army in England at the time. The other half under Halfdan (Ragnar Lodbrog's son?) had never troubled itself about Wessex, but had taken firm possession in Northumbria.

The six territories which we have signalized—Ireland, Western Scotland, England, the three in West Francia which merge into each other by the end of the 9th century—do not comprise the whole field of viking raids or attempted invasion. For farther still to the east they twice sailed up the Elbe (A.D. 851, 880) and burnt Hamburg. Southwards they plundered far up the Garonne, and in the north of Spain; and one fleet of them sailed all round Spain, plundering, but attempting in vain to establish themselves in this Arab caliphate. They plundered on the opposite African coast, and at last got as far as the mouth of the Rhone, and thence to Luna in Italy.

What we found in the case of the Irish raids, that at first they are quite anonymous, but that presently the names of the captains of the expeditions emerge, is likewise the case in all other lands. In Ireland, besides the important and successful Turgesius, we read of a Saxulf who early met his death, as well as of Ivar (Ingvar), famous also in England and called the son of Ragnar Lodbrog, and of Oisla, Ivar's comrade; finally (the vikings in Ireland being mostly of Norse descent) of the well-known Olaf the White, who became king of all the Scandinavian settlements in Ireland. In France, Oscar is one of the earliest and most successful of the invaders. Later the name of Ragnar (probably Ragnar Lodbrog) appears, along with Weland, Hasting and one of the sons of Ragnar, Björn. Farther to the east we meet the names of Rurik, Godfred and Siegfried. In the eastern region the viking leaders seem to have been closely connected with one of the Danish royal families, the kings of Jutland. The practical though short-lived conquest of England begins under Ivar, Ubbe and Halfdan, reputed sons of Ragnar, and is completed by the last of the three in conjunction with the Guthorm above mentioned. This is, of course, what we should expect, that larger acquaintance gives to the Christian chroniclers more knowledge of their enemy. Precisely the same process in a converse sense develops the casual raids of early times into a scheme of conquest. For at the outset the Christian world was wholly strange to these northmen. We have, it has been said, hardly any means of viewing these raids from the other side. But one small point of light is so suggestive that it may be cited here. The mythical saga of Ragnar Lodbrog is undoubtedly concerned with the Viking Age, though it is impossible now to identify most of the expeditions attributed to this northern hero, stories of conquest in Sweden, in Finland, in Russia and in England, which belong to quite a different age from this one. In the Christian chronicles the name of Ragnar is associated with an attack on Paris in A.D. 845, when the adventurers were (through the interposition of St Germain, say the Christians) suddenly enveloped in darkness—in a thick fog?—and fell before the arms of the defenders. In Saxo Grammaticus's account of Ragnar Lodbrog, this event seems to be reflected in the story of an expedition of Ragnar's to Bjarmaland or Perm in Russia. For Bjarmaland, though it gained a local habitation, is also in Norse tradition a wholly mythical and mythological place, more or less identical with the underworld (Niflhel, mist-hell). So it appears in the history given by Saxo Grammaticus of the voyage to Bjarmaland of one "Gorm the old." It "looks like a vaporous cloud" and is full of tricks and illusions of sense. We see then that in virtue of some quite historical misfortune to the viking invaders connected with a mist and with a great sickness which invaded the army, the place they have come to (in reality Paris) is in Scandinavian tradition identified with the mythic Bjarmaland; and later, in the history of Saxo Grammaticus, it is identified with the geographical Bjarmaland or Perm. (Saxo Grammat., *Hist. Dan.* p. 452. Gylfaginning (Edda Snorra); Acta SS. 18th May and 11th Oct.; Steenstrup, *Normannerne*, i. p. 97 seq.; Keary, *The Vikings in Western Christendom*, pp. 162, 260.)

No example could better than this bring home to us the strangeness of the Christian world to the first adventurers from the north, nor better explain the process of familiarity which gradually extended the sphere of their ambition. The expedition which we have made mention of took place almost in the middle of the 9th century, and exactly fifty years after the effective opening of the Viking Age. But after this date events developed rapidly. It was fourteen years later (in A.D. 859) that Ragnar's son Björn Ironside and Hasting made their great expedition round Spain to the Mediterranean. In 865 or 866 came to England what we know as *the* Army, or the Great Army, whose first attacks were in the north of England. Five kings are mentioned in connexion with this veritable invasion of England, and many earls. Their course was not unchequered; but it was only in Wessex that they met with any effective resistance, and the victory of Ashdown (871) put no end to their advance; for, as we know, Alfred himself had at last to wander a fugitive in the fastnesses of Selwood Forest. Much was retrieved by the victory of Aethandune; yet even after the peace of Wedmore as large a part of the land lay under the power of the Danes as of the English.

It is from this time that we discern two distinct tendencies in the viking people. While one section is ready to settle down and receive territory at the hands of the Christian rulers, with or without homage, another section still adheres to a life of mere adventure and of plunder. A large portion of the Great Army refused to be bound by the peace of Wedmore, made some further attempts on England which were frustrated by Alfred's powerful new-built fleet, and then sailed to the continent and spread devastation far and wide. We see them under command of two Danish "kings," Godfred and Siegfried, first in the country of the Rhine-mouth or the Lower Scheldt; afterwards dividing their forces and, while some devastate far into Germany, others extend their ravages on every side in northern France down to the Loire. The whole of these vast countries, Northern Francia, with part of Burgundy, and the Rhineland, seem to lie as much at their mercy as England had done before Aethandune, or Ireland before the death of Turgesius. But in every country alike the wave of viking conquest now begins to recede. The settlement of Normandy was the only permanent outcome of the Viking Age in France. In England under Edward the Elder and Aethelflaed, Mercia recovered a great portion of what had been ceded to the Danes. In Ireland a great expulsion of the invaders took place in the beginning of the 10th century. Eventually the Norsemen in Ireland contented themselves with a small number of colonies, strictly confined in territory around certain seaports which they themselves had created: Dublin, Waterford and Wexford; though as the whole of Ireland was divided into petty kingdoms, it might easily happen that the Norse king in Ireland rose to the position—not much more than nominal—of over-king (Ard-Ri) for the whole land.

Character of the Vikings.—Severe, therefore, as were the viking raids in Europe, and great as was the suffering they inflicted—on account of which a special prayer, *A furore Normannorum libera nos*, was inserted in some of the litanies of the West—if they had been pirates and nothing more their place in history would be an insignificant one. If they had been no more than what the Illyrian pirates had been in the early history of Rome, or than the Arabic corsairs were at this time in southern Europe, the disappearance of the evil would have been quickly followed by its oblivion. But even at the outset the vikings were more than isolated bands of freebooters. As we have seen, the viking outbreak was probably part of a national movement. We know that at the same time that some Scandinavian folk were harrying all the western lands, others were founding Garðarfki (Russia) in the east; others were pressing still farther south till they came in contact with the eastern empire in Constantinople, which the northern folk knew as Mikillgarðr (Mikklegard); so that when Hasting and Björn had sailed to Luna in the gulf of Genoa the northern folk had almost put a girdle round the Christian world. There is every evidence that the vikings were not a mere lawless folk—that is, in their internal relations—but that a system of laws existed among them which was generally respected. The nearest approach to it now preserved is probably the code of laws attributed to the mythic king Froði (the Wise) and preserved in the pages of Saxo Grammaticus. It contains provisions for the partition of booty, punishments for theft, desertion and treachery. But some of the clauses securing a comparative liberty for women appear less characteristic of the Viking Age (cf. Alexander Bugge, *Vikingerne*, vol. i. p. 49). Women, indeed, did not take part in their first expeditions. In the constitution of the Jómborg state and again in that of the eastern Vaerings (a Scandinavian body in the service of the East Roman Empire) we see a constitution which looks like the foretaste of that of the Templars or the Teutonic Knights. Steenstrup thinks the code cited by Saxo may be identical with the laws which Rollo promulgated for his Norman subjects. In any case, they fall more near the viking period than any other northern table of laws. A certain republicanism was professed by these adventurers. "We have no king," one body answered to some Frankish delegates. We do read frequently of kings in the accounts of their hosts; but their power may not have extended beyond the leadership of the expedition; they may have been kings *ad hoc*. On the other hand, the whole character of northern tradition (Teutonic and Scandinavian tradition alike) forbids us to suppose that any would be elected to that office who was not of noble or princely blood. They were not entirely unlettered; for the use of runes dates back considerably earlier than the Viking Age. But these were used almost exclusively for lapidary inscriptions. What we can alone describe as a literature, first the early Eddic verse, next the habit of narrating sagas: these things the Norsemen learned probably from their Celtic subjects, partly in Ireland, partly in the western islands of Scotland; and they first developed the new literature on the soil of Iceland. Nevertheless, some of the Eddic songs do seem to give the very form and pressure of the viking period.[1]

In certain material possessions—those, in fact, belonging to their trade, which was war and naval adventure—these viking folk were ahead of the Christian nations: in shipbuilding, for example. There is certainly a historical connexion between the ships which the tribes on the Baltic possessed in the days of Tacitus and the viking ships (Keary, *The Vikings in Western Europe*, pp. 108–9): a fact which would lead us to believe that the art of shipbuilding had been better preserved there than elsewhere in northern Europe. Merchant vessels must of course have plied between England and France or Frisia. But it is certain that even Charlemagne possessed no adequate navy, though a late chronicler tells us how he thought of building one. His descendants never carried out his designs. Nor was any English king before Alfred stirred up to undertake the same task. And yet the Romans, when threatened by the Carthaginian power, built in one year a fleet capable of holding its own against the, till then, greatest maritime nation in the world. The viking ships had a character apart. They may have owed their origin to the Roman galleys: they did without doubt owe their sails to them.[2] Equally certain it is that this special type of shipbuilding was developed in the Baltic, if not before the time of Tacitus, long before the dawn of the Viking Age. Their structure is adapted to short voyages in a sea well studded with harbours, not exposed to the most violent storms or most dangerous tides. To the last, judging by the specimens of Scandinavian boats which have come down to us, they must have been not very seaworthy; they were shallow, narrow in the beam, pointed at both ends, and so eminently suitable for manœuvring (with oars) in creeks and bays. The viking ship had but one large and heavy square sail. When a naval battle was in progress, it would depend for its manœuvring on the rowers. The accounts of naval battles in the sagas show us, too, that this was the case. The rowers in each vessel, though among the northern folk these were free men and warriors, not slaves as in the Roman and Carthaginian galleys, would yet need to be supplemented by a contingent of fighting men, marines, in addition to their crew. Naturally the shipbuilding developed: so that vessels in the viking time would be much smaller than in the Saga Age. In saga literature we read of craft (of "long ships") with 20 to 30 benches of rowers, which would mean 40 to 60 oars. There exist at the museum in Christiania the remains of two boats which were found in the neighbourhood: one, the Gökstad ship, is in very tolerable preservation. It belongs probably to the 11th century. On this boat there are places for 16 oars a side. It is not probable that the largest viking ships had more than 10 oars a side. As these ships must often, against a contrary wind, have had to row both day and night, it seems reasonable to imagine the crew divided into three shifts (as they call them in mining districts), which would give double the number of men available to fight on any occasion as to row.[1] Thus a 20-oared vessel would carry 60 men. But some 40 men per ship seems, for this period, nearer the average. In 896, toward the end of our age, it is incidentally mentioned in one place that five vessels carried 200 vikings, an average of 40 per ship. Elsewhere about the same time we read of 12,000 men carried in 250 ships, an average of 48.

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[1] More especially the beautiful series contained in book iii. of the *Corpus Poeticum Boreale*, and ascribed by the editors of that collection to one poet—"the Helgi Poet." Here vikings are mentioned by name—*e.g.*:—

"Varð ára ymr, ok iarna glymr:
Brast rönd við rönd; rero víkingar."

[2] "Sail" in every Teutonic language is practically the same word, and derived from the Latin *sagulum*.

The round and painted shields of the warriors hung outside along the bulwarks: the vessel was steered by an oar at the right side (as whaling boats are to-day), the steerboard or starboard side. Prow and stern rose high; and the former was carved most often into the likeness of a snake's or dragon's head: so generally that "dragon" or "worm" (snake) became synonymous with a war-ship. The warriors were well armed. The *brynie* or mail-shirt is often mentioned in Eddic songs: so are the axe, the spear, the javelin, the bow and arrows and the sword. The Danes were specially renowned for their axes; but about the sword the most of northern poetry and mythology clings. An immense joy in battle breathes through the earliest Norse literature, which has scarce its like in any other literature; and we know that the language recognized a peculiar battle fury, a veritable madness by which certain were seized and which went by the name of "berserk's way" (*berserksgangr*).[2] The courage of the vikings was proof against anything, even as a rule against superstitious terrors. "We cannot easily realize how all-embracing that courage was. A trained soldier is often afraid at sea, a trained sailor lost if he has not the protecting sense of his own ship beneath him. The viking ventured upon unknown waters in ships very ill-fitted for their work. He had all the spirit of adventure of a Drake or a Hawkins, all the trained valour of reliance upon his comrades that mark a soldiery fighting a militia" (*The Vikings in Western Christendom*, p. 143). He was unfortunately hardly less marked for cruelty and faithlessness. Livy's words, "inhumana crudelitas, perfidia plus quam Punica," might, it is to be feared, have been applied as justly to the vikings as to any people of western Europe. It is also true, however, that they showed a great capacity for government, and in times of peace for peaceful organization. Normandy was the best-governed part of France in the 11th century; and the Danes in East Anglia and the Five Burgs were in many regards a model to their Saxon neighbours (Steenstrup, *op. cit.* iv. ch. 2). Of all European lands England is without doubt that on which the Viking Age has left most impression: in the number of original settlers after 878; in the way which these prepared for Canute's conquest; and finally in that which she absorbed from the conquering Normans. England's gain was France's loss: had the Normans turned their attention in the other direction, they might likely enough have gained the kingdom in France and saved that country from the intermittent anarchy from which it suffered from the 11th till the middle of the 15th century.

Sources of Viking History.—These are, as has been said, almost exclusively the chronicles of the lands visited by the vikings. For Ireland we have, as on the whole our best authority, the *Annales Ultonienses* (C. O'Conor, *Scr. Rer. Hib.* iv.), supplemented by the *Annals of the Four Masters* (ed. O'Donovan) and the *Chronicon Scottorum* (ed. Henessy). Finally, *The War of the Gaidhill with the Gaill* (ed. Todd); *Three Fragments of Irish History* (O'Donovan); cf. W. F. Skene, *Celtic Scotland*. For England the *Anglo-Saxon Chronicle*, *Annales Lindisfarnenses* (in Pertz, *Monumenta*, vol. xix.); Simeon of Durham, *Historia Dunelmi Ecclesiae*. For the Frankish empire the chief sources of our information are *The Annales Regni Francorum*, *Annales Bertiani* (Pertz, vol. i.) in three parts (the first anonymous, the second by Prudentius, the third by Hincmar, A.D. 830–82). *The Annales Xantenses* (A.D. 876, 873; Pertz, vol. ii.) are the authorities for the northern and eastern regions, and the *Annales Fuldenses* (which begin with Pipin of Herestel and go down to A.D. 900; Pertz, vol. i.) for Germany. Toward the end of the 9th century the *Annales Vedastini* (Pertz, vols. i. and ii.) are almost the exclusive authority for the western raids. In the historians of Normandy, especially in Dudo of St Quentin, much incidental matter may be found.

References to the Viking Age in a general way are to be found in a vast number of books, especially histories of the Scandinavian countries, of which Munch's *Det Norske Folks Historie* (1852, &c.) is the most distinguished; J. J. A. Worsaae has written *Minder om de Danske og Nordmændene i England, Skotland og Irland* (1851), an antiquarian rather than an historical study; G. B. Depping, *L'Histoire des expéditions maritimes des Normands* (1843), a not very critical work, and E. Mabille, "Les Invasions Normandes dans la Loire" (*École des chartes*, t. 30, 1869). A completer work than either of these is W. Vogel's *Die Normannen und das Fränkische Reich* (1906). It does not, however, break any fresh ground. J. C. H. Steenstrup's *Normannerne* (1876–82), in four volumes, is not a continuous history, but a series of studies of great learning and value; C. F. Keary, *The Vikings in Western Europe* (1891) is a history of the viking raids on all the western lands, but ends A.D. 888. A. Bugge's *Vikingerne* (1904–6) is a study of the moral and social side of the vikings, or, one should rather say, of the earliest Scandinavian folk. (C. F. K.)

VIKRAMADITYA, a legendary Hindu king of Ujjain, who is supposed to have given his name to the Vikram Samvat, the era which is used all over northern India, except in Bengal, and at whose court the "nine gems" of Sanskrit literature are also supposed to have flourished. The Vikram era is reckoned from the vernal equinox of the year 57 B.C., but there is no evidence that that date corresponds with any event in the life of an actual king. As a matter of fact, all dates in this era down to the 10th century never use the word Vikram, but that of Malava instead, that being the tribe that gives its name to Malwa. The name Vikramaditya simply means "sun of power," and was adopted by several Hindu kings, of whom Chandragupta II. (Chandragupta Vikramaditya), who ascended the throne of the Guptas about A.D. 375, approaches most nearly to the legend.

See Alexander Cunningham, *Book of Indian Eras* (1883); and Vincent Smith, *Early History of India* (1904).

VILAS, WILLIAM FREEMAN (1840–1908), American political leader and lawyer, was born in Chelsea, Vermont, on the 9th of July 1840. His father, Levi B. Vilas, a lawyer and Democratic politician, emigrated in 1851 to Madison, Wisconsin. William graduated at the university of Wisconsin in 1858, and at the Albany (New York) Law School in 1860 and began to practise law in Madison with his father. In 1861 he recruited and became captain of Company A of the Twenty-Third Wisconsin

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[1] Steenstrup (*Normannerne*, i. p. 352), to get the number of men on (say) a 30-oared vessel, adds but some 20 more. This seems an unlikely limitation, throwing an impossible amount of work upon the crew, and leaving each ship terribly weak supposing a naval battle had to be undertaken—as with some rival viking fleet, even before any Christian nation possessed a fleet.

[2] Cf. Grett. S. ch. 42, Njála, ch. 104, &c., and many other sources.

Volunteers, of which he was made lieutenant-colonel in 1863, and which he commanded in the siege of Vicksburg. In August 1863 he resigned his commission and resumed his law practice. He was professor of law in the university of Wisconsin in 1868–85, and again in 1889–92, and in 1875–78 was a member of the commission which revised the statutes of Wisconsin. From 1876 to 1886 he was a member of the National Democratic Committee, and virtually the leader of his party in his state; he was a delegate to the National Democratic Conventions of 1876, 1880 and 1884, and was permanent chairman of the last. In 1885 he was a member of the state Assembly. He was postmaster-general in President Grover Cleveland's cabinet from March 1885 until January 1888, and was then secretary of the interior until March 1889. From 1891 until 1897 he was a member of the United States Senate, in which, during President Cleveland's second term, he was recognized as the chief defender of the Administration, and he was especially active in securing the repeal of the silver-purchase clause of the Sherman Act. He was a delegate to the Democratic National Convention of 1896, but withdrew after the adoption of the free-silver plank. He then became one of the chief organizers of the National (or Gold) Democratic party, attended the convention at Indianapolis, and was chairman of its committee on resolutions. In 1881–85 and in 1898–1905 he was a regent of the university of Wisconsin; and he was a member (1897–1903) of the commission which had charge of the erection of the State Historical Library at Madison, and in 1906–8 of the commission for the construction of the new state capitol. He died at Madison on the 27th of August 1908.

With E. E. Bryant he edited vols. i. to xx., except vol. v., of the *Reports of the Wisconsin Supreme Court.*

VILL, the Anglicized form of the word *villa*, used in Latin documents to translate the Anglo-Saxon *tun*, township, "the unit of the constitutional machinery, the simplest form of social organization" (Stubbs, *Const. Hist.* § 39). The word did not always and at all times have this meaning in Latin-English documents, but "vill" and "township" were ultimately, in English law, treated as convertible terms for describing a village community, and they remained in use in legal nomenclature until the ecclesiastical parishes were converted into areas for civil administration under the Poor Law Acts. This technical sense is derived from the late Latin use of *villa* for *vicus*, a village. Thus Fleta (vi. c. 51), writing in the time of Edward I., distinguishes the *villa*, as a collection of habitations and their appurtenances, from the *mansio*, a single house, *nulli vicina*, and the manor, which may embrace one or more *villae*. In classical Latin *villa* had meant "country-house," "farm," "villa" (see VILLA); but the word was probably an abbreviation of *vicula*, diminutive of *vicus*, and in the sense of *vicus* it is used by Apuleius in the 2nd century. Later it even displaced *civitas*, for city; thus Rutilius Numatianus in his *Itinerarium* speaks of *villae ingentes, oppida parvae*; whence the French *ville* (see Du Cange, *Glossarium lat.* s.v. Villa). In the Frankish empire *villa* was also used of the royal and imperial palaces or seats with their appurtenances. In the sense of a small collection of habitations the word came into general use in England in the French form "village." From *villa*, too, are derived villein and villenage (*q.v.*) (see also VILLAGE COMMUNITIES).

VILLA, the Latin word (diminutive of *vicus*, a village) for a country-house. This term, which in England is usually given to a small country-house detached or semi-detached in the vicinity of a large town, is being gradually superseded by such expressions as "country" or "suburban house," "bungalow," &c., but in Italy it is still retained as in Roman times and means a summer residence, sometimes being of great extent. References to the villa are constantly made by Roman writers. Cicero is said to have possessed no less than seven villas, the oldest of which was near Arpinum, which he inherited. Pliny the younger had three or four, of which the example near Laurentium is the best known from his descriptions. There is too wide a divergence in the various conjectural restorations to make them of much value, but the remains of the villa of Hadrian at Tivoli, which covered an area over seven miles long and in which reproductions were made of all the most celebrated buildings he had seen during his travels, those in Greece seeming to have had the most attraction for him, and the villas of the 16th century on similar sites, such as the Villa d'Este near Tivoli, enable one to form some idea of the exceptional beauty of the positions selected and of the splendour of the structures which enriched them. According to Pliny, there were two kinds of villas, the *villa urbana*, which was a country seat, and the *villa rustica*, the farm-house, occupied by the servants who had charge generally of the estate. The Villa Boscoreale near Pompeii, which was excavated in 1893–94, was an example of the *villa rustica*, in which the principal room was the kitchen, with the bakery and stables beyond and room for the wine presses, oil presses, hand mill, &c. The villas near Rome were all built on hilly sites, so that the laying out of the ground in terraces formed a very important element in their design, and this forms the chief attraction of the Italian villas of the 16th century, among which the following are the best known: the Villa Madama, the design of which, attributed to Raphael, was carried out by Giulio Romano in 1520; the Villa Medici (1540); the Villa Albani, near the Porta Salaria; the Borghese; the Doria Pamphili (1650); the Villa di Papa Giulio (1550), designed by Vignola; the Aldobrandini (1592); the Falconieri and the Montdragon Villas at Frascati, and the Villa d'Este near Tivoli, in which the terraces and staircases are of great importance. In the proximity of other towns in Italy there are numerous villas, of which the example best known is that of the Villa Rotunda or Capra near Vicenza, which was copied by Lord Burlington in his house at Chiswick.

The Italian villas of the 16th and 17th century, like those of Roman times, included not only the country residence, but the whole of the other buildings on the estate, such as bridges, casinos, pavilions, small temples, rectangular or circular, which were utilized as summer-houses, and these seem to have had a certain influence in England, which may account for the numerous examples in the large parks in England of similar erections, as also the laying out of terraces, grottos and formal gardens. In France the same influence was felt, and at Fontainebleau, Versailles, Meudon and other royal palaces, the celebrated Le Nôtre transformed the parks surrounding them and introduced the cascades, which in Italy are so important a feature, as at St Cloud near Paris. (R. P. S.)

VILLACH, a town in Carinthia, Austria, 24 m. W. of Klagenfurt by rail. Pop. (1900) 9690. It is situated on the Drave, near its confluence with the Gail, in a broad fertile basin at the foot of the Dobratsch or Villacher Alp (7107 ft.). The parish church is an interesting Gothic edifice of the 15th century. The principal industry of Villach consists in the fabrication of various lead wares, and is mostly dependent on the lead mines of Bleiberg, which is situated about 9 m. to the west. This village (pop. 3435) is one of the richest lead-mining centres in Europe. The ores found here comprise silver-free galena, sulphate of zinc and calamine. The mines were already worked during the middle ages. Warmbad Villach, a watering-place with hot sulphur baths, and Mittewald, a favourite summer resort, whence the ascent of the Dobratsch can be made, are in the neighbourhood of Villach. Some of the prettiest Carinthian lakes are to be found near Villach, as the Ossiacher-see, on whose southern shore stands the ruined castle of Landskron, dating from the middle of the 16th century, the Wörther-see and the small but lovely Faaker-see.

Villach is an old town, which was given by Heinrich II. to the bishopric of Bamberg in 1007. During the middle ages it was an important centre of commerce between Germany and Italy. With the advent of new trade routes at the beginning of modern times the town lost its importance, and in 1745 the citizens nearly decided to emigrate *en masse*. Its trade revived during the French occupation of 1809–13, and it continued to improve during the 19th century. The Turks were defeated here in 1492 by Maximilian I., and an engagement between the Austrians and the French took place here on the 21st of August 1813.

VILLA DEL PILAR, a city of Paraguay, 104 m. S. by E. of Asuncion, on the left bank of the navigable river Paraguay, which receives the Bermejo from the right immediately opposite. Pop. (1910) about 10,000. Villa del Pilar is a thriving modern city, containing barracks, law courts, a national college, several schools and a branch of the Agricultural Bank. It has a fine harbour, and is one of the principal centres in the republic for the exportation of oranges.

VILLAFRANCA DI VERONA, a town of Venetia, Italy, in the province of Verona, 11 m. S.S.W. of Verona, on the railway to Mantua, 174 ft. above sea-level. Pop. (1901) 5037 (town); 9635 (commune). It has considerable silk industries. Here preliminaries of peace were signed between Napoleon III. and the Austrians in 1859 after the battle of Solferino. Five miles to the N. is Custozza, where the Italians were defeated by the Austrians in 1848 and 1866. Villafranca is a common place name in Italy.

VILLAGE COMMUNITIES. The study of village communities has become one of the fundamental methods of discussing the ancient history of institutions. It would be out of the question here to range over the whole field of human society in search for communal arrangements of rural life. It will be sufficient to confine the present inquiry to the varieties presented by nations of Aryan race, not because greater importance is to be attached to these nations than to other branches of humankind, although this view might also be reasonably urged, but principally because the Aryan race in its history has gone through all sorts of experiences, and the data gathered from its historical life can be tolerably well ascertained. Should the road be sufficiently cleared in this particular direction, it will not be difficult to connect the results with similar researches in other racial surroundings.

The best way seems to be to select some typical examples, chiefly from the domain of Celtic, Slavonic and Germanic social history, and to try to interpret them in regard to the general conditions in which communal institutions originate, grow and decay. As the principal problem will consist in ascertaining how far land was held in common instead of being held, as is usual at present, by individuals, it is advisable to look out for instances in which this element of holding in common is very clearly expressed. We ought to get, as it were, acclimatized to the mental atmosphere of such social arrangements in order to counteract a very natural but most pernicious bent prompting one to apply to the conditions of the past the key of our modern views and habitual notions. A certain acquaintance with the structure of Celtic society, more especially the society of ancient Wales, is likely to make it clear from the outset to what extent the husbandry and law of an Aryan race may depend on institutions in which the individual factor is greatly reduced, while the union first of kinsmen and then of neighbours plays a most decisive part.

F. Seebohm has called our attention to the interesting surveys of Welsh tracts of country made in the 14th century, soon after these regions passed into the hands of English lords. The fragments of these surveys published by him and his commentary on them are very illuminating, but further study of the documents themselves discloses many important details and helps to correct some theories propounded on the subject. Let us take up a concrete and simple case, *e.g.* the description of Astret Canon, a trev or township (*villata*) of the honour of Denbigh, surveyed in 1334. In the time of the native Welsh princes it was occupied entirely by a kindred (*progenies*) of free tribesmen descended from a certain Canon, the son of Lawaurgh. The kindred was subdivided into four gavells or bodies of joint-tenants. On the half-gavell of Monryk ap Canon, *e.g.* there are no less than sixteen coparceners, of whom eight possess houses. The peculiarity of this system of land tenure consists in the fact that all the tenants of these gavells derive their position on the land from the occupation of the township by their kindred, and have to trace their rights to shares in the original unit. Although the village of Astret Canon was occupied under the Survey by something like fifty-four male tenants, the majority of whom were settled in houses of their own, it continued to form a unit as well in regard to the payment of tungpound, that is, of the direct land tax and other services and payments, but also in respect of the possession and usage of the soil. On the other hand, movable property is owned in severalty. Services have to be apportioned among the members of the kindreds according to the number of heads of cattle owned by them. From the description of another township—Pireyon—we may gather another important feature of this tribal tenure. The population of this village also clustered in gavells, and we hear that these gavells ought to be considered as equal shares in respect of the arable, the wood and the waste of the township. If the shares were reduced into acres there would have fallen to each of the eight gavells of Pireyon ninety-one acres, one rood and a half and six perches of arable and woodland, and fifty-three and one-third of an acre and half a rood of waste land. But as a matter of fact the land was not divided in such a way, and the rights of the tenants of the gavell were realized not through the appropriation of definite acres, but as proportionate opportunities in regard to tillage and as to usages in pasture, wood and waste. Pastoral habits must have greatly contributed to give the system of landholding its peculiar character. It was not necessary, it would have been even harmful, to subdivide sharply the area on which the herds of cows and the flocks of sheep and goats were grazing. Still Welsh rural life in the 14th century had already a definite though subordinate agricultural aspect, and it is important to notice that individual appropriation had as yet made very slight progress in it.

We do not notice any systematic equalization between members of the tribal communities of the trevs. In fact, both differences in the ownership of cattle and differences of tribal standing, established by complex reckonings of pedigree and of social rank, led to marked inequalities. But there was also the notion of birthright, and we find in the laws that every free tribesman considered himself entitled to claim from his kindred grazing facilities and five erws for tillage. Such a claim could be made unconditionally only at a time when there was a superabundance of land to dispose of. In the 14th century, to which our typical descriptions refer, this state of things had ceased to be universal. Although great tracts of Welsh land were undoubtedly still in a state of wilderness, the soil in more conveniently situated regions was beginning to be scarce, and considerable pressure of population was already felt, with a consequent transition from pastoral pursuits to agriculture. The tract appropriated to the township of Astret Canon, for instance, contained only 574 acres of land of all kinds. In this case there was hardly room for the customary five erws per head of grown-up males besides commons. And yet although the population lived on a small pittance, the system of tribal tenure was not abandoned.

Although there are no rearrangements or redivision within the tribe as a whole, inside every gavell, representing more narrow circles of kinsmen, usually the descendants of one great-grandfather, *i.e.* second cousins, the shares are shifted and readjusted according to one of two systems. In one case, that of the trevcyvriv or joint-account village, every man receives "as much as another yet not of equal value"—which means, of course, that the members of such communities were provided with equal allotments, but left to make the best of them, each according to chance and ability. This practice of reallotment was, however, restricted in the 14th century to taeog trevs, to villages occupied by half-free settlers. The free tribesmen, the *priodorii* of Wales, held by *daddenhud*, and reallotted shares within the trev on the coming of each new generation or, conversely, on the going out, the dying out, of each older generation. In other words: at the demise of the last of the grandfathers in a gavell, all The fathers took equal rank and claimed equal shares, although formerly some of the portions had been distributed equally only between the grandfathers or their offspring (*stirps*). The right to claim redivision held good only within the circle of second cousins. Members of the kindred who stood further than that from each other, that is, third cousins, were not entitled to reallotment on the strength of *daddenhud*.

Another fact which is brought out with complete evidence by the Welsh Surveys is that the tenure is ascribed to communities of kinsmen and not to chiefs or headmen The latter certainly existed and had exerted a powerful influence on the disposal of common land as well as on government and justice. But in the view of 14th-century surveys each township is owned not by this or the other elder, but by numerous bodies of coparceners. The gavell of Owen Gogh, for instance, contained twenty-six coparceners. In this way there is a clear attribution of rights of communal ownership, if we like to use the term, and not merely of rights of maintenance. Nor is there any warrant for a construction of these arrangements on a supposed patriarchal system.

Let us now compare this description of Celtic tribal tenure with Slavonic institutions. The most striking modern examples of tribal communities settled on a territorial basis are presented by the history of the Southern Slavs in the Balkan Peninsula and in Austria, of Slovenes, Croats, Serbs and Bulgarians, but it is easy to trace customs of the same kind in the memories of Western Slavs conquered by Germans, of the Poles and of the different subdivisions of the Russians. A good clue to the subject is provided by a Serb proverb which says that *a man by himself is bound to be a martyr*. One might almost suggest that these popular customs illustrate the Aristotelian conception of the single man seeking the "autarkeia," a complete and self-sufficient existence in the society of his fellow-men, and arriving at the stage of the tribal village, the γένος, which is also a *κώμη*, as described in the famous introductory chapter of the Greek philosopher's *Politics*. The Slavs of the mountainous regions of the Balkans and of the Alps in their stubborn struggle with nature and with human enemies have clustered and still cluster to some extent (*e.g.* in Montenegro) in closely united and widely spreading brotherhoods (*bratstva*) and tribes (*plemena*). Some of these brotherhoods derive their names from a real or supposed common ancestor, and are composed of relatives as well as of affiliated strangers. They number sometimes hundreds of members,[1] of guns, as the fighting males are characteristically called. Such are—the Vukotići, Kovacevići, as one might say in Old English —the Vukotings or Kovachevings, of Montenegro. The dwellings, fields, and pasturages of these brotherhoods or kindreds are scattered over the country, and it is not always possible to trace them in compact divisions on the map. But there was the closest union in war, revenge, funeral rites, marriage arrangements, provision for the poor and for those who stand in need of special help, as, for instance, in case of fires, inundations and the like. And corresponding to this union there existed a strong feeling of unity in regard to property, especially property in land. Although ownership was divided among the different families, a kind of superior or eminent domain stretched over the whole of the *bratstvo*, and was expressed in the participation in common in pasture and wood, in the right to control alienations of land and to exercise pre-emption. If any of the members of the brotherhood wanted to get rid of his share he had to apply first to his next of kin within the family and then to the further kinsmen of the *bratstvo*.

As the Welsh kindred (*progenies*) were subdivided into gavells formed of extended family communities, even so the Bosnian, Montenegrin, Servian, Slovene tribes fell into house communities, *Kućas*, *Zadrugas*, which were built up on the principle of keeping blood-relatives and their property together as long as possible. They consisted generally of some 10 to 20 grown-up persons, some 6 or 7 first and second cousins with their wives and children, living in a hamlet around the central house of the *domaćin*, the house leader. In some instances the number of coparceners increased to 50 or even to 70. The members of the united house community, which in fact is a small village or hamlet, joined in meals and work. Their rights in the undivided household of the hamlet were apportioned according to the pedigree, *i.e.* this apportionment took account first of the *stirpes* or extant descendants of former scions of the family, so that, say, the offspring of each of two grandfathers who had been brothers were considered as equal sharers although the *stirps*, the stock, of one was represented only by one person, while the *stirps* of the other had grown to consist of two uncles and of three nephews all alive. There was no resettlement of shares, as in the case of Wales, but the life of the house community while it existed unbroken led to work in common, the contributions to which are regulated by common consent and supervised by the leader. Grounds, houses, implements of agriculture (ploughs, oxen, carts) and of viniculture—casks, cauldrons for the making of brandy, &c., are considered to be common capital and ought not to be sold unless by common consent. Divisions were not prohibited. Naturally a family had to divide sooner or later, and the shares have to be made real, to be converted into fields and vineyards. But this was an event which marks, as it were, the close of the regular existence of one union and the birth of similar unions derived from it. As a rule, the *kuća* kept together as long as it could, because co-operation was needed and isolation dangerous—for economic considerations as well as for the sake of defence.

Attention, however, should be called more particularly to the parallel phenomena in the social history of the Russians, where the conditions seem to stand out in specially strong contrast with those prevailing among the mountain Slavs of the Balkans and of the Alps. In the enormous extent of Russia we have to reckon with widely different geographical and racial areas, among other, with the Steppe settlements of the so-called Little Russians in the Ukraina and the forest settlements of the Great Russians in the north. In spite of great divergencies the economic history of all these branches of Slavonic stock gravitates towards one main type, viz. towards rural unions of kinsmen, on the basis of enlarged households. In the south the typical village settlement is the *dvorišče*, the big court or hamlet consisting of some four to eight related families holding together; in the north it is the *pečišče*, the big oven, a hamlet of somewhat smaller size in which three to five families are closely united for purposes of common husbandry.

It is interesting to notice that even the break-up of the joint household does not lead to an entire severance of the ties between its members. They mostly continue in another form, viz. in the shape of an open-field system with intermixture of strips, compulsory rotation of crops, commons of pasture, of wood, sometimes shifting allotments as regards meadows. There is, *e.g.* an act of division between six brothers from the north of Russia of the year 1640. They agree to divide bread and salt, house and liberties, money, cloth and stores of all kinds and to settle apart. As to arable, Shumila is to take the upper strip in the field by the settlement, and next to him Tretjak, then Maxim, then Zaviala, then Shestoy, then Luke. In the big harvest furlong likewise, and in the small likewise, and by the meadow likewise and so on through all the furlongs. So that in this case and in innumerable other cases of the same kind the open-field system with its inconvenient intermixture of plots and limited power of every husbandman to manage his land appears as a direct continuation of the joint tribal households.

Another fact to be noticed is the tendency to form artificial associations on the pattern of the prevailing unions of kinsmen. People who have no blood-relations to appeal to for clearing the waste, for providing the necessary capital in the way of cattle and plough implements, for raising and fitting out buildings, join in order to carry on these economic undertakings, and also to help each other against enemies and aggressors. The members of these voluntary associations, which at once call to mind German, Norse and English gilds, are called "siabri," "skladniki," and the gilds themselve. "spólkie," in south Russia. Ih a district of the Ukraina called the "Ratensky Sharostvo" there were no fewer than 278 such gilds interchanging with natural kindreds. The organization of all these unions could in no way be called patriarchal Even in cases when there is a definite elder or headman (*bolshoy*), he was only the first among equals and exercised only a limited authority over his fellows. all the important decisions had to be taken by the council of the community.

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[1] They range from 80 or 90 to 700.

In Great Russia, in the districts gathered under the sway of the Moscow tsars, the basis of the household community and of the rural settlements which sprang from it was modified in another direction. The entire agricultural population was subjected to strict supervision and coercive measures for purposes of military organization and taxation. Society was drilled into uniformity and service on the principle that every man has to serve the tsar, the upper class in war and civil administration, the lower class by agricultural labour. A consequence of the heavy burden laid on the land and of the growth of a landed aristocracy somewhat resembling the gentry and the *noblesse* of the West was a change in the management of land allotments. They became as much a badge of service and a basis for fiscal requirements as a means of livelihood. The result was the practice of reallotments according to the strength and the needs of different families. The shifting of arable (*peredel*) was not in this case a reapportionment of rights, but a consequence of the correspondence between rights and obligations. But although this admeasurement of claims appears as a comparatively recent growth of the system, the fundamental solidarity between kinsmen or neighbourly associates grouped into villages was in no way an invention of the tsars or of their officials: it was rooted in traditional customs and naturally suggested by the practices of joint households. When these households become crowded in certain areas, open-field systems arise; when they are burdened with public and private service their close co-operation produces occasional or periodical redivisions of the soil between the shareholders.

Let us now pass to village communities in Teutonic countries, including England. A convenient starting-point is afforded by the social and economic conditions of the southern part of Jutland.

Now the Saxon or Ditmarschen portion of this region gives us an opportunity of observing the effects of an extended and highly systematized tribal organization on Germanic soil. The independence of this northern peasant republic, which reminds one of the Swiss cantons, lasted until the time of the Reformation. We find the Ditmarschen organized in the 15th, as they had been in the 10th century, in a number of large kindreds, partly composed of relatives by blood and partly of "cousins" who had joined them. The membership of these kindreds is based on agnatic ties—that is, on relationship through males—or on affiliation as a substitute for such agnatic kinship. The families or households are grouped into brotherhoods, and these again into clans or "Schlachten" (*Geschlechter*), corresponding to Roman *gentes*. Some of them could put as many as 500 warriors in the field. They took their names from ancestors and chieftains: the Wollersmannen, Hennemannen, Jerremannen, &c.—that is, the men of Woll, the men of Henne, the men of Jerre. In spite of these personal names the organization of the clans was by no means a monarchical one: it was based on the participation of the full-grown fighting men in the government of each clan and on a council of co-opted elders at the head of the entire federation. We need not repeat here what has already been stated about the mutual support which such clans afforded to their members in war and in peace, in judicial and in economic matters.

Let us notice the influence of this tribal organization on husbandry and property. The regular economic arrangement was an open-field one based on a three-field and similar systems. The furlongs were divided into intermixed strips with compulsory rotation on the usual pattern. And it is interesting to notice that in these economic surroundings indivisible holdings corresponding to the organic unities required for efficient agriculture arose of themselves. In spite of the equal right of all coheirs to an estate, this estate does not get divided according to their numbers, but either remains undivided or else falls into such fractions, halves or fourths, which will enable the farming to be carried on successfully. without mischievous interruption and disruption Gradually the people settled down into the custom of united succession for agrarian units. The Hufe or Hof, the virgate, as might have been said in England, goes mostly to the eldest son, but also sometimes to the youngest, while the brothers of the heir either remain in the same household with him, generally unmarried, or leave the house after having settled with the heir. who takes charge of the holding, as to an indemnity for their relinquished claims. This indemnity is not equivalent to the market price, but is fixed, in case of dispute or doubt, by an award of impartial and expert neighbours, who have to consider not only the claims of interested persons but also the economic quality and strength of the holding. In other words, the heir has to pay so much as the estate can conveniently provide without being wrecked by the outlay.

This evidence is of decisive importance in regard to the formation of unified holdings; we are on entirely free soil, with no vestige whatever of manorial organization or of coercion of tenants by the lord, and yet the Hufe, the normal holding, comes to the fore as a result of the economic situation, on the strength of considerations drawn from the efficiency of the farming. This "Anerben" system is widely spread all through Germany. The question whether the eldest or the youngest succeeds is a subordinate one. Anyhow, manorial authority is not necessary to produce the limitation of the rights of succession to land and the creation of the system of holdings, although this has been often asserted, and one of the arguments for a servile origin of village communities turns on a supposed incompatibility between unified succession and the equal rights of free coheirs.

We need not speak at any length about other parts of Germany, as space does not permit of a description of the innumerable combinations of communal and individual elements in German law, the various shapes of manorial and political institutions with which the influence of blood relationship, gild and neighbourly union had to struggle.

But we must point out some facts from the range of Scandinavian customs. In the mountainous districts of Norway we notice the same tendency towards the unification of holdings as in the plains and hills of Schleswig and Holstein. The bönder of Gudbrandsdalen and Telemarken, the free peasantry tilling the soil and pasturing herds on the slopes of the hills since the days of Harold Hárfagr to our own times, sit in *Odalgaards*, or freehold estates, from which supernumerary heirs are removed on receiving some indemnity, and which are protected from alienation into strange hands by the privilege of pre-emption exercised by relatives of the seller. Equally suggestive are some facts on the Danish side of the Straits, viz. the arrangements of the *bôls* which correspond to the hides and virgates of England and to the Hufen of Germany. Here again we have to do with normal holdings independent of the number of coheirs, but dependent on the requirements of agriculture—on the plough and oxen, on certain constant relations between the arable of an estate and its outlying commons, meadows and woods. The bôl does not stand by itself like the Norwegian gaard, but is fitted into a very close union with neighbouring bôls of the same kind. Practices of coaration, of open-field intermixture, of compulsory rotation of lot-meadows, of stinting the commons, arise of themselves in the villages of Denmark and Sweden. Laws compiled in the 13th century but based on even more ancient customs give us most interesting and definite information as to Scandinavian practices of allotment.

We catch a glimpse, to begin with, of a method of dividing fields which was considered archaic even in those early times. The Swedish laws use the expression "forniskift," which means ancient mode of allotment, and another term corresponding to it is "hamarskift," which may possibly be connected with throwing the hammer in order to mark the boundary of land occupied by a man's strength. The two principal features of forni or hamar skift are the irregularity of the resulting shapes of plots and the temporary character of their occupation. The first observation may be substantiated by a description like that of Laasby in Jutland: "These lands are to that extent scattered and intermixed by the joint owners that it cannot be said for certain what (or how much) they are." Swedish documents, on the other hand, speak expressly of practices of shifting arable and meadows periodically, sometimes year by year.

Now the uncertainty of these practices based on occupation became in process of time a most inconvenient feature of the situation and evidently led to constant wrangling as to rights and boundaries. The description of Laasby which I have just quoted ends with the significant remark: "They should be compelled to make allotment by the cord." This making of allotments by the cord is the process of rebning, from *reb*, the surveyor's cord, and the juridical procedure necessary for it was called "solskift"—because it was a division following the course of the sun.

The two fundamental positions from which this form of allotment proceeds are: (1) that the whole area of the village is common land (*faellesjord*), which has to be lotted out to the single householders; (2) that the partition should result in the creation of equal holdings of normal size (bols). In some cases we can actually recognize the effect of these allotments by ancient solskift in the 18th century, at a time when the Danish enclosure acts produced a second general revolution in land tenure.

The oldest twelve inhabitants, elected as sworn arbitrators for effecting the allotment, begin their work by throwing together into one mass all the grounds owned by the members of the community, including dwellings and farm-buildings, with the exception of some privileged plots. There is a close correspondence between the sites of houses and the shares in the field. The first operation of the surveyors consists in marking out a village green for the night-rest and pasture of the cattle employed in the tillage (*forté*), and to assign sites to the houses of the coparceners with orchards appendant to them (tofts); every householder getting exactly as much as his neighbour. From the tofts they proceed to the fields on the customary notion that the toft is the mother of the field. The fields are disposed into furlongs and shots, as they were called in England, and divided among the members of the village with the strictest possible equality. This is effected by assigning to every householder a strip in every one of the furlongs constituting the arable of the village. Meadows were often treated as lot-meadows in the same way as in England. According to the account of a solrebning executed in 1513 (Oester Hoejsted), every *otting*, the eighth part of a bol (corresponding to the English oxgang or bovate), got a toft of 40 roods in length and 6 in breadth. One of the coparceners received, however, 8 roods because his land was worse than that of his neighbours. Of the arable there were allotted to each otting two roods' breadth for the plough in each furlong and appendant commons "in damp and in dry"—in meadow and pasture. After such a "solskift" the peasants held their tenements in undisturbed ownership, but the eminent demesne of the village was recognized and a revision of the allotment was possible. Many such revisions did actually take place, and in such cases all rights and claims were apportioned according to the standard of the original shares. Needless to say that these shares were subjected to all the usual limitations of champion farming.

After having said so much about different types of village communities which occur in Europe it will be easier to analyse the incidents of English land tenure which disclose the working of similar conceptions and arrangements. Features which have been very prominent in the case of the Welsh, Slavs, Germans or Scandinavians recur in the English instances sometimes with equal force and at other times in a mitigated shape.

There are some vestiges of the purely tribal form of community on English soil. Many of the place-names of early Saxon and Anglican settlements are derived from personal names with the suffix *ing*, as designations like Oakington, the town of the Hockings.

True, it is just possible to explain some of these place-names as pointing to settlements belonging to some great man and therefore taking their designation from him with the adjunct of an *ing* indicating possession. But the group of words in question falls in exactly with the common patronymics of Saxon and German families and kindreds, and therefore it is most probable, as Kemble supposed, that we have to do in most of these instances with tribal and family settlements, although the mere fact of belonging to a great landowner or a monastery may have been at the root of some cases.

A very noticeable consequence of tribal habits in regard to landownership is presented by the difficulties which stood in the way of alienation of land by the occupiers of it. The Old English legal system did not originally admit of any alienation of folkland, land held by folkright, or, in other words, of the estates owned under the ordinary customary law of the people. Such land could not be bequeathed out of the kindred and could not be sold without the consent of the kinsmen. Such complete disabilities could not be upheld indefinitely, however, in a growing and progressive community, and we find the ancient folkright assailed from different points of view. The Church insists on the right of individual possessors to give away land for the sake of their souls; the kings grant exemption from folkright and constitute privileged estates held by book and following in the main the rules of individualized Roman law; the wish of private persons to make provision for daughters and to deal with land as with other commodities produces constant collisions with the customary tribal views. Already, by the end of the Saxon period transfer and alienation of land make their way everywhere, and the Norman conquest brings these features to a head by substituting the notion of tenure—that is, of an estate burdened with service to a superior—for the ancient notion of tribal folkland.

But although the tribal basis of communal arrangements was shaken and removed in England in comparatively early times, it had influenced the practices of rural husbandry and landholding, and in the modified form of the village community it survived right through the feudal period, leaving characteristic and material traces of its existence down to the present day.

To begin with, the open-field system with intermixture of strips and common rights in pasture and wood has been the prevailing system in England for more than a thousand years. Under the name of champion farming it existed everywhere in the country until the Inclosure Acts of the 18th and 19th centuries put an end to it; it may be found in operation even now in some of its features in backward districts. It would have been absurd to build up these practices of compulsory rotation of crops, of a temporary relapse of plots into common pasture between harvest and ploughing time, of the interdependence of thrifty and negligent husbandmen in respect of weeds and times of cultivation, &c., from the point of view of individual appropriation. On the other hand, it was the natural system for the apportionment of claims to the shareholders of an organic and perpetual joint-stock company.

Practices of shifting arable are seldom reported in English evidence. There are some traces of periodical redivisions of arable land in Northumberland: under the name of runrig system such practices seem to have been not uncommon in the outer fields, the non-manured portions of townships in Scotland, both among the Saxon inhabitants of the lowlands and the Celtic population of the highlands. The joining of small tenants for the purpose of coaration, for the formation of the big, heavy ploughs, drawn by eight oxen, also produced sometimes the shifting in the possession of strips between the coparceners of the undertaking. But, as a rule, the arable was held in severalty by the different members of the township.

On the other hand, meadows were constantly owned by entire townships and distributed between the tenements entitled to shares from year to year either by lot or according to a definite order. These practices are in full vigour in some places even at the present day Any person living in Oxford may witness the distribution by lot on Lammas day (1st of August) of the Lammas meadows, that is, the meadows inclosed for the sake of raising hay-grass in the village of Yarnton, some three miles to the north of Oxford.

Let us, however, return for a moment to the arable. Although held in severalty by different owners it was subjected to all sorts of interference on the part of the village union as represented in later ages by the manorial court framing by-laws and settling the course of cultivation. It might also happen that in consequence of encroachments, disputes and general uncertainty as to possession and boundaries, the whole distribution of the strips of arable in the various fields had to be gone over and regulated anew. In an interesting case reported from a Cartulary of Dunstable in Bedfordshire, all the possessions of the villagers in a place called Segenhoe were thrown together in the 12th century and redivided according to an award of experts chosen by a meeting of the villagers from among the oldest and wisest inhabitants.

Exactly as in the Danish examples quoted before, the strips were apportioned, not to the single owners, but to the normal holdings, the hides, and the actual owners had to take them in proportion to their several rights in the hides. This point is very important. It gives the English village community its peculiar stamp. It is a community not between single members or casual households, but between determined holdings constructed on a proportional scale. Although there was no provision for the admeasurement and equalization of the claims of Smith and of Brown, each hide or ploughland of a township took as much as every other hide, each virgate or yardland as every other yardland, each bovate or oxgang as every other oxgang. Now the proportions themselves, although varying in respect of the number of acres included in each of these units in different places, were constant in their relation to each other. The yardland was almost everywhere one-fourth of the hide or ploughland, and corresponded to the share of two oxen in an eight-oxen plough; the oxgang was reckoned at one-half of the yardland, and corresponded to the share of one ox in the same unit of work. The constant repetition of these fractions and units proves that we have to do in this case with phenomena arising not from artificial devices but from the very nature of the case. Nor can there be a doubt that both the unit and the fractions were produced by the application to land of the chief factor of working strength in agrarian husbandry, the power of the ploughteam for tillage.

The natural composition of the holdings has its counterpart, as in Schleswig-Holstein and as in the rest of Germany, in the customs of united succession. The English peasantry worked out customary rules of primogeniture or of so-called Borough English or claim of the youngest to the land held by his father. The German examples adduced in the beginning of this article teach us that the device is not suggested primarily by the interest of the landlord. Unified succession takes the place of the equal rights of sons, because it is the better method for preserving the economic efficiency of the household and of the tenement corresponding to it. There are exceptions, the most notorious being that of Kentish gavelkind, but in agricultural districts the holding remains undivided as long as possible, and if it gets divided, the division follows the lines not of the casual number of coheirs, but of the organic elements of the ploughlands. Fourths and eighths arise in connexion with natural fractions of the ploughteam of eight oxen.

One more feature of the situation remains to be noticed, and it is the one which is still before our eyes in all parts of the country, that is, the *commons* which have survived the wholesale process of inclosure. They were an integral part of the ancient village community from the first, not only because the whole ground of a township could not be taken up by arable and meadows, at a time when population was scanty, but because there existed the most intimate connexion between the agricultural and pastoral part of husbandry in the time of the open-field system. Pasture was not treated as a commodity by itself but was mostly considered as an adjunct, as appendant to the arable, and so was the use of woods and of turf. This fact was duly emphasized, *e.g.* in an Elizabethan case reported by Coke—Tyrringham's case. The problem of admeasurement of pasture was regulated in the same way as that of the apportionment of arable strips, by a reference to the proportional holdings, the hides, yardlands and oxgangs of the township, and the only question to be decided was how many heads of cattle and how many sheep each hide and yardland had the right to send to the common pasturage grounds.

When in course of time the open-field system and the tenure of arable according to holdings were given up, the right of freeholders and copyholders of the old manors in which the ancient townships were, as it were, encased, still held good, but it became much more difficult to estimate and to apportion such rights.

In connexion with the individualistic policy of inclosure the old writ of admeasurement of commons was abolished in 1837 (3 & 4 Will. IV.) The ordinary expedient is to make out how much commonable cattle could be kept by the tenements claiming commons through the winter. It is very characteristic and important that in the leading modern case on sufficiency of commons—in *Robertson* v. *Hartopp*—it was admitted by the Court of Appeal that the sufficiency has to be construed as a right of turning out a certain number of beasts on the common, quite apart from the number which had been actually turned out at any given time. Now a vested right has to be construed from the point of view of the time when it came into existence. The standards used to estimate such rights ought not to be drawn from modern practice, which might help to dispense altogether with commons of pasture by stable feeding, substitutes for grass, &c., but ought to correspond to the ordinary usages established at a time when the open-field system was in full vigour. The legal view stands thus at present, but we cannot conceal from ourselves that after all the inroads achieved by individual appropriation it is by no means certain that the reference to the rights and rules of a previous period will continue to be recognized. However this may be, in the present commons we have certainly a system which draws its roots from customs, as to the origin of which legal memory does not run.

We may, in conclusion, summarize very briefly the principal results of our inquiry as to the history of European village communities. It seems that they may be stated under the following heads: (1) Primitive stages of civilization disclose in human society a strong tendency towards mutual support in economic matters as well as for the sake of defence. (2) The most natural form assumed by such unions for defence and co-operation is that of kinship. (3) In epochs of pastoral husbandry and of the beginnings of agriculture land is mainly owned by tribes, kindreds and enlarged households, while individuals enjoy only rights of usage and possession. (4) In course of time unions of neighbours are substituted for unions of kinsmen. (5) In Germanic societies the community of the township rests on the foundation of efficient holdings—bols, hides, hufen—kept together as far as possible by rules of united or single succession. (6) The open-field system, which prevailed in the whole of Northern Europe for nearly a thousand years, was closely dependent on the customs of tribal and neighbourly unions. (7) Even now the treatment of commons represents the last manifestations of ancient communal arrangements, and it can only be reasonably and justly interpreted by reference to the law and practice of former times.

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VILLALBA, a town of north-western Spain, in the province of Lugo; on the left bank of the river Ladra, one of the headstreams of the Miño, and at the junction of the main roads from Ferrol and Mondoñedo to the city of Lugo Pop. (1900) 13,572 Villalba is the chief town of the district watered by the Ladra, Tamboga and other small streams—a fertile plateau 1500 ft. above sea-level. Cloth and pottery are manufactured, and there is some trade in grain and live stock. The nearest railway station is Otero, 15 m. S. by E., on the Lugo-Corunna line.

VILLAMEDIANA, COUNT DE (1582–1622), Spanish poet, was born at Lisbon towards the end of 1582. His father, a distinguished diplomatist, upon whom the dignity of count was conferred in 1603, entrusted the education of the brilliant boy (Juan de Tassis y Peralta) to Luis Tribaldos de Toledo, the future editor of Mendoza's *Guerras de Granada*, and to Bartolomé Jimenez Patón, who subsequently dedicated *Mercurius Trismegistus* to his pupil. On leaving Salamanca the youth married in 1601, and succeeded to the title on the death of his father in 1607, he was prominent in the dissipated life of the capital, acquired a bad reputation as a gambler, was forbidden to attend court, and resided in Italy from 1611 to 1617. On his return to Spain, he soon proved himself a fearless, pungent satirist. Such public men as Lerma, Rodrigo Calderón and Jorge de Tobar writhed beneath his murderous invective; the foibles of humbler private persons were exposed to public ridicule in verses furtively passed from hand to hand. So great was the resentment caused by these envenomed attacks that Villamediana was once more ordered to withdraw from court in 1618 He returned on the death of Philip III, and was appointed gentleman in waiting to Philip IV's young wife, Isabel de Bourbon, daughter of Henri IV. Secure in his position, he scattered his scathing epigrams in profusion; but his ostentatious attentions to the queen supplied his countless foes with a weapon which was destined to destroy him. A fire broke out while his masque, *La Gloria de Niquea*, was being acted before the court on the 15th of May 1622, and Villamediana carried the queen to a place of safety. Suspicion deepened; Villamediana neglected a significant warning that his life was in peril, and on the 21st of August 1622 he was murdered as he stepped out of his coach. The responsibility for his death was divided between Philip IV. and Olivares, the actual assassin was either Alonso Mateo or Ignacio Mendez; and naturally the crime remained unpunished.

Villamediana's works, first published at Saragossa in 1629, contain not only the nervous, blighting verses which made him widely feared and hated, but a number of more serious poems embodying the most exaggerated conceits of gongorism. But, even when adopting the perverse conventions of the hour, he remains a poet of high distinction, and his satirical verses, more perfect in form, are instinct with a cold, concentrated scorn which has never been surpassed. (J. F.-K.)

VILLANELLE, a form of verse, originally loose in construction, but since the 16th century bound in exact limits of an arbitrary kind. The word is ultimately derived from the Latin *villa*, a country house or farm, through the Italian *villano*, a peasant or farm hand, and a villanelle was primarily a round song taken up by men on a farm. The Spaniards called such a song a *villancejo* or *villancete* or a *villancico*, and a man who improvised villanelles was a *villanciquero*. The villanelle was a pastoral poem made to accompany a rustic dance, and from the first it was necessary that it should contain a regular system of repeated lines. The old French villanelles, however, were irregular in form. One of the most celebrated, the "Rosette, pour un peu d'absence" of Philippe Desportes (1545–1606), is a sort of ballade, and those contained in the *Astrée* of d'Urfé, 1610, are scarcely less unlike the villanelles of modern times. It appears, indeed, to have been by an accident that the special and rigorously defined form of the villanelle was invented. In the posthumous poems of Jean Passerat (1534–1602), which were printed in 1606, several villanelles were discovered, in different forms. One of these became, and has remained, so deservedly popular, that it has given its exact character to the subsequent history of the villanelle. This famous poem runs as follows:—

"J'ai perdu ma tourterelle:
Est-ce point celle que j'oi?
Je veux aller après elle.

Tu regrettes ta femelle?
Hélas! aussi fais-je moi:
J'ai perdu ma tourterelle.

Si ton amour est fidèle,
Aussi est ferme ma foi:
Je veux aller après elle.

Ta plainte se renouvelle?
Toujours plaindre je me dois:
J'ai perdu ma tourterelle.

En ne voyant plus la belle
Plus rien de beau je ne vois:
Je veux aller après elle.

Mort, que tant de fois j'appelle,
Prends ce qui se donne à toi:
J'ai perdu ma tourterelle,
Je veux aller après elle."

This exquisite lyric has continued to be the type of its class, and the villanelle, therefore, for the last three hundred years has been a poem, written in tercets, on two rhymes, the first and the third line being repeated alternatively in each tercet It is usual to confine the villanelle to five tercets, but that is not essential, it must, however, close with a quatrain, the last two lines of which are the first and third line of the original tercet. The villanelle was extremely admired by the French poets of the Parnasse, and one of them, Théodore de Banville, compared it to a ribband of silver and gold traversed by a thread of rose-colour. Boulmier, who was the first to point out that Passerat was the inventor of the definite villanelle, published collections of these poems in 1878 and 1879, and was preparing another when he died in 1881. When, in 1877, so many of the early French forms of verse were introduced, or reintroduced, into English literature, the villanelle attracted a great deal of attention, it was simultaneously cultivated by W. E. Henley, Austin Dobson, Lang and Gosse. Henley wrote a large number, and he described the form itself in a specimen beginning:—

" A dainty thing's the Villanelle,
Sly, musical, a jewel in rhyme,
It serves its purpose passing well."

It has since then been very frequently used by English and American poets. There are several excellent examples in English of humorous villanelles, especially those by Austin Dobson and by Henley.

See Joseph Boulmier, *Les Villanelles* (Paris, 1878; 2nd enlarged edition, 1879). (E. G.)

VILLANI, GIOVANNI (*c.* 1275–1348), Italian chronicler, was the son of Villano di Stoldo, and was born at Florence in the second half of the 13th century; the precise year is unknown. He was of good burgher extraction, and, following the traditions of his family, applied himself to commerce. During the early years of the 14th century he travelled in Italy, France and the Netherlands, seeing men and things with the sagacity alike of the man of business and of the historian. Before leaving Florence, or rather in the interval between one journey and another, he had at least taken some part in that troubled period of civil contentions which Dino Compagni has described and which swept Dante Alighieri into banishment. In 1301 Villani saw Charles, count of Valois, ruining his country under the false name of peacemaker, and was witness of all the misery which immediately followed. Somewhat later he left Italy, and in September 1304 he visited Flanders. It is not well ascertained when he returned to his native city. He was certainly living there shortly after the emperor Henry VII. visited Italy in 1312, and probably he had been there for some time before. While still continuing to occupy himself with commerce, he now began to take a prominent part in public affairs. In 1316 and 1317 he was one of the priors, and shared in the crafty tactics whereby Pisa and Lucca were induced to conclude a peace with Florence, to which they were previously averse. In 1317 he also had charge of the mint, and during his administration of this office he collected its earlier records and had a register made of all the coins struck in Florence. In 1321 he was again chosen prior; and, the Florentines having just then undertaken the rebuilding of the city walls, he and some other citizens were deputed to look after the work. They were afterwards accused of having diverted the public money to private ends, but Villani clearly established his innocence. He was next sent with the army against Castruccio Castracani, lord of Lucca, and was present at its defeat at Altopascio In 1328 a terrible famine visited many provinces of Italy, including Tuscany, and Villani was appointed to guard Florence from the worst effects of that distressing period. He has left a record of what was done in a chapter of his *Chronicle*, which shows the economic wisdom in which the medieval Florentines were often so greatly in advance of their age. In 1339, some time after the death of Castruccio, some rich Florentine merchants, and among them Villani, treated for the acquisition of Lucca by Florence for 80,000 florins, offering to supply the larger part of that sum out of their own private means, but the negotiations fell through, owing to the discords and jealousies then existing in the government (*Chron* x. 143) The following year Villani superintended the making of Andrea Pisano's bronze doors for the baptistery In the same year he watched over the raising of the campanile of the Badia, erected by Cardinal Giovanni Orsini (*Chron* x 177) In 1341 the acquisition of Lucca was again under treaty, this time with Martino della Scala, for 250,000 florins. Villani was sent with others as a hostage to Ferrara, where he remained for some months. He was present in Florence during the unhappy period that elapsed between the entry of Walter of Brienne, duke of Athens, and his expulsion by the Florentines (1342–43) Involved through no fault of his own in the failure of the commercial company of the Bonaccorsi, which in its turn had been drawn into the failure of the company of the Bardi, Villani, towards the end of his life, suffered much privation and for some time was kept in prison. In 1348 he fell a victim to the plague described by Boccaccio.

The idea of writing the *Chronicle* was suggested to Villani under the following circumstances. " In the year of Christ 1300 Pope Boniface VIII. made in honour of Christ's nativity a special and great indulgence. And I, finding myself in that blessed pilgrimage in the holy city of Rome, seeing her great and ancient remains, and reading the histories and great deeds of the Romans as written by Virgil, Sallust, Lucan, Livy, Valerius, Paulus Orosius and other masters of history who wrote the exploits and deeds, both great and small, of the Romans and also of strangers, in the whole world . . . considering that our city of Florence, the daughter and offspring of Rome, is on the increase and destined to do great things, as Rome is in her decline, it appeared to me fitting to set down in this volume and new chronicle all the facts and beginnings of the city of Florence, in as far as it has been possible to me to collect and discover them, and to follow the doings of the Florentines at length . . . and so in the year 1300, on my return from Rome, I began to compile this book, in honour of God and of the blessed John, and in praise of our city of Florence." Villani's work, written in Italian, makes its appearance, so to speak, unexpectedly in the historical literature of Italy, just as the history of Florence, the moment it emerges from the humble and uncertain origin assigned to it by legend, rises suddenly into a rich and powerful life of thought and action. Nothing but scanty and partly legendary records had preceded Villani's work, which rests in part on them. The *Gesta Florentinorum* of Sanzanome, starting from these vague origins, begins to be more definite about 1125, at the time of the union of Fiesole with Florence. The *Chronica de Origine Civitatis* seems to be a compilation, made by various hands and at various times, in which the different legends regarding the city's origin have been gradually collected. The *Annales Florentini Primi* (1110–1173) and the *Annales Florentini Secundi* (1107–1247), together with a list of the consuls and podestas from 1197 to 1267, and another chronicle, formerly attributed, but apparently without good reason, to Brunetto Latini, complete the series of ancient Florentine records. To these must, however, be added a certain quantity of facts which were to be found in various manuscripts, being used and quoted by the older Florentine and Tuscan writers under the general name of *Gesta Florentinorum*. Another work, formerly reckoned among the sources of Villani, is the *Chronicle of the Malespini*, but grave doubts are now entertained as to its authenticity, and many hold that at best it is merely a remodelling, posterior to Villani's time, of old records from which several chroniclers may have drawn, either without citing them at all or only doing so in a vague manner.

The *Historie Fiorentine*, or *Cronica universale*, of Villani begins with Biblical times and comes down to 1348. The universality of the narrative, especially in the times near Villani's own, while it bears witness to the author's extensive travels and to the comprehensiveness of his mind, makes one also feel that the book was inspired within the walls of the universal city. Whereas Dino Compagni's *Chronicle* is confined within definite limits of time and place, this of Villani is a general chronicle extending over the whole of Europe. Dino Compagni feels and lives in the facts of his history, Villani looks at them and relates them calmly and fairly, with a serenity which makes him seem an outsider, even when he is mixed up in them. While very important for Italian history in the 14th century, this work is the cornerstone of the early medieval history of Florence. Of contemporary events Villani has a very exact knowledge. Having been a sharer in the public affairs and in the intellectual and economic life of his native city at a time when in both it had no rival in Europe, he depicts what he saw with the vividness natural to a clear mind accustomed to business and to the observation of mankind. He was Guelph, but without passion; and his book is much more taken up with an inquiry into what is useful and true than with party considerations. He is really a chronicler, not an historian, and has but little method in his narrative, often reporting the things which occurred long ago just as he heard them and without criticism. Every now and then he falls into some inaccuracy; but such defects as he has are largely compensated for by his valuable qualities. He was for half a century eyewitness of his history, and he provides abundant information on the constitution of Florence, its customs, industries, commerce and arts; and among the chroniclers throughout Europe he is perhaps unequalled for the value of the statistical data he has preserved. As a writer Villani is clear and acute; and, though his prose has not the force and colouring of Compagni's, it has the advantage of greater simplicity, so that, taking his work as a whole, he may be regarded as the greatest chronicler who has written in Italian. The many difficulties connected with the publication of this important text have hitherto prevented the preparation of a perfect edition. However, the *Chronicle* has been printed by L. A. Muratori in tome xiii. of the *Rerum Italicarum Scriptores* (Milan, 1728), and has been edited by I. Moutier and F. G. Dragomanni (Florence, 1844). Among other editions is one published at Trieste in 1857 and another at Turin in 1879. Selections have been translated into English by R. E. Selfe (1896).

Villani's *Chronicle* was continued by two other members of his family. (1) MATTEO VILLANI, his brother, of whom nothing is known save that he was twice married and that he died of the plague in 1363, continued it down to the year of his death. Matteo's work, though inferior to Giovanni's, is nevertheless very valuable. A more prolix writer than his brother and a less acute observer, Matteo is well informed in his facts, and for the years of which he writes is one of the most important sources of Italian history. (2) FILIPPO VILLANI, the son of Matteo, flourished in the end of the 14th and the beginning of the 15th century. In his continuation which goes down to 1364, though showing greater literary ability, he is very inferior as an historian to his predecessors. His most valuable work was a collection of lives of illustrious Florentines. Twice, in 1401 and 1404, he was chosen to explain in public the *Divina Commedia*. The year of his death is unknown.

See P. Scheffer-Boichorst, *Florentiner Studien* (Leipzig, 1874); G. Gervinus, "Geschichte der Florentinen Historiographie" in his *Historische Schriften* (1833); U. Balzani, *Le cronache Italiane nel medio evo* (Milan, 1884); A. Gaspary, *Geschichte der italienischen Literatur* (Berlin, 1885); O. Knoll, *Beitrage zur italienischen Historiographie im 14. Jahrhundert* (Göttingen 1876), and O. Hartwig, "G. Villani und die Leggenda di Messer Gianni di Procida" in Band xxv. of H. von Sybel's *Historische Zeitschrift*. (U. B.)

VILLANOVA, the name given to an ancient cemetery in the neighbourhood of Bologna, Italy, and generally applied by archaeologists to all the remains of that period, and to the period itself, owing to the discovery therein of a large number of the characteristic remains of the earliest Iron Age of Italy. The antiquities of this culture are widely spread over upper Italy and differ essentially from those of the previous epoch known as Terramara, and they have been described by some as following at a considerable interval, for they show a great advance in metal work. The chief cemeteries of the Villanova period are at Bologna, Este, Villanova, Golaserca, Trezzo, Rivoli and Oppiano. As there can be no doubt that the Terramara culture was that of the aboriginal Ligurians (see, however, TERRAMARA), so the Villanova is that of the Umbrians, who, according to the historians, were masters of all northern Italy, as far as the Alps at the time of the Etruscan conquest (*c.* 1000 B.C.). They contain cist-graves, the bottoms, sides and tops being formed of flat unhewn stones, though sometimes there are only bottom and top slabs: the dead were burnt, and the remains are usually in urns, each grave containing as a rule but one ossuary; sometimes the vessel is covered with a flat stone or a dish inverted, sometimes the urns are deposited in the ground without any protection. The vases are often hand-made and adorned with incised linear ornament, though in later times the bones were often placed in bronze urns or buckets. Though iron is steadily making its way into use, flat, flanged, and socketed and looped celts of bronze are found in considerable numbers. Brooches of many kinds, ranging from the most primitive safety-pin fashioned out of a common bronze pin (such as those found in the Bronze Age settlement at Peschiera on Lake Maggiore) through many varieties, are in universal use. Representations of the human figure are practically unknown, but models of animals of a rude and primitive kind are very common, probably being votive offerings. These are closely parallel to the bronze figures found at Olympia, where human figures were likewise rare. All these objects are decorated in *repoussé* with geometric designs. The culture of the Villanova period is part of the Hallstatt civilization, though the contents of the Hallstatt (*q.v.*) graves differ in several marked features from the antiquities of the ordinary Villanova period, there is no breach of continuity between Hallstatt and Villanova, for the types of Vadena, Este, Golasecca and Villanova are found in the Hallstatt culture. The connexion between the north and the south of the Alps is never interrupted. The chief difference lies in the fact that the Celts of the Danubian region made greater advances in the development of weapons and defensive armour than their kindred in northern Italy. The Po and Danube regions alike are characterized by bronze buckets, cists, girdles and the like, wrought in *repoussé* with animal and geometric designs; but the introduction of iron into Italy is considerably posterior to its development in the Hallstatt area.

See Montelius, *La Civilisation primitive en Italie*; Ridgeway, *Early Age of Greece*, vol. i.; Brizio, in *C. R. Acad. Inscr.* (1906), 315 sqq.; Grenier, in *Mélanges de l'école française* (1907), 325 sqq.; Pigorini and Vaglieri have contributed articles to the *Rendiconti dei Lincei* and the *Notizie degli scavi* from 1907 onwards. (W. Ri.)

VILLANUEVA DE LA SERENA, a town of western Spain, in the province of Badajoz, near the left bank of the river Guadiana, and on the Madrid-Badajoz railway. Pop. (1900) 13,489. Villanueva is a clean and thriving place, with good modern public buildings—town hall, churches, convents and schools. It is the chief town of an undulating plain, La Serena, locally celebrated for red wine and melons. Grain and hemp are also cultivated, and live stock extensively reared in the neighbourhood.

VILLANUEVA Y GELTRU, a seaport of north-eastern Spain, in the province of Barcelona; on the Barcelona-Tarragona section of the coast railway. Pop. (1900) 11,850. Villanueva is a busy modern town, with manufactures of cotton, woollen and linen goods, and of paper. It has also iron foundries and an important agricultural trade. The harbour affords safe and deep anchorage; it is a lifeboat station and the headquarters of a large fishing fleet. The coasting trade is also considerable. Villanueva has a museum, founded by the Catalan poet, historian and diplomat, Vittorio Balaguer (1824–1901), which contains collections of Roman, Egyptian and prehistoric antiquities, besides paintings, engravings, sculptures, coins and a large library, including many valuable MSS.

VILLARD, HENRY (1835–1900), American journalist and financier, was born in Speyer, Rhenish Bavaria, on the 10th of April 1835. His baptismal name was Ferdinand Heinrich Gustav Hilgard. His parents removed to Zweibrücken in 1839, and in 1856 his father, Gustav Leonhard Hilgard (d. 1867), became a justice of the Supreme Court of Bavaria, at Munich. Henry was educated at the gymnasium of Zweibrücken, at the French semi-military academy in Phalsbourg in 1849–50, at the gymnasium of Speyer in 1850–52, and at the universities of Munich and Würzburg in 1852–53; and in 1853, having had a disagreement with his father, emigrated—without his parents' knowledge—to the United States. It was at this time that he adopted the name Villard. Making his way westward in 1854, he lived in turn at Cincinnati, Belleville (Illinois), Peoria (Illinois) and Chicago, engaged in various employments, and in 1856 formed a project, which came to nothing, for establishing a colony of "free soil" Germans in Kansas. In 1856–57 he was editor, and for part of the time was proprietor, of the Racine (Wis.) *Volksblatt*, in which he advocated the election of John C. Frémont (Republican). Thereafter he was associated (in 1857) with the *Staats-Zeitung*, *Frank Leslie's* and the *Tribune*, of New York, and with the Cincinnati *Commercial* in 1859–60; was correspondent of the New York *Herald* in 1861 and of the New York *Tribune* (with the Army of the Potomac) in 1862–63, and in 1864 was at the front as the representative of a news agency established by him in that year at Washington. In 1865 he became Washington correspondent of the Chicago *Tribune*, and in 1866 was the correspondent of that paper in the Prusso-Austrian War. He began to take an interest in railway financiering in 1871, was elected president of the Oregon & California railroad and of the Oregon Steamship Company in 1876, was receiver of the Kansas Pacific railway in 1876–78, organised the Oregon Railway & Navigation Company in 1879, the Oregon Improvement Company in 1880, and the Oregon & Transcontinental Company in 1881, becoming in that year president of the Northern Pacific railway, which was completed under his management, and of which he remained president until 1883. In 1887 he again became connected with the Northern Pacific, and in 1889 was chosen chairman of its finance committee. He was actively identified with the financing of other Western railway projects until 1893. In 1881 he acquired the New York *Evening Post* and the *Nation*. In 1883 he paid the debt of the state university of Oregon, and gave to the institution $50,000, and he also gave to the town of Zweibrücken, the home of his boyhood, an orphan asylum (1891). He died on the 12th of November 1900.

See *Memoirs of Henry Villard, Journalist and Financier, 1835–1900* (2 vols., Boston, 1904).

VILLA REAL, the capital of the district of Villa Real, Portugal; 10 m. N. of the river Douro and 47 m. by road E.N.E. of Oporto. Pop. (1900) 6716. The town has a large transit trade in wine, mineral waters and live stock, especially pigs. The administrative district of Villa Real corresponds with the western part of the ancient province of Traz os Montes (*q.v.*). Pop. (1900) 242,196; area, 1650 sq. m. There are alkaline waters and baths at Vidago (near Chaves) and at Pedras Salgadas (near Villa Pouca d'Aguiar). The district adjacent to the Douro is known as the *Paiz do vinho*, or "wine country"; here are the vineyards from which "port" wine is manufactured.

VILLARET DE JOYEUSE, LOUIS THOMAS (1750–1812), French admiral, was born at Auch, of a noble family of Languedoc. He was originally destined for the church, but served for some time in the royal guard, which he had to leave at the age of sixteen after killing one of his comrades in a duel. He then entered the navy, and in 1773 was lieutenant on the "Atalante" in Indian waters. In 1778 he distinguished himself at the siege of Pondicherry, and was promoted captain. He afterwards served under Suffren, took part in the battle of Cuddalore, and in 1781 was taken prisoner after a fierce encounter with an English vessel. He was released in 1783, and, unlike the majority of naval officers, did not emigrate during the Revolution. In 1791 he was in command of the "Prudente" in the waters of San Domingo, and in 1794 was appointed rear-admiral and assisted the Conventional, St André, in the reorganisation of the fleet. Villaret was in command of the French fleet at the battle of the First of June. He was appointed a member of the Council of the Ancients in 1796, and was sentenced to deportation in the following year on account of his royalist sympathies. He escaped arrest, however, and until the Consulate lived in obscurity at Oléron. In 1801 he commanded the squadron which transported the French army to San Domingo, and the following year was made captain-general of Martinique, which he surrendered to the English in 1809 after a brave defence. In 1811, after some hesitation on the part of Napoleon, Villaret was rewarded for his services with the command of a military division and the post of governor-general of Venice. He died at Venice.

VILLARI, PASQUALE (1827–), Italian historian and statesman, was born at Naples on the 3rd of October 1827. He studied together with Luigi la Vista under Francesco de Sanctis. He was implicated in the riots of the 15th of May 1848 at Naples, against the Bourbon government, and had to take refuge in Florence. There he devoted himself to teaching and historical research in the public libraries, and in 1859 he published the first volume of his *Storia di Girolamo Savonarola e de' suoi tempi*, in consequence of which he was appointed professor of history at Pisa. A second volume appeared in 1861, and the work, which soon came to be recognized as an Italian classic, was translated into various foreign languages. It was followed by a work of even greater critical value, *Niccolò Machiavelli e i suoi tempi* (1877–82). In the meanwhile Villari had left Pisa and was transferred to the chair of philosophy of history at the Institute of Studii Superiori in Florence, and he was also appointed a member of the council of education (1862). He served as a juror at the international exhibition of that year in London, and contributed an important monograph on education in England and Scotland. In 1869 he was appointed under-secretary of state for education, and shortly afterwards was elected member of parliament, a position which he held for several years. In 1884 he was nominated senator, and in 1891–92 he was minister of education in the Marchese di Rudini's first cabinet. In 1893–94 he collected a number of essays on Florentine history, originally published in the *Nuova Antologia*, under the title of *I primi due secoli della storia di Firenze*, and in 1901 he produced *Le Invasioni barbariche in Italia*, a popular account in one volume of the events following the dissolution of the Roman empire. All these works have been translated into English by the historian's wife, Linda White Villari. Another side of Villari's activity was his interest in the political and social problems of the day; and although never identified with any political party, his speeches and writings have always commanded considerable public attention.

Among his other literary works may be mentioned: *Saggi Critici* (1868); *Arte, Storia, e Filosofia* (Florence, 1884); *Scritti varii* (Bologna, 1894); another volume of *Saggi Critici* (Bologna, 1896); and a volume of *Discussioni critiche e discorsi* (Bologna, 1905), containing his speeches as president of the Dante Alighieri Society. His most important political and social essays are collected in his *Lettere Meridionali ed altri scritti sulla questione sociale in Italia* (Turin, 1885), and *Scritti sulla questione sociale in Italia* (Florence, 1902). The *Lettere Meridionali* (originally published in the newspaper *L'Opinione* in 1875) produced a deep impression, as they were the first exposure of the real conditions of southern Italy. A selection of Villari's essays, translated by his wife, has been published in England (1907).

See also Francesco Baldasseroni, *Pasquale Villari* (Florence, 1907).

VILLA RICA, the largest city in the interior of Paraguay, on the railway from Asuncion (70 m. N.W.) to Encarnacion. Pop. (1910) about 25,000. Situated in a rich agricultural region watered by the upper Tepicuary, with finely timbered mountains extending to the E. and W., Villa Rica has an important trade in tobacco and *yerba maté*. It is to a great extent modern, and contains some fine buildings, including a national college, a church, many schools, and a branch of the Agricultural Bank.

VILLARREAL, a town of eastern Spain, in the province of Castellón de la Plana; 4 m. from the Mediterranean Sea, near the right bank of the river Mijares, and on the Barcelona-Valencia railway. Pop. (1900) 16,098. Villarreal has a station on the light railway between Onda and the seaports of Castellón de la Plana and Burriana. Under Moorish rule, and up to the expulsion of the Moriscoes in 1609, it was the headquarters of a flourishing trade, and in modern times its industries have revived. Palm-groves, churches with blue-tiled cupolas, and houses with flat roofs and view-turrets (*miradores*) to some extent preserve the Moorish character of the town. There are extensive orange-groves, watered by the irrigation canal of Castellón, which is a good example of Moorish engineering skill. The local industries include manufactures of paper, woollen goods and spirits.

VILLARS, CLAUDE LOUIS HECTOR DE, Prince de Martigues, Marquis and Duc de Villars and Vicomte de Melun (1653–1734), marshal of France, one of the greatest generals of French history, was born at Moulins on the 8th of May 1653, and entered the army through the corps of pages in 1671. He served in the light cavalry in the Dutch wars, and distinguished himself by his daring and resourcefulness. But in spite of a long record of excellent service under Turenne, Condé and Luxembourg, and of his aristocratic birth, his promotion was but slow for he had incurred the enmity of the powerful Louvois, and although he had been proprietary colonel (*mestre de camp*) of a cavalry regiment since 1674, thirteen years elapsed before he was made a *maréchal de camp* In the interval between the Dutch wars and the formation of the League of Augsburg, Villars, who combined with his military gifts the tact and subtlety of the diplomatist, was employed in an unofficial mission to the court of Bavaria, and there became the constant companion of the elector, with whom he took the field against the Turks and fought at Mohacs. He returned to France in 1690 and was given a command in the cavalry of the army in Flanders, but towards the end of the Grand Alliance War he went to Vienna as ambassador His part in the next war (see SPANISH SUCCESSION WAR), beginning with Friedlingen (1702) and Höchstett (1703) and ending with Denain (1712), has made him immortal. For Friedlingen he received the marshalate, and for the pacification of the insurgent Cévennes the Saint-Esprit order and the title of duke Friedlingen and Höchstett were barren victories, and the campaigns of which they formed part records of lost opportunities. Villars's glory thus begins with the year 1709 when France, apparently helpless, was roused to a great effort of self-defence by the exorbitant demands of the Coalition. In that year he was called to command the main army opposing Eugene and Marlborough on the northern frontier During the famine of the winter he shared the soldiers' miserable rations. When the campaign opened the old Marshal Boufflers volunteered to serve under him, and after the terrible battle of Malplaquet (*q.v.*), in which he was gravely wounded, he was able to tell the king. "If it please God to give your majesty's enemies another such victory, they are ruined" Two more campaigns passed without a battle and with scarcely any advance on the part of the invaders, but at last Marlborough manœuvred Villars out of the famous *Ne plus ultra* lines, and the power of the defence seemed to be broken. But Louis made a last effort, the English contingent and its great leader were withdrawn from the enemy's camp, and Villars, though still suffering from his Malplaquet wounds, outmanœuvred and decisively defeated Eugene in the battle of Denain. This victory saved France, though the war dragged on for another year on the Rhine, where Villars took Landau, led the stormers at Freiburg and negotiated the peace of Rastatt with Prince Eugene.

He played a conspicuous part in the politics of the Regency period as the principal opponent of Cardinal Dubois, and only the memories of Montmorency's rebellion prevented his being made constable of France. He took the field for the last time in the War of the Polish Succession (1734), with the title "marshal-general of the king's armies," that Turenne alone had held before him. But he was now over eighty years of age, and the war was more diplomatic than earnest, and after opening the campaign with all the fire and restless energy of his youth he died at Turin on the 17th of June 1734.

Villars's memoirs show us a "fanfaron plein d'honneur," as Voltaire calls him. He was indeed boastful, with the gasconading habit of his native province, and also covetous of honours and wealth. But he was an honourable man of high courage, moral and physical, and a soldier who stands above all his contemporaries and successors in the 18th century, on the same height as Marlborough and Frederick.

The memoirs, part of which was published in 1734 and afterwards several times republished in untrustworthy versions, were for the first time completely edited by the Marquis de Vogüé in 1884–92.

VILLAVICIOSA, a seaport of northern Spain, in the province of Oviedo; on the Ria de Villaviciosa, an estuary formed by the small river Villaviciosa which here enters the Bay of Biscay Pop. (1900) 20,995. The town is the headquarters of a large fishery, and has some coasting trade. Its exports are chiefly agricultural produce. Villaviciosa suffers from the competition of the neighbouring ports of Gijón and Avilés, and from the lack of railway communication. It is connected by good roads with Siero (13 m.) and Infiesto (9 m.) on the Oviedo-Infiesto railway

VILLEFRANCHE-DE-ROUERGUE, a town of France, capital of an arrondissement in the department of Aveyron, 36 m. W of Rodez by road. Pop (1906) town, 6297, commune, 3352. Villefranche, which has a station on the Orleans railway, lies amongst the hills on the right bank of the Aveyron at its junction with the Alzou One of the three bridges that cross the river belongs to the 13th century, and the straight, narrow streets are full of gabled houses of the 13th and 14th centuries One of the principal thoroughfares passes beneath the porch of Notre-Dame, the principal church of Villefranche. Notre-Dame was built from 1260 to 1581, the massive tower which surmounts its porch being of late Gothic architecture. The remarkable woodwork in the choir dates from the 15th century A Carthusian monastery overlooking the town from the left bank of the Aveyron derives much interest from the completeness and fine preservation of its buildings, which date from the 15th century They include a fine refectory and two cloisters, the smaller of which is a masterpiece of the late Gothic style. The manufacture of leather, animal-traps, hosiery, bell-founding, hemp-spinning, &c., are carried on. Quarries of phosphates and mines of argentiferous lead are worked near Villefranche

Villefranche, founded about 1252, owes its name to the numerous immunities granted by its founder Alphonse, count of Toulouse (d. 1271), and in 1348 it was so flourishing that sumptuary laws were passed. Soon afterwards the town fell into the hands of Edward, the Black Prince, but was the first place in Guienne to rise against the English. New privileges were granted to the town by King Charles V, but these were taken away by Louis XI In 1588 the inhabitants repulsed the forces of the League, and afterwards murdered a governor sent by Henry IV. The town was ravaged by plague in 1463, 1558 and 1628, and in 1643 a revolt, excited by the exactions of the *intendants*, was cruelly repressed.

VILLEFRANCHE-SUR-SAÔNE, a manufacturing town of east-central France, capital of an arrondissement in the department of Rhône, on the Morgon near its junction with the Saône, 21 m. N by W. of Lyons by rail. Pop (1906) 14,794. Among its industries the chief are the manufacture of working clothes, the manufacture, dyeing and finishing of cotton fabrics, the spinning of cotton thread, copper founding and the manufacture of machinery and agricultural implements. The wines of Beaujolais, hemp, cloth, linen, cottons, drapery goods and cattle are the principal articles of trade. An old Renaissance house is used as the town hall. The church of Notre-Dame des Marais, begun at the end of the 14th century and finished in the 16th century, has a tower and spire (rebuilt in 1862), standing to the right of the façade (15th century), in which are carved wooden doors. Villefranche is the seat of a sub-prefect and has tribunals of first instance and of commerce, a chamber of commerce and a communal college among its public institutions.

Founded in 1212 by Guichard IV count of Beaujeu, Villefranche became in the 14th century capital of the Beaujolais. As a punishment for an act of violence towards the mayor's daughter, Edward II. was forced to surrender the Beaujolais to the duke of Bourbon.

VILLEGAS, ESTEBAN MANUEL DE (1589–1669), Spanish poet, was born at Matute (Logroño) on the 5th of February 1589, matriculated at Salamanca on the 20th of November 1610, and challenged attention by the mingled arrogance and accomplishment of *Las Eróticas* (1617), a collection of clever translations from Horace and Anacreon, and of original poems, the charm of which is marred by the writer's petulant vanity Marrying in 1626 or earlier, Villegas practised law at Nájera till 1659, when he was charged with expressing unorthodox views on the subject of free will; he was exiled for four years to Santa Maria de Ribaredonda, but was allowed to return for three months to Nájera in March 1660. It seems probable that the rest of the sentence was remitted, for the report of the local inquisition lays stress on Villegas's simple piety, on the extravagance of his attire, ridiculous in a man of his age, and on the eccentricity of his general conduct and conversation, so marked as to suggest "a kind of mania or lesion of the imagination." In his version of Boetius (1665), Villegas showed that he had profited by his experience, for he made no attempt to translate the last book (in which the problem of free will is discussed), and reprinted the Latin text without comment. He died at Nájera on the 3rd of September 1669. His tragedy *El Hipólito*, imitated from Euripides, and a series of critical dissertations entitled *Varsae Philologiae*, finished in 1650, are unpublished, and "a book of satires," found among his papers by the inquisitors, was confiscated.

VILLEHARDOUIN, GEOFFROY DE (*c.* 1160–*c.* 1213), the first vernacular historian of France, and perhaps of modern Europe, who possesses literary merit, is rather supposed than known to have been born at the château from which he took his name, near Troyes, in Champagne, about the year 1160. Not merely his literary and historical importance, but almost all that is known about him, comes from his chronicle of the fourth crusade, or *Conquête de Constantinople*. Nothing is positively known of his ancestry, for the supposition (originating with Du Cange) that a certain William, marshal of Champagne between 1163 and 1179, was his father appears to be erroneous. Villehardouin himself, however, undoubtedly held this dignity, and certain minute and perhaps not very trustworthy indications, chiefly of an heraldic character, have led his most recent biographers to lay it down that he was not born earlier than 1150 or later than 1164. He introduces himself to us with a certain abruptness, merely specifying his own name as one of a list of knights of Champagne who with their count, Thibault, took the cross at a tournament held at Escry-sur-Aisne in Advent 1199, the crusade in contemplation having been started by the preaching of Fulk de Neuilly, who was commissioned thereto by Pope Innocent III The next year six deputies, two appointed by each of the three allied counts of Flanders, Champagne and Blois, were despatched to Venice to negotiate for ships Of these deputies Villehardouin was one and Quesnes de Béthune, the poet, another. They concluded a bargain with the seigniory for transport and provisions at a fixed price. Villehardouin had hardly returned when Thibault fell sick and died, but this did not prevent, though it somewhat delayed, the enterprise of the crusaders. The management of that enterprise, however, was a difficult one, and cost Villehardouin another embassy into Italy to prevent if possible some of his fellow-pilgrims from breaking the treaty with the Venetians by embarking at other ports and employing other convoy. He was only in part successful, and there was great difficulty in raising the charter-money among those who had actually assembled (in 1202) at Venice, the sum collected falling far short of the stipulated amount. It is necessary to remember this when the somewhat erratic and irregular character of the operations which followed is judged. The defence that the crusaders were bound to pay their passage-money to the Holy Land, in one form or other, to the Venetians, is perhaps a weak one in any case for the attack on two Christian cities, Zara and Constantinople; it becomes weaker still when it is found that the expedition never went or attempted to go to the Holy Land at all. But the desire to discharge obligations incurred is no doubt respectable in itself, and Villehardouin, as one of the actual negotiators of the bargain, must have felt it with peculiar strength.

The crusaders set sail at last, and Zara, which the Venetians coveted, was taken without much trouble. The question then arose whither the host should go next. Villehardouin does not tell us of any direct part taken by himself in the debates on the question of interfering or not in the disputed succession to the empire of the East—debates in which the chief ecclesiastics present strongly protested against the diversion of the enterprise from its proper goal. It is quite clear, however, that the marshal of Champagne, who was one of the leaders and inner counsellors of the expedition throughout, sympathized with the majority, and it is fair to point out that the temptation of chivalrous adventure was probably as great as that of gain. He narrates spiritedly enough the dissensions and discussions in the winter camp of Zara and at Corfu, but is evidently much more at ease when the voyage was again resumed, and, after a fair passage round Greece, the crusaders at last saw before them the great city of Constantinople which they had it in mind to attack. When the assault was decided upon, Villehardouin himself was in the fifth "battle," the leader of which was Mathieu de Montmorency. But, though his account of the siege is full of personal touches, and contains one reference to the number of witnesses whose testimony he took for a certain wonderful fact, he does not tell us anything of his own prowess. After the flight of the usurper Alexius, and when the blind Isaac, whose claims the crusaders were defending, had been taken by the Greeks from prison and placed on the throne, Villehardouin, with Montmorency and two Venetians, formed the embassy sent to arrange terms. He was again similarly distinguished when it became necessary to remonstrate with Alexius, the blind man's son and virtual successor, on the non-keeping of the terms. Indeed Villehardouin's talents as a diplomatist seem to have been held in very high esteem, for later, when the Latin empire had become a fact, he was charged with the delicate business of mediating between the emperor Baldwin and Boniface, marquis of Montferrat, in which task he had at least partial success. He was also appointed marshal of "Romanie"—a term very vaguely used, but apparently signifying the mainland of the Balkan Peninsula, while his nephew and namesake, afterwards prince of Achaia, took a great part in the Latin conquest of Peloponnesus. Villehardouin himself before long received an important command against the Bulgarians. He was left to maintain the siege of Adrianople when Baldwin advanced to attack the relieving force, and with Dandolo had much to do in saving the defeated crusaders from utter destruction, and conducting the retreat, in which he commanded the rearguard, and brought his troops in safety to the sea of Rodosto, and thence to the capital As he occupied the post of honour in this disaster, so he had that (the command of the vanguard) in the expedition which the regent Henry made shortly afterwards to revenge his brother Baldwin's defeat and capture And, when Henry had succeeded to the crown on the announcement of Baldwin's death, it was Villehardouin who fetched home his bride Agnes of Montferrat, and shortly afterwards commanded under him in a naval battle with the ships of Theodore Lascaris at the fortress of Cibotus. In the settlement of the Latin empire after the truce with Lascaris, Villehardouin received the fief of Messinople (supposed to be Mosynopolis, a little inland from the modern Gulf of Lagos, and not far from the ancient Abdera) from Boniface of Montferrat, with the record of whose death the chronicle abruptly closes.

In the foregoing account only those particulars which bear directly on Villehardouin himself have been detailed; but the chronicle is as far as possible from being an autobiography, and the displays of the writer's personality, numerous as they are, are quite involuntary, and consist merely in his way of handling the subject, not in the references (as brief as his functions as chronicler will admit) to his own proceedings. The chronicle of Villehardouin is justly held to be the very best presentation we possess of the spirit of chivalry—not the designedly exalted and poetized chivalry of the romances, not the self-conscious and deliberate chivalry of the 14th century, but the unsophisticated mode of thinking and acting which brought about the crusades, stimulated the vast literary development of the 12th and 13th centuries, and sent knights-errant, principally though not wholly of French blood, to establish principalities and kingdoms throughout Europe and the nearer East. On the whole, no doubt, it is the more masculine and practical side of this enthusiastic state of mind which Villehardouin shows. No woman makes any but the briefest appearance in his pages, though in reference to this it must of course be remembered that he was certainly a man past middle life when the events occurred, and perhaps a man approaching old age when he set them down. Despite the strong and graphic touches here and there, exhibiting the impression which the beauty of sea and land, the splendour of Constantinople, the magnitude of the effete but still imposing Greek power, made on him, there is not only an entire absence of dilation on such subjects as a modern would have dilated on (what was to be expected), but an absence likewise of the elaborate and painful description of detail in which contemporary trouvères would have indulged. It is curious, for instance, to compare the scanty references to the material marvels of Constantinople which Villehardouin saw in their glory, which perished by sack and fire under his very eyes, and which live chiefly in the melancholy pages of his Greek contemporary Nicetas, with the elaborate descriptions of the scarcely greater wonders of fabulous courts at Constantinople itself, at Babylon, and elsewhere, to be found in his other contemporaries, the later *chanson de geste* writers and the earlier embroiderers of the Arthurian romances and *romans d'aventures*. And this later contrast is all the more striking that Villehardouin agrees with, and not impossibly borrows from, these very writers in many points of style and phraseology. The brief chapters of his work have been justly compared to the *laisses* or *tirades* of a chanson in what may be called the vignetting of the subject of each, in the absence of any attempt to run on the narrative, in the stock forms, and in the poetical rather than prosaic word-order of the sentences. Undoubtedly this half-poetic style (animated as it is and redeemed from any charge of bastardy by the freshness and vigour which pervade it) adds not a little to the charm of the book. Its succession of word pictures, conventional and yet vigorous as the illuminations of a medieval manuscript, and in their very conventionality free from all thought of literary presentation, must charm all readers. The sober lists of names with which it opens; the account of the embassy, so business-like in its estimates of costs and terms, and suddenly breaking into a fervent description of how the six deputies, "prostrating themselves on the earth and weeping warm tears, begged the doge and people of Venice to have pity on Jerusalem"; the story immediately following, how the young count Thibault of Champagne, raising himself from a sickbed in his joy at the successful return of his ambassadors, "leva sus et chevaucha, et laz! com grant domages, car onques puis ne chevaucha que cele foiz," compose a most striking overture. Then the history relapses into the business vein and tells of the debates which took place as to the best means of carrying out the vow after the count's decease, the rendezvous, too ill kept at Venice, the plausible suggestion of the Venetians that the balance due to them should be made up by a joint attack on their enemy, the king of Hungary. Villehardouin does not in the least conceal the fact that the pope ("l'apostoilles de Rome," as he calls him, in the very phrase of the *chansons*) was very angry with this; for his own part he seems to think of little or nothing but the reparation due to the republic, which had loyally kept its bargain and been defrauded of the price, of the infamy of breaking company on the part of members of a joint association, and perhaps of the unknightliness of not taking up an adventure whenever it presents itself. For here again the restoration of the disinherited prince of Constantinople supplied an excuse quite as plausible as the liquidation of the debt to Venice. A famous passage, and one short enough to quote, is that describing the old blind doge Dandolo, who had "Grant ochoison de remanoir (reason for staying at home), car viels hom ere, et si avoit les yaulx en la teste biaus et n'en véoit gote (goutte)," and yet was the foremost in fight.

It would be out of place to attempt any further analysis of the *Conquête* here. But it is not impertinent, and is at the same time an excuse for what has been already said, to repeat that Villehardouin's book, brief as it is, is in reality one of the capital books of literature, not merely for its merit, but because it is the most authentic and the most striking embodiment in contemporary literature of the sentiments which determined the action of a great and important period of history. There are but very few books which hold this position, and Villehardouin's is one of them. If every other contemporary record of the crusades perished, we should still be able by aid of this to understand and realize what the mental attitude of crusaders, of Teutonic knights, and the rest was, and without this we should lack the earliest, the most undoubtedly genuine, and the most characteristic of all such records. The very inconsistency with which Villehardouin is chargeable, the absence of compunction with which he relates the changing of a sacred religious pilgrimage into something by no means unlike a mere filibustering raid on the great scale, add a charm to the book. For, religious as it is, it is entirely free from the very slightest touch of hypocrisy or indeed of self-consciousness of any kind. The famous description of the crusades, *gesta Dei per Francos*, was evidently to Villehardouin a plain matter-of-fact description, and it no more occurred to him to doubt the divine favour being extended to the expeditions against Alexius or Theodore than to doubt that it was shown to expeditions against Saracens and Turks.

The person of Villehardouin reappears for us once, but once only, in the chronicle of his continuator, Henri de Valenciennes. There is a great gap in style, though none in subject, between the really poetical prose of the first historian of the fifth crusade and the Latin empire and the awkward mannerism (so awkward that it has been taken to represent a "disrhymed" verse chronicle) of his follower But the much greater length at which Villehardouin appears on this one occasion shows us the restraint which he must have exercised in the passages which deal with himself in his own work. He again led the vanguard in the emperor Henry's expedition against Burilas the Bulgarian, and he is represented by the Valenciennes scribe as encouraging his sovereign to the attack in a long speech. Then he disappears altogether, with the exception of some brief and chiefly diplomatic mentions. Du Cange discovered and quoted a deed of donation by him dated 1207, by which certain properties were devised to the churches of Notre Dame de Foissy and Notre Dame de Troyes, with the reservation of life interests to his daughters Alix and Damerones, and his sisters Emmeline and Haye, all of whom appear to have embraced a monastic life. A letter addressed from the East to Blanche of Champagne is cited, and a papal record of 1212 styles him still "marshal of Romania." The next year this title passed to his son Erard; and 1213 is accordingly given as the date of his death, which, as there is no record or hint of his having returned to France, may be supposed to have happened at Messinople, where also he must have written the *Conquête*.

The book appears to have been known in the ages immediately succeeding his own; and, though there is no contemporary manuscript in existence, there are some half-dozen which appear to date from the end of the 13th or the course of the 14th century, while one at least appears to be a copy made from his own work in that spirit of unintelligent faithfulness which is much more valuable to posterity than more pragmatical editing. The first printed edition of the book, by a certain Blaise de Vigenère, dates from 1585, is dedicated to the seigniory of Venice (Villehardouin, it should be said, has been accused of a rather unfair predilection for the Venetians), and speaks of either a part or the whole of the memoirs as having been printed twelve years earlier. Of this earlier copy nothing seems to be known. A better edition, founded on a Netherlandish MS., appeared at Lyons in 1601. But both these were completely antiquated by the great edition of Du Cange in 1657, wherein that learned writer employed all his knowledge, never since equalled, of the subject, but added a translation, or rather paraphrase, into modern French which is scarcely worthy either of himself or his author. Dom Brial gave a new edition from different MS. sources in 1823, and the book figures with different degrees of dependence on Du Cange and Brial in the collections of Petitot, Buchon, and Michaud and Poujoulat. All these, however, have been superseded for the modern student by the editions of Natalis de Wailly (1872 and 1874), in which the text is critically edited from all the available MSS. and a new translation added, while there is a still later and rather handier one by E. Bouchet (2 vols., Paris, 1891), which, however, rests mainly on N. de Wailly for text. The charm of Villehardouin can escape no reader; but few readers will fail to derive some additional pleasure from the two essays which Sainte-Beuve devoted to him, reprinted in the ninth volume of the *Causeries du lundi*. See also A. Debidour, *Les Chroniqueurs* (1888). There are English translations by T. Smith (1829), and (more literally) Sir F. T. Marzials (Everyman's Library, 1908). (G. Sa.)

VILLÈLE, JEAN BAPTISTE GUILLAUME MARIE ANNE SÉRAPHIN, Comte de (1773–1854), French statesman, was born at Toulouse on the 14th of April 1773 and educated for the navy. He joined the "Bayonnaise" at Brest in July 1788 and served in the West and East Indies. Arrested in the Isle of Bourbon under the Terror, he was set free by the revolution of Thermidor (July 1794). He acquired some property in the island, and married in 1799 the daughter of a great proprietor, M. Desbassyns de Richemont, whose estates he had managed. His apprenticeship to politics was served in the Colonial Assembly of Bourbon, where he fought successfully to preserve the colony from the consequences of perpetual interference from the authorities in Paris, and on the other hand to prevent local discontent from appealing to the English for protection. The arrival of General Decaen, sent out by Bonaparte in 1802, restored security to the island, and five years later Villèle, who had now realized a large fortune, returned to France. He was mayor of his commune, and a member of the council of the Haute-Garonne under the Empire At the restoration of 1814 he at once declared for royalist principles. He was mayor of Toulouse in 1814–15 and deputy for the Haute-Garonne in the "Chambre Introuvable" of 1815 Villèle, who before the promulgation of the charter had written some *Observations sur le projet de constitution* opposing it, as too democratic in character, naturally took his place on the extreme right with the ultra-royalists. In the new Chamber of 1816 Villèle found his party in a minority, but his personal authority nevertheless increased. He was looked on by the ministerialists as the least unreasonable of his party, and by the "ultras" as the safest of their leaders. Under the electoral law of 1817 the Abbé Grégoire, who was popularly supposed to have voted for the death of Louis XVI. in the Convention, was admitted to the Chamber of Deputies. The Conservative party gained strength from the alarm raised by this incident and still more from the shock caused by the assassination of the duc de Berri. The duc de Richelieu was compelled to admit to the cabinet two of the chiefs of the Left, Villèle and Corbière. Villèle resigned within a year, but on the fall of Richelieu at the end of 1821 he became the real chief of the new cabinet, in which he was minister of finance. Although not himself a courtier, he was backed at court by Sosthènes de la Rochefoucauld and Madame du Cayla, and in 1822 Louis XVIII. gave him the title of count and made him formally prime minister. He immediately proceeded to muzzle opposition by stringent press laws, and the discovery of minor liberal conspiracies afforded an excuse for further repression. Forced against his will into interference in Spain by Mathieu de Montmorency and Chateaubriand, he contrived to reap some credit for the monarchy from the successful campaign of 1823. Meanwhile he had consolidated the royal power by persuading Louis XVIII. to swamp the liberal majority in the upper house by the nomination of twenty-seven new peers; he availed himself of the temporary popularity of the monarchy after the Spanish campaign to summon a new Chamber of Deputies. This new and obedient legislature, to which only nineteen liberals were returned, made itself into a septennial parliament, thus providing time, it was thought, to restore some part of the *ancien régime*. Villèle's plans were assisted by the death of Louis XVIII. and the accession of his bigoted brother. Prudent financial administration since 1815 had made possible the conversion of the state bonds from 5 to 4%. It was proposed to utilize the money set free by this operation to indemnify by a milliard francs the *emigrés* for the loss of their lands at the Revolution; it was also proposed to restore their former privileges to the religious congregations. Both these propositions were, with some restrictions, secured. Sacrilege was made a crime punishable by death, and the ministry were preparing a law to alter the law of equal inheritance, and thus create anew the great estates. These measures roused violent opposition in the country, which a new and stringent press law, nicknamed the "law of justice and love," failed to put down. The peers rejected the law of inheritance and the press law; it was found necessary to disband the National Guard; and in November 1827 seventy-six new peers were created, and recourse was had to a general election. The new Chamber proved hostile to Villèle, who resigned to make way for the short-lived moderate ministry of Martignac.

The new ministry made Villèle's removal to the upper house a condition of taking office, and he took no further part in public affairs. At the time of his death, on the 13th of March 1854, he had advanced as far as 1816 with his memoirs, which were completed from his correspondence by his family as *Mémoires et correspondance du comte de Villèle* (Paris, 5 vols., 1887–90).

See also C. de Mazade, *L'Opposition royaliste* (Paris, 1894); J. G. Hyde de Neuville. *Notice sur le comte de Villèle* (Paris, 1899); and M. Chotard, "L'Œuvre financière de M. de Villèle," in *Annales des sciences politiques* (vol. v., 1890).

VILLEMAIN, ABEL FRANÇOIS (1790–1867), French politician and man of letters, was born in Paris on the 9th of June 1790. He was educated at the lycée Louis-le-Grand, and became assistant master at the lycée Charlemagne, and subsequently at the École Normale. In 1812 he gained a prize from the Academy with an *éloge* on Montaigne. Under the restoration he was appointed, first, assistant professor of modern history, and then professor of French eloquence at the Sorbonne. Here he delivered a series of literary lectures which had an extraordinary effect on his younger contemporaries. Villemain had the great advantage of coming just before the Romantic movement, of having a wide and catholic love of literature without being an extremist. All, or almost all, the clever young men of the brilliant generation of 1830 passed under his influence; and, while he pleased the Romanticists by his frank appreciation of the beauties of English, German, Italian and Spanish poetry, he had not the least inclination to decry the classics—either the classics proper of Greece and Rome or the so-called classics of France. In 1819 he published a book on *Cromwell*, and two years later he was elected to the Academy. Villemain was appointed by the restoration government "chef de l'imprimerie et de la librairie," a post involving a kind of irregular censorship of the press, and afterwards to the office of master of requests. Before the revolution of July he had been deprived of his office for his liberal tendencies, and had been elected deputy for Évreux. Under Louis Philippe he received a peerage in 1832. He was a member of the council of public instruction, and was twice minister of that department, and he also became secretary of the Academy. During the whole of the July monarchy he was thus one of the chief dispensers of literary patronage in France, but in his later years his reputation declined. He died in Paris on the 8th of May 1867.

Villemain's chief work is his *Cours de la littérature française* (5 vols., 1828–29). Among his other works are: *Tableau de la littérature du moyen âge* (2 vols., 1846); *Tableau de la littérature au XVIII^e siècle* (4 vols., 1864); *Souvenirs contemporains* (2 vols., 1856); *Histoire de Grégoire VII.* (2 vols., 1873; Eng. trans., 1874).

Among notices on Villemain may be cited that of Louis de Loménie (1841), E. Mirecourt (1858), J. L. Dubut (1875). See also Sainte-Beuve, *Portraits* (1841, vol. iii.), and *Causeries du lundi* (vol. xi. "Notes et pensées").

VILLENA, ENRIQUE DE (1384–1434), Spanish author, was born in 1384. Through his grandfather, Alphonso de Aragon, count de Denia y Ribagorza, he traced his descent from Jaime II. of Aragon and Blanche of Naples. He is commonly known as the marquess de Villena; but, although a marquessate was at one time in the family, the title was revoked and annulled by Henry III. Villena's father, Don Pedro de Villena, was killed at Aljubarrota; the boy was educated by his grandfather, showed great capacity for learning and was reputed to be a wizard. About 1402 he married Maria de Albornoz, señora del Infantado, who speedily became the recognized mistress of Henry III.; the complaisant husband was rewarded by being appointed master of the military order of Calatrava in 1404, but on the death of Henry at the end of 1406 the knights of the order refused to accept the nomination, which, after a long contest, was rescinded in 1415. He was present at the coronation of Ferdinand of Aragon at Saragossa in 1414, retired to Valencia till 1417, when he moved to Castile to claim compensation for the loss of his mastership. He obtained in return the lordship (*señorio*) of Miesta, and, conscious of his unsuitability for warfare or political life, dedicated himself to literature. He died of fever at Madrid on the 15th of December 1434. He is represented by a fragment of his *Arte de trobar* (1414), an indigestible treatise composed for the Barcelona Consistory of Gay Science; by *Los Trabajos de Hércules* (1417), a pedantic and unreadable allegory; by his *Tratado de la Consolación* and his handbook to the pleasures and fashions of the table, the *Arte cisoria*, both written in 1423; by a commentary on Psalm viii. ver. 4, which dates from 1424; by the *Libro de Aojamiento* (1425), a ponderous dissertation on the evil eye and its effects; and by a translation of the *Aeneid*, the first ever made, which was finished on the 10th of October 1428. His treatise on leprosy exists but has not been published. Villena's writings do not justify his extraordinary fame; his subjects are devoid of charm, and his style is so uncouth as to be almost unintelligible. Yet he has an assured place in the history of Spanish literature; he was a generous patron of letters, his translation of Virgil marks him out as a pioneer of the Renaissance, and he set a splendid example of intellectual curiosity. Moreover, there is an abiding dramatic interest in the baffling personality of the solitary high-born student whom Lope de Vega introduces in *Porfiar hasta morir*, whom Ruiz de Alarcón presents in *La Cueva de Salamanca*, and who reappears in the

19th century in Larra's *Macias* and in Hartzenbusch's play *La Redoma encantada*. (J. F.-K.)

VILLENA, a town of eastern Spain, in the province of Alicante; on the right bank of the river Vinalapo, and at the junction of railways from Valencia, Alicante, Albacete and Yecla. Pop. (1900) 14,099. Villena is a labyrinth of winding alleys, which contain some interesting examples of Moorish domestic architecture. It is dominated by a large and picturesque Moorish castle. The surrounding hills are covered with vines, and to the east there is an extensive salt lagoon. Silk, linen, flour, wine, brandy, oil, salt and soap are the chief industrial products.

VILLENAGE (VILLAINAGE, VILLANAGE, VILLEINAGE), a medieval term (from *villa*, *villanus*), pointing to serfdom, a condition of men intermediate between freedom and slavery. It occurs in France as well as in England, and was certainly imported into English speech through the medium of Norman French. The earliest instances of its use are to be found in the Latin and French versions of English documents in the 11th and 12th centuries (cf. Domesday Book; Liebermann, Glossary to the *Gesetze der Angelsachsen*, s.v. *villanus*, *vilain*). The history of the word and of the condition is especially instructive in English usage.

The materials for the formation of the villein class were already in existence in the Anglo-Saxon period. On the one hand, the Saxon ceorls (*twihyndemen*), although considered as including the typical freemen in the earlier laws (Æthelberht, Hlothhere and Edric, Ine), gradually became differentiated through the action of political and economic causes, and many of them had to recognize the patronage of magnates or to seek livelihood as tenants on the estates of the latter. These ceorls, sitting on gafol-land, were, though personally free, considered as a lower order of men, and lapsed gradually into more or less oppressive subjection in respect of the great landowners. It is characteristic in this connexion that the West Saxon laws do not make any distinction between ceorls and laets or half-freemen as the Kentish laws had done: this means that the half-free people were, if not Welshmen, reckoned as members of the ceorl class. Another remarkable indication of the decay of the ceorl's estate is afforded by the fact that in the treaties with the Danes the twibynde ceorls are equated with the Danish lysings or freedmen. It does not mean, of course, that their condition was practically the same, but in any case the fact testifies to the gulf which had come to separate the two principal subdivisions of the free class—the ceorl and the thane. The Latin version of the *Rectitudines Singularum Personarum*, a document compiled probably in the 11th century, not long before the Conquest, renders *geneat* (a peasant tenant of a superior kind performing lighter services than the gebur, as he was burdened with heavy week-work) by *villanus*; but the gebur came to be also considered as a *villanus* according to Anglo-Norman terminology. The group designated as *geburs* in Anglo-Saxon charters, though distinguished from mere slaves (*theow baerde-burbaerde*, Kemble, *Cod. Dipl.* 1079), undoubtedly included many freedmen who in point of services and economic subjection were not very much above the slaves. Both ceorls and geburs disappear as separate classes, and it is clear that the greater part of them must have passed into the rank of villeins.

In the terminology of the Domesday Inquest we find the villeins as the most numerous element of the English population. Out of about 240,000 households enumerated in Domesday 100,000 are marked as belonging to villeins. They are rustics performing, as a rule, work services for their lords. But not all the inhabitants of the villages were designated by that name. Villeins are opposed to socmen and freemen on one hand, to *bordarii*, cottagers and slaves on the other. The distinction in regard to the first two of these groups was evidently derived from their greater freedom, although the difference is only one in degree and not in kind. In fact, the villein is assumed to be a person free by birth, but holding land of which he cannot dispose freely. The distinction as against *bordarii* and cottagers is based on the size of the holding: the villeins are holders of regular shares in the village—that is, of the virgates, bovates or half-hides which constitute the principal subdivisions in the fields and contribute to form the plough-teams—whereas the *bordarii* hold smaller plots of some 5 acres, more or less, and *cotarii* are connected with mere cottages and crofts. Thus the terminology of Domesday takes note of two kinds of differences in the status of rustics: a legal one in connexion with the right to dispose of property in land, and an economic one reflecting the opposition between the holders of shares in the fields and the holders of auxiliary tenements. The feature of personal serfdom is also noticeable, but it provides a basis only for the comparatively small group of *servi*, of whom only about 25,000 are enumerated in Domesday Book. The contrast between this exceptionally situated class and the rest of the population shows that personal slavery was rapidly disappearing in England about the time of the Conquest. It is also to be noticed that the Domesday Survey constantly mentions the *terra villanorum* as opposed to the demesne in the estates or manors of the time, and that the land of the rustics is taxed separately for the geld, so that the distinction between the property of the lord and that of the peasant dependent on him is clearly marked and by no means devoid of practical importance.

The Domesday Survey puts before us the state of things in England as it was at the very beginning of the Norman and at the close of the Saxon period. The development of feudal society, of centralizing kingship and ultimately of a system of common law, brought about great changes which all hinge on the fundamental fact that the kings, while increasing the power of the state in other respects, surrendered it completely as regards the relations between the peasants and their lords. The protection of the assizes was tendered in civil matters to free tenants and refused to villeins. The royal courts refused to entertain suits of villeins against their lords, although there was a good deal of vacillation before this position was definitely taken up. Bracton still speaks in his treatise of the possibility for the courts to interfere against intolerable cruelty on the part of the lord involving the destruction of the villein's waynage, that is, of his ploughteam, and in the *Notebook* of Bracton there are a couple of cases which prove that 13th-century judges occasionally allowed themselves to entertain actions by persons holding in villenage against their lords. Gradually, however, the exception of villenage became firmly settled. As the historical and practical position was developing on these lines the lawyers who fashioned English common law in the 12th and 13th centuries did not hesitate to apply to it the teaching of Roman law on slavery. Bracton fits his definition of villenage into the Romanesque scheme of Azo's *Summa* of the Institutes, and the judges of the royal courts made sweeping inferences from this general position. To begin with, the relation between the villein and his lord was regarded as a personal and not a praedial one. Everyone born of villein stock belonged to his master and was bound to undertake any service which might be imposed on him by the master's or the steward's command. The distinction between villeins in gross and villeins regardant, of which much is made by modern writers, was suggested by modes of pleading and does not make its appearance in the Year-Books before the 15th century. Secondly, all independent proprietary rights were denied to the villein as against his lord, and the legal rule "quicquid servo acquiritur domino acquiritur" was extended to villeins. The fact that a great number of these serfs had been enjoying protection as free ceorls in former ages made itself felt, however, in three directions. (1) In criminal matters the villein was treated by the King's Court irrespectively of any consideration as to his debased condition. More especially the police association, organized for the keeping of the peace and the presentation of criminals—the frankpledge groups were formed of all "worthy of were and wite," villeins as well as freemen. (2) Politically the villeins were not eliminated from the body of citizens: they had to pay taxes, to serve in great emergencies in the militia, to serve on inquests, &c., and although there was a tendency to place them on a lower footing in all these respects yet the fact of their being lesser members of the commonwealth did not remove the fundamental qualification of citizenship. (3) Even in civil matters villeins were deemed free as regards third persons. They could sue and be sued in their own name, and although they were able to call in their lords as defendants when proceeded against, there was nothing in law to prevent them from appearing in their own right. The state even afforded them protection against extreme cruelty on the part of their masters in respect of life and limb, but in laying down this rule English lawyers were able to follow the precedents set by late Roman jurisprudence, especially by measures of Hadrian, Antonine and Constantine the Great.

There was one exception to this harsh treatment of villeins, namely, the rustic tenantry in manors of *ancient demesne*, that is, in estates which had belonged to the crown before the Conquest, had a standing-ground even against their lords as regards the tenure of their plots and the fixity of their services. Technically this right was limited to the inhabitants of manors entered in the Domesday Survey as *terra regis* of Edward the Confessor. On the other hand the doctrine became effective if the manors in question had been granted by later kings to subjects, because if they remained in the hand of the king the only remedy against ejectment and exaction lay in petitioning for redress without any definite right to the latter. If, however, the two conditions mentioned were forthcoming, villeins, or, as they were technically called, villein socmen of ancient demesne manors, could resist any attempt of their lords to encroach on their rights by depriving them of their holdings or increasing the amount of their customary services. Their remedy was to apply for a little writ of right in the first case and for a writ of *monstraverunt* in the second. These writs entitled them to appear as plaintiffs against the lord in his own manorial court and, eventually, to have the question at issue examined by way of appeal, on a writ of error, or by reservation on some legal points in the upper courts of the king. A number of cases arising from these privileges of the men of ancient demesne are published in the *Notebook* of Bracton and in the *Abbreviatio placitorum*. This exceptional procedure does not simply go back to the rule that persons who had been tenants of the king ought not to have their condition altered for the worse in consequence of a royal grant. If this were the only doctrine applicable in the case there would be no reason why similar protection should be denied to all those who held under grantees of manors escheated after the Conquest. A material point for the application of the privilege consists in the fact that ancient demesne has to be proved from the time before the Conquest, and this shows clearly that the theory was partly derived from the recognition of tenant right in villeins of the Anglo-Saxon period who, as we have said above, were mostly ceorls, that is, freeborn men.

In view of the great difference in the legal position of the free man and of the villein in feudal common law, it became very important to define the exact nature of the conditions on which the status of a villein depended. The legal theory as to these conditions was somewhat complex, because it had to take account of certain practical considerations and of a rather abrupt transition from a previous state of things based on different premises. Of course, persons born from villein parents in lawful wedlock were villeins, but as to the condition of illegitimate children there was a good deal of hesitation. There was a tendency to apply the rule that a bastard follows the mother, especially in the case of a servile mother. In the case of mixed marriages, the condition of the child is determined by the free or villein condition of the tenement in which it was born. This notion of the influence of the tenement is well adapted to feudal notions and makes itself felt again in the case of the pursuit of a fugitive villein. He can be seized without further formalities if he is caught in his "nest," that is, in his native place. If not, the lord can follow him in fresh pursuit for four days; once these days past, the fugitive is maintained provisionally in possession of his liberty, [illegible] the lord has to bring an action *de nativo habendo* and has to [illegible] the burden of proof.

So much as to the proof of villenage by birth or previous condition. But there were numbers of cases when the discussion as to servile status turned not on these formal points but on an examination of the services performed by the person claimed as a villein or challenged as holding in villenage. In both cases the courts had often recourse to proof derived not from direct testimony but from indirect indications as to the kind of services that had been performed by the supposed villein. Certain services, especially the payment of *merchet*—the fine for marrying a daughter—were considered to be the badge of serfdom. Another service, the performance of which established a presumption as to villenage, was compulsory service as a reeve. The courts also tried to draw a distinction from the amount and regularity of agricultural services to which a tenant was subjected. Bracton speaks of the contrast between the irregular services of a serf, "who could not know in the evening what he would have to do in the morning," and services agreed upon and definite in their amount. The customary arrangements of the work of villeins, however, render this contrast rather fictitious. The obligations of downright villeins became to that degree settled and regular that one of the ordinary designations of the class was *custumarii*. Therefore in most cases there were no arbitrary exactions to go by, except perhaps one or the other tallage imposed at the will of the lord. The original distinction seems to have been made not between arbitrary and agreed but between occasional services and regular agricultural week-work. While the occasional services, even when agricultural, in no way established a presumption of villenage, and many socmen, freemen and holders by serjeanty submitted to them, agricultural week-work was primarily considered as a trait of villenage and must have played an important part in the process of classification of early Norman society. The villein was in this sense emphatically the man holding "by the fork and the flail."

This point brings us to consider the matter-of-fact conditions of the villeins during the feudal period, especially in the 12th, 13th and 14th centuries. As is shown by the Hundred Rolls, the Domesday of St Paul, the Surveys of St Peter, Glouc., Glastonbury Abbey, Ramsey Abbey and countless other records of the same kind, the customary conditions of villenage did not tally by any means with the identification between villenage and slavery suggested by the jurists. It is true that in nomenclature the word "*servi*" is not infrequently used (*e.g.* in the Hundred Rolls) where *villani* might have been mentioned, and the feminine *nief* (*nativa*) appears as the regular parallel of *villanus*, but in the descriptions of usages and services we find that the power of the lord loses its discretionary character and is in every respect moderated by custom. As personal dependents of the lord native villeins were liable to be sold, and we find actual sales recorded: Glastonbury Abbey *e.g.* sells a certain Philipp Hardyng for 20 shillings. But such transfers of human chattels occur seldom, and there is nothing during the English feudal period corresponding to the brisk trade in men characteristic of the ancient world. *Merchet* was regarded, as has been stated already, as a badge of serfdom in so far as it was said to imply a "buying of one's own blood" (*servus de sanguine suo emendo*). The explanation is even more characteristic than the custom itself, because fines on marriage may be levied and were actually levied from people of different condition, from the free as well as from the servi. Still the tendency to treat *merchet* as a distinctive feature of serfdom has to be noted, and we find that the custom spread for this very reason in consequence of the encroachments of powerful lords: in the Hundred Rolls it is applied indiscriminately to the whole rustic population of certain hundreds in a way which can hardly be explained unless by artificial extension. *Heriot*, the surrender of the best horse or ox, is also considered as the common incident of villein tenure, although, of course, its very name proves its intimate connexion with the outfit of soldiers (*here-geata*).

Economically the institution of villenage was bound up with the manorial organization—that is, with the fact that the country was divided into a number of districts in which central home farms were cultivated by the help of work supplied by villein households.

The most important of villein services is the *week-work* performed by the peasantry. Every virgater or holder of a bovate has to send a labourer to do work on the lord's farm for some days in the week. Three days is indeed the most common standard for service of this kind, though four or even five occur sometimes, as well as two. It must be borne in mind in the case of heavy charges, such as four or five days' week-work, that only one labourer from the whole holding is meant, while generally there were several men living on every holding—otherwise the service of five days would be impossible to perform. In the course of these three days, or whatever the number was, many requirements of the demesne had to be met. The principal of these was *ploughing the fields* belonging to the lord, and for such ploughing the peasant had not only to appear personally as a labourer, but to bring his oxen and plough, or rather to join with his oxen and plough in the work imposed on the village: the heavy, costly plough with a team of eight oxen had to be made up by several peasants contributing their beasts and implements towards its composition. In the same way the villagers had to go through the work of harrowing with their harrows, and of removing the harvest in their vans and carts. *Carriage* duties in carts and on horseback were also apportioned according to the time they took as a part of the week-work. Then came innumerable varieties of manual work for the erection and keeping up of hedges, the preservation of dykes, canals and ditches, the threshing and garnering of corn, the tending and shearing of sheep and so forth. All this hand-work was reckoned according to customary standards as day-work and week-work. But besides all these services into which the regular week-work of the peasantry was differentiated, stood some additional duties. The ploughing for the lord, for instance, was not only imposed in the shape of a certain number of days in the week, but took sometimes the shape of a certain number of acres which the village had to plough and to sow for the lord irrespectively of the time employed on it. This was sometimes termed *gafolearth*. Exceedingly burdensome services were required in the seasons when farming processes are, as it were, at their height—in the seasons of mowing and reaping, when every day is of special value and the working power of the farm hands is strained to the utmost. At that time it was the custom to call up the whole able-bodied population of the manor, with the exception of the housewives for two, three or more days of mowing and reaping on the lord's fields; to these *boon-works* the peasantry was asked or invited by special summons, and their value was so far appreciated that the villagers were usually treated to meals in cases where they were again and again called off from their own fields to the demesne. The liberality of the lord actually went so far, in exceptionally hard straits, that some ale was served to the labourers to keep them in good humour.

In the 14th century this social arrangement, based primarily on natural economy and on the feudal disruption of society, began to give way. The gradual spread of *intercourse* rendered unnecessary the natural husbandry of former times which sought to produce a complete set of *goods* in every separate locality. Instead of acting as a little world by itself for the raising of corn, the breeding of cattle, the gathering of wool, the weaving of linen and common cloths, the fabrication of necessary implements of all kinds, the local group began to buy some of these goods and to sell some others, renouncing isolation and making its destiny dependent on commercial intercourse. Instead of requiring from its population all kinds of work and reducing its ordinary occupations to a hard-and-fast routine meeting in a slow and unskilled manner all possible contingencies, the local group began to move, to call in workmen from abroad for tasks of a special nature, and to send its own workmen to look out for profitable employment in other places. Instead of managing the land by the constant repetition of the same processes, by a customary immobility of tenure and service, by communalistic restrictions on private enterprise and will, local society began to try improvements, to escape from the bounds of champion farming. Instead of producing and collecting goods for immediate consumption, local society came more and more into the habit of exchanging corn, cattle, cloth, for money, and of laying money by as a means of getting all sorts of exchangeable goods, when required. In a word, the time of *commercial, contractual, cash intercourse* was coming fast. What was exceptional and subsidiary in feudal times came to obtain general recognition in the course of the 14th and 15th centuries, and, for this very reason, assumed a very different aspect. A similar transformation took place in regard to government. The local monarchy of the manorial lords was fast giving way to a central power which maintained its laws, the circuits of its judges, the fiscal claims of its exchequer, the police interference of its civil officers all through the country, and, by prevailing over the franchises of manorial lords, gave shape to a vast dominion of legal equality and legal protection, in which the forces of commercial exchange, of contract, of social intercourse, found a ready and welcome sphere of action. In truth both processes, the economic and the political one, worked so much together that it is hardly possible to say which influenced the other more, which was the cause and which the effect. Government grew strong because it could draw on a society which was going ahead in enterprise and well-being; social intercourse progressed because it could depend on a strong government to safeguard it.

If we now turn to the actual stages by which this momentous passage from the manorial to the commercial arrangement was achieved, we have to notice first of all a rapid *development of contractual relations*. We know that in feudal law there ran a standing contrast between *tenure by custom*—villein tenure—and *tenure by contract*—free tenure. While the manorial system was in full force this contrast led to a classification of holdings and affected the whole position of people on the land. Still, even at that time it might happen that a freeholder owned some land in villenage by the side of his free tenement, and that a villein held some land freely by agreement with his lord or with a third person. But these cases, though by no means infrequent, were still exceptional. As a rule people used land as holdings, and those were rigidly classified as villein or free tenements. The interesting point to be noticed is that, without any formal break, *leasing land for life and for term of years* is seen to be rapidly spreading from the end of the 13th century, and numberless small tenancies are created in the 14th century which break up the disposition of the holdings. From the close of the 13th century downwards countless transactions on the basis of leases for terms of years occur between the peasants themselves, any suitably kept set of 14th-century court rolls containing entries in which such and such a villein is said to appear in the *halimote* and to surrender for the use of another person named a piece of land belonging to the holding. The number of years and the conditions of payment are specified. Thus, behind the screen of the normal shares a number of small tenancies arise which run their economic concerns independently from the cumbersome arrangements of tenure and service, and, needless to add, all these tenancies are burdened with money rents.

Another series of momentous changes took place in the *arrangement of services*. Even the manorial system admitted the buying off for money of particular dues in kind and of specific performance of work. A villein might be allowed to bring a penny instead of bringing a chicken or to pay a rent instead of appearing with his oxen three times a week on the lord's fields. Such rents were called *mal* or *mail* in contrast with the *gafol*, ancient rents which had been imposed independently, apart from any buying off of customary services. There were even whole bodies of peasants called *Molmen*, because they had bought off work from the lord by settling with him on the basis of money rents. As time went on these practices of *commutation* became more and more frequent. There were, for both sides, many advantages in arranging their mutual relations on this basis. The lord, instead of clumsy work, got clear money, a much-coveted means of satisfying needs and wishes of any kind—instead of cumbrous performances which did not come always at the proper moment, were carried out in a half-hearted manner, yielded no immediate results, and did not admit of convenient rearrangement. The peasant got rid of a hateful drudgery which not only took up his time and means in an unprofitable manner, but placed him under the rough control and the arbitrary discipline of stewards or reeves and gave occasion to all sorts of fines and extortions.

With the growth of intercourse and security money became more frequent and the number of such transactions increased in proportion. But it must be kept in mind that the conversion of services into rents went on very gradually, as a series of private agreements, and that it would be very wrong to suppose, as some scholars have done, that it had led to a general commutation by the middle or even the end of the 14th century. The 14th century was marked by violent fluctuations in the demand and supply of labour, and particularly the tremendous loss in population occasioned in the middle of this century by the Black Death called forth a most serious crisis. No wonder that many lords clung very tenaciously to customary services, and ecclesiastical institutions seem to have been especially backward in going over to the system of money rents. There is evidence to show, for instance, that the manors of the abbey of Ramsey were managed on the system of enforced labour right down to the middle of the 15th century, and, of course, survivals of these customs in the shape of scattered services lived on much longer. A second drawback from the point of view of the landlords was called forth by the fact that commutation for fixed rents gradually lessened the value of the exactions to which they were entitled. Money not only became less scarce but it became cheaper, so that the couple of pence for which a day of manual work was bought off in the beginning of the 13th century did not fetch more than half of their former value at its end. As quit rents were customary and not rack rents, the successors of those who had redeemed their services were gaining the whole surplus in the value of goods and labour as against money, while the successors of those who had commuted their right to claim services for certain sums in money lost all the corresponding difference. These inevitable consequences came to be perceived in course of time and occasioned a backward tendency towards services in kind which could not prevail against the general movement from natural economy to money dealings, but was strong enough to produce social friction and grave disturbances.

The economic crisis of the 14th century has its complement in the legal crisis of the 15th. At that time the courts of law begin to do away with the denial of protection to villeins which, as we have seen, constituted the legal basis of villenage. This is effected by the recognition of copyhold tenure (see Copyhold).

It is a fact of first-rate magnitude that in the 15th century customary relations on one hand, the power of government on the other, ripened, as it were, to that extent that the judges of the king began to take cognizance of the relations of the peasants to their lords. The first cases which occur in this sense are still treated not as a matter of common law, but as a manifestation of equity. As doubtful questions of trust, of wardship, of testamentary succession, they were taken up not in the strict course of justice, but as matters in which redress was sorely needed and had to be brought by the exceptional power of the court of chancery. But this interference of 15th-century chancellors paved the way towards one of the greatest revolutions in the law; without formally emancipating villeins and villein tenure they created a legal basis for it in the law of the realm: in the formula of copyhold—tenure held *at the will of the lord and by the custom of the manor*—the first part lost its significance and the second prevailed, in downright contrast with former times when, on the contrary, the second part had no legal value and the first expressed the view of the courts. One may almost be tempted to say that these obscure decisions rendered unnecessary in England the work achieved with such a flourish of trumpets in France by the emancipating decree of the 4th of August 1789.

The personal condition of villenage did not, however, disappear at once with the rise of copyhold. It lingered through the 16th century and appears exceptionally even in the 17th. Deeds of emancipation and payments for personal enfranchisement are often noticed at that very time. But these are only survivals of an arrangement which has been destroyed in its essence by a complete change of economic and political conditions.

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VILLENEUVE, PIERRE CHARLES JEAN BAPTISTE SILVESTRE (1763–1806), French admiral, was born at Valensoles in Provence on the 31st of December 1763. He entered the French royal navy as a "garde du Pavillon." Although he belonged to the corps of "noble" officers, who were the object of peculiar animosity to the Jacobins, he escaped the fate of the majority of his comrades, which was to be massacred, or driven into exile. He sympathized sincerely with the general aims of the Revolution, and had a full share of the Provençal fluency which enabled him to make a timely and impressive display of "civic" sentiments. In the dearth of trained officers he rose with what for the French navy was exceptional rapidity, though it would have caused no surprise in England in the case of an officer who had good interest. He was named post-captain in 1793, and rear-admiral in 1796. At the close of the year he was appointed to take part in the unsuccessful expedition to Ireland which reached Bantry Bay, but the ships which were to have come to Brest from Toulon with him arrived too late, and were forced to take refuge at L'Orient. He accompanied the expedition to Egypt, with his flag in the "Guillaume Tell" (86). She was the third ship from the rear of the French line at the battle of the Nile, and escaped from the general destruction in company with the "Généreux" (74). Villeneuve reached Malta on the 23rd of August. His conduct was severely blamed, and he defended himself by a specious letter to his colleague Blanquet-Duchayla on the 13th of November 1800, when he had returned to Paris. At the time, Napoleon approved of his action. In a letter written to him on the 21st of August 1798, three weeks after the battle, Napoleon says that the only reproach Villeneuve had to make against himself was that he had not retreated sooner, since the position taken by the French commander-in-chief had been forced and surrounded. When, however, the emperor after his fall dictated his account of the expedition to Egypt to General Bertrand at St Helena, he attributed the defeat at the Nile largely to the "bad conduct of Admiral Villeneuve." In the interval Villeneuve had failed in the execution of the complicated scheme for the invasion of England in 1805. Napoleon must still have believed in the admiral's capacity and good fortune, a qualification for which he had a great regard, when he selected him to succeed Latouche Tréville upon his death at Toulon in August 1804. The duty of the Toulon squadron was to draw Nelson to the West Indies, return rapidly, and in combination with other French and Spanish ships to enter the Channel with an overwhelming force. It is quite obvious that Villeneuve had from the first no confidence in the success of an operation requiring for its execution an amazing combination of good luck and efficiency on the part of the squadrons concerned. He knew that the French were not efficient, and that the Spanish ships were in a far worse state than themselves. It required a very strict order from Napoleon to drive him out of Cadiz in October 1805. He took the command in November. On the 17th of January 1805 he left Toulon for the first time, but was driven back by a squall which dismasted some of his awkwardly handled ships. On the 3rd of March he was out again, and this time he headed Nelson by some weeks on a cruise to the West Indies. But Villeneuve's success so far had not removed his fears. Though on taking up his command he had issued an order of the day in which he spoke boldly enough of the purpose of his cruise, and his determination to adhere to it, he was racked by fears of what might happen to the force entrusted to his care. For the details of the campaign see TRAFALGAR. In so far as the biography of Villeneuve is concerned, his behaviour during these trying months cannot escape condemnation. He had undertaken to carry out a plan of which he did not approve. Since he had not declined the task altogether, it was clearly his duty to execute his orders at all hazards. If he was defeated, as he almost certainly would have been, he could have left the responsibility for the disaster to rest on the shoulders of Napoleon who assigned him the task. But Villeneuve could not free himself from the conviction that it was his business to save his fleet even if he ruined the emperor's plan of invasion. Thus after he returned to Europe and fought his confused action with Sir R. Calder off Ferrol on the 22nd of July 1805, he first hesitated, and then, in spite of vehement orders to come on, turned south to Cadiz. Napoleon's habit of suggesting alternative courses to his lieutenants gave him a vague appearance of excuse for making for that port. But it was one which only a very weak man would have availed himself of, for all his instructions ought to have been read subject to the standing injunction to come on to the Channel—and in turning south to Cadiz, he was going in the opposite direction. His decision to leave Cadiz and give battle in October 1805, which led directly to the battle of Trafalgar, cannot be justified even on his own principles. He foresaw defeat to be inevitable, and yet he went out solely because he learnt from the Minister of Marine that another officer had been sent to supersede him. In fact he ran to meet the very destruction he had tried to avoid. No worse fate would have befallen him in the Channel than came upon him at Trafalgar, but it might have been incurred in a manly attempt to obey his orders. It was provoked in a spasm of wounded vanity. At Trafalgar he showed personal courage, but the helpless incapacity of the allies to manœuvre gave him no opportunity to influence the course of the battle. He was taken as a prisoner to England, but was soon released. Shortly after landing in France he committed suicide in an inn at Rennes, on the 22nd of April 1806. Among the other improbable crimes attributed to Napoleon by the fear and hatred of Europe, was the murder of Villeneuve, but there is not the faintest reason to doubt that the admiral died by his own hand.

The correspondence of Napoleon contains many references to Villeneuve. Accounts of the naval operations in which he was concerned will be found in James's *Naval History*. Troude, in his *Batailles navales de la France*, vol. iii., publishes several of his letters and orders of the day. (D. H.)

VILLENEUVE-LÈS-AVIGNON, a town of south-eastern France, in the department of Gard on the right bank of the Rhone opposite Avignon, with which it is connected by a suspension bridge. Pop. (1906) 2582. Villeneuve preserves many remains of its medieval importance. The church of Notre Dame, dating from the 14th century, contains a rich marble altar and remarkable pictures. The hospice, once a Franciscan convent, part of which is occupied by a museum of pictures and antiquities, has a chapel in which is the fine tomb of Innocent VI. (d. 1362). The church and other remains of the Carthusian monastery of Val-de-Bénédiction, founded in 1356 by Innocent VI., are now used for habitation and other secular purposes. A gateway and a rotunda, built as shelter for a fountain, both dating from about 1670, are of architectural note. On the Mont Andaon, a hill to the north-east of the town, stands the Fort of St André (14th century), which is entered by an imposing fortified gateway and contains a Romanesque chapel and remains of the abbey of St André. The other buildings of interest include several old mansions once belonging to cardinals and nobles, and a tower, the Tour de Philippe le Bel, built in the 14th century, which guarded the western extremity of the Pont St Bénézet (see AVIGNON).

In the 6th century the Benedictine abbey of St André was founded on Mount Andaon, and the village which grew up round it took its name. In the 13th century the monks, acting in concert with the crown, established a *bastide*, or "new town," which came to be called Villeneuve. The town was the resort of the French cardinals during the sojourn of the popes at Avignon, and its importance, due largely to its numerous religious establishments, did not decline till the Revolution.

VILLENEUVE-SUR-LOT, a town of south-western France, capital of an arrondissement in the department of Lot-et-Garonne, 22 m. N. by E. of Agen on a branch line of the Orleans railway. Pop. (1906) town, 6978; commune, 13,540. Villeneuve is divided into two unequal portions by the river Lot, which here runs between high banks. The chief quarter stands on the right bank and is united to the quarter on the left bank by a bridge of the 13th century, the principal arch of which, constructed in the reign of Louis XIII. in place of two older arches, has a span of 118 ft. and a height of 59 ft. On the left bank portions of the 13th century ramparts, altered and surmounted by machicolations in the 15th century, remain, and high square towers rise above the gates to the north-east and south-west, known respectively as the Porte de Paris and Porte de Pujols. On the right bank boulevards have for the most part taken the place of the ramparts. Arcades of the 13th century surround the Place La Fayette, and old houses of the 13th, 14th and 15th centuries are to be seen in various parts of the town. The church of St Étienne is in late Gothic style. On the left bank of the Lot, 2 m. S.S.W of Villeneuve, are the 13th-century walls of Pujols. The buildings of the ancient abbey of Eysses, about a mile to the N.E., which are mainly of the 17th century, serve as a departmental prison and penitentiary settlement. The principal hospital, the hospice St Cyr, is a handsome building standing in beautiful gardens. Villeneuve has a sub-prefecture, tribunals of first instance and of commerce and communal colleges for both sexes. It is an important agricultural centre and has a very large trade in plums (*prunes d'ente*) and in the produce of the market gardens which surround it, as well as in cattle, horses and wine. The preparation of preserved plums and the tinning of peas and beans occupy many hands; there are also manufactures of boots and shoes and tin boxes. The important mill of Gajac stands on the bank of the Lot a little above the town.

Villeneuve was founded in 1254 by Alphonse, count of Poitiers, brother of Louis IX., on the site of the town of Gajac, which had been deserted during the Albigensian crusade.

VILLEROI, FRANÇOIS DE NEUFVILLE, DUC DE (1644–1730), French soldier, came of a noble family which had risen into prominence in the reign of Charles IX. His father Nicolas de Neufville, Marquis de Villeroi, marshal of France (1598–1685), created a duke by Louis XIV., was the young king's governor, and the boy was thus brought up in close relations with Louis. An intimate of the king, a finished courtier and leader of society and a man of great personal gallantry, Villeroi was marked out for advancement in the army, which he loved, but which had always a juster appreciation of his incapacity than Louis. In 1693, without having exercised any really important and responsible command, he was made a marshal. In 1695, when Luxembourg died, he obtained the command of the army in Flanders, and William III. found him a far more complaisant opponent than the "little hunchback." In 1701 he was sent to Italy to supersede Catinat and was soon beaten by the inferior army of Eugene at Chiari (see SPANISH SUCCESSION WAR). In the winter of 1701 he was made prisoner at the surprise of Cremona, and the wits of the army made at his expense the famous rhyme:

> "Par la faveur de Bellone, et par un bonheur sans égal,
> Nous avons conservé Crémone—et perdu notre général."

In the following years he was pitted against Marlborough in the Low Countries. Marlborough's own difficulties with the Dutch and other allied commissioners, rather than Villeroi's own skill, put off the inevitable disaster for some years, but in 1706 the duke attacked him and thoroughly defeated him at Ramillies (*q.v.*). Louis consoled his old friend with the remark, "At our age, one is no longer lucky," but superseded him in the command, and henceforward Villeroi lived the life of a courtier, much busied with intrigues but retaining to the end the friendship of his master. He died on the 18th of July 1730 at Paris.

VILLERS LA VILLE, a town of Belgium in the province of Brabant, 2 m. E. of Quatre Bras, with a station on the direct line from Louvain to Charleroi. Pop. (1904) 1166. It is chiefly interesting on account of the fine ruins of the Cistercian abbey of Villers founded in 1147 and destroyed by the French republicans in 1795. In the ruined church attached to the abbey are still to be seen the tombstones of several dukes of Brabant of the 13th and 14th centuries.

VILLETTE, CHARLES, MARQUIS DE (1736–1793), French writer and politician, was born in Paris on the 4th of December 1736, the son of a financier who left him a large fortune and the title of marquis. After taking part in the Seven Years' War, young Villette returned in 1763 to Paris, where he made many enemies by his insufferable manners. But he succeeded in gaining the intimacy of Voltaire, who had known his mother and who wished to make a poet of him. The old philosopher even went so far as to call his *protégé* the French Tibullus. In 1777, on Voltaire's advice, Villette married Mademoiselle de Varicourt, but the marriage was unhappy, and his wife was subsequently adopted by Voltaire's niece, Madame Denis. During the Revolution Villette publicly burned his letters of nobility, wrote revolutionary articles in the *Chronique de Paris*, and was elected deputy to the Convention by the department of Seine-et-Oise. He had the courage to censure the September massacres and to vote for the imprisonment only, and not for the death, of Louis XVI. He died in Paris on the 7th of July 1793.

In 1784 he published his *Œuvres*, which are of little value, and in 1792 his articles in the *Chronique de Paris* appeared in book form under the title *Lettres choisies sur les principaux événements de la Révolution*.

VILLIERS, CHARLES PELHAM (1802–1898), English statesman, son of George Villiers, grandson of the 1st earl of Clarendon of the second (Villiers) creation, and brother of the 4th earl (*q.v.*), was born in London on the 3rd of January 1802, and educated at St John's College, Cambridge. He read for the bar at Lincoln's Inn, and became an associate of the Benthamites and "philosophical radicals" of the day. He was an assistant commissioner to the Poor Law Commission (1832), and in 1833 was made by the master of the Rolls, whose secretary he had been, a chancery examiner of witnesses, holding this office till 1852. In 1835 he was elected M.P. for Wolverhampton, and retained his seat till his death. He was the pioneer of the free-trade movement, and became prominent with Cobden and Bright as one of its chief supporters, being indefatigable in pressing the need for free trade on the House of Commons, by resolution and by petition. After free trade triumphed in 1846 his importance in politics became rather historical than actual, especially as he advanced to a venerable old age; but he was president of the Poor Law Board, with a seat in the Cabinet, from 1859 to 1866, and he did other useful work in the Liberal reforms of the time. Like Bright, he parted from Mr Gladstone on Home Rule for Ireland. He attended parliament for the last time in 1895, and died on the 16th of January 1898.

VILLIERS DE L'ISLE-ADAM, PHILIPPE AUGUSTE MATHIAS, COMTE DE (1838–1889), French poet, was born at St Brieuc in Brittany and baptized on the 28th of November 1838. He may be said to have inaugurated the Symbolist movement in French literature, and *Axël*, the play on which he was engaged during so much of his life, though it was only published after his death, is the typical Symbolist drama. He began with a volume of *Premières Poésies* (1856–58). This was followed by a wild romance of the supernatural, *Isis* (1862), and by two plays in prose, *Elën* (1866) and *Morgane* (1866). *La Révolte*, a play in which Ibsen's *Doll's House* seems to be anticipated, was represented at the Vaudeville in 1870; *Contes cruels*, his finest volume of short stories, in 1883, and a new series in 1889, *Le Nouveau Monde*, a drama in five acts, in 1880, *L'Ève future*, an amazing piece of buffoonery satirizing the pretensions of science, in 1886, *Tribulat Bonhomet* in 1887, *Le Secret de l'échafaud* in 1888, *Axël* in 1890. He died in Paris, under the care of the Frères Saint-Jean-de-Dieu, on the 19th of August 1889. Villiers has left behind him a legend probably not more fantastic than the truth. Sharing many of the opinions of Don Quixote, he shared also Don Quixote's life. He was the descendant of a Grand Master of the Knights of Malta, famous in history, and his pride as an aristocrat and as an idealist were equal. He hated mediocrity, science, progress, the present age, money and "serious" people. In one division of his work he attacked all the things which he hated with a savage irony; in another division of his work he discovered at least some glimpses of the ideal world. He remains a remarkable poet and a remarkable satirist, imperfect as both. He improvised out of an abundant genius, but the greater part of his work was no more than improvisation. He was accustomed to talk his stories before he wrote them. Sometimes he talked them instead of writing them. But he has left, at all events, the *Contes cruels*, in which may be found every classic quality of the French *conte*, together with many of the qualities of Edgar Allan Poe and Ernst Hoffman, and the drama of *Axël*, in which the stage takes a new splendour and a new subtlety of meaning. Villiers's influence on the younger French writers was considerable. It was always an exaltation. No one in his time followed a literary ideal more romantically.

(A. SY.)

See also R. du Pontavice de Heussey, *Villiers de l'Isle-Adam* (1893), a biography, English trans. (1904) by Lady Mary Loyd; S. Mallarmé, *Les Miens: Villiers de l'Isle-Adam* (1892); R. Martineau, *Un vivant et deux morts* (1901), bibliography. A selection from his stories, *Histoires souveraines*, was made by his friends (Brussels, 1899).

VILLINGEN, a town of Germany in the grand duchy of Baden, pleasantly situated amid well-wooded hills, 52 m. by rail N. of Schaffhausen. Pop. (1905) 9582. It is in part still surrounded by walls, with ancient gate towers. It is the chief seat of the watch-making industry of the Black Forest. It also produces musical-boxes, glass and silk, and has a Gothic church of the 13th century and another of the 11th, a 15th-century town hall, with a museum of antiquities, and music, technical and agricultural schools.

VILLOISON, JEAN BAPTISTE GASPARD D'ANSSE (or DANSSE) **DE** (1750–1805), French classical scholar, was born at Corbeil-sur-Seine on the 5th of March 1750 (or 1753, authorities differ). He belonged to a noble family (De Ansso) of Spanish origin, and took his surname from a village in the neighbourhood. In 1773 he published the Homeric Lexicon of Apollonius from a MS. in the abbey of Saint Germain des Prés. In 1778 appeared his edition of Longus's *Daphnis and Chloe*. In 1781 he went to Venice, where he spent three years in examining the library, his expenses being paid by the French government. His chief discovery was a 10th-century MS. of the *Iliad*, with ancient scholia and marginal notes, indicating supposititious, corrupt or transposed verses. After leaving Venice, he accepted the invitation of the duke of Saxe-Weimar to his court. Some of the fruits of his researches in the library of the palace were collected into a volume (*Epistolae Vinarienses*, 1783), dedicated to his royal hosts. Hoping to find a treasure similar to the Venetian Homer in Greece, he returned to Paris to prepare for a journey to the East. He visited Constantinople, Smyrna, the Greek islands, and Mount Athos, but the results did not come up to his expectation. In 1786 he returned, and in 1788 brought out the Codex Venetus of Homer, which created a sensation in the learned world. When the revolution broke out, being banished from Paris, he lived in retirement at Orléans, occupying himself chiefly with the transcription of the notes in the library of the brothers Valois (Valesius). On the restoration of order, having returned to Paris, he accepted the professorship of modern Greek established by the government, and held it until it was transferred to the Collège de France as the professorship of the ancient and modern Greek languages. He died soon after his appointment, on the 25th of April 1805. Another work of some importance, *Anecdota Graeca* (1781), from the Paris and Venice libraries, contains the *Ionia* (violet garden) of the empress Eudocia, and several fragments of Iamblichus, Porphyry, Procopius of Gaza, Choricius and the Greek grammarians. Materials for an exhaustive work contemplated by him on ancient and modern Greece are preserved in the royal library of Paris.

See J. Dacier, *Notice historique sur la vie et les ouvrages de Villoison* (1806): Chardon de la Rochette, *Mélanges de critique et de philologie*, iii. (1812); and especially the article by his friend and pupil E. Quatremère in *Nouvelle biographie générale*, xiii., based upon private information.

VILLON, FRANÇOIS (1431–*c.* 1463), French poet (whose real surname is a matter of much dispute, so that he is also called De Montcorbier and Des Loges and by other names, though in literature Villon is the sole term used), was born in 1431, and, as it seems, certainly at Paris. The singular poems called *Testaments*, which form his chief if not his only certain work, are largely autobiographical, though of course not fully trustworthy. But his frequent collisions with the law have left more certain records, which have of late been ransacked with extraordinary care by students, especially by M. Longnon. It appears that he was born of poor folk, that his father died in his youth, but that his mother, for whom he wrote one of his most famous *ballades*, was alive when her son was thirty years old. The very name Villon was stated, and that by no mean authority, the president Claude Fauchet, to be merely a common and not a proper noun, signifying "cheat" or "rascal"; but this seems to be a mistake. It is, however, certain that Villon was a person of loose life, and that he continued, long after there was any excuse for it in his years, the reckless way of living common among the wilder youth of the university of Paris. He appears to have derived his surname from a friend and benefactor named Guillaume de Villon, chaplain in the collegiate church of Saint-Benoît-le-Bestourné, and a professor of canon law, who took Villon into his house. The poet became a student in arts, no doubt early, perhaps at about twelve years of age, and took the degree of bachelor in 1449 and that of master in 1452. Between this year and 1455 nothing positive is known of him, except that nothing was known against him. Attempts have been made, in the usual fashion of conjectural biography, to fill up the gap with what a young graduate of Bohemian tendencies would, could, or might have done; but they are mainly futile.

On the 5th of June 1455 the first important incident of his life that is known occurred. Being in the company of a priest named Giles and a girl named Isabeau, he met, in the rue Saint-Jacques, a certain Breton, Jean le Hardi, a master of arts, who was with a priest, Philippe Chermoye or Sermoise or Sermaise. A scuffle ensued; daggers were drawn, and Sermaise, who is accused of having threatened and attacked Villon and drawn the first blood, not only received a dagger-thrust in return, but a blow from a stone which struck him down. Sermaise died of his wounds. Villon fled, and was sentenced to banishment—a sentence which was remitted in January 1456, the formal pardon being extant, strangely enough, in two different documents, in one of which the culprit is described as "François des Loges, autrement dit Villon," in the other as "François de Montcorbier" That he is also said to have described himself to the barber-surgeon who dressed his wounds as Michel Mouton is less surprising, and hardly needs an addition to the list of his aliases. It should, however, be said that the documents relative to this affair confirm the date of his birth, by representing him as twenty-six years old or thereabouts. By the end of 1456 he was again in trouble. In his first broil "la femme Isabeau" is only generally named, and it is impossible to say whether she had anything to do with the quarrel. In the second, Catherine de Vaucelles, of whom we hear not a little in the poems, is the declared cause of a scuffle in which Villon was so severely beaten that, to escape ridicule, he fled to Angers, where he had an uncle who was a monk. It was before leaving Paris that he composed what is now known as the *Petit testament*, of which we shall speak presently with the rest of his poems, and which, it should be said, shows little or no such mark of profound bitterness and regret for wasted life as does its in every sense greater successor the *Grand testament*. Indeed, Villon's serious troubles were only beginning, for hitherto he had been rather injured than guilty. About Christmas-time the chapel of the college of Navarre was broken open, and five hundred gold crowns stolen. The robbery was not discovered till March 1457, and it was not till May that the police came on the track of a gang of student-robbers owing to the indiscretion of one of them, Guy Tabarie. A year more passed, when Tabarie, being arrested, turned king's evidence and accused Villon, who was then absent, of being the ring-leader, and of having gone to Angers, partly at least, to arrange for similar burglaries there. Villon, for this or some other crime, was sentenced to banishment: and he did not attempt to return to Paris. In fact for four years he was a wanderer; and he may have been, as each of his friends Regnier de Montigny and Colin des Cayeux certainly was, a member of a wandering thieves' gang. It is certain that at one time (in 1457), and probable that at more times than one, he was in correspondence with Charles d'Orléans, and it is likely that he resided, at any rate for some period, at that prince's court at Blois. He had also something to do with another prince of the blood, Jean of Bourbon, and traces are found of him in Poitou, in Dauphiné, &c. But at his next certain appearance he is again in trouble. He tells us that he had spent the summer of 1461 in the bishop's prison (bishops were fatal to Villon) of Meung. His crime is not known, but is supposed to have been church-robbing; and his enemy, or at least judge, was Thibault d'Aussigny, who held the see of Orleans. Villon owed his release to a general gaol-delivery at the accession of Louis XI., and became a free man again on the 2nd of October.

It was now that he wrote the *Grand testament*, the work which has immortalized him. Although he was only thirty at the date (1461) of this composition (which is unmistakable, because given in the book itself), there seems to be no kind of aspiration towards a new life, nor even any hankering after the old. Nothing appears to be left him but regret, his very spirit has been worn out by excesses or sufferings or both. Even his good intentions must have been feeble, for in the autumn of 1462 we find him once more living in the cloisters of Saint-Benoît, and in November he was in the Châtelet for theft. In default of evidence the old charge of the college of Navarre was revived, and even a royal pardon did not bar the demand for restitution. Bail was, however, accepted, but Villon fell promptly into a street quarrel, was arrested, tortured and condemned to be hanged, but the sentence was commuted to banishment by the parlement on the 5th of January 1463. The actual event is unknown: but from this time he disappears from history. Rabelais indeed tells two stories about him which have almost necessarily been dated later. One is a countryside anecdote of a trick supposed to have been played by the poet in his old age at Saint Maixent in Poitou, whither he had retired. The other, a coarse but pointed jest at the expense of England, is told as having been addressed by Villon to King Edward V during an exile in that country. Now, even if King Edward V were not evidently out of the question, a passage of the story refers to the well-known scholar and man of science, Thomas Linacre, as court physician to the king, and makes Villon mention him, whereas Linacre was only a young scholar, not merely at the time of Edward V 's supposed murder, but at the extreme date (1489) which can be assigned to Villon's life. For in this year the first edition of the poet's work appeared, obviously not published by himself, and with no sign in it of his having lived later than the date (1461) of the *Grand testament*. It would be easy to dismiss these Rabelaisian mentions of Villon as mere humorous inventions, if it were not that the author of *Pantagruel* was born almost soon enough to have actually seen Villon if he had lived to anything that could be called old age, that he almost certainly must have known men who had known Villon, and that the poet undoubtedly spent much time in Rabelais's own country on the banks of the lower Loire.

The obscurity, the unhappiness and the evil repute of Villon's life would not be in themselves a reason for the minute investigation to which the events of that life have been subjected, and the result of which has been summed up here. But his poetical work, scanty as the certainly genuine part of it is, is of such extraordinary quality, and marks such an epoch in the history of European literature, that he has been at all times an interesting figure, and, like all very interesting figures, has been often praised for qualities quite other than those which he really possessed. Boileau's famous verses, in which Villon is extolled for having first known how to smooth out the confused art of the old romancers, are indeed a prodigy of blundering or ignorance or both. As far as art or the technical part of poetry goes, Villon made not the slightest advance on his predecessors, nor stood in any way in front of such contemporaries as his patron Charles d'Orléans. His two *Testaments* (so called by the application to them of a regular class-name of medieval poetry and consisting of burlesque legacies to his acquaintances) are made up of eight-line stanzas of eight-syllabled verses, varied in the case of the *Grand testament* by the insertion of ballades and rondeaux of very great beauty and interest, but not formally different in any way from poems of the same kind for more than a century past. What really distinguishes Villon is the intenser quality of his poetical feeling and expression, and what is perhaps arrogantly called the modern character of his subjects and thought. Medieval poetry, with rare exceptions, and, with exceptions not quite so rare, classical poetry, are distinguished by their lack of what is now called the personal note. In Villon this note sounds, struck with singular force and skill. Again, the simple joy of living which distinguishes both periods—the medieval, despite a common opinion, scarcely less than the ancient—has disappeared. Even the riot and rollicking of his earlier days are mentioned with far less relish of remembrance than sense of their vanity. This sense of vanity, indeed, not of the merely religious, but of the purely mundane and even half-pagan kind, is Villon's most prominent characteristic. It tinges his narrative, despite its burlesque bequests, all through; it is the very keynote of his most famous and beautiful piece, the *Ballade des dames du temps jadis*, with its refrain, "Mais où sont les neiges d'antan?" as well as of his most daring piece of realism, the other ballade of *La Grosse Margot*, with its burden of hopeless entanglement in shameless vice. It is nowhere more clearly sounded than in the piece which ranks with these two at the head of his work, the *Regrets de la Belle Heaulmière*, in which a woman, once young and beautiful, now old and withered, laments her lost charms. So it is almost throughout his poems, including the grim *Ballade des pendus*, and hardly excluding the very beautiful *Ballade pour sa mère*, with its description of sincere and humble piety. It is in the profound melancholy which the dominance of this note has thrown over Villon's work, and in the suitableness of that melancholy to the temper of all generations since, that his charm and power have consisted, though it is difficult to conceive any time at which his poetical merit could be ignored.

His certainly genuine poems consist of the two *Testaments* with their codicil (the latter containing the *Ballade des pendus*, or, more properly *Épitaphe en forme de ballade*, and some other pieces of a similarly grim humour), a few miscellaneous poems, chiefly ballades, and an extraordinary collection (called *Le Jargon ou jobelin*) of poems in argot, the greater part of which is now totally unintelligible, if, which may perhaps be doubted, it ever was otherwise. Besides these, several poems of no inconsiderable interest are usually printed with Villon's works, though they are certainly, or almost certainly, not his. The chief are *Les Repues Franches*, a curious series of verse stories of cheating tavern-keepers, &c., having some resemblance to those told of George Peele, but of a broader and coarser humour. These, though in many cases "common form" of the broader tale-kind, are not much later than his time, and evidence to reputation if not to fact. Another of these spurious pieces is the extremely amusing monologue of the *Franc Archier de Baignolet*, in which one of the newly constituted archers or regularly trained and paid soldiery, who were extremely unpopular in France, is made to express his own poltroonery. The third most important piece of this kind is the *Dialogue de Mallepaye et de Baillevent*, a dramatic conversation between two penniless spendthrifts, which is not without merit. These poems, however, were never attributed to Villon or printed with his works till far into the 16th century.

It has been said that the first dated edition of Villon is of 1489, though some have held one or more than one undated copy to be still earlier. Between the first, whenever it was, and 1542 there were numerous editions, the most famous being that (1533) of Clément Marot, one of whose most honourable distinctions is the care he took of his poetical predecessors. The Pléiade movement and the classicizing of the *grand siècle* put Villon rather out of favour, and he was not again reprinted till early in the 18th century, when he attracted the attention of students of old French like Le Duchat, Bernard de la Monnoye and Prosper Marchand. The first critical edition in the modern sense—that is to say, an edition founded on MSS. (of which there are in Villon's case several, chiefly at Paris and Stockholm)—was that of the Abbé J. H. R. Prompsault in 1832. The next was that of the "Bibliophile Jacob" (P. Lacroix) in the *Bibliothèque Elzévirienne* (Paris, 1854). The standard edition is *Œuvres complètes de François Villon*, by M. Auguste Longnon (1892). This contains copies of the documents on which the story of Villon's life is based, and a bibliography. The late M. Marcel Schwob discovered new documents relating to the poet, but died before he could complete his work, which was posthumously published in 1905. See also A. Campaux, *F. Villon, sa vie et ses œuvres* (1859); A. Longnon, *Étude biographique* (1877); and especially G. Paris, *François Villon* (1901), a book of the first merit. A complete translation of Villon was written by Mr John Payne (1878) for the Villon Society. There are also translations of individual poems in Mr Andrew Lang's *Ballads and Lyrics of Old France* (1872) and in the works of D. G. Rossetti and Mr Swinburne. Among critical studies of Villon may be mentioned those by Sainte-Beuve in the *Causeries du lundi*, vol. xiv., by Théophile Gautier in *Grotesques*, and by R. L. Stevenson in his *Familiar Studies of Men and Books* (1882). An unedited ballad by Villon, with another by an unknown poet of the same date, was published by W. G. C. Bijvanck (1891) as *Un poète inconnu*. M. Pierre d'Alheim published (1892) an edition of *Le Jargon* with a translation into ordinary French. (G. Sa.)

VILNA, or Wilno, a Lithuanian government of West Russia, having the Polish government of Suwalki on the W., Kovno and Vitebsk on the N., and Minsk and Grodno on the E. and S. Area, 16,176 sq. m.; pop. (1906 estimate) 1,806,300. Vilna lies on the broad marshy swelling, dotted with lakes, which separates Poland from the province of East Prussia and stretches E.N.E. towards the Valdai Plateau.

Its highest parts are a little more than 1000 ft. above sea-level. On its western and eastern boundaries it is deeply trenched by the valleys of the Niemen and the S. Dvina. It is chiefly built up of Lower Tertiary deposits, but in the north Devonian sandstones appear on the surface. The Tertiary deposits consist of Eocene clay, slates, sandstones, limestones and chalk, with gypsum, and are partly of marine and partly of terrene origin. The whole is overlain with thick layers of Glacial boulder clay and post-Glacial deposits, containing remains of the mammoth and other extinct mammals. Interesting discoveries of Neolithic implements, especially of polished stone, and of implements belonging to the Bronze Age and the early years of the Christian epoch, have been made. Numerous lakes and marshes, partly covered with forests, and scarcely passable except when frozen, as well as wet meadowland, occupy a large area in the centre of the government. The Niemen, which flows along the southern and western borders for more than 200 m., is the chief artery of trade, and its importance in this respect is enhanced by its tributary the Viliya, which flows west for more than 200 m. through the central parts of Vilna, receiving many affluents on its course. Among the tributaries of the Niemen is the Berezina, which acquired renown during Napoleon's retreat in 1812; it flows in a marshy valley in the south-east. The S. Dvina for 50 m. of its course separates Vilna from Vitebsk. The climate of the government is only slightly tempered by its proximity to the Baltic Sea (January, 21°·8; July, 64°·5); the average temperature at the town of Vilna is only 43°·5. But in winter the thermometer descends very low, a minimum of −30° F having been observed. The flora and fauna are intermediate between those of Poland and middle Russia.

The government is divided into seven districts, the chief towns of which are Vilna, Vileiki, Disna, Lida, Oshmyany, Zventsyany and Troki.

VILNA, or Wilno, a town of Russia, capital of the government of the same name, 436 m. S.S.W. of St Petersburg, at the intersection of the railways from St Petersburg to Warsaw and from Libau to the mouth of the Don. Pop. (1883) 93,760; (1900) 162,633. With its suburbs Antokol, Lukishki, Pogulyanka and Sarechye, it stands on and around a knot of hills (450 ft.) at the confluence of the Vileika with the Viliya. Its streets are in part narrow and not very clean; but Vilna is an old town, rich in historical associations. Its imperial palace, and the cathedral of St Stanislaus (1387, restored 1801), containing the silver sarcophagus of St Casimir and the tomb of Prince Vitoft, are fine buildings. There is a second cathedral, that of St Nicholas, built in 1596–1604; also several churches dating from the 14th to the 16th centuries. The Ostra Brama chapel contains an image of the Virgin greatly venerated by Orthodox Greeks and Roman Catholics alike. The museum of antiquities has valuable historical collections. The ancient castle of the Jagellones is now a mass of ruins. The old university, founded in 1578, was restored (1803) by Alexander I., but has been closed since 1832 for political reasons; the only departments which remain in activity are the astronomical observatory and a medical academy. Vilna is an archiepiscopal see of the Orthodox Greek Church and an episcopal see of the Roman Catholic Church, and the headquarters of the governor-general of the Lithuanian provinces and of the III. army corps. The city possesses a botanical garden and a public library, and is adorned with statues to Catherine II. (1903), the poet Pushkin and Count M. Muraviev (1898). It is an important centre for trade in timber and grain, which are exported; and has theological seminaries, both Orthodox Greek and Roman Catholic, a military school, a normal school for teachers and professional schools. It is the seat of many scientific societies (geographical, medical and archaeological), and has a good antiquarian museum and a public library.

History.—The territory of Vilna has been occupied by the Lithuanians since the 10th century, and probably much earlier; their chief fortified town, Vilna, is first mentioned in 1128. A temple to the god Perkunas stood on one of its hills till 1387, when it was destroyed by Prince Jagiello, after his baptism. After 1323, when Gedymin, prince of Lithuania, abandoned Troki, Vilna became the capital of Lithuania. The formerly independent principalities of Minsk and Lidy, as well as the territory of Disna, which belonged to the Polotsk principality, were annexed by the Lithuanian princes, and from that time Vilna, which was fortified by a stone wall, became the chief city of the Lithuanian state. It was united with Poland when its prince, Casimir IV., was elected (1447) to the Polish throne. The plague of 1588, a fire in 1610 and still more the wars between Russia and Poland, which began in the 17th century, checked its further growth. The Russians took Vilna in 1655, and in the following year it was ceded to Russia. The Swedes captured it in 1702 and in 1706. The Russians again took possession of it in 1788; and it was finally annexed to Russia in 1795, after the partition of Poland. Its Polish inhabitants took an active part in the risings of 1831 and 1863, for which they were severely punished by the Russian government.

VILVORDE, a town of Belgium in the province of Brabant, 9 m. N. of Brussels and on the Senne. Pop. (1904) 14,418. The old castle of Vilvorde, which often gave shelter to the dukes of Brabant in their days of trouble, is now used as a prison. The younger Teniers lived and died at a farm outside Vilvorde, and is buried in the parish church of Dry Toren.

VINCENNES, a town of northern France, in the department of Seine, on a wooded plateau 1½ m. E. of the fortifications of Paris, with which it is connected by rail and tram. Pop. (1906) town, 29,791; commune, 34,185. Its celebrated castle, situated to the south of the town and on the northern border of the Bois de Vincennes, was formerly a royal residence, begun by Louis VII. in 1164, and more than once rebuilt. It was frequently visited by Louis IX., who held informal tribunals in the neighbouring wood, a pyramid marking the spot where the oak under which he administered justice is said to have stood. The chapel, an imitation of the Sainte Chapelle at Paris, was begun by Charles V. in 1379, continued by Charles VI. and Francis I., consecrated in 1552 and restored in modern times. In the sacristy is the monument erected in 1816 to the memory of the duke of Enghien, who was shot in the castle moat in 1804. Louis XI. made the castle a state prison in which Henry of Navarre, the great Condé, Mirabeau and other distinguished persons were afterwards confined. Under Napoleon I. the castle became a magazine of war-material. Louis XVIII. added an armoury, and under Louis Philippe numerous casemates and a new fort to the east of the donjon were constructed. The place now serves as a fort, arsenal and barracks. It forms a rectangle 417 yds. long by 245 yds. wide. The enclosing wall was originally flanked by nine towers, which were cut down to its level between 1808 and 1811, and now serve as bastions. The donjon is a square tower, 170 ft. high, with turrets at the corners. The Bois de Vincennes, which covers about 2300 acres and stretches to the right bank of the Marne, contains a race-course, a military training-ground, a school of military explosives (pyrotechnic), several artificial lakes, an artillery polygon and other military establishments, an experimental farm, the redoubts of Gravelle and La Faisanderie and the normal school of military gymnastics. The wood, which now belongs to Paris, was laid out during the second empire on the same lines as the Bois de Boulogne. On its south border is the asylum of Vincennes, founded in 1855 for the benefit of convalescents from the hospitals. In the town there is a statue of General Daumesnil, celebrated for his defense of the castle against the allies in 1814 and 1815. Vincennes has a school of military administration and carries on horticulture and the manufacture of ironware of various kinds, rubber goods, chemicals, perfumery, mineral waters, &c.

VINCENNES, a city and the county-seat of Knox county, Indiana, U.S.A., in the S.W. part of the state, on the E. bank of the Wabash river, about 117 m. S.W. of Indianapolis. Pop. (1890) 8853; (1900) 10,249, of whom 736 were foreign-born; (1910 census) 14,895. It is served by the Baltimore & Ohio South-Western, the Cleveland, Cincinnati, Chicago & St Louis, the Evansville & Terre Haute, and the Vandalia railways. Extensive levees, 15 m. in length, prevent the overflow of the Wabash river, which for nine months in the year is navigable from this point to the Ohio. The city is level and well drained, and has a good water-supply system. In Vincennes are a Roman Catholic cathedral, erected in 1835, one of the oldest in the West, occupying the site of a church built early in the 18th century; Vincennes University (1806), the oldest educational institution in the state, which in 1910 had 14 instructors and 236 students; St Rose Female Academy, and a public library. Coal, natural gas and oil are found near Vincennes. The city is a manufacturing and railway centre, and ships grain, pork and neat cattle. The total value of the factory products in 1905 was $3,172,279. Vincennes was the first permanent settlement in Indiana. On its site François Margane, Sieur de Vincennes, established a French military post about 1731, and a permanent settlement was made about the fort in 1735. After the fall of Quebec the place remained under French sovereignty until 1777, when it was occupied by a British garrison. In 1778 an agent of George Rogers Clark took possession of the fort on behalf of Virginia, but it was soon afterwards again occupied by the British, who called it Fort Sackville and held it until February 1779, when it was besieged and was captured (on the 25th of February) by George Rogers Clark, and passed finally under American jurisdiction. The site of the fort is marked by a granite shaft erected in 1905 by the Daughters of the Revolution. Vincennes was the capital of Indiana Territory from 1800 to 1813, and was the meeting-place in 1805 of the first General Assembly of Indiana Territory. In 1839 it was incorporated as a borough, and it became a city in 1856.

See J. Law, *The Colonial History of Vincennes* (Vincennes, 1858); W. H. Smith, "Vincennes, the Key to the North-West," in L. P. Powell's *Historic Towns of the Western States* (New York, 1901); "The Capture of Vincennes by George Rogers Clark," *Old South Leaflets*, No. 43 (Boston, n.d.); also chap. ii. of J. P. Dunn's *Indiana* (Boston, 1892).

VINCENT (or VINCENTIUS), **ST**, deacon and martyr, whose festival is celebrated on the 22nd of January. In several of his discourses St Augustine pronounces the eulogy of this martyr, and refers to *Acts* which were read in the church. It is doubtful whether the *Acts* that have come down to us (*Acta Sanctorum*, January, ii. 394–397) are those referred to by St Augustine, since it is not certain that they are a contemporary document. According to this account, Vincent was born of noble parents in Spain, and was educated by Valerius, bishop of Saragossa, who ordained him to the diaconate. Under the persecution of Diocletian, Vincent was arrested and taken to Valencia. Having stood firm in his profession before Dacianus, the governor, he was subjected to excruciating tortures and thrown into prison, where angels visited him, lighting his dungeon with celestial light and relieving his sufferings. His warders, having seen these wonders through the chinks of the wall, forthwith became Christians. He was afterwards brought out and laid upon a soft mattress in order that he might regain sufficient strength for new torments; but, while Dacianus was meditating punishment, the saint gently breathed his last. The tyrant exposed his body to wild beasts, but a raven miraculously descended and protected it. It was then thrown into the sea, but was cast up on the shore, recovered by a pious woman and buried outside Valencia. Prudentius devoted one of his hymns (*Peristeph.* v.) to St Vincent, and St Augustine attests that in his lifetime the festival of the saint was celebrated throughout the Christian world (*Serm.* 276, n. 4).

See T. Ruinart, *Acta martyrum sincera* (Amsterdam, 1713), pp. 364–66; Le Nain de Tillemont, *Mémoires pour servir à l'histoire ecclésiastique* (Paris, 1701, seq.), v. 215–225, 673–675. (H. De.)

VINCENT OF BEAUVAIS, or Vincentius Bellovacensis (*c.* 1190–*c.* 1264), the encyclopaedist of the middle ages, was probably a native of Beauvais.[1] The exact dates of his birth and death are unknown. A tolerably old tradition, preserved by Louis a Valleoleti (*c.* 1413), gives the latter as 1264;[2] but Tholomaeus de Luca, Vincent's younger contemporary (d. 1321), seems to reckon him as living during the pontificate of Gregory X. (1271–76). If we assume 1264 as the year of his death, the immense volume of his works forbids us to think he could have been born much later than 1190. Very little is known of his career. A plausible conjecture makes him enter the house of the Dominicans at Paris between 1215 and 1220, from which place a second conjecture carries him to the Dominican monastery founded at Beauvais in 1228–29. There is no evidence to show that the Vincent who was sub-prior of this foundation in 1246 is the encyclopaedist; nor indeed is it likely that a man of such abnormally studious habits could have found time to attend to the daily business routine of a monastic establishment. It is certain, however, that he at one time held the post of "reader" at the monastery of Royaumont (*Mons Regalis*), not far from Paris, on the Oise, founded by St Louis between 1228 and 1235. St Louis read the books that he compiled, and supplied the funds for procuring copies of such authors as he required for his compilations. Queen Margaret, her son Philip and her son-in-law, Theobald V. of Champagne and Navarre, are also named among those who urged him to the composition of his "little works," especially the *De Institutione Principum*. Though Vincent may well have been summoned to Royaumont even before 1240, there is no actual proof that he lived there before the return of Louis IX. and his wife from the Holy Land, early in the summer of 1254. But it is evident that he must have written his work *De Eruditione Filiorum Regalium* (where he styles himself as "Vincentius Belvacensis, de ordine praedicatorum, qualiscumque lector in monasterio de Regali Monte") after this date and yet before January 1260, the approximate date of his *Tractatus Consolatorius*. When he wrote the latter work he must have left Royaumont, as he speaks of returning from the funeral of Prince Louis (15th January 1260) "ad nostram domum," a phrase which can hardly be explained otherwise than as referring to his own Dominican house, whether at Beauvais or elsewhere.

The *Speculum Majus*, the great compendium of all the knowledge of the middle ages, as it left the pen of Vincent, seems to have consisted of three parts only, viz. the *Speculum Naturale*, *Doctrinale* and *Historiale*. Such, at least, is Échard's conclusion, derived from an examination of the earliest extant MSS. All the printed editions, however, consist of four parts, the additional one being entitled *Speculum Morale*. This has been clearly shown to be the production of a later hand, and is ascribed by Échard to the period between 1310 and 1325. In arrangement and style it is quite different from the other three parts, and indeed it is mainly a compilation from Thomas Aquinas, Stephen de Bourbon, and two or three other contemporary writers.

The *Speculum Naturale* fills a bulky folio volume of 848 closely printed double-columned pages. It is divided into thirty-two books and 3718 chapters. It is a vast summary of all the natural history known to western Europe towards the middle of the 13th century. It is, as it were, the great temple of medieval science, whose floor and walls are inlaid with an enormous mosaic of skilfully arranged passages from Latin, Greek, Arabic, and even Hebrew authors. To each quotation, as he borrows it, Vincent prefixes the name of the book and author from whom it is taken, distinguishing, however, his own remarks by the word "actor." The *Speculum Naturale* is so constructed that the various subjects are dealt with according to the order of their creation; it is in fact a gigantic commentary on Genesis i. Thus book i. opens with an account of the Trinity and its relation to creation; then follows a similar series of chapters about angels, their attributes, powers, orders, &c., down to such minute points as their methods of communicating thought, on which matter the author decides, in his own person, that they have a kind of intelligible speech, and that with angels to think and to speak are not the same process. The whole book, in fact, deals with such things as were with God "in the beginning." Book ii. treats of our own world, of light, colour, the four elements, Lucifer and his fallen angels, thus corresponding in the main with the sensible world and the work of the first day. Books iii. and iv. deal with the phenomena of the heavens and of time, which is measured by the motions of the heavenly bodies, with the sky and all its wonders, fire, rain, thunder, dew, winds, &c. Books v.–xiv. treat of the sea and the dry land: they discourse of the seas, the ocean and the great rivers, agricultural operations, metals, precious stones, plants, herbs, with their seeds, grains and juices, trees wild and cultivated, their fruits and their saps. Under each species, where possible, Vincent gives a chapter on its use in medicine, and he adopts for the most part an alphabetical arrangement. In book vi. c. 7 he incidentally discusses what would become of a stone if it were dropped down a hole, pierced right through the earth, and, curiously enough, decides that it would stay in the centre. Book xv. deals with astronomy—the moon, stars, and the zodiac, the sun, the planets, the seasons and the calendar. Books xvi. and xvii. treat of fowls and fishes, mainly in alphabetical order and with reference to their medical qualities. Books xviii.–xxii. deal in a similar way with domesticated and wild animals, including the dog, serpents, bees and insects; they also include a general treatise on animal physiology spread over books xxi.–xxii. Books xxiii.–xxviii. discuss the psychology, physiology and anatomy of man, the five senses and their organs, sleep, dreams, ecstasy, memory, reason, &c. The remaining four books seem more or less supplementary; the last (xxxii.) is a summary of geography and history down to the year 1250, when the book seems to have been given to the world, perhaps along with the *Speculum Historiale* and possibly an earlier form of the *Speculum Doctrinale*.

The *Speculum Doctrinale*, in seventeen books and 2374 chapters, is a summary of all the scholastic knowledge of the age and does not confine itself to natural history. It is intended to be a practical manual for the student and the official alike; and, to fulfil this object, it treats of the mechanic arts of life as well as the subtleties of the scholar, the duties of the prince and the tactics of the general. The first book, after defining philosophy, &c., gives a long Latin vocabulary of some 6000 or 7000 words. Grammar, logic, rhetoric and poetry are discussed in books ii. and iii., the latter including several well-known fables, such as the lion and the mouse. Book iv. treats of the virtues, each of which has two chapters of quotations allotted to it, one in prose and the other in verse. Book v. is of a somewhat similar nature. With book vi. we enter on the practical part of the work; it deals with the *ars oeconomica*, and gives directions for building, gardening, sowing, reaping, rearing cattle and tending vineyards; it includes also a kind of agricultural almanac for each month in the year. Books vii.–ix. have reference to the *ars politica*: they contain rules for the education of a prince and a summary of the forms, terms and statutes of canonical, civil and criminal law. Book xi. is devoted to the *artes mechanicae*, viz. those of weavers, smiths, armourers, merchants, hunters, and even the general and the sailor. Books xii.–xiv. deal with medicine both in practice and in theory: they contain practical rules for the preservation of health according to the four seasons of the year, and treat of various diseases from fever to gout. Book xv. deals with physics and may be regarded as a summary of the *Speculum Naturale*. Book xvi. is given up to mathematics, under which head are included music, geometry, astronomy, astrology, weights and measures, and metaphysics. It is noteworthy that in this book Vincent shows a knowledge of the Arabic numerals, though he does not call them by this name. With him the unit is termed "digitus"; when multiplied by ten it becomes the "articulus"; while the combination of the articulus and the digitus is the "numerus compositus." In this chapter (xvi. 9), which is superscribed "actor," he clearly explains how the value of a number increases tenfold with every place it is moved to the left. He is even acquainted with the later invention of the "cifra" or cipher.

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[1] He is sometimes styled Vincentius Burgundus; but, according to [illegible], this appellation cannot be traced back further than [illegible] the 15th century.

[2] [illegible] confirmed by the few enigmatical lines preserved by [illegible]

[illegible] sicut post annos mille ducentos,
[illegible] aut habe, sex mihi retentos."

The last book (xvii.) treats of theology or (as we should now say) mythology, and winds up with an account of the Holy Scriptures and of the Fathers, from Ignatius and Dionysius the Areopagite to Jerome and Gregory the Great, and even of later writers from Isidore and Bede, through Alcuin, Lanfranc and Anselm, down to Bernard of Clairvaux and the brethren of St Victor.

As the fifteenth book of the *Speculum Doctrinale* is a summary of the *Speculum Naturale*, so the *Speculum Historiale* may be regarded as the expansion of the last book of the same work. It consists of thirty-one books divided into 3793 chapters. The first book opens with the mysteries of God and the angels, and then passes on to the works of the six days and the creation of man. It includes dissertations on the various vices and virtues, the different arts and sciences, and carries down the history of the world to the sojourn in Egypt. The next eleven books (ii.–xii.) conduct us through sacred and secular history down to the triumph of Christianity under Constantine. The story of Barlaam and Josaphat occupies a great part of book xv.; and book xvi. gives an account of Daniel's nine kingdoms, in which account Vincent differs from his professed authority, Sigebert of Gembloux, by reckoning England as the fourth instead of the fifth. In the chapters devoted to the *origines* of Britain he relies on the Brutus legend, but cannot carry his catalogue of British or English kings further than 735, where he honestly confesses that his authorities fail him. Seven more books bring us to the rise of Mahomet (xxiii.) and the days of Charlemagne (xxiv.). Vincent's Charlemagne is a curious medley of the great emperor of history and the champion of romance. He is at once the gigantic eater of Turpin, the huge warrior eight feet high, who could lift the armed knight standing on his open hand to a level with his head, the crusading conqueror of Jerusalem in days before the crusades, and yet with all this the temperate drinker and admirer of St Augustine, as his character had filtered down through various channels from the historical pages of Einhard. Book xxv. includes the first crusade, and in the course of book xxix., which contains an account of the Tatars, the author enters on what is almost contemporary history, winding up in book xxxi. with a short narrative of the crusade of St Louis in 1250. One remarkable feature of the *Speculum Historiale* is Vincent's constant habit of devoting several chapters to selections from the writings of each great author, whether secular or profane, as he mentions him in the course of his work. The extracts from Cicero and Ovid, Origen and St John, Chrysostom, Augustine and Jerome are but specimens of a useful custom which reaches its culminating point in book xxviii., which is devoted entirely to the writings of St Bernard. One main fault of the *Speculum Historiale* is the unduly large space devoted to miracles. Four of the medieval historians from whom he quotes most frequently are Sigebert of Gembloux, Hugh of Fleury, Helinand of Froidmont, and William of Malmesbury, whom he uses for Continental as well as for English history.

Vincent has thus hardly any claim to be reckoned as an original writer. But it is difficult to speak too highly of his immense industry in collecting, classifying and arranging these three huge volumes of 80 books and 9885 chapters. The undertaking to combine all human knowledge into a single whole was in itself a colossal one and could only have been born in a mind of no mean order. Indeed more than six centuries passed before the idea was again resuscitated; and even then it required a group of brilliant Frenchmen to do what the old Dominican had carried out unaided. The number of writers quoted by Vincent is almost incredible: in the *Speculum Naturale* alone no less than 350 distinct works are cited, and to these must be added at least 100 more for the other two *Specula*. His reading ranges from Arabian philosophers and naturalists to Aristotle, Eusebius, Cicero, Seneca, Julius Caesar (whom he calls Julius Celsus), and even the Jew, Peter Alphonso. But Hebrew, Arabic and Greek he seems to have known solely through one or other of the popular Latin versions. He admits that his quotations are not always exact, but asserts that this was the fault of careless copyists.

A list of Vincent's works, both MS. and printed, will be found in the *Histoire littéraire de France*, vol. xviii., and in Jacques Échard's *Scriptores ordinis praedicatorum* (1719–21). The *Tractatus consolatorius pro morte amici* and the *Liber de eruditione filiorum regalium* (dedicated to Queen Margaret) were printed at Basel in December 1480. The *Liber de Institutione Principum*, a treatise on the duties of kings and their functionaries, has never yet been printed, and the only MS. copy the writer of this article has been able to consult does not contain in its prologue all the information which Échard seems to imply is to be found there. The so-called first edition of the *Speculum Majus*, including the *Speculum Morale*, ascribed to Johann Mentelin and long celebrated as the earliest work printed at Strassburg, has lately been challenged as being only an earlier edition of Vincent's three genuine *Specula* (*c.* 1468–70), with which has been bound up the *Speculum Morale* first printed by Mentelin (*c.* 1473–76). The edition most frequently quoted is that by the Jesuits (4 vols., Douai, 1624).

See J. B. Bourgeat, *Études sur Vincent de Beauvais, théologien, philosophe, encyclopédiste* (Paris, 1856); E. Boutaric, *Examen des sources du Speculum historiale de Vincent de Beauvais* (Paris, 1863), and in tome xvii. of the *Revue des questions historiques* (Paris, 1875); W. Wattenbach, *Deutschlands Geschichtsquellen*, vol. ii. (1894. B. Hauréau, *Notices . . . de MSS. latins de la Bibliothèque Nationale*, tome v. (1892); and E. Mâle, *L'art religieux du XIII^e siècle en France*. (T. A. A.)

VINCENT, GEORGE (1796–1831?), English landscape and marine painter, was born at Norwich in June 1796. He studied art under "Old" Crome, and at the age of fifteen began to contribute to the Norwich exhibition. From 1814 till 1823 he exhibited occasionally at the Royal Academy, and also in the Water-Colour Exhibition and the British Institution. In 1819 he removed from Norwich to London, and he was a contributor to the Suffolk Street gallery from its foundation in 1824 till 1830. He possessed great artistic abilities; but he fell into dissipation, and his works became slight and hastily executed. Finally he dropped out of sight, and he is believed to have died about 1831. His most important work, a "View of Greenwich Hospital," was shown in the International Exhibition of 1862. His "London from the Surrey Side of Waterloo Bridge" is also a fine work.

VINCENT, MARY ANN (1818–1887), American actress, was born in Portsmouth, England, on the 18th of September 1818, the daughter of an Irishman named Farlin. Left an orphan at an early age, she turned to the stage, making her first appearance in 1834 as Lucy in *The Review*, at Cowes, Isle of Wight. The next year she married J. R. Vincent (d. 1850), an actor, with whom she toured England and Ireland for several years. In 1846 Mrs J. R. Vincent went to America to join the stock company of the old National theatre in Boston. Here she became a great favourite. No actress in America, except Mrs Gilbert, has ever been such "a dear old lady" to so wide a circle of constant admirers. She died in Boston on the 4th of September 1887. Her memory is honoured by the Vincent Memorial Hospital, founded in that city in 1890 by popular subscription, and formally opened on the 6th of April 1891, by Bishop Phillips Brooks, as a hospital for wage-earning women and girls.

VINCENT DE PAUL, ST (1576–1660), French divine, founder of the "Congregation of Priests of the Mission," usually known as Lazarites (*q.v.*), was born on the 24th of April 1576 at Pouy, near Dax, in Gascogne, and was educated by the Franciscans at Dax and at Toulouse. He was ordained priest in 1600. Voyaging from Toulouse to Narbonne, he was captured by Barbary pirates, who took him to Tunis and sold him as a slave. He converted his third master, a renegade Italian, and escaped with him to Aigues-Mortes near Marseilles in June 1607. After short stays at Avignon and Rome, Vincent found his way to Paris, where he became favourably known to Monsieur (afterwards Cardinal) de Bérulle, who was then founding the congregation of the French Oratory. At Bérulle's instance he became curate of Clichy near Paris (1611); but this charge he soon exchanged for the post of tutor to the count of Joigny at Folleville, in the diocese of Amiens, where his success in dealing with the spiritual needs of the peasants led to the "missions" with which his name is associated. In 1617 he accepted the curacy of Châtillon-lès-Dombes (or sur-Chalaronne), and here he received from the countess of Joigny the means by which he was enabled to found his first "confrérie de charité," an association of women who ministered to the poor and the sick. In 1619 Louis XIII. made him royal almoner of the galleys. Among the works of benevolence with which his name is associated are the establishment of a hospital for galley slaves at Marseilles, the institution of two establishments for foundlings at Paris, and the organization of the "Filles de la Charité," to supplement the work of the *confréries*, whose members were mainly married women with domestic duties. He died at Paris on the 27th of September 1660, and was buried in the church of St Lazare. He was beatified by Benedict XIII. in 1729, and canonized by Clement XII. in 1737, his festival (duplex) being observed on the 19th of July. The Society of St Vincent de Paul was founded by Frederic Ozanam and others in 1833, in reply to a charge brought by some free-thinking contemporaries that the church no longer had the strength to inaugurate a practical enterprise. In a variety of ways it does a great deal of social service similar to that of gilds of help. Its administration has always been in the hands of laymen, and it works through local "conferences" or branches, the general council having been suspended because it declined to accept a cardinal as its official head.

Lives by Maynard (4 vols., Paris, 1860); Bougaud (2 vols., Paris, 1891); E. de Broglie (5th edition, Paris, 1899); *Letters* (2 vols., Paris, 1882); A. Loth (Paris, 1880); H. Simard (Lyons, 1894).

VINCENT OF LERINS, ST, or Vincentis Lerinensis (d. *c.* A.D. 450), an ecclesiastical writer of the Western Church of whose personal history hardly anything is known, except that he was a native of Gaul, possibly brother of St Loup, bishop of Troyes, that he became a monk and priest at Lerinum, and that he died in or about 450. Lerinum (Lerins, off Cannes) had been made by Honoratus, afterwards bishop of Arles, the seat of a monastic community which produced a number of eminent churchmen, among them Hilary of Arles. The school did not produce an extensive literature, but it played an important part in resisting an exaggerated Augustinianism by reasserting the freedom of the will and the continued existence of the divine image in human nature after the fall. As regards Vincent he himself tells us that only after long and sad experience of worldly turmoil did he betake himself to the haven of a religious life. In 434, three years after the council of Ephesus, he wrote the *Commonitorium adversus profanas omnium haereticorum novitates*, in which he ultimately aims at Augustine's doctrine of grace and predestination. In it he discusses the "notes" which distinguish Catholic truth from heresy, and (cap. 2) lays down and applies the famous threefold test of orthodoxy—*quod ubique, quod semper, quod ab omnibus creditum est*. It is very striking that in his appeal to tradition Vincent assigns no part to the bishops as such—apart from the council; he appeals to the ancient "teachers," not to any apostolic succession. His "semi-Pelagian" opposition to Augustine is dealt with by Prosper of Aquitania in his *Pro Augustini doctrina responsiones ad capitula objectionum Vincentiarnarium*. It explains why the *Commonitorium* has reached us only in a mutilated form.

The *Commonitorium* has been edited by Baluze (Paris, 1663, 1669 and 1684) and by Klüpfel (Vienna, 1809). It also occurs in vol. L of Migne's *Patrol. Ser. Lat.* (1846). A full summary is given in A. Harnack's *History of Dogma*, iii. 230 ff. See also F. H. Stanton, *Place of Authority in Religion*, pp. 167 ff.; A. Cooper-Marsdin, *The School of Lerins* (Rochester, 1905).

VINCENT FERRER, ST (1355–1419), Spanish Dominican preacher, was born of respectable parentage at Valencia on the 23rd of January 1355. In February 1374 he took the Dominican habit, and after spending some years in teaching, and in completing his theological studies, he was licensed to preach. He graduated as doctor of theology at Lerida in 1374, and his sermons in the cathedral of Valencia from 1385 onwards soon became famous. Cardinal Peter de Luna took him with him to Paris in 1391; and on his own election to the pontificate as antipope Benedict XIII. made Ferrer his confessor and master of the sacred palace. Finding, however, the ecclesiastical atmosphere of Avignon an uncongenial one, he in 1397 resumed his work as a preacher, and Spain, France, Italy, Germany and Great Britain and Ireland were successively visited by him; and in every case numerous conversions were the result of his eloquence, which is described as having been singularly powerful and moving. In 1412 he was delegated by his native city to take part in the election of a successor to the vacant crown of Aragon; and in 1416 he received a special invitation to attend the council of Constance, where he supported the cause of the Flagellants (*q.v.*). He died at Vannes on the 5th of April 1419, and was canonized by Calixtus III. in 1455, his festival (duplex) being observed on the 5th of April.

See A. Sorbelli, *Il trattato di S. Vincenzo Ferrer intorno al Grande Scisma d'Occidente* (Bologna, 1906).

[illegible] (1690–1730), Italian musical composer, [illegible] in Calabria in 1690 and educated at [illegible] Greco in the Conservatorio dei Poveri di [illegible] known first by his comic operas in Neapolitan dialect in 1719; he also composed many serious operas. He was received into the Congregation of the Rosary at Formiello in 1728 and died by poisoning in 1730, not 1732, as is generally stated. His comic operas, of which *Le Zite 'n Galera* (1722) is the best, are full of life and spirit; in his serious operas, of which *Didone Abbandonata* (Rome, 1728) and *Artaserse* (Rome, 1730) are the most notable, have an incisive vigour and directness of dramatic expression deservedly praised by Burney. The well-known air "Vo solcando," from *Artaserse*, is a good example of his style.

VINDELICIA, in ancient geography, a country bounded on the S. by Raetia, on the N. by the Danube and the Vallum Hadriani, on the E. by the Oenus (Inn), on the W. by the territory of the Helvetii. It thus corresponded to the N.E. portion of Switzerland, the S.E. of Baden, and the S. of Württemberg and Bavaria. Together with the neighbouring tribes it was subjugated by Tiberius in 15 B.C., and towards the end of the 1st century A.D. was made part of Raetia (*q.v.*). Its chief town was Augusta Vindelicorum (Augsburg). Its inhabitants were probably of Celtic origin (cf. the recurrence of *Vind-* in other Celtic names—Vindobona, Vindonissa); some authorities, however, regard them as German. According to Dio Cassius (liv. 22) they were an agricultural people, and later writers (*e.g.* Isidorus, *Origines*, i. 4), describe the country as very fertile.

VINDHYA, a range of mountains in Central India. It forms a well-marked, though not quite continuous, chain across India, separating the Ganges basin from the Deccan. Starting on the west in Gujarat, the Vindhyas cross Malwa and the central portions of India, until their easternmost spurs abut on the valley of the Ganges at Rajmahal. They thus roughly form the northern side of the triangle, of which the other two sides are the Eastern and Western Ghats. They have an elevation of 1500 to 4500 ft., nowhere exceeding 5000 ft. Geologically they give their name to the "Vindhyan formation," one of the recognized rock systems of India. In legendary tradition they formed the demarcating line between the Madyadesha or middle land of the Sanskrit invaders and the non-Aryan Deccan, and they are still largely inhabited by aboriginal races such as the Bhils.

VINE. The grape-vine, botanically *Vitis*, is a genus of about thirty species, widespread in the north temperate zone, but richest in species in North America. The best known and longest cultivated species is the old-world grape-vine, *Vitis vinifera*; a variety of this, *silvestris*, occurs wild in the Mediterranean region, spreading eastwards towards the Caucasus and northwards into southern Germany, and may be regarded as the parent of the cultivated vine. It is of interest to note that grape-stones have been found with mummies in Egyptian tombs of not later age than 3000 years. The seeds have the characteristics of those of *V. vinifera*, but show some very slight variations from the type of seed now prevalent. Among the Greeks in the time of Homer wine was in general use. The cultivation of the vine must also have been introduced into Italy at a very early period. In Virgil's time the varieties in cultivation seem to have been exceedingly numerous; and the varied methods of training and culture now in use in Italy are in many cases identical with those described by Columella and other Roman writers. Grape-stones have been found among the remains of Swiss and Italian lake dwellings of the Bronze period, and others in tufaceous volcanic deposits near Montpellier, not long before the historic era.

The old-world species is also extensively cultivated in California, but the grape industry of the eastern United States has been developed from native species, chiefly *V. Labrusca* and *V. aestivalis* and their hybrids with *V. vinifera*. Some of the American varieties have been introduced into France and other countries infested with *Phylloxera*, to serve as stocks on which to graft the better kinds of European vines, because their roots, though perhaps equally subject to the attacks of the insects, do not suffer so much injury from them as the European species.

The vine requires a high summer temperature and a prolonged period in which to ripen its fruit. Where these are forthcoming, it can be profitably cultivated, even though the winter temperature be very low. Tchihatchef mentions that at Erivan in Russian Armenia the mean winter temperature is 7°·1 C. and falls in January to −30° C., and at Bokhara the mean temperature of January is 4° C. and the minimum −22° C., and yet at both places the vine is grown with success. In the Alps it is profitably cultivated up to an altitude of 1870 ft., and in the north of Piedmont as high as 3180 ft. At the present time the limit of profitable cultivation in Europe passes from Brittany, lat. 47° 30′, to beyond the Rhine by Liége and through Thuringia to: Silesia in lat. 51° 55′. In former centuries vines were cultivated to the north of this region, as, for instance, in Holland, in Belgium largely, and in England, where they might still be grown. Indeed, experiments have been made in this direction near Cardiff in South Wales. The yield is satisfactory, and the wine made, the variety known as Gamay noir, is described as being like still champagne. In the middle ages, owing to various causes, the better wines of France and Germany could not be obtained in England except at prohibitive prices; but when this state of things ceased, and foreign wine could be imported, the English consumers would no longer tolerate the inferior productions of their own vineyards. It is also probable that the English mixed sugar or honey with the wine and thus supplied artificially that sweetness which the English sun denied. It is a curious fact that at the present day much or even most of the wine of finest quality is made at or near to the northern limits of possible cultivation with profit. This circumstance is probably explained by the greater care and attention bestowed both on the cultivation of the vine and on the manufacture of the wine in northern countries than in those where the climate is more propitious. The relative inferiority of the wines made at the Cape of Good Hope and in Australia is partly due to variations of climate, the vine not yet having adapted itself to the new conditions, and partly to the deficient skill of the manufacturers. That such inferiority may be expected to disappear is suggested by the success of vine-culture in Madeira and the Canary Islands.

The development of other species of *Vitis*, such as the curious succulent species of the Soudan and other parts of equatorial Africa, or the numerous kinds in India and Cochin China, is of course possible under suitable conditions; but it is obvious that an extremely long period must elapse before they can successfully compete with the product of many centuries.

[See also generally the article WINE. For currants and raisins, both produced by varieties of the grape-vine, see the respective articles.]

Apart from their economic value, vines are often cultivated for purely ornamental purposes, owing to the elegance of their foliage, the rich coloration they assume, the shade they afford, and their hardihood.

Vines have woody climbing stems, with alternate, entire or palmately lobed leaves, provided at the base with small stipules. Opposite some of these leaves springs a tendril, by aid of which the plant climbs. There are numerous transitional states between the ordinary form of tendril and the inflorescence. The flowers are small, green and fragrant, and are arranged in dense clusters. Each has a small calyx in the form of a shallow rim, sometimes five-lobed or toothed; five petals, which cohere by their tips and form a cap or hood, which is pushed off when the stamens are ripe; and five free stamens, placed opposite the petals and springing from a fleshy ring or disk surrounding the ovary; each bears a two-celled anther. The anomalous position of the stamens in front of the petals is explained by the abortion or non-development of an outer row of stamens, indications of which are sometimes seen on the hypogynous disk encircling the ovary. The ovary bears a sessile stigma and is more or less completely two-celled, with two erect ovules in each cell. This ripens into the berry and seed. The cultivated vine has usually hermaphrodite flowers; but as it occurs in a wild state, or as an escape from cultivation, the flowers manifest a tendency towards unisexuality: that is, one plant bears flowers with stamens only, or only the rudiments of the pistil, while on another plant the flowers are bisexual. Exclusively female flowers without stamens do not appear to have been observed. Seedling plants from the cultivated vines often produce unisexual flowers, thus reverting to the feral type. Perhaps the explanation of the fact that some of the cultivated varieties are, as gardeners say, " bad setters," —*i.e.* do not ripen their fruit owing to imperfect fertilization,—is to be sought in this natural tendency to dioecism.

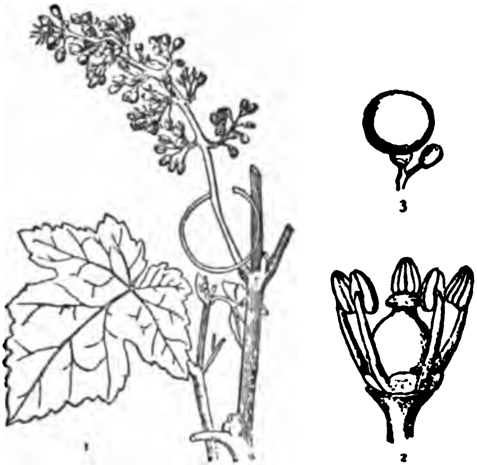


FIG. 1.—Vine.
1. Foliage, tendril and inflorescence, reduced.
2. Flower after fall of petals, magnified.
3. Fruit, reduced.

The conformation of the vine stem has elicited a vast amount of explanatory comment. The most generally accepted explanation is the " sympodial " one. According to this, the shoot of the vine is a " sympodium," consisting of a number of " podia " placed one over the other in longitudinal series. Each podium consists of a portion of the stem bearing one or more leaves, each with an axillary bud or buds, and terminating in a tendril or an inflorescence. In *V. Labrusca* there is a tendril opposite to each leaf, so that the podium bears only a single leaf. In other species there is a definite arrangement of the leaves, some with and others without tendrils opposite to them, the numerical order remaining constant or nearly so. These arrangements have doubtless some reference to climatic phenomena, continuity of growth being arrested by cold and promoted by warmth. In any case, it is obvious that these facts might be turned to practical ends in cultivation. A vine, for instance, that produces bunches of grapes at each joint is preferable to one in which there are several barren joints, as a larger quantity can be grown within a smaller area. The practice of pruning or " stopping " is, consciously or unconsciously, regulated by the mode of growth. The tendril or inflorescence, according to the views above explained, though in reality terminal, is bent to one side; hence it appears to be lateral and opposite to the leaf. While the tendril is thus diverted from its original direct course, the axillary bud of the leaf opposite the tendril begins a new podium, by lengthening into a shoot which assumes the direction the tendril had prior to its deflexion. This new podium, now in a direct line with its predecessor, produces leaves and ends in its turn in a tendril or inflorescence. A third podium succeeds the second, and so on. Other authorities explain the formation of the tendril and its anomalous position opposite to a leaf by supposing that the end of the stem bifurcates during growth, one division forming the shoot, the other the tendril or inflorescence. It is not possible within the limits at our command to specify the facts and arguments by which these theories are respectively supported. Practically the tendrils assist the plant in its native state to scramble over rocks or trees. As in the case of similar formations generally, they are endowed with a sensitiveness to touch which enables them to grasp and coil themselves round any suitable object which comes in their way, and thus to support the plant. The seeds or grape-stones are somewhat club-shaped, with a narrow neck-like portion beneath, which expands into a rounded and thickened portion above. On the inner or central side of the seed is a ridge bounded on either side by a shallow groove. This ridge indicates the point of union of the " raphe " or seed-stalk with the seed; it serves to distinguish the varieties of *V. vinifera* from those of other species. In endeavouring to trace the filiation and affinities of the vine. the characters afforded by the seed are specially valuable, because they have not been wittingly interfered with by human agency. Characters derived from the size, colour or flavour of the berry are of less value for historical or genealogical purposes than those which are the outcome of purely natural conditions.

The vine is hardy in Britain so far as regards its vegetation, but not hardy enough to bring its fruit to satisfactory maturity, so that for all practical purposes the vine must be regarded as a tender fruit. Planted against a wall or a building having a south aspect, or trained over a sunny roof, such sorts as the Black Cluster, Black Prince, Pitmaston White Cluster, Royal Muscadine, Sweetwater, &c., will ripen in the warmest English summers so as to be very pleasant eating; but in cold summers the fruit is not eatable in the raw state, and can only be converted into wine or vinegar. For outdoor culture the long-rod system is generally preferred.

When the plant is grown under glass, the vine border should occupy the interior of the house and also extend outwards in the front, but it is best made by instalments of 5 or 6 ft. as fast as the previous portions become well filled with roots, which may readily be done by packing up a turf wall at the extremity of the portion to be newly made; an exterior width of 15 ft. will be sufficient. If the soil beyond this is very unfavourable, the roots should be prevented from entering it by building a wall at the extreme edge of the border. Inside borders require frequent and thorough waterings. In well-drained localities the border may be partially below the ground level, but in damp situations it should be made on the surface; in either case the firm solid bottom should slope outwards towards an efficient drain. A good bottom may be formed by chalk rammed down close. On this should be laid at least a foot thick of coarse, hard, rubbly material, a layer of rough turf, grass side downwards, being spread over it to prevent the compost from working down. The soil itself, which should be 2½ or 3 ft. deep, never less than 2 ft., should consist of five parts rich turfy loam, one part old lime rubbish or broken bricks, including a little wood ashes or burnt earth (ballast), one part broken charcoal, and about one part of half-inch bones, the whole being thoroughly mixed, and kept dryish till used. It is well after the borders are completed to remove the top soil, in which no roots are to be found, every two or three years, and to replace it with a mixture of good loam, rotten manure, lime rubbish and bone meal, to the depth of 6 or 7 in. A mulch of half-decayed stable litter is useful to prevent loss of moisture in summer.

Young vines raised from eyes, *i.e.* buds having about ½ in. wood above and 1 in. below, are generally preferred for planting. The eyes being selected from well-ripened shoots of the previous year are planted about the end of January, singly, in small pots of light loamy compost, and after standing in a warm place for a few days should be plunged in a propagating bed, having a bottom heat of 75°, which should be increased to 85° when they have produced several leaves, the atmosphere being kept at about the same temperature or higher by sun heat during the day, and at about 75° at night. As soon as roots are freely formed the plants must be shifted into 6-inch pots, and later on into 12-inch ones. The shoots are trained up near the glass, and, with plenty of heat (top and bottom) and of water, with air and light, and manure water occasionally, will form firm, strong, well-ripened canes in the course of the season. To prepare the vine for planting, it should be cut back to within 2 ft. of the pot early in the season, and only three or four of the eyes at the base should be allowed to grow on. The best time for planting is in spring, when the young shoots have just started. The vines should be planted inside the house, from 1 to 2 ft. from the front wall, and from 6 ft. to 8 ft. apart, the roots being placed an inch deeper in the soil than before, carefully disentangled and spread outwards from the stem, and covered carefully and firmly with friable loam, without manure. When the shoots are fairly developed, the two strongest are to be selected and trained in. When forcing is commenced, the vinery is shut up for two or three weeks without fire heat, the mean temperature ranging about 50°. Fire heat must be at first applied very gently, and may range about 55° at night, and from 65° to 70° by day, but a few degrees more may be given them as the buds break and the new shoots appear. When they are in flower, and onwards during the swelling of the berries, 85° may be taken as a maximum, running up to 90° with sun heat and the temperature may be lowered somewhat when the fruit is ripe. The temperature must, however, be regulated according to the variety, Muscats requiring a higher temperature from the time their bunches show than Hamburghs. As much ventilation as the state of the weather will permit should be given. A moist growing atmosphere is necessary both for the swelling fruit and for maintaining the health of the foliage. A due amount of moisture may be kept up by the use of evaporating troughs and by syringing the walls and pathways two or three times a day, but the leaves should not be syringed. When the vines are in flower, and when the fruit is colouring, the evaporating troughs should be kept dry, but the aridity must not be excessive, lest the red spider and other pests should attack the leaves. In the course of the season the borders (inside) will require several thorough [illegible] of warm water—the first when the house is shut up, [illegible] when the vines have made young shoots a few [illegible] when the vines are in flower, and still again when [illegible] the second swelling after stoning. Outside [illegible] in very dry summer weather only.

[illegible] systems of pruning vines, termed the *long-rod*, the *short-rod* and the *spur* systems, and good crops have been obtained by each of them. It is admitted that larger bunches are generally obtained by the long-rod than by the spur system. The principle of this mode of pruning is to train in at considerable length, according to their strength, shoots of the last year's growth for producing shoots to bear fruit in the present, these rods are afterwards cut away and replaced by young shoots trained up during the preceding summer; and these are in their turn cut out in the following autumn after bearing, and replaced by shoots of that summer's growth. By the short-rod system, short instead of long rods are retained, they are dealt with in a similar manner. The spur system has, however, become the most general. In this case the vines are usually planted so that one can be trained up under each rafter, or up the middle of the sash, the latter method being preferable. The shoots are cut back to buds close to the stem, which should be encouraged to form alternately at equal distances right and left, by removing those buds from the original shoot which are not conveniently placed. The young shoots from these buds are to be gently brought to a horizontal position, by bending them a little at a time, and tied in, and usually opposite about the fourth leaf the rudiments of a bunch will be developed. The leaf directly opposite the bunch must in all cases be preserved, and the young shoot is to be topped at one or two joints beyond the incipient fruit, the latter distance being preferable if there is plenty of room for the foliage to expand; the lateral shoots, which will push out after the topping, must be again topped above their first or second joints. If the bunches are too numerous they must be thinned before the flowers expand, and the berries also must be properly thinned out and regulated as soon as they are well set, care being taken, in avoiding overcrowding, that the bunches be not made too thin and loose.

The cultivation of vines in pots is very commonly practised with good results, and pot-vines are very useful to force for the earliest crop. The plants should be raised from eyes, and grown as strong as possible in the way already noted, in rich turfy loam mixed with about one-third of horse dung and a little bone dust. The temperature should be gradually increased from 60° to 80°, or 90° by sun heat, and a bottom heat a few degrees higher must be maintained during their growth. As the roots require more room, the plants should be shifted from 3-inch pots into those of 6, 12 or 15 in. in diameter, in any of which larger sizes they may be fruited in the following season, but, to be successful in this, the young rod produced must be thoroughly matured after it has reached its limit of growth. The periodical thorough cleansing of the vine stems and every part of the houses is of the utmost importance.

The number of varieties of grapes possessing some merit is considerable, but a very few of them will be found sufficient to supply all the wants of the cultivator. For general purposes nothing approaches the Black Hamburgh (including Frankenthal) in merit.

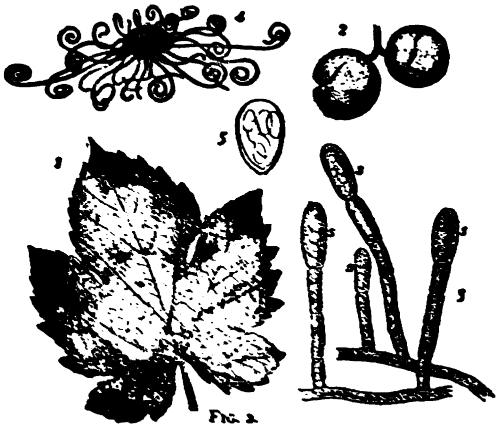


FIG. 2.

1. Vine leaf attacked by mildew, *Uncinula necator* (*Erysiphe Tuckeri*), which forms white patches on the upper face, reduced.
2. Grapes similarly attacked.
3. Portion of the mycelium of the fungus bearing spores (conidia). s, on erect branches.
4. Perithecium or "fruit" of the fungus with its curled appendages.
5. Ascus from perithecium containing six spores.

Fungoid Diseases.—The most destructive form of fungoid disease which attacks the vine is caused by a mildew, *Uncinula necator* (*Erysiphe Tuckeri*) (fig. 2). The disease was first noticed in England in

1845: in 1848 it appeared at Versailles; by 1851 it had spread through all the wine-producing countries of Europe, being specially virulent in the lands bordering on the Mediterranean; and in the following year it made its appearance in Madeira. Like the *Phylloxera* (*q.v.*; also WINE), the mildew is in its origin probably American. The disease is characterized by the appearance of a mycelium forming white or greyish-white patches on the young leaves; this spreads quickly and attacks the older leaves and branches, and ultimately reaches the grapes. At first these are marked only by small brown spots; but the spots spread and fuse together, the skin of the grape is destroyed, and the flesh decays, the seed only remaining apparently untouched. The disease spreads by the mycelium growing over the epidermis of the plant. The hyphae composing the mycelium are provided with haustoria which project into the cells of the affected part (fig. 3). Some of the hyphae which project from the leaf bear spores (conidia), which are constricted off one at a time, and by their means the fungus is distributed (fig. 2, 3). The perithecia are only produced exceptionally in Europe, but this stage of the life-history is common in the United States and causes a widely spread disease among the American vines. The mildew is in its turn attacked by a fungus of the same tribe, *Cicinnobolus Cesatii*, which lives parasitically within the hyphae of its host, and at times even succeeds in destroying it. The means which have proved most efficacious, both as a remedy and a preventive of this disease, is to scatter flowers of sulphur over the vines, before the morning dew has evaporated. Another method is to boil one part of lime with three parts of sulphur, and to sprinkle the mixture over the affected plants.

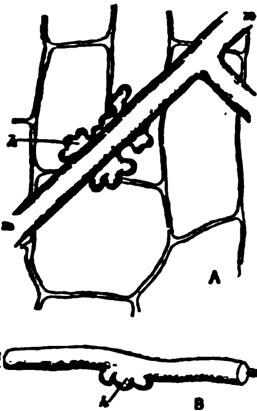


FIG. 3.—*Uncinula necator* (*Erysiphe Tuckeri*). A and B, mycelium (*m*), with haustoria (*h*). (After de Bary.) In A several cells of the epidermis are indicated.

Another fungus which attacks vines, especially those of America, is *Plasmopara viticola*, which has also been introduced from America to Europe. The mycelium spreads through the green parts of the plant, attacking the leaves, twigs and unripe grapes. On the upper side of the leaf, where it is first visible, it forms pale green irregular spots, which become darker in colour. On the under side of the leaf these patches are white and are composed of the spore-bearing hyphae. The leaf ultimately becomes dried up and brittle. The grapes which are attacked cease to grow, turn brown or white, and ultimately dry up and fall off. This disease has been successfully treated with a spray of copper sulphate and lime, or sulphate of iron; solutions of these salts prevent the conidia from germinating.

Anthracnose is the name usually given to a disease which was formerly known as "charbon," "pech" or "brenner." This disease is caused by the parasitism of *Sphaceloma ampelinum*, one of the Pyrenomycetous fungi (fig. 4). The fungus assails all the green parts of the vine, and injures the leaves and young shoots as much as it does the grape itself. The first sign of its presence is the appearance of a minute spot, which is greyish in the centre, with a brown border. This spot increases in size; in the stalks it assumes an oval shape, with its long axis parallel to the stalk, whilst in the leaves and grapes it is more or less circular in outline. The centre of the spots on the grapes becomes darker as the disease advances, and a red line appears dividing the dark brown border into an outer and an inner rim and giving a very characteristic appearance to the diseased plant. The surrounding tissue enlarges, so that the spots appear as if sunk in depressions, and bear a considerable resemblance to hailstone wounds. Later the spots on the leaves often drop out. The berries do not shrivel up as those do that are affected by the black rot. The mycelium of *Sphaceloma* grows just beneath the cuticle of the vine, through which it soon bursts, giving rise to a number of minute hyphae, which bear conidia. These are minute, oval, colourless spores, which serve to spread the disease over the vineyard and from place to place. The complete life-history of this form is at present unknown; and information as to where the fungus passes the winter, and in what form, would probably afford some useful indications as to the method that should be adopted to combat the disease. Anthracnose has been known in Europe for many years, but has only been observed in America since 1881, whither it was probably imported from the old world. As a preventive to its attacks the copper sulphate sprays and a solution (50%) of iron sulphate have been found very useful, as well as care in planting on well-drained soil that does not lie too low, the disease seldom appearing in dry, well-exposed vineyards. A great deal of confusion still exists with regard to this disease. A similar disease which of late has frequently been found in England, and which is ascribed to the fungus *Gloeosporium ampelophagum*, is very similar to it. In their mode of attack, in the symptoms they produce, and in the result upon the grapes and the vine the two fungi are so much alike that for practical purposes they may be regarded as identical. Massee recommends that the shoots should be dredged with flowers of sulphur at intervals of ten days, while the disease continues to spread, a small quantity of quicklime in a finely powdered condition being added and the quantity of lime being increased at every application, not so as to exceed the sulphur, however. The iron sulphate solution should be used while the vines are in a dormant condition, and diseased parts should be cleared away and burned.

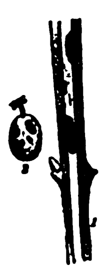


FIG. 4.—Charbon or Anthracnose of Vine, caused by *Sphaceloma ampelinum*.

1. Portion of twig with discoloured patches, caused by the fungus.
2. Fruit attacked by the fungus (reduced).

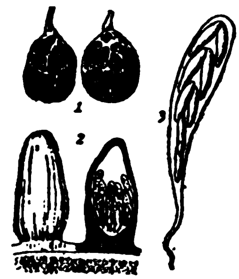
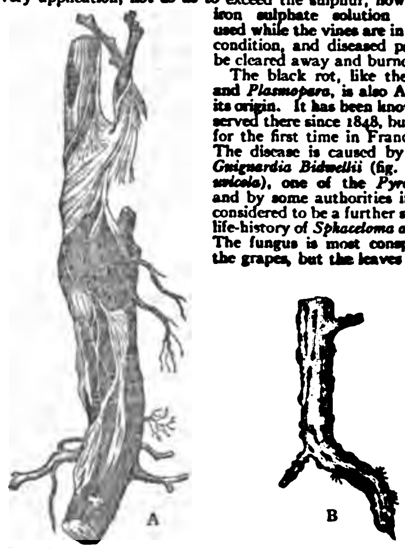


FIG. 5.—Black Rot of Grapes, *Guignardia Bidwellii*.

1. Grapes attacked by the fungus; the fruit becomes black, hard and shrivelled.
2. Fructification of the fungus, entire and in section; the latter shows the asci containing ascospores, much enlarged.
3. Single ascus, more enlarged, showing the eight contained spores.



From Hartig's *Lehrbuch der Pflanzenkrankheiten*, by permission of Julius Springer.

FIG. 6.—*Rosellinia* (*Dematophora*) *necatrix*.

A. Mycelium of the fungus attacking root of vine (reduced).
B. Portion of vine root, showing masses of fructification (*perithecia*) of the fungus (reduced).

The black rot, like the *Uncinula* and *Plasmopara*, is also American in its origin. It has been known and observed there since 1848, but appeared for the first time in France in 1885. The disease is caused by a fungus, *Guignardia Bidwellii* (fig. 5) (*Phoma uvicola*), one of the *Pyrenomycetes*, and by some authorities it has been considered to be a further stage in the life-history of *Sphaceloma ampelinum*. The fungus is most conspicuous on the grapes, but the leaves and stems are also affected. The grapes are not assailed until nearly full-grown, when a brownish spot appears, which spreads over the whole grape. The latter for a time retains its plumpness, but on the appearance of little black pustules, which first occur on the part primarily affected, the grape begins to shrivel. This continues until the grape is reduced to a black hard mass, with the folds of skin pressed closely against the seed. The disease spreads from grape to grape, so that as a rule many of the grapes in a bunch are destroyed. The hyphae of the mycelium of this fungus are septate, with numerous short branches. The pustules on the surface are due to fructifications, pycnidia and spermagonia. The fungus passes the winter in the withered grapes which fall to the ground, and on these the mature form of the fungus (fig. 5, 2 and 3) is produced; hence every care should be taken to collect these and burn them. The use of the copper solutions mentioned above may also be recommended as a preventive.

Among the other fungi which infest the vine may be mentioned *Phyllosticta viticola* and *Ph. Labruscae*, which, when the attack is severe, cause the destruction of the leaves, the only part they assail. These, like the foregoing, are members of the *Pyrenomycetes*, while many other allied fungi have been described as causing spots on the leaves. *Cercospora Vitis* (*Cladosporium viticolum*), which has club-shaped spores of a green-brown colour, also attacks the leaves; but, unless the season is extremely unfavourable, it does little harm.

A very disastrous root-disease of the vine is due to the ravages of another pyrenomycetous fungus, *Rosellinia* (*Dematophora*) *necatrix* (fig. 6), which forms subterranean strings of mycelium—so-called rhizomorphs. The diseased roots have been confounded with those attacked by *Phylloxera*. The only mode of combating the malady seems to be to uproot the plants and burn them. Isolation of the diseased areas by means of trenches has also been practised.

VINEGAR, a dilute solution of impure acetic acid, prepared by the acetous fermentation of alcohol or of substances which yield alcohol when suitably decomposed (ordinary vinegar), or obtained from the products resulting on the dry distillation of wood (wood vinegar). Ordinary or table vinegars, which contain, in addition to acetic acid, small quantities of alcohol, higher acids such as tartaric and succinic, various esters, albuminous substances, &c., are produced solely by acetous fermentation, wood vinegar being only employed in certain arts. Ordinary vinegar has been known from the earliest times, and its power of combining with or dissolving mineral substances caused the alchemists to investigate its preparation and properties. They failed, however, to obtain pure acetic acid, although by distillation they prepared more concentrated solutions (*spiritus Veneris*). In 1697 Stahl showed that vinegar could be concentrated by freezing out part of the water, and, better, in 1702, by neutralizing the acid with an alkali and distilling the salt with oil of vitriol. A notable improvement was made in 1789 by Löwitz, who showed that the dilute acid could be concentrated by repeatedly passing it over charcoal powder, and by cooling he obtained a crystalline substance named in 1777 by Durande, "glacial acetic acid." The presence of an acid substance in the products of the dry distillation of wood was mentioned by Glauber in 1648 and received the name of pyroligneous acid. Its identity with acetic acid was demonstrated by Vauquelin in 1800.

The mechanism of acetous fermentation is described under FERMENTATION; here we only treat of the actual processes. There are two methods in use: the "quick" process, proposed in 1720 by Boerhaave and introduced by Schützenbach in 1823 (analogous processes were proposed at about the same time by Wagmann in Germany and by Ham in England), and the older or "slow" process.

In the "quick" process advantage is taken of the fact that the fermentation proceeds more quickly when a large surface of the liquid is exposed to air. Any alcoholic liquid can be treated. The apparatus consists essentially of a vat divided into three portions: the lowest, which is separated from the one above by a grid or false bottom, serves for the collection of the vinegar; the central portion, which is by far the largest, is the chamber wherein the fermentation is effected; and it is separated from the topmost section by a disk perforated with holes about the size of quills through which thin strings lead into the upper part of the central section. The purpose of this disk is to subdivide the liquid placed upon it into drops so as to increase the surface of the liquid. The sides of the vat enclosing the lowest portion are provided with a ring of holes to admit air to the tub; and the vat is enclosed with a tightly fitting lid perforated by a hole through which the liquor to be fermented is admitted and the air drawn upwards from the base escapes. The central chamber is filled with some material of large surface. The commonest are [illegible] shavings, which, before use, must be carefully freed from all extractives by washing and steaming, then dried, and finally soured by immersion in hot vinegar for twenty-four hours. The fermented wort, prepared in various ways and of varying composition, or wine, is warmed to about 38° C. and then fed into the upper chamber. Falling on to the shavings, the surface is largely increased, and the fermentation which ensues maintains the temperature at about 37°, and draws a current of air upwards through the shavings, which after a time become covered with the so-called mother of vinegar. If the liquid contains only 4% of alcohol, it is completely converted into acetic acid, but stronger liquors require to be passed through the vat three or four times. Some of the alcohol (and consequently some acetic acid) is carried away by the air which escapes to the top of the vat; this is avoided in some factories by leading the air over or into water, whereby the alcohol and aldehyde are recovered. The same is effected in Singer's generators, which are coupled together in tiers.

For making wine-vinegar by the slow process, full-bodied wines about one year old and containing 10% of alcohol (this amount being obtained, when necessary, by blending) are preferred; and they are clarified by standing with beech shavings upon which the lees deposit. The fermentation is carried out in casks holding from 50 to 100 gallons; these casks are repeatedly extracted with water in order to prevent any impurity finding its way into the vinegar; also it is found that the casks foul after about six years' use, when it is necessary to remove the deposits of argol, yeast sediments, &c., and re-extract with water, after which they are again fit for use. In conducting the fermentation the cask is one-third filled with boiling strong vinegar and allowed to stand for eight days. Nine pints of the wine are now added every day until the cask is two-thirds full, and the mixture is allowed to stand for fourteen days. After this interval from 10 gallons to half the contents of the cask are drawn off, and more wine added. The working temperature is about 25°. The progress of the operation is shown by the white froth which appears on a spatula after immersion in the liquid; if it be reddish, more wine must be added. In certain parts of France, Holland and of the Rhine district a different procedure is adopted. Two casks, fitted with false bottoms on which are placed vine cuttings, are taken; one cask is completely filled with the wine, whilst the other is only half filled. The acetification proceeds more rapidly in the second cask, and after twenty-four hours half the contents of the first cask are transferred to it, and the process repeated. The product is settled in casks containing birch wood, and after fourteen days it is put upon the market.

In preparing malt vinegar, an infusion of malt is prepared by extracting it with water at 72°, then at a higher temperature and finally at the boiling-point. After cooling the extracts are fermented with yeast, and the product kept for some months before acetification. This step can be effected by the quick process as described above, or by the slow process. In the latter the liquid at 25° is transferred to barrels lying on their sides and the fermentation allowed to proceed. When the process is complete the product is filtered through rapes in a fining tun. This is a cask fitted with a false bottom in which are placed spent tanner's wood, shavings, or, better, the pressed stalks and skins of grapes and raisins from wine manufacture. Household vinegar is made in upright casks; after twenty-four hours it is transferred to a similar cask, and the process repeated in a third and fourth cask. Malt vinegar is sold in four strengths designated 18, 20, 22, 24, the last being "proof" vinegar, containing 6% of acetic acid and having a specific gravity of 1·019. These numbers represent the grains of dry pure sodium carbonate, which are neutralized by one fluid ounce of the vinegar.

Several other vinegars are made. Crystal vinegar is ordinary vinegar decolorized by treatment with animal charcoal. Ale vinegar is prepared from strong sour pale ale; it has a tendency to putrefy. Glucose or sugar vinegar is made by first fermenting amylaceous substances to alcohol, and then acetifying the alcohol. Compound table vinegars are made by digesting ordinary vinegar with condiments such as pepper, garlic, capers, &c.; whilst aromatic vinegars popularly used in vinaigrettes on account of their refreshing, stimulating pungency are obtained by distilling ordinary vinegar with plants, perfumes and aromatic substances. Medicinal vinegars are prepared either by digestion or distillation of vinegar with various drugs. Vinegar, however, is not now much used in medicine, although occasionally taken, under a false impression, in order to reduce obesity.

Wood vinegar is not used in cooking, as it lacks those substances which render ordinary vinegar palatable. It is largely manufactured for conversion into pure acetic acid and acetone; and also for use as an antiseptic and wood preservative. (See ACETIC ACID.)

VINELAND, a borough of Cumberland county, New Jersey, U.S.A., in the southern part of the state, about 34 m. S of Philadelphia and about 115 m. S.W. of New York. Pop. (1890) 3822, (1900) 4370, including 500 foreign-born; (1905 state census) 4593; (1910) 5282. Area, 1 sq. m. It is served by the Central of New Jersey and the West Jersey & Seashore railways, and by electric railway to Millville and Bridgeton. Vineland is situated at an altitude of 90–118 ft. above the sea, on a generally level or slightly undulating plain, and has unusually broad, straight and well-shaded streets. The borough maintains a public library, a public park of 40 acres, artesian waterworks, a sewerage system and an electric lighting plant. It is the seat of the New Jersey Training School for Feeble-Minded Girls and Boys (1888), the State Home for the Care and Training of Feeble-Minded Women (1888), and the State Home for Disabled Soldiers, Sailors, Marines and their Wives. The Vineland Historical and Antiquarian Society (organized in 1864) has a library (8000 volumes in 1909) housed in the Society's building, and it maintains a free lecture course. Saloons for the sale of intoxicating liquors have never been allowed in Vineland. The surrounding country is largely devoted to the growing of small fruits, grapes, peaches, pears and apples, and the raising of sweet potatoes; and within the borough are manufactured unfermented grape juice wine, boots and shoes, clothing, carpets, rugs, chenille curtains, pearl buttons, flint-glass tubes and bottles, and iron castings.

Vineland was founded in 1861 by Charles K. Landis (1835–1900), who conceived the idea of creating a settlement in the almost uninhabited "Pines" of Southern New Jersey; and after purchasing a large tract he laid out a village with small farms adjoining. The settlers, largely from New England and the Middle States, received the land at moderate prices on agreeing to make certain stipulated improvements. The township of Landis (pop. in 1910, 6435), named in honour of the founder of the settlement, was incorporated in 1864, having formerly been a part of Millville; from it Vineland was separated and was incorporated as a borough in 1880.

See *The Founder's Own Story of the Founding of Vineland* (Vineland, 1903), a pamphlet published by the Vineland Historical and Antiquarian Society.

VINER, SIR ROBERT (1631–1688), lord mayor of London, was born in Warwick, but migrated in early life to London, where he was apprenticed to his uncle, Sir Thomas Viner (1558–1665), a goldsmith, who was lord mayor of London in 1653–54, and who was created a baronet in 1661. Soon Robert became a partner in his kinsman's business, and in 1666 an alderman of the city of London; in 1665 he was made a knight, and in the following year a baronet. He was sheriff during the year of the great fire in London, and was chosen lord mayor in 1674. Combining like his uncle the business of a banker with that of a goldsmith, Viner was brought much into contact with Charles II. and with the court. The king attended his mayoral banquet, and the lord mayor erected an equestrian statue in his honour on a spot now covered by the Mansion House. Having been appointed the king's goldsmith in 1661, Sir Robert was one of those who lent large sums of money for the expenses of the state and the extravagances of the court; over £400,000 was owing to him when the national exchequer suspended payment in 1672, and he was reduced to the necessity of compounding with his creditors. He obtained from the state an annuity of £25,000. Viner died at Windsor on the 2nd of September 1688.

See *Viner: a Family History*, published anonymously (1885).

VINET, ALEXANDRE RODOLPHE (1797–1847), French critic and theologian, of Swiss birth, was born near Lausanne on the 17th of June 1797. He was educated for the Protestant ministry, being ordained in 1819, when already teacher of the French language and literature in the gymnasium at Basel; and during the whole of his life he was as much a critic as a theologian. His literary criticism brought him into contact with Sainte-Beuve, for whom he procured an invitation to lecture at Lausanne, which led to his famous work on Port-Royal. Vinet's *Chrestomathie française* (1829), his *Études sur la littérature française au XIXme siècle* (1849–51), and his *Histoire de la littérature française au XVIIIme siècle*, together with his *Études sur Pascal*, *Études sur les moralistes aux XVIme et XVIIme siècles*, *Histoire de la prédication parmi les Réformés de France* and other kindred works, gave evidence of a wide knowledge of literature, a sober and acute literary judgment and a distinguished faculty of appreciation. He adjusted his theories to the work under review, and condemned nothing so long as it was good work according to the writer's own standard. His criticism had the singular advantage of being in some sort foreign, without the disadvantage which attaches in French eyes to all criticism of things French written in a foreign language. As theologian he gave a fresh impulse to Protestant theology, especially in French-speaking lands, but also in England and elsewhere. Lord Acton classed him with Rothe. He built all on conscience, as that wherein man stands in direct personal relation with God as moral sovereign, and the seat of a moral individuality which nothing can rightly infringe. Hence he advocated complete freedom of religious belief, and to this end the formal separation of church and state (*Mémoire en faveur de la liberté des cultes* (1826), *Essai sur la conscience* (1829), *Essai sur la manifestation des convictions religieuses* (1842). Accordingly, when in 1845 the civil power in the canton of Vaud interfered with the church's autonomy, he led a secession which took the name of *L'Église libre*. But already from 1831, when he published his *Discours sur quelques sujets religieux* (*Nouveaux discours*, 1841), he had begun to exert a liberalizing and deepening influence on religious thought far beyond his own canton, by bringing traditional doctrine to the test of a living personal experience (see also FROMMEL, GASTON). In this he resembled F. W. Robertson, as also in the change which he introduced into pulpit style and in the permanence of his influence. Vinet died on the 4th of May 1847 at Clarens (Vaud). A considerable part of his works was not printed till after his death.

His life was written in 1875 by Eugène Rambert, who re-edited the *Chrestomathie* in 1876. See also L. M. Lane, *Life and Writings of A. Vinet* (1890); L. Molines, *Étude sur Alexandre Vinet* (Paris, 1890); V. Rossel, *Hist. de la litt. française hors de France* (Lausanne, 1895); V. Rivet, *Études sur les origines de la pensée religieuse de Vinet* (Paris, 1896); A. Schumann, *Alex. Vinet* (1907). A uniform edition of his works was begun in 1908, see *Revue de théologie et philosophie* (Lausanne, 1908, 234 sqq.). (J. V. B.)

VINGT-ET-UN (colloquially, "Van John"), a round game of cards, at which any number of persons may play, though five or six are enough. The right to deal having been decided, the dealer gives one card face downwards to each person, including himself. The others thereupon look at their cards and declare their stakes—one, two, three or more counters or chips—according to the value of their cards. When all have staked, the dealer looks at his own card and can double all stakes if he chooses. The amount of the original stake should be set by each player opposite his card. Another card is then dealt, face downwards, all round; each player looking at his own. The object of the game is to make 21, by the pips on the cards, an ace counting as 1 or 11, and the court cards as 10 each. Hence a player who receives an ace and a ten-card scores 21 at once. This is called a "natural"; the holder receives twice—sometimes thrice—the stake or the doubled stake. If the dealer has a natural too, the usual rule is that the other natural pays nothing, in spite of the rule of "ties pay the dealer." The deal passes to the player who turns up the natural, unless it occurs in the first round of a deal or the dealer has a natural too. If the dealer has not a natural, he asks each player in turn, beginning with the player on his left, if he wishes for another card or cards, the object still being to get to 21, or as near up to it as possible. The additional cards are given him one by one, face upwards, though the original cards are not exposed. If he requires no additional card, or when he has drawn sufficient, he says, "Content," or "I stand." If a player overdraws, *i.e.* if his cards count more than 21, he pays the dealer at once. When all are either overdrawn or content, the dealer may "stand" on his own hand, or draw cards, till he is overdrawn or stands. All the hands are then shown, the dealer paying those players whose cards are nearer to 21 than his own, and receiving from *all* the others, as "ties pay the dealer." If the dealer's cards, with the additions, make exactly 21, he receives double the stake, or doubled stake; if a player holds 21, he receives double likewise, but ties still pay the dealer. If a player receives two similar cards he *may* put his stake on each and draw on them separately, receiving or paying according as he stands successfully or overdraws, but the two cards must be similar, *i.e.* he cannot draw on both a knave and a queen, or a king and a ten, though their values are equal for the purpose of counting. A natural drawn in this way, however, only counts as 21, and does not turn out the dealer. Similarly a player may draw on three cards, or even four, should they be dealt him. A player who overdraws on one of such cards must declare and pay immediately, even though he stands on another. After a hand is played, the "pone" (Latin for "behind")—the player on the dealer's right—collects and shuffles the cards played, the dealer dealing from the remainder of the pack, till it is exhausted, when he takes the cards the pone holds, after the pone has cut them. It is a great advantage to deal, as the dealer receives from all who have already withdrawn, even if he overdraws himself.

French Vingt-et-un, or *vingt-et-un with variations*, is played by any number of persons. The first deal is played as in the ordinary game. In the second ("Imaginary Tens") each player is supposed to hold a ten-card and receives one card from the dealer, face downwards; he is then considered to hold a ten-card *plus* the one dealt, and stands or draws, receives or pays, as in the ordinary game. If he receives an ace he holds a natural. In the third deal ("Blind *Vingt-et-un*") each player receives two cards, and draws or stands without looking at either. The fourth deal is "Sympathy and Antipathy," each player staking, and declaring which of the two he backs: two cards are then dealt to him: if they are of the same colour, it is "sympathy"; if of different colours, "antipathy." At the fourth deal (*Rouge-et-noir*), each player, having received three cards, bets that the majority will be either black or red, as he chooses. In "Self and Company" every one stakes but the dealer, who then sets out two cards, face upwards, one for himself and one for the players. If the two cards are pairs, the dealer wins; if not, he deals till one of the cards exposed is paired, paying or receiving according as that card belongs to himself or the "company." The seventh deal is "Paying the difference." Each player receives two cards, face upwards. The dealer pays or receives a stake for the difference in number between the pips on his own cards and those of each player. The ace counts as one. The eighth deal is "Clock." The stakes are pooled. The dealer deals the cards out, face upwards, calling "one" for the first, "two" for the second, and so on, the knave being 11, queen 12, and king 13. If any of the cards dealt correspond to the number called, the dealer takes the pool; if none correspond, he forfeits that amount. At the end of this (the eighth) deal, the next player deals.

VINITA, a city and the county-seat of Craig county, Oklahoma, U.S.A., in the N.E. part of the state, about 135 m. E.N.E. of Guthrie. Pop. (1900) 2339; (1907) 3157, including 624 Indians and 479 negroes; (1910) 4082. Vinita is served by the Missouri, Kansas & Texas and the St Louis & San Francisco railways. In the city are the Sacred Heart Institute (Roman Catholic), and a hospital for masons. Vinita is situated in an agricultural and stock-raising region, and lead, zinc, oil and natural gas are found in the vicinity; the city's water supply is obtained from artesian wells. Bricks are manufactured. The first settlement was made here in 1870 and Vinita was chartered as a city in 1898.

VINLAND (Old Norse, *Vinland*, *i.e.* Vineland or Wineland), some region on the eastern coast of North America, visited and named by the Norsemen in the beginning of the 11th century. The word first appeared in print in Adam of Bremen's *Descriptio Insularum Aquilonis*, an appendix to his *Gesta Hammaburgensis Ecclesiae Pontificum*, published by Lindenbrog in 1595. In pursuit of historical study, Adam visited the Danish court during the reign of the well-informed monarch Svend Estridsson (1047–1076), and writes that the king "spoke of an island (or country) in that ocean discovered by many, which is called Vinland, because of the wild grapes [*vites*] that grow there, out of which a very good wine can be made. Moreover, that grain unsown grows there abundantly [*fruges ibi non seminatas abundare*] is not a fabulous fancy, but is based on trustworthy accounts of the Danes." This passage offers important corroboration of the Icelandic accounts of the Vinland voyages, and is, furthermore, interesting "as the only undoubted reference to Vinland in a medieval book written beyond the limits of the Scandinavian world" (Fiske). Adam's information concerning Vinland did not, however, impress his medieval readers, as he placed the new land somewhere in the Arctic regions: "All those regions which are beyond are filled with insupportable ice and boundless gloom." These words show the futility of ascribing to Adam's account Columbus's knowledge of lands in the West, as many overzealous advocates of the Norse discoveries have done. The importance of the information, meagre as it is, lies in the fact that Adam received from the lips of kinsmen of the explorers (as the Danes in a sense were) certain characteristic facts (the finding of grapes and unsown grain) that support the general reliability of the Icelandic sagas which tell of the Vinland voyages (in which these same facts are prominent), but which were not put into writing by the Norsemen until later—just how much later it is not possible to determine. The fact that the Icelandic sagas concerning Vinland are not contemporaneous written records has caused them to be viewed by many with suspicion; hence such a significant allusion as that by Adam of Bremen is not to be overlooked. To the student of the Norse sources, Adam's reference is not so important, as the internal evidence of the sagas is such as to give easy credence to them as records of exploration in regions previously unknown to civilization. The contact with savages would alone prove that.

During the middle ages the Scandinavians were the first to revive geographical science and to practise pelagic navigation. For six centuries previous to about 800, European interest in practical geographical expansion was at a standstill. During the 6th and 7th centuries, Irish anchorites, in their "passion for solitude," found their way to the Hebrides, Orkneys, Shetlands, Faroes and Iceland, but they were not interested in colonization or geographical knowledge. The discovery of new lands in the West by the Norsemen came in the course of the great Scandinavian exodus of the 9th, 10th and 11th centuries—the Viking Age—when Norsemen, Swedes and Danes swarmed over all Europe, conquering kingdoms and founding colonies. The main stream of Norsemen took a westerly course, striking Great Britain, Ireland and the Western Isles, and ultimately reached Iceland (in 874), Greenland (in 985) and Vinland (in 1000). This western migration was due mainly to political dissatisfaction in Norway, doubtless augmented by a restless spirit of adventure. The chiefs and their followers that settled Iceland were "picked men," the flower of the land, and sought a new home from other motives than want or gain. They sought political freedom. In Iceland they lived active, not to say tumultuous, lives, and left fine literary records of their doings and achievements. The Icelandic colony was an interesting forerunner of the American republic, having a prosperous population living under a republican government, and maintaining an independent national spirit for nearly four centuries.

Geographically Iceland belongs to America, and its colonization meant, sooner or later, the finding of other lands to the West. A century later Greenland was peopled from Iceland, and a colony existed for over four hundred years, when it was snuffed out, doubtless by hostile Eskimos. Icelandic records, among them the Vinland sagas, also a Norwegian work of the 13th century, called *Speculum regale* (The King's Mirror), and some papal letters, give interesting glimpses of the life of this colony. It was from the young Greenland colony that an attempt was made to establish a new outpost in Vinland, but plans for permanent settlement were given up on account of the hostility of the natives, with whom the settlers felt powerless to grapple. Gunpowder had not yet been invented.

Icelandic literature consists mainly of the so-called "sagas," or prose narratives, and is rich in historical lore. In the case of the Vinland sagas, however, there are two independent narratives of the same events, which clash in the record of details. Modern investigators have been interested in establishing the superiority of one over the other of the two narratives. One of them is the "Saga of Eric the Red" as found in the collection known as *Hauk's Book*, so called because the manuscript was made by Hauk Erlendsson, an Icelander who spent much of his life in Norway. It was copied, in part by Hauk himself, between the years 1305 and 1334, the date of his death, and probably during the period 1310–20. It is No. 544 of the Arne-Magnaean collection in Copenhagen. Another manuscript that tells the same story, with only verbal variations, is found in No. 557 of the same collection. This manuscript was made later than Hauk's, probably in the early part of the 15th century, but it is not a copy of Hauk's. Both were made independently from earlier manuscripts. The story as found in these two manuscripts has been pronounced by competent critics, especially Professor Gustav Storm of the university of Christiania, as the best and the most trustworthy record.

The other saga, which by chance came to be looked upon as the chief repository of facts concerning the Vinland voyages, is found in a large Icelandic work known as the *Flatey Book*, as it was once owned by a man who lived on Flat Island (Flatey), on the north-western coast of Iceland. This collection of sagas, completed in about 1380, is "the most extensive and most perfect of Icelandic manuscripts," and was sent to Denmark in 1662 as a gift to the king. It was evidently the general excellence of this collection that gave the version of the Vinland story that it contained precedence, in the works of early investigators, over the Vinland story of *Hauk's Book*. (Reeves's *Finding of Wineland* contains fine photographs of all the vellum pages that give the various Vinland narratives.)

According to *Flatey Book* saga, Biarni Heriulfsson, on a voyage from Iceland to Greenland in the early days of the Greenland colony, was driven out of his course and sighted new lands to the south-west. He did not go ashore (which seems strange), but sailed northward to Greenland. Fifteen years later, according to this account, Leif Ericsson set out from Greenland in search of the lands that Biarni had seen, found them and named them—Helluland (Flat-stone-land), Markland (Forestland) and Vinland. After his return to Greenland, several successive expeditions visited the new lands, none of which (strangely enough) experienced any difficulty in finding Leif's hut in the distant Vinland.

According to the Vinland saga in *Hauk's Book*, Leif Ericsson, whose father, Eric the Red, had discovered and colonized Greenland, set out on a voyage, in 999, to visit Norway, the native land of his father. He visited the famous King Olaf Tryggvason, who reigned from 995 to 1000, and was bending his energies toward Christianizing Norway and Iceland. He immediately saw in Leif a likely aid in the conversion of the Greenlanders. Leif was converted and consented to become the king's emissary to Greenland, and the next year (1000) started on his return voyage. The saga says that he was "tossed about" on this long voyage, and came upon an unknown country, where he found "self-sown wheatfields, and vines," and also some trees called "mösur," of which he took specimens. Upon his arrival in Greenland, Leif presented the message of King Olaf, and seems to have attempted no further expeditions. But his visits to the new lands aroused much interest, and his brother Thorstein made an unsuccessful attempt to find them. Later, in 1003, an Icelander, Thorfinn Karlsefni, who was visiting the Greenland colony, and who had married Gudrid, the widow of Leif's brother Thorstein, set out with four vessels and 160 followers to found a colony in the new lands. Here they remained three years, during which time a son, Snorri, was born to Thorfinn and Gudrid. This expedition, too, found "grapes and self-sown wheat," though seemingly not in any great abundance. Concerning the southernmost region of Vinland, the saga says: "They found self-sown wheatfields in the lowlands, but vines everywhere on higher places. . . . There were great numbers of wild animals in the woods." Then the saga relates that one morning a large number of men in skin canoes came paddling toward them and landed, staring curiously at them: "They were swarthy men and ill-looking, and the hair of their heads was ugly; they had large eyes and broad cheeks." Later the saga says: "No snow came there, and all of their live stock lived by grazing, and thrived." The natives appeared again the next spring, and a clash occurred. Fearing continued trouble with them, Karlsefni resolved to return to Greenland. This he did a year later, and spent the winter of 1006–7 there, whereupon he settled in Iceland. From him and Gudrid a number of prominent ecclesiastics claimed descent, and also Hauk Erlendsson. The Vinland story was doubtless a cherished family possession, and was put into writing, when *writing* sagas, instead of *telling* them, came into fashion. And here it is important to remember that before the age of writing in Iceland there was a saga-telling age, a most remarkable period of intellectual activity, by the aid of which the deeds and events of the seething life of the heroic age was carried over into the age of writing. "Among the medieval literatures of Europe, that of Iceland is unrivalled in the profusion of detail with which the facts of ordinary life are recorded, and the clearness with which the individual characters of numberless real persons stand out from the historic background" (*Origines Islandicae*). Icelandic literary history says that Ari the Learned (born in 1067) was "the first man in this land who wrote in the Norse tongue history relating to times ancient and modern." Among his works is the *Book of Settlements*, "a work of thorough and painstaking research unequalled in medieval literature" (Fiske). His work *The Book of Icelanders* is unfortunately lost, but an abridgment of it, *Libellus Islandorum*, made by Ari himself, contains a significant reference to Vinland. It tells that the colonists in Greenland found "both broken cayaks (canoes) and stone implements, whereby it may be seen that the same kind of folk had been there as they which inhabited Vinland, and whom the men of Greenland (*i.e.* the explorers) called the 'skrælings' (*i.e.* inferior people)." From this allusion one cannot but think that so keen and alert a writer as Ari had given some attention to Vinland in the lost work. But of this there is no other proof. We are left to affirm, on account of definite references in various sagas and annals to Leif Ericsson and the discovery of Vinland, that the saga as preserved in *Hauk's Book* (and also in No. 557) rested on a strong *viva voce* tradition that was early put into writing by a competent hand. Dr Finnur Jonsson of Copenhagen says: "The classic form of the saga and its vivid and excellent tradition surely carry it back to about 1200." This conservative opinion does not preclude the possibility, or even probability, that written accounts of the Vinland voyages existed before this date. Vigfusson, in speaking of the sagas in general, says: "We believe that when once the first saga was written down, the others were in quick succession committed to parchment, some still keeping their form through a succession of copies, other changed. . . . That which was not written down quickly, in due time, was lost and forgotten for ever."

The fact that there are discrepancies between the two versions as they appear in the *Hauk's Book* and in the *Flatey Book* does not justify the overthrow of both as historical evidence. The general truth of the tradition is strengthened by the fact that it has come down from two independent sources. One of them must be the better, however, and this it is the province of competent scholars to determine. The best modern scholarship gives the precedence to the *Hauk's Book* narrative, as it harmonizes better with well-established facts of Scandinavian history, and is besides a more plausible account. In accordance with this decision, Biarni Heriulfson's adventure should be eliminated, the priority of discovery given to Leif Ericsson, and the honour of being the first European colonists on the American continent awarded to Thorfinn Karlsefni and his followers. This was evidently the only real attempt at colonization, despite the numerous contentions to the contrary. Under date of 1121 the Icelandic annals say: "Bishop Eric of Greenland went in search of Vinland." Nothing further is recorded. The fact that his successor as bishop was appointed in 1123 would seem to indicate that the Greenlanders had information that Eric had perished.

The only important phase of the Vinland voyages that has not been definitely settled is the identifications of the regions visited by Leif and Thorfinn. The Danish antiquarian Rafn, in his monumental *Antiquitates Americanae*, published in 1837, and much discussed in America at that time, held for Rhode Island as Leif's landfall and the locality of Thorfinn's colony. Professor E. N. Horsford, in a number of monographs (unfortunately of no historical or scientific value), fixed upon the vicinity of Boston, where now stand a Leif Ericsson statue and Horsford's Norumbega Tower as testimonials to the Norse explorers. But in 1887 Professor Storm announced his conviction that the lands visited by the Norsemen in the early part of the 11th century were Labrador, Newfoundland and Nova Scotia. And a careful reading of the *Hauk's Book* narrative seems to show that the numerous details of the saga fit Nova Scotia remarkably well, and much better than any other part of the continent. This view has in recent years been quite generally accepted by American scholars. But in 1910 Professor M. L. Fernald, a botanist of Harvard University, published a paper in *Rhodora*, vol. 12, No. 134, in which he contends that it is most probable that the "vinber" of the sagas were not "grapes," but "wine-berries," also known as the mountain or rock cranberries. The "self-sown wheat" of the sagas he identifies as strand wheat, instead of Indian corn, or wild rice, and the mösur trees as the canoe birch. He thinks the natives were Eskimos, instead of American Indians, as stoutly maintained by John Fiske. Professor Fernald concludes his paper by saying that: "The mass of evidence which the writer has in hand, and which will soon be ready for publication, makes it clear that, if we read the sagas in the light of what we know of the abundant occurrence north of the St Lawrence of the 'vinber' (*Vaccinium Vitis-Idaea* or possibly *Ribes triste*, *R. prostratum*, or *R. lacustre*), 'hveiti' (*Elymus arenarius*), and 'mösur' (*Betula alba*, i.e. *B. papyrifera* of many botanists), the discrepancies in geography, ethnology and zoology, which have been so troublesome in the past, will disappear; other features, usually considered obscure, will become luminous; and the older and less distorted sagas, at least in their main incidents, will become vivid records of actual geographic exploration."

It is possible that Professor Fernald may show conclusively that Leif's landfall was north of the St Lawrence. That the "vinber" were mountain cranberries would explain the fact, mentioned in the *Flatey Book* saga, that Leif filled his after-boat with "vinber" *in the spring*, which is possible with the cranberries, as they are most palatable after having lain under the snow for the winter. But Thorfinn Karlsefni found no abundance of "vinber," in fact one of his followers composed some verses to express his disappointment on this score. "Vines" were found only in the southernmost regions visited by Karlsefni. It is to be noted that the word "vines" is more prominent in the *Hauk's Book* narrative than the word "vinber." At present it does not seem likely that Professor Fernald's argument will seriously affect Professor Storm's contention that Thorfinn's colony was in Nova Scotia. At any rate, the incontrovertible facts of the Vinland voyages are that Leif and Thorfinn were historical characters, that they visited, in the early part of the 11th century, some part of the American continent south-west of Greenland, that they found natives whose hostility prevented the founding of a permanent settlement, and that the sagas telling of these things are, on the whole, trustworthy descriptions of actual experience.

BIBLIOGRAPHY.—The bibliography of this subject is large, but adequate documents, accounts and discussions may be found in the following modern works: Gustav Storm, *Studies on the Vineland Voyages* (Copenhagen, 1889); Arthur M. Reeves, *The Finding of Wineland, the Good* (London, 1890 and 1895); John Fiske, *The Discovery of America*, vol. i. (Boston, 1892); Juul Dieserud, "Norse Discoveries in America," in *Bulletin of the American Geographical Society*, vol. xxxiii. (New York, 1901); Gudbrandr Vigfússon and F. Yorke Powell, *Origines Islandicae* (Oxford, 1905); and Julius E. Olson and others, *The Northmen, Columbus and Cabot, 985–1503* (New York, 1906), the first volume of Original Narratives of Early American History. (J. E. O.)

VINOGRADOFF, PAUL (1854–), Anglo-Russian jurist, was born at Kostroma in Russia. He became professor of history in the university of Moscow, but his zeal for the spread of education brought him into conflict with the authorities, and consequently he was obliged to leave Russia. Having settled in England, Vinogradoff brought a powerful and original mind to bear upon the social and economic conditions of early England, a subject which he had already begun to study in Moscow. His *Villainage in England* (1892) is perhaps the most important book written on the peasantry of the feudal age and the village community in England; it can only be compared for value with F. W. Maitland's *Domesday Book and Beyond*. In masterly fashion Vinogradoff here shows that the villein of Norman times was the direct descendant of the Anglo-Saxon freeman, and that the typical Anglo-Saxon settlement was a free community, not a manor, the position of the freeman having steadily deteriorated in the centuries just around the Norman Conquest. The status of the villein and the conditions of the manor in the 12th and 13th centuries are set forth with a legal precision and a wealth of detail which shows its author, not only as a very capable historian, but also as a brilliant and learned jurist. Almost equally valuable was Vinogradoff's essay on "Folkland" in vol. viii. of the *English Historical Review* (1893), which proved for the first time the real nature of this kind of land. Vinogradoff followed up his *Villainage in England* with *The Growth of the Manor* (1905) and *English Society in the 11th Century* (1908), works on the lines of his earlier book. In 1903 he was appointed Corpus professor of jurisprudence in the university of Oxford, and subsequently became a fellow of the British Academy. He received honorary degrees from the principal universities, was made a member of several foreign academies and was appointed honorary professor of history at Moscow.

VINOY, JOSEPH (1803–1880), French soldier, was originally intended for the Church, but, after some years at a seminary, he decided upon a military career, and entered the army in 1823. When he was a sergeant in the 14th line infantry, he took part in the Algerian expedition of 1830. He won his commission at the capture of Algiers, and during the subsequent campaigns he rose by good service to the rank of colonel. He returned to France in 1850, and in the Crimean War served under Canrobert as general of brigade. For his brilliant conduct at the Malakoff he was promoted general of division, and he led a division of Niel's corps in the campaign of Solferino. Retired on account of age in 1865, he was recalled to active service on the outbreak of the war of 1870, and after the early reverses was put at the head of the XIII. army corps, which, fortunately for France, did not arrive at the front in time to be involved in the catastrophe of Sedan. By a skilful retreat he brought his corps intact to Paris on September 7th. Vinoy during the siege commanded the III. army operating on the south side of the capital and took part in all the actions in that quarter. On Trochu's resignation he was appointed to the supreme command, in which capacity he had to negotiate the surrender. During the commune he held important commands in the army of Versailles, and occupied the burning Tuileries and the Louvre on May 23rd. He was in the same year made grand chancellor of the Legion of Honour.

Vinoy wrote several memoirs on the war of 1870–71: *Opérations de l'armée pendant le siège de Paris* (1872), *L'Armistice et la commune* (1872), *L'Armée française* (1873).

VINT, a Russian card-game. It is generally considered as the immediate ancestor of Bridge (*q.v.*). *Vint* means in Russian "screw," and is given to the game because the four players, each in turn, propose, bid and overbid each other until one, having bid higher than the others care to follow, makes the trump, his *vis-à-vis* becoming his partner. It has many points of resemblance to Bridge. The cards have the same rank; the score of tricks is entered under the line, and points for *slam*, penalties and honours above the line; while the value of the different suits is the same as in Bridge: spades, clubs, diamonds, hearts and "no trumps." In a "no trump" declaration aces only count as honours; in a suit declaration both the aces and the five next highest cards. During the progress of the bidding and declaring, opportunity is taken by the players to indicate by their calls their strength in the various suits and the high cards they hold, so that, when the playing begins, the position of the best cards and the strength of the different hands can often be fairly accurately estimated.

The leads are subject to much the same rules as those in Bridge.

See *The Laws and Principles of Vint*, edited by Frank W. Haddan (London, 1900).

VINTON, FREDERIC PORTER (1846–), American portrait painter, was born at Bangor, Maine, on the 29th of January 1846. He was a pupil of Duveneck, of William M. Hunt in Boston, of Léon Bonnat and Jean Paul Laurens in Paris, and of the Royal Academy of Munich. In 1891 he was elected a full member of the National Academy of Design, New York.

VIOL, a generic term for the bowed precursors of the violin (*q.v.*), but in England more specially applied to those immediate predecessors of the violin which are distinguished in Italy and Germany as the *Gamba* family. The chief characteristics of the viols were a flat back, sloping shoulders, "c"-shaped sound-holes, and a short finger-board with frets. All these features were changed or modified in the violin, the back becoming delicately arched, the shoulders reverting to the rounded outline of the guitar or troubadour fiddle, the shape of the sound-holes changing from "c" to "f," and the finger-board being carried considerably nearer the bridge. The viols, of which the origin may be traced to the 13th and 14th century German Minnesinger fiddle, characterized also by sloping shoulders, can hardly be said to have evolved into the violin. The latter was derived from the guitar-fiddle through the Italian lyre or viol-lyra family, distinguished as *da braccio* and *da gamba*, and having early in the 17th century the outline and "f" sound-holes of the violin. The viol family consisted of treble, alto, tenor and bass instruments, being further differentiated as *da braccio* or *da gamba* according to the position in which they were held against the arm or between the knees. The favourite viol da gamba, or division viol, frequently had a man or a woman's head instead of the scroll finish to the peg-box, and sometimes a few fine wire sympathetic strings tuned an octave higher than the strings in the bridge.

Michael Praetorius mentions no less than five sizes of the viol da gamba, the largest corresponding to the double bass, and in a table he notes the various accordances in use for each. He carefully distinguishes these instruments as *violen* and the viole da braccio (our violin family) as *geigen*. Of the latter he gives six sizes, the highest being the *pochette* with vaulted back, a rebec in fact, and the lowest corresponding to the violoncello, which he calls bass viol or geige da braccio.

The viols were very popular in England in the 16th and 17th centuries, holding their own for a long time after the introduction of the louder-toned violin; they are fully described and figured in the musical works of the period, and more especially in Christopher Simpson's *Division Viol* (1667), Thomas Mace's *Musick's Monument* (1676) and John Playford's *Introduction to the Skill of Music.*
(K. S.)

VIOLA [Fr. *viole*, Ger. *Bratsche*, Ital. *viola*, *alto*], the tenor member of the violin family. The construction of the viola is the same, but on a larger scale, as that of the violin (*q.v.*). The instrument is pitched a perfect fifth below the violin.

VIOLET. The violets comprise a large botanical genus (*Viola*)—in which more than 200 species have been described—found principally in temperate or mountain regions of the northern hemisphere; they also occur in mountainous districts of South America and South and Tropical Africa, while a few are found in Australasia. The species are mostly low-growing herbs with alternate leaves provided with large leafy stipules (fig. 1). The flowers, which are solitary, or rarely in pairs, at the end of slender axillary flower-stalks, are very irregular in form, with five sepals prolonged at the base, and five petals, the lowest one larger than the others and with a spur, in which collects the honey secreted by the spurs of the two adjoining stamens. The five anthers are remarkable for the coloured processes which extend beyond the anther cells and form a sort of cone around the style (fig. 2). The ovary is superior and one-celled, with three parietal placentas and numerous ovules; it bears a single style, which ends in a dilated or hood-like stigma (fig. 3). The fruit is a capsule bursting loculicidally, *i.e.* through the centre of each of the three valves. By the contraction of the valves the small smooth seeds, which form a row down the centre, are shot out to some little distance from the parent plant. The irregular construction of the flower is connected with fertilization by insect agency. To reach the honey in the spur of the flower, the insect must thrust its proboscis into the flower close under the globular head of the stigma. This lies in the anterior part of a groove fringed with hairs on the inferior petal. The anthers shed their pollen into this groove, either of themselves or when the pistil is shaken by the insertion of the bee's proboscis. The proboscis, passing down this groove to the spur, becomes dusted with pollen; as it is drawn back, it presses up the lip-like valve of the stigma so that no pollen can enter the stigmatic chamber; but as it enters the next flower it leaves some pollen on the upper surface of the valve, and thus cross-fertilization is effected. In the sweet violet, *V. odorata* and other species, inconspicuous permanently closed or "cleistogamic" flowers (fig. 4) occur of a greenish colour, so that they offer no attractions to insect visitors and their form is correspondingly regular. The anthers are so situated that the pollen on escaping comes into contact with the stigma; in such flowers self-fertilization is compulsory and very effectual, as seeds in profusion are produced.

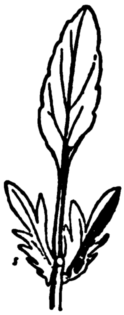


FIG. 1.—Leaf of *Viola tricolor* (Pansy) showing the large leafy stipules (*s*).

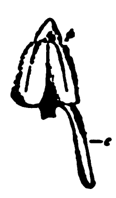


FIG. 2.—Two Stamens of *Viola tricolor* (Pansy), with their two anther lobes and the process *p* extending beyond them. One of the stamens has been deprived of its spur; the other shows its spur, *c*.

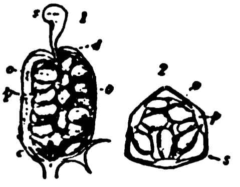


FIG. 3.—Pistil of *Viola tricolor* (Pansy). 1. Vertical section to show the ovules *o*, attached to the parietes. Two rows of ovules are seen, one in front and the other in profile. *p*, a thickened line on the walls forming the placenta; *c*, calyx; *d*, ovary; *s*, hooded stigma terminating the short style. 2. Horizontal section of the same. *p*, placenta; *o*, ovules; *s*, suture, or median line of carpel.

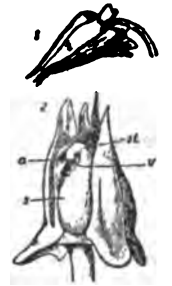


FIG. 4.—Cleistogamic Flower of *Viola sylvatica*. 1. Flower. 2. Flower more highly magnified and cut open. *a*, anther; *s*, pistil; *st*, style; *v*, stigmatic surface.

Several species of *Viola* are native to Great Britain. *Viola canina* (fig. 5) is the dog violet, many forms or subspecies of which are recognized; *V. odorata*, sweet violet, is highly prized for its fragrance, and in cultivation numerous varieties have originated. The Neapolitan or Parma violet (var. *pallida plena*) is a form with very sweet-scented, double, pale lavender flowers; var. *sulphurea* has shining deep green leaves and lemon-yellow flowers, deeper yellow in the centre, and with a pale-violet spur. Sweet violets like a rich, fairly heavy soil, with a north or north-west aspect if possible;

they are readily increased by dividing the crowns after flowering. Other species known in gardens are: *V. altaica*, flowers yellow or violet with yellow eye; *V. biflora*, a pretty little species 3–4 in. high with small yellow flowers, the large petal being streaked with black; *V. calcarata*, flowers light blue or white, or yellow in var. *flava*; *V. cornuta*, flowers pale blue—there are a few good varieties of this, including one with white flowers; *V. cucullata*, a free-flowering American species with violet-blue or purple flowers; *V. Munbyana*, a native of Algeria, with large violet or yellow flowers; *V. pedata*, the bird's-foot violet, with pedately divided leaves and usually bright blue flowers; *V. rothomagensis*, a native of western Europe, with flowers bright blue striped with black, and sometimes called the Rouen violet; and *V. suavis*, a native of Asia Minor, the Russian violet, with pale-blue sweet-scented flowers. The garden pansies or heartseases are derivatives from *V. tricolor*, a cornfield weed, or *V. altaica*, a native of the Altai mountains. (See PANSY.) "Bedding violas," which differ from pansies in some slight technical details, have been raised from *V. cornuta* and *V. lutea* by crossing with the show pansies. The application of an infusion of violet leaves was at one time believed to have the power of reducing the size of cancerous growths, but its use is now discredited.

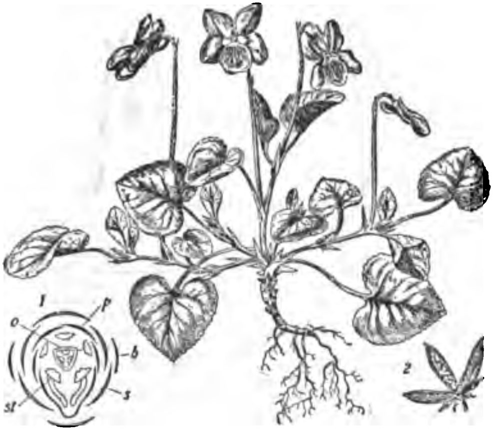
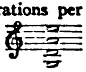


FIG. 5.—Dog Violet (*Viola canina*).

1. Floral diagram of *Viola*, showing arrangement of parts in horizontal plan. *b*, pair of bracteoles below the flower; *s*, sepals; *p*, petals; *st*, stamens; *o*, ovary.
2. Fruit, split open.

VIOLIN, a musical instrument consisting essentially of a resonant box of peculiar form, over which four strings of different thicknesses are stretched across a bridge standing on the box, in such a way that the tension of the strings can be adjusted by means of revolving pegs to which they are severally attached at one end. The strings are tuned, by means of the pegs, in fifths, from the second or A string, which is tuned to a fundamental note of about 435 vibrations per second at the modern normal pitch: thus giving  as the four open notes. To produce other notes of the scale the length of the strings is varied by stopping them with the fingers on a finger-board, attached to a "neck" at the end of which is the "head" in which the pegs are inserted. The strings are set in vibration by drawing across them a bow strung with horse-hair, which is rosined to increase adhesion.

The characteristic features which, in combination, distinguish the violin (including in that family name its larger brethren the viola and the violoncello) from other stringed instruments are: the restriction of the strings to four, and their tuning in fifths; the peculiar form of the body, or resonating chamber, especially the fully moulded back as well as front, or belly; the shallow sides or "ribs" bent into characteristic curves; the acute angles of the corners where the curves of the ends and middle "bouts" or waist ribs meet; and the position and shape of the sound-holes, cut in the belly. By a gradual process of development in all these particulars the modern violin was evolved from earlier bowed instruments, and attained its highest perfection at the hands of the great Italian makers in the 16th, 17th and early 18th centuries, since which time, although many experiments have been made, no material improvement has been effected upon the form and mode of construction then adopted.

The *body*, or sounding-box, of the violin is built up of two arched plates of thin wood, the belly and the back, united by side pieces or ribs to form a shallow box. The belly is cut from soft elastic wood, pine being universally used for this purpose, while the back is made of a close-grained wood, generally sycamore or maple. Both back and belly are carved to their model from the solid, but for utilitarian reasons are generally, though not always, built up of two longitudinal sections; while the sides or ribs, of very thin sycamore or maple, usually in six sections, are bent on a mould, by the aid of heat, to the required form. Into the corners are glued corner-blocks of soft wood, which help to retain the ribs in their sharply recurved form, and materially strengthen the whole structure. Into the angle of the joints between the sides and the back and belly are glued thin lining strips, bent to the mould, giving a bearing surface for the glued joint along the whole outline of the instrument; while, in addition, end blocks are inserted at the head and bottom of the body, the former to receive the base of the neck, and the latter the "tail pin" to which is attached the tail-piece, carrying the lower (fixed) ends of the strings. The belly is pierced with two sound-holes in the form of near, and approximately parallel to, the "bouts." The size, shape and position of these holes have an important influence on the character of the tone of the instrument, and present distinctive variations in the instruments of the different great makers.

The *neck*, made of maple, is glued and now always mortised into the block at the upper end of the body,[1] bearing against a small semicircular projection of the back, and is inclined at such an angle that the finger-board, when glued on to its upper surface, may lie clear of the belly, over which it projects, but in such relation to the height of the bridge as to allow the strings to be stretched nearly parallel to, and at a convenient distance above, its own surface.

The *bridge*, cut out of maple, in the peculiar form devised by Stradivari in the 17th century, and not since materially departed from, is in the violin about 1¼ in. high by 1⅝ in. wide, and tapers in thickness from about ¼ in. at the base to 1/16 at the crown; but the dimensions of this very important member vary for different instruments according to the arch of the belly, the strength of the wood and other considerations. It is placed on the belly exactly midway between the sound-holes and in such a position as to stand on a transverse line dividing the surface into two approximately equal areas, that is, about 1⅜ in. below the middle, the lower end of the body being wider than the upper part or shoulders; whereby a greater length is rendered available for the vibrating portion of the strings.

A short distance behind the right foot of the bridge, the *sound-post*, a rod of soft pine about ¼ in. thick, is fixed inside the body in contact with the belly and the back, and serves directly, not only to sustain the belly against the pressure of the bridge under the tension of the strings, but to convey vibrations to the back. It also exercises a very important influence on the nodal arrangement of these vibrating plates. The pressure of the other foot of the bridge, where the tension of the fourth string is far less than that of the first string, is partly sustained by the *bass-bar*—a strip of wood tapering from the middle to both ends, which is glued underneath the belly and extends to within rather less than 2 in. of the ends of the instrument. This fitting not only serves to strengthen the belly mechanically, but exerts a profound effect upon the vibrations of that plate.

The fixed structure is completed by the *head*, which surmounts the neck and consists primarily of a narrow box into the sides of which are inserted the pegs round which the free ends of the strings are wound. The head is finished by an ornamentation which in the hands of the Italian makers followed the traditional pattern of a scroll, or volute, offering the skilled craftsmen infinite scope for boldness and freedom in its execution; but sometimes, especially in the Tirolean instruments, it was carved in the form of an animal's head, usually a lion's.

The *strings*, fastened at one end to an ebony *tail-piece* or tongue, which is itself attached by a gut loop to the pin at the base of the instrument, pass over the bridge, along the finger board and over the *nut* (a dwarf bridge forming the termination of the finger-board) to the pegs. The effective vibrating portion of the strings is accordingly the length between the nut and the bridge, and measures now in an ordinary full-sized violin about 13 in. The portion of the strings to which the bow is applied lies over the space, measuring about $2\frac{1}{4}$ in., between the bridge and the free end of the finger-board. The strings are manufactured from so-called catgut, made from the intestines of lambs, and range in thickness from the first to the third or D string from ·026 to ·046 in. more or less. The necessary weight is given to the string of lowest pitch, G, without unduly sacrificing its elasticity, by winding a thin gut string with fine silver wire to about the same thickness as the A string.

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[1] Up to about the year 1800 the old Italian makers, including Stradivari (in his earlier instruments), usually strengthened the attachment of the neck by driving nails, frequently three and sometimes four, through the top block into the base of the neck, which was not mortised into the block.

An ornamental feature characteristic of nearly all violins is the *purfling*, a very thin slip of wood with margins of ebony or (rarely) whalebone, inlaid in thin strips close to the edge of both plates, and following the entire outline of the instrument. In some instruments, especially of the Brescian school, a double line of purfling was inserted.

The total number of pieces of wood of which the violin is composed amounts to about 70, varying, as the plates are made in one piece or built together, and with the number of sections in which the ribs are put together. Of this number 57 pieces are built into the permanent structure, while 13 may be described as fittings. The whole of the permanent structure is cemented together with glue alone, and it is a striking testimony to the mechanical conditions satisfied by the design, that the instrument built of such slender material withstands without deformation the considerable stresses applied to it. It is worthy of remark that after the lapse of so many years, since it attained perfect musical efficiency, no essential adjunct has entered into the construction of this instrument. No play of fancy has grafted anything beyond quite minor ornamentation on a work of art distinguished by its simplicity of pure outline and proportion.

The following are the exact principal dimensions of a very fine specimen of Stradivari's work, which has been preserved in perfect condition since the latter end of the 17th century:—

Length of body	= 14 in. full.
Width across top	= $6\frac{11}{16}$ in. bare.
Width across bottom	= $8\frac{1}{4}$ in.
Height of sides (top)	= $1\frac{3}{16}$ „
Height of sides (bottom)	= $1\frac{7}{32}$ „

The back is in one piece, supplemented a little in width at the lower part, after a common practice of the great makers, and is cut from very handsome wood; the ribs are of the same wood, while the belly is formed of two pieces of soft pine of rather fine and beautifully even grain. The sound-holes, cut with perfect precision, exhibit much grace and freedom of design. The scroll, which is very characteristic of the maker's style and beautifully modelled, harmonizes admirably with the general modelling of the instrument. The model is flatter than in violins of the earlier period, and the design bold, while displaying all Stradivari's microscopic perfection of workmanship. The whole is coated with a very fine orange-red-brown varnish, untouched since it left the maker's hand in 1690, and the only respects in which the instrument has been altered since that date are in the fitting of the longer neck and stronger bass-bar necessitated by the increased compass and raised pitch of modern violin music.

The measurements given above are the same as those of a well-known Stradivari of later date (1714).

Acoustics.

The acoustics of the violin are extremely complex, and notwithstanding many investigations by men of science, and the enunciation of some plausible hypotheses with regard to details of its operation as a musical instrument, remain as a whole obscure. So far as the elementary principles which govern its action are concerned, the violin follows familiar laws (see SOUND). The different notes of the scale are produced by vibrating strings differing in weight and tension, and varying in length under the hand of the player. The vibrations of the strings are conveyed through the bridge to the body of the instrument, which fulfils the common function of a resonator in reinforcing the notes initiated by the strings. So far first principles carry us at once. But when we endeavour to elucidate in detail the causes of the peculiar character of tone of the violin family, the great range and variety in that character obtained in different instruments, the extent to which those qualities can be controlled by the bow of the player, and the mode in which they are influenced by minute variations in almost every component part of the instrument, we find ourselves faced by a series of problems which have so far defied any but very partial solution.

The distinctive quality of the musical tones of the violin is generally admitted to be due largely to its richness in the upper harmonic or partial tones superimposed on the fundamental notes produced by the simple vibrations of the strings.

The characteristic tone and its control by the player are undoubtedly conditioned in the first place by the peculiar path of the vibrating string under the action of the rosined bow. This takes the form not of a symmetrical oscillation but of a succession of alternating bound and free movements, as the string adheres to the bow according to the pressure applied and, releasing itself by its elasticity, rebounds.

The lightness of the material of which the strings are made conduces to the production of very high upper partial tones which give brilliancy of sound, while the low elasticity of the gut causes these high constituents to be quickly damped, thus softening the ultimate quality of the note.

In order that the resonating body of the instrument may fulfil its highest purpose in reinforcing the complex vibrations set up by the strings vibrating in the manner above described, not only as a whole, but in the number of related segments whose oscillations determine the upper partial tones, it is essential that the plates, and consequently the body of air contained between them, should respond sensitively to the selective impulses communicated to them. It is the attainment of this perfect selective responsiveness which marks the construction of the best instruments. Many factors contribute to this result. The thickness of the plates in different parts of their areas, the size and form of the interior of the body, the size and shape of the sound-holes through which the vibrations of the contained air are communicated to the external air, and which also influence the nodal points in the belly, according to the number of fibres of the wood cut across, varying with the angle at which the sound-holes cross the grain of the wood. Their position in this respect also affects the width of the central vibrating portion of the belly under the bridge.

All these important factors are influenced by the quality and elasticity of the wood employed.

Much has been written and many speculations have been advanced with regard to the superiority in tone of the old Italian instruments over those of modern construction. This superiority has sometimes been disputed, and, judging from the many examples of second-rate instruments which have survived from the 17th and 18th centuries, it is certain that antiquity alone does not confer upon violins the merits which have frequently been claimed for it. When, however, we compare the comparatively few really fine specimens of the Italian school which have survived in good condition, with the best examples of modern construction in which the proportions of the older masterpieces have been faithfully followed, and in which the most careful workmanship of skilled hands has been embodied, it cannot be denied that the former possess a superiority in the quality of their tone which the musical ear immediately recognizes. After taking into account the practical identity in dimensions and construction between the classical and many of the best modern models, the conclusion suggests itself that the difference must be attributed to the nature of the materials used, or to the method of their employment, as influenced by local conditions and practice. The argument, not infrequently advanced, that the great makers of Italy had special local sources of supply, jealously guarded, for wood with exceptional acoustical properties, can hardly be sustained. Undoubtedly they exercised great care in the selection of sound and handsome wood; but there is evidence that some of the finest wood they used was imported from across the Adriatic in the ordinary course of trade; and the matter was for them, in all probability, largely one of expense. There is good reason to suppose that a far larger choice of equally good material is accessible to modern makers.

There remains the varnish with which the completed instrument is coated. This was an item in the manufacture which received most careful attention at the hands of the great makers, and much importance has been attached to the superiority of their varnish over that used in more recent times—so much so that its composition has been attributed to secret processes known only to themselves. The probability is that they were able to exercise more personal selection of the materials used than has been generally practised by makers dependent upon commercial products under modern conditions, and the general result has been analogous to that seen in the pigments employed by modern painters as compared with those made up for themselves by the old masters who could ensure perfect purity in their ingredients. But that the Italian makers individually or collectively attempted, or were able, to preserve as a secret the composition of the varnish they used is unlikely. Instruments exhibiting similar excellence in this respect were too widespread in their range, both of period and locality, to justify the assumption that the general composition of the finest varnish of the early makers was not a matter of common knowledge in an industry so flourishing as that of violin-making in the 17th and early 18th centuries. The excellence of an instrument in respect of its varnish depended on the quality of the constituent materials, on the proportions in which they were combined, and, perhaps mainly, on the method of its application. The most enduring and perfect varnish used for violins is an oil varnish, and the best results therewith can only be obtained under the most advantageous conditions for the drying process. In this respect there can be no doubt that the southern climate placed the makers whose work lies in higher latitudes at a disadvantage. In a letter to Galileo in 1638 concerning a violin he had ordered from Cremona, the writer states that it cannot be brought to perfection without the strong heat of the sun"; and all recorded experience indicates the great importance of slow drying of the varnish under suitable conditions. Stradivari himself wrote to account for delay in the delivery of an instrument because of the time required for the drying of the varnish.

That a perfect varnish conduces to the preservation of a fine tone in the instrument is generally admitted; and its operation in this respect is due, not merely to the external protection of the wood from deterioration, but especially to its action, when supplied under favourable conditions to wood at a ripe stage of seasoning (when that process has proceeded far enough, but not so far as to allow the fibres to become brittle), in soaking into the pores of the wood and preserving its elasticity. This being so, successful varnishing will be seen to be an operation of great delicacy, and one in which the old masters found full scope for their skill and large experience. The effects, upon the vibrational qualities of the wood, of thickness of coat, texture and gradual absorption into the pores of the wood under favourable conditions of drying, are great and far-reaching, as is proved in the survival through two centuries of the great qualities of the specimens most fittingly treated in this respect.

After the early part of the 18th century the use of the fine oil varnish employed by the great makers was gradually abandoned, concurrently with the decline of the instrument maker's art in Italy. Except in the hands of the fast-diminishing band of craftsmen trained in the old traditions, its place was taken by the newer spirit varnishes which, with their quick-drying qualities and ease of application, satisfied the requirements of the more cheaply manufactured instruments of the period following the death of Stradivari; and before the end of the century these inferior varnishes had quite supplanted the old recipes.

Having regard to all these considerations it is not unreasonable to conclude that the varnish of the old instruments contributed probably the most important single element of their superiority in tone to their more modern copies. It must, however, be borne in mind that the instrument makers of the 16th and 17th centuries carried on a great and flourishing and a highly developed craft; and that their best creations owe their distinction largely to causes similar to those which produced the great art works of the same period. The violin makers had a lifelong training in their craft. The productions of the famous among them were eagerly sought after. Throughout western Europe the highest in the land were true amateurs of music and vied with one another to secure the masterpieces of Brescia and Cremona. In such circumstances the trained judgment and wide experience of the craftsman were naturally concentrated upon securing the preliminary conditions of high excellence in his work: the choice of sound and handsome wood; perfection of design and workmanship; the composition of his varnish, and the utmost care and skill in applying it under the best conditions; and, not least important, time for deliberate and thoughtful production. The masterpieces of that period were not constructed upon any exact or scientific system, but were the products of development of a traditional craft working on empirical lines. Such theories of their construction as have been propounded are based on analysis of an already perfected organism; and careful historical research has revealed no record or trace of laws or rules by which the great makers worked.

Elaborate attempts have been made, notably by Savart early in the 19th century, to educe from experiments on the elasticities and vibration periods of various specimens of wood used in some of the older instruments an exact system for the adjustment of these factors to the production of the best results; but data obtained by experiments with test specimens of regular shape do not carry us very far when applied to so complex and irregular a structure as the violin. The vibrating plates of the violin are neither symmetrical nor uniform in dimensions. They are not free plates, but are fixed round the whole edge of a very irregular outline; and these conditions, taken together with their unsymmetrically arched form, held under pressure by the tension of the strings, establish a state of complex stresses under vibration which have so far escaped analysis. Their vibratory movements are moreover influenced by so many accessory features of the instrument, such as the bass-bar, already described, the reaction of the sound-post, and the different pressures by the two feet of the bridge, that it is impossible to figure closely the vibrations of any given area of the instrument. It is certainly very remarkable that so precise a pattern of irregular form should have been arrived at empirically, and should have survived as the standard, apparently for all time. Not only is the arch of the plates unsymmetrical in its longitudinal section, but, as is less commonly noticed, the upper bouts, especially in violins of the Cremona school, are slightly shallower than the lower; so that the edges of the belly are not strictly parallel to those of the back, but the two plates converge in the direction of the head.

Probably the most successful attempts at analysing the vibrations of the violin have been those made by Sir William Huggins, by means of direct tactile observation with the finger holding a small rod of soft wood upon various spots on the surface of the vibrating plates. [illegible]

the belly is close to the foot of the bridge, under the fourth string, while that of least vibration is exactly over the top of the sound-post. The back, which is strongly agitated, also has its point of least vibration where the sound-post rests upon it. With the sound-post removed the belly vibrated almost equally on both sides of its area, while the vibration of the back was very feeble, and the tone became very poor; supporting the view that in the complete instrument the vibrations of the back are derived from the belly mainly through the sound-post. Pressure on that point in the belly normally in contact with the top of the sound-post partially restored the proper character though not the power of the tone; indicating the important function of the sound-post in establishing a nodal point which largely determines the normal vibration of the belly. Modifications of the material of which the sound-post was made produced a profound effect upon the quality, but comparatively small effect upon the power of the tone. Of the part played by the sides in transmitting vibrations from belly to back, the most important share is borne by the middle bouts, or incurved sides at the waist of the instrument.

Experiments made lately afford some interesting evidence as to the nature of the vibrations set up in a sounding-box in response to those of a string at various pitches and under various conditions of bowing. These observations were made on a monochord and restricted to one portion of a sounding-board of regular shape. Experiments on similar lines made with an actual violin body might throw further light upon the behaviour of that instrument as a resonator; but such researches entail prolonged investigation.

Two phenomena, familiar to violin players, are suggestive of further lines of research that may help to elucidate the problems of the localization of the principal responses in the body of the violin, and of the action of the wood under vibration. Many violins, especially old and inferior ones, fail to resonate clearly and fully to particular notes, the sounds produced being commonly known as "Wolf" notes; and these notes are, certainly sometimes and possibly always, associated with particular spots in the body of the instrument; for, if pressure be applied at these spots, the resonance of the respective "Wolf" notes is improved. This observation suggests that the region concerned has been cut, or has become disproportionately thin in relation to the normal thickness of the plates and, when stimulated by the appropriate note, sets up a local system of vibrations, which interfere with, instead of sharing, the proper vibrations of the plate as a whole; this interfering vibration being damped by local pressure. These defects are said to develop with age and constant use, and to be minimized by the use of thin strings but aggravated by thick ones; a circumstance which tends to support the hypothesis of thin regions in the plate, which might be expected to respond more truly to the vibrations of lighter, than to those of heavier strings. Detailed investigation of these phenomena on the lines of the experiments already referred to may have valuable results. Another well-known characteristic of the violin is that a new instrument, or one that has been long in disuse, is found to be "sleepy," that is, it fails to speak readily in response to the bow, a defect which gradually disappears with use. Experiments made to test the effect of prolonged transverse vibrations upon strips of suitable wood have shown that such treatment increases the flexibility of the wood, which returns to its normal degree of rigidity after a period of rest. No conclusive interpretation of these experiments has yet been offered; but they indicate the probability of modifications of the internal viscosity of the wood, by molecular changes under the influence of continued vibratory movement.

The function of the bridge, as above mentioned, is to communicate the vibrations of the strings to the resonating body of the violin. This communication is made mainly, though not entirely, through the left foot of the bridge, which under the comparatively low tension of the G string rests with light pressure upon the belly, which at that point has accordingly greater freedom of movement than under the other foot, in proximity to which the sound-post, extending from back to belly, maintains that region of the plates in a state of relative rigidity, under the high tension of the E string. The view, however, maintained by some writers that the right foot of the bridge communicates no vibrations directly to the belly is inaccurate. The main object of placing the sound-post some distance behind, instead of immediately under, the bridge foot is to allow the belly under that foot to vibrate with some freedom. This has been proved by the destructive effect produced upon the tone by fixing the sound-post immediately under the foot of the bridge.

The form into which the bridge is fretted after the pattern devised by Stradivari has given rise to some speculation; but the justification of this form is probably to be found in the explanation propounded by Sir William Huggins, namely, that the strings, when agitated by the bow, vibrate in a plane oblique to the vertical axis of the bridge; the vibrations may be accordingly resolved into two components, one horizontal along the length of the bridge, the other vertical—that is, in a direction favourable for setting the [illegible] the transverse vibrations before they reach the belly. This is accomplished by a certain lateral elasticity of the bridge itself, attained by under-cutting the sides so as to allow the upper half of the bridge to oscillate or rock from side to side upon its central trunk; the work done in setting up this oscillation absorbing the transverse vibrations above mentioned.

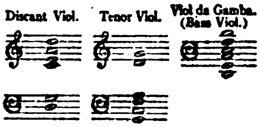
The function of the sound-post is on the one hand mechanical, and on the other acoustical. It serves the purpose of sustaining the greater share of the pressure of the strings, not so much to save the belly from yielding under that pressure, as to enable it to vibrate more freely in its several parts than it could do, if unsupported, under the stresses which would be set up in its substance by that pressure. The chosen position of the post, allowing some freedom of vibration under the bridge, ensures the belly's proper vibrations being directly set up before the impulses are transmitted to the back through the sound-post: this transmission being, as already shown, its principal function. The post also by its contact with both vibrating plates is, as already shown, a governing factor in determining the nodal division of their surfaces, and its position therefore influences fundamentally the related states of vibration of the two plates of the instrument, and the compound oscillations set up in the contained body of air. This is an important element in determining the tone character of the instrument.

History.

The immediate ancestors of the violins were the viols, which were the principal bowed instruments in use from the end of the 15th to the end of the 17th century, during the latter part of which period they were gradually supplanted by the violins; but the bass viol did not go out of use finally until towards the later part of the 18th century, when the general adoption of the larger pattern of violoncello drove the viol from the field it had occupied so long. The sole survivor of the viol type of instrument, although not itself an original member of the family, is the double bass of the modern orchestra, which retains many of the characteristic features of the viol, notably the flat back, with an oblique slope at the shoulders, the high bridge and deep ribs. Excepting the marine trumpet or bowed monochord, we find in Europe no trace of any large bowed instruments before the appearance of the viols; the bowed instruments of the middle ages being all small enough to be rested on or against the shoulder during performance. The viols probably owe their origin directly to the minnesinger fiddles, which possessed several of the typical features of the violin, as distinct from the guitar family, and were sounded by a bow. These in their turn may be traced to the "guitar fiddle" (*q.v.*), a bowed instrument of the 13th century, with five strings, the lowest of which was longer than the rest, and was attached to a peg outside the head so as to clear the nut and finger-board, thus providing a fixed bass, or *bourdon*. This instrument had incurved sides, forming a waist to facilitate the use of the bow, and was larger than its descendants the fiddles and violins. None of these earlier instruments can have had a deeper compass than a boy's voice. The use of the fidel in the hands of the troubadours, to accompany the adult male voice, may explain the attempts which we trace in the 13th century to lengthen the oval form of the instrument. The parentage of the fiddle family may safely be ascribed to the rebec, a bowed instrument of the early middle ages, with two or three strings stretched over a low bridge, and a pear-shaped body pierced with sound-holes, having no separate neck, but narrowed at the upper end to provide a finger-board, and (judging by pictorial representations, for no actual example is known) surmounted by a carved head holding the pegs, in a manner similar to that of the violin. The bow, which was short and clumsy, had a considerable curvature. So far it is justifiable to trace back the descent of the violin in a direct line; but the earlier ancestry of this family is largely a matter of speculation. The best authorities are agreed that stringed instruments in general are mainly of Asiatic origin, and there is evidence of the mention of bowed instruments in Sanskrit documents of great antiquity. Too much genealogical importance has been attached by some writers to similarities in form and construction between the bowed and plucked instruments of ancient times. They probably developed to a great extent independently; and the bow is of too great and undoubted antiquity to be regarded as a development of the plectrum or other devices for agitating the plucked string. The two classes of instrument no doubt were under mutual obligations from time to time in their development. Thus the stringing of the viols was partly adapted from that of the lute; and the form of the modern Spanish guitar was probably derived from that of the fidel.

The Italian and Spanish forms (ribeba, rabe) of the French name rebec suggest etymologically a relationship, which seems to find confirmation in the striking similarity of general appearance between that instrument and the Persian rebab, mentioned in the 12th century, and used by the Arabs in a primitive form to this day. The British crwth, which has been claimed by some writers as a progenitor of the violin, was primarily a plucked instrument, and cannot be accepted as in the direct line of ancestry of the viols.

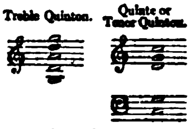
The viol was made in three main kinds—discant, tenor and bass—answering to the cantus, medius and bassus of vocal music. Each of these three kinds admitted of some variation in dimensions, especially the bass, of which three distinct sizes ultimately came to be made—(1) the largest, called the concert bass viol; (2) the division or solo bass viol, usually known by its Italian name of viola da gamba; and (3) the lyra or tablature bass viol. The normal tuning of the viols, as laid down in the earliest books, was adapted from the lute to the bass viol, and repeated in higher intervals in the rest. The fundamental idea, as in the lute, was that the outermost strings should be two octaves apart—hence the intervals of fourths with a third in the middle. The highest, or discant viol, is not a treble but an alto instrument, the three viols answering to the three male voices. As a treble instrument, not only for street and dance music, but in orchestras, the rebec or geige did duty until the invention of the violin, and long afterwards. The discant viol first became a real treble instrument in the hands of the French makers, who converted it into the quinton.



Discant viol.

Development of the viols.

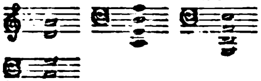
The earliest use of the viols was to double the parts of vocal concerted music; they were next employed in special compositions for the viol trio written in the same compass. Many such works in the form of "fantasies" or "fancies," and preludes with suites in dance form, by the masters of the end of the 16th and 17th centuries, exist in manuscript; a set by Orlando Gibbons, which are good specimens, has been published by the English Musical Antiquarian Society. Later, the viols, especially the bass, were employed as solo instruments, the methods of composition and execution being based on those of the lute. Most lute music is in fact equally adapted for the bass viol, and vice versa. In the 17th century, when the violin was coming into general use, constructive innovations began which resulted in the abandonment of the trio of pure six-stringed viols. Instruments which show these innovations are the quinton and the viola d'amore. The first-mentioned is of a type intermediate between the viol and the violin. In the case of the discant and tenor viol the lowest string, which was probably found to be of little use, was abandoned, and the pressure on the bass side of the belly thus considerably lightened. The five strings were then spread out, as it were, to the compass of the six, so as to retain the fundamental principle of the outer strings being two octaves apart. This was effected by tuning the lower half of the instrument in fifths, as in the violin, and the upper half in fourths. This innovation altered the tuning of the treble and tenor viols, thus—One half of the instrument was therefore tuned like a viol, the other half as in a violin, the middle string forming the division. The tenor viol thus improved was called in France the quinte, and the treble corresponding to it the quinton. From the numerous specimens which survive it must have been a popular instrument, as it is undoubtedly a substantially excellent one. The



relief in the bass, and the additional pressure caused by the higher tuning in the treble, gave it greater brilliancy, without destroying the pure, ready and sympathetic tone which characterizes the viol. While the tendency in the case of the discant and tenor was to lighten and brighten them, the reverse process took place in that of the bass. The richer and more sonorous tones of the viola da gamba were extended downwards by the addition of a string tuned to double bass A. Marais, a French virtuoso, is usually credited with this improvement; and this extended compass is recognized in the classical viola da gamba writings of Sebastian Bach and De Caix d'Hervelois. The result, however, was not universally satisfactory, for Abel used the six-stringed instrument; and the seven strings never came into general use in England, where the viola da gamba was more generally employed and survived longer than elsewhere.

The chief defect of the viols was their weakness of tone; this the makers thought to remedy in two ways: first by additional strings in unisons, fifths and octaves; and secondly by sympathetic strings of fine steel wire, laid under the fingerboard as close as possible to the belly, and sounding in sympathy with the notes produced on the bowed strings. The sympathetic strings were attached to ivory pegs driven into the bottom block, and, passing through the lower part of the bridge, or over a very low bridge of their own, were stretched to pitch either by means of additional pegs or by wrest pins driven into the sides of the head, and tuned with a key. Originally six, seven or eight wire strings were used, tuned to the diatonic scale of the piece to be performed. Later on a chromatic set of twelve was employed, and occasionally viols were made with twenty-four wire strings, two for each semitone in the scale. This system of reinforcement was applied to all the various sizes of viols in use during that period.

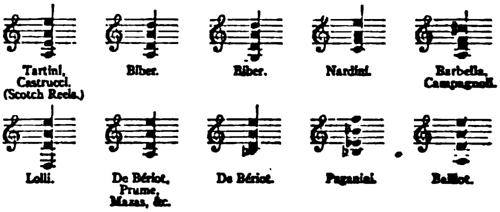
The improvements which resulted in the production of the violin proceeded on different lines. They consisted in increasing the resonance of the body of the instrument, by making it lighter and more symmetrical, and by stringing it more lightly. These changes transformed the body of the viol into that of the violin; and the transformation was completed by rejecting the lute tuning with its many strings, and tuning the instrument by fifths, as the fiddle had been tuned. The tenor viol appears to have been the first instrument in which the change was made, and thus the viola or tenor may probably be claimed as the father of the modern violin family. Violas were used in church music before the modern violin period, and violins as we know them were at first called "Piccoli Violini" to distinguish them from the earlier and larger instruments. A tenor viol of date 1500 is still extant, bearing in general outline the typical features of the violin, as distinct from the viol family. This instrument was exhibited in 1872 in the Loan Exhibition of Musical Instruments at South Kensington with the label "Pietro Zanure, Brescia, 1509." From existing specimens we know that a bass violin, precursor of the violoncello, with a tuning an octave below the tenor, appeared shortly after that instrument. A double bass violin, tuned a fourth below the violoncello and usually known as the "basso da camera," completed the set of instruments in violin shape; but from the difficulty attending its manipulation it never came into general use. The celebrated double bass player, Dragonetti, occasionally used the basso da camera, and an English player named Hancock, who dispensed with the highest or E string, is still remembered for his performances on this unusual instrument.


Tenor Violin. Violoncello. Basso da Camera.

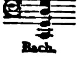
Tenor violin and violoncello.

The tenor and violoncello are made on the same general model and principles as the violin, but with modifications. Both are, relatively to their pitch, made in smaller proportions than the violin, because, if they were constructed to dimensions having the same relation to pitch and tension of strings as the violin, they would not only have an overpowering tone but would be unmanageable from their size. These relatively diminished dimensions, both in the size of the instrument and in the thickness of the wood and strings, give to the tenor and violoncello a graver and more sympathetic tone. To some extent the reduced size is compensated by giving them a greater proportional height in the ribs and bridge; an increase hardly perceptible in the tenor, but very noticeable in the violoncello. To lighten the tension and thus allow greater freedom of vibration to the belly on the bass side, as with the lowest string of the violin, the two lowest of the tenor and violoncello are made of thin gut, covered with fine metal wire; thus providing the necessary weight without inconvenient thickness. If the tension of the lowest string, or the two lowest strings, be increased, not only will they be elevated in pitch, but the violin will produce a more powerful tone; if the bass string be lowered, the contrary will take place. By adapting the music to this altered tuning (*scordatura*) some novel effects are produced. The following are the principal *scordature* which have been occasionally employed by various players:—

Scordatura.


Tartini, Castrucci, (Scotch Reels.) Biber. Biber. Nardini. Barbella, Campagnoli.
Lolli. De Bériot, Prume, Mazas, &c. De Bériot. Paganini. Baillot.

The violoncello is less amenable to the *scordatura* than the violin; the only classical instance is the tuning employed by Bach in his fifth sonata, which consists in lowering the first string by a tone.


Bach.

Early Italian makers.

The early Italian school is chiefly represented by the Brescian makers, Gaspar da Salò, Giovanni Paolo Maggini, Giovita Rodiani and Zanetto Peregrino. It is, however, somewhat misleading to denominate it the Brescian school, for its characteristics are shared by the earliest makers of Cremona and Venice. To eyes familiar with the geometrical curves of the later Cremona school, most of the violins of these makers have a rude and uncouth appearance. The height of the model varies; the pattern is attenuated; the *f*-holes share the general rudeness of design, and are set high in the pattern. Andreas Amati of Cremona, the eldest maker of that name, effected some improvements on this primitive model; but the violin owes most to his sons, Antonio and Geronimo, who were partners. They introduced the substantial improvements which developed the Brescian violin into the modern instrument. These improvements were in their inception probably of an artistic rather than a scientific nature. Painting and inlaying had long been employed in the decoration of stringed instruments; but the brothers Amati were the first who applied to the violin the fundamental law of decorative art, that the decorative and constructive elements should be blended in their conception: in other words, the construction should be itself decorative and the decoration itself constructive. Nicholas Amati (1596–1684), son of Geronimo, made some slight improvements in the model, and his pupil Antonio Stradivari (1644–1737) finally settled the typical Cremona pattern, which has been generally followed; for the majority of violins since made, whether by good or bad makers, are copies of Stradivari. Besides the last-named, the following makers worked generally on the Amati model—Cappa, Gobetti, the Grancino family, Andreas Guarnieri and his son Giuseppe, the Ruggieri family and Serafin of Venice. The Bergonzi family, Alessandro Gagliano, the earlier members of the Guadagnini family, and Panormo were either pupils or followers of Stradivari. But excepting Carlo Bergonzi and Stradivari's two sons, Omobono and Francesco, there is no evidence of any having actually worked with or for him. Landolfi, Storioni, and Carlo Giuseppe Testore, a pupil of Giovanni Grancino, leaned to the model of Giuseppe Guarnieri del Gesù. Some resemblances, especially in the matter of the varnish, are traceable between the works of makers who lived contemporaneously in the same town, *e.g.* in Naples, Milan and Venice.

German, English and French makers.

A high model was adopted by Jacob Stainer of Absam, near Hall in Tirol, whose well-known pattern was chiefly followed by the makers of England, Tirol and Germany, down to the middle of the 18th century. It thenceforward fell into disuse, owing to the superior musical qualities of the Cremona violin. The school of Stainer is represented by Albani, Hornsteiner, the Klotz family (who made large numbers of instruments excellent in their kind), Schorn of Salzburg and Withalm of Nuremberg, and others. The English makers may be divided into three successive groups: (1) an antique English school, having a character of its own (Rayman, Urquhart, Pamphilon, Barak Norman, Duke, of Oxford, &c.); (2) imitators of Stainer, at the head of whom stands Peter Wamsley (Smith, Barrett, Cross, Hill, Aireton, Norris, &c.); (3) a later school who leaned to the Cremona model (Banks, Duke, of Holborn, Betts, the Forsters, Gilkes, Carter, Fendt, Parker, Harris, Matthew Hardie of Edinburgh, &c.). The early French makers have little merit or interest (Bocquay, Gavinies, Pierray, Guersan, &c.), but the later copyists of the Cremona models (Lupot, Aldric, Chanot the elder, Nicholas, Pique, Silvestre, Vuillaume, &c.) produced admirable instruments, some of which rank next in merit to the first-rate makers of Cremona.

The general form of the violin, as finally developed under the hands of the leading makers, resolved itself into two main types, the high and the flat models, of which the latter, on the lines ultimately adopted by Stradivari, has survived as the most efficient pattern for all modern instruments. The distinction is one of degree only, the maximum difference of actual measurement in extreme cases amounting to little more than a quarter of an inch in the convexity of the belly above the top line of the ribs; but the difference in character of tone of the two types is, in the main, well marked. Speaking generally, the tone of the high-built instrument is less powerful and sweeter, and it speaks more readily, but responds less completely to gradations of tone under the action of the bow than the flatter type, which yields a tone of greater carrying power and flexibility, susceptible to more subtle variation by the player, and with a peculiar penetrating quality lacking in the highly arched model. These differences in tone probably depend less upon any direct effect of variations in depth of the sounding-box than on the incidental effects of cutting the wood to the higher or lower arch; for it would seem that the best results in tone have been attained in instruments with a fairly constant volume of contained air, the depth of the sides being roughly in inverse proportion to the height of arch in the best examples of the different models. In the high-cut arch the fibres of the wood on the upper surface are necessarily cut shorter, with the result that the plate as a whole does not vibrate so perfectly as in the flatter model, and this has a weakening effect on the tone. Again, the higher arch, with steeper curves towards the sides, necessitates the inclination of the sound-holes at a considerable angle to the main horizontal plane of the instrument; and it is conceivable that, under such conditions, the vibrations of the upper layer of air within the body are dissipated too readily, before the composite vibrations of the whole mass of air inside the instrument have attained their full harmonic value. Apart from these acoustical considerations, the question is probably one of material, the flatter construction demanding the use of a very strong and elastic wood in relation to the most suitable thickness, in order to withstand the pressure of the bridge, a resistance which the higher arch renders possible with a stiffer and more brittle material; and the effect of these qualities upon tone must be taken into account in estimating the tone characters of the two types of instrument.

Broadly speaking, the higher-arched type found favour with the earlier makers up to the end of the Amati period. Stainer in Tirol inclined particularly in the direction of this model, which he appears to have developed on independent lines, the tradition that he learnt his craft from the Amati being no longer tenable. The flatter model was gradually evolved by Stradivari as he outgrew the immediate influence of the Amati and developed on his own incomparable lines a somewhat larger and more powerful instrument, adapted to the requirements of the increasing class of solo players.

The bow.

The violins as a distinctive family of instruments cannot be fully discussed without reference to the bow (*q.v.*) as an essential adjunct, on account of the very important part taken by the bow in determining, as already mentioned, the peculiar form of the vibrations of the string, and in controlling, in the hand of a skilled player, the subtle gradations of tone produced from the instrument. The evolution of the modern bow has taken place almost entirely since the violin attained its final form, and has followed, more completely perhaps than the instrument itself, the development of violin music and the requirements of the player. It reached its highest perfection at the hands of the celebrated François Tourte of Paris, about 1780, whose bows have served as a model for all succeeding makers, even more exclusively than the violins of Stradivari controlled the pattern of later instruments; and at the present time Tourte bows are valued beyond any others.

For more than 250 years the violin and its larger brethren have held the leading position among musical instruments. For them have been written some of the most inspired works of the great musicians. Famous composers, such as Tartini, Corelli, Spohr and Viotti have been great violinists, and by their compositions, as much as by their talents as virtuosi, have largely developed the capacity of the violin as a vehicle of profound musical expression. To the listener the violin speaks with an intensity, a sympathy, and evokes a thrill of the senses such as no other instrument can produce. For the player it seems to respond to every pulse of his emotions.

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VIOLLET, PAUL MARIE (1840–), French historian, was born at Tours on the 24th of October 1840. After serving his native city as secretary and archivist, he became archivist to the national archives in Paris in 1866, and later librarian to the faculty of law. In 1890 he was appointed professor of civil and canon law at the école des chartes. His work mainly concerns the history of law and institutions, and on this subject he published two valuable and scholarly books—*Droit public: Histoire des institutions politiques et administratives de la France* (1890–98), and *Précis de l'histoire du droit français* (1886).

VIOLLET-LE-DUC, EUGÈNE EMMANUEL (1814–1879), French architect and writer on archaeology, was born in Paris on the 21st of January 1814. He was a pupil of Achille Leclère, and in 1836–37 spent a year studying Greek and Roman architecture in Sicily and Rome. His chief interest was, however, in the art of the Gothic period, and, like Sir Gilbert Scott in England, he was employed to "restore" some of the chief medieval buildings of France, his earliest works being the abbey church of Vézelay, various churches at Poissy, St Michel at Carcassonne, the church of Semur in Côte-d'Or, and the fine Gothic town halls of Saint-Antonin and Narbonne, all carried out between 1840 and 1850. From 1845 to 1856 he was occupied on the restoration of Notre Dame in Paris in conjunction with Lassus;[1] and also with that of the abbey of St Denis. In 1849 he began the restoration of the fortifications of Carcassonne and of Amiens cathedral; and in later years he restored Laon cathedral, the château of Pierrefonds, and many other important buildings. He was an intimate friend of Napoleon III., and during the siege of Paris (1871) gave valuable help as an engineer to the beleaguered army. He held many important offices, both artistic and political, and was for many years inspector-general of the ancient buildings throughout a large part of France. His last work was the general scheme for the Paris exhibition buildings in 1878. He died on the 17th of September 1879 at Lausanne.

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[1] He published in 1867–69 a fine work showing his not very successful coloured decoration applied to the chapels of Notre Dame.

As a designer Viollet-le-Duc occupied only a secondary place; but as a writer on medieval architecture and the kindred arts he takes the highest rank. His two great dictionaries are the standard works in their class, and are most beautifully illustrated with very skilful drawings by his own hand. Viollet-le-Duc was a man of the most varied and brilliant abilities, endowed with a power of work which has seldom been equalled. He was at once an artist, a man of science, a learned archaeologist and a scholar. The map in his *Le Massif du Mont Blanc*, showing the rock contours and the glaciers of Mont Blanc, is a model of its kind, which combines great artistic beauty with the accuracy of the most skilful engineer. His strong poetical fancy enabled him to reconstruct the life and buildings of the middle ages in the most vivid way.

His principal literary works were the *Dictionnaire de l'architecture française du XI. au XVI. siècle* (1854–68); *Dictionnaire du mobilier français* (1858–75); *L'Architecture militaire au moyen âge* (1854); *Entretiens sur l'architecture* (1863–72); *Cités et ruines américaines* (1863); *Mémoire sur la défense de Paris* (1871); *Habitations modernes* (1874–77); *Histoire d'une maison* (1873); *Histoire d'une forteresse* (1874); *Histoire de l'habitation humaine* (1875); *Le Massif du Mont Blanc* (1876); *L'Art russe* (1877); *Histoire d'un hôtel-de-ville et d'une cathédrale* (1878); *La Décoration appliquée aux édifices* (1879); as well as many minor works dealing with separate buildings.

VIOLONCELLO (Fr. *violoncelle*, Ger. *Violoncell*, Ital. *violoncello*), the bass member of the violin family. Although the word violoncello is a diminutive, signifying "small violone," or double bass, the instrument is really a bass violin, formed on a different model from the violone, which has the sloping shoulders and flat back of the viol family, whereas those of the violoncello are rounded as in the violin. The construction of the violoncello is therefore the same as that of the violin (*q.v.*) but on a much larger scale. It is either held, on account of its size, between the performer's knees, or rests on the floor supported on a foot or spike.

VIONVILLE, a village of Lorraine, between Metz and the French frontier, celebrated as the scene of the battle of Vionville (Rezonville or Mars-la-Tour), fought on the 16th of August 1870 between the French and the Germans (see METZ and FRANCO-GERMAN WAR).

VIOTTI, GIOVANNI BATTISTA (1753–1824), Italian violinist and musical composer, was born at Fontanetto in the province of Turin on the 23rd of May 1753. He learned the rudiments of music from his father, a blacksmith who played the horn; and in 1764 Giovannini taught him the violin for a year. Two years later he was placed at the cost of the prince de la Cisterne under the violinist G. Pugnani at Turin, where he became violinist in the court chapel. In 1780 Viotti, having already made himself a name, travelled through Germany and Poland to Russia, where the empress Catherine honoured him with marks of extraordinary favour. He next appeared in London, in company with Pugnani, and at once achieved a brilliant and lasting reputation. In 1782 he was equally successful in Paris. Two years later he was appointed leader of the prince de Soubise's private orchestra; and in 1788 he undertook the direction of the opera, raising the performances, with Cherubini's assistance, to a very high level. He had also started an Italian opera in co-operation with the barber Léonard, which was opened in 1789 in the Tuileries, being subsequently amalgamated with the Théâtre de la Foire St Germain in 1790 and finally merged in the new Théâtre Feydeau in 1791. In 1791 the Revolution compelled Viotti to fly to London, where he took part in the Hanover Square concerts; but being suspected to be an agent of the Revolutionary Committee in Paris he was compelled to retire for a time to the neighbourhood of Hamburg, which he subsequently quitted, although the date of his departure, often given as 1795, does not seem probable. It is possible that he was already in 1794 in London, where he took shares in a wine business, and he resided almost uninterruptedly there until 1819, when he once more settled in Paris, resumed the direction of the opera, and retired in 1822 with a pension. He died in London on the 10th (or 3rd) of March 1824.

Viotti's playing was distinguished by an extreme purity of style, a magnificent tone, and an inexhaustible variety of poetical and imaginative expression. Among his works are 29 violin concertos, a series of symphonies concertantes for two violins, 45 duos, 18 trios and 21 quartets, and a great number of sonatas, notturnos and other instrumental works. His school was worthily perpetuated by his pupil Rode.

VIPER. The vipers constitute a family of Old-World poisonous snakes, with a pair of poisonous fangs in the maxillary bones, which are short and movable. The main anatomical features are described in the article SNAKES. In the present article only the *Viperinae*, namely those without an external pit between the eye and the nose, are described. Pit vipers, or *Crotalinae*, are treated under SNAKES, and those which are possessed of a rattle under RATTLESNAKE. The true vipers comprise about nine genera with some forty species, which can be distinguished as follows:—

Causus in Africa, and *Azemiophis feae* in Burma, are the only vipers which have the head covered with large symmetrical shields, while in the other genera the head shields are broken up into small shields, or into still more numerous scales. *C. rhombeatus*, common from the Gambia to the Cape.

Atractaspis, small burrowing snakes in Africa, without post-frontal bones.

Echis and *Atheris* have only one row of subcaudal shields. *E. carinata*, scarcely exceeding 20 in. in length, is very poisonous and easily overlooked on account of its light brown coloration, with pale spots and delicate markings on the keels of the scales of the back. It is a desert type, having the lateral scales strongly keeled and directed downwards, by means of which it shuffles itself into the sand; by folding itself and rubbing the scales together it produces a rustling sound. It ranges from India, where it is known as the "Krait," called "Kuppur" in Sind, through North Africa. This desert type is replaced farther south in Africa, where vegetation flourishes, by the closely allied genus, *Atheris*, which, however, possesses a prehensile tail and vivid coloration and has assumed truly arboreal habits.

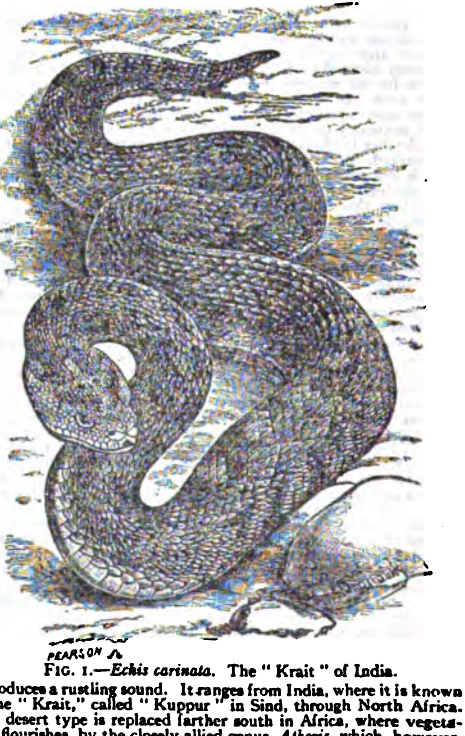

FIG. 1.—*Echis carinata*. The "Krait" of India.

Cerastes is another desert form, but is restricted to Africa; the arrangement of the scales of the sides of the body is similar to that of

Echis, but it has two rows of subcaudals. *C. cornutus*, the "horned viper" of North Africa, from Algeria to Palestine, has a large horny spike above each eye. This, the "Efa" of the Arabs, buries itself in the sand, with only the eyes, nostrils and the horns appearing above the surface. It attains a length of 2½ ft. *C. vipera* is hornless.

Bitis s. *Echidna* s. *Clotho* has two rows of shields on the underside of the very short tail; the thick head is much depressed, like the body. The nasal shields are separated from the rostral by small scales, otherwise much resembling the genus *Vipera*. *B. arietans*, the "puff-adder" of nearly the whole of Africa, an ugly, very dangerous brute growing to a length of 4 or 5 ft. *B. nasicornis*, the West African nose-horned viper, has a pair of erectile scales on the nose. Scarcely smaller and less bulky than the puff-adder and just as poisonous, it is yet very handsomely marked with a series of large pale, dark-edged spots and oblique crosses on a purplish or reddish brown ground. Especially handsome are the young, which at birth are as much as 1 ft. in length. On one occasion one of these snakes, after giving birth to twenty-one young (which bit and killed mice within five minutes of being born), became very ill-tempered, and when two adult males were placed in her cage she bit one with such violence as to break off one of her fangs, which she left, about three-quarters of an inch in length, sticking in his back. He, however, appeared not to suffer the slightest inconvenience, and was never the worse for it (see *Proc. Zool. Soc.* 1871, p. 638).

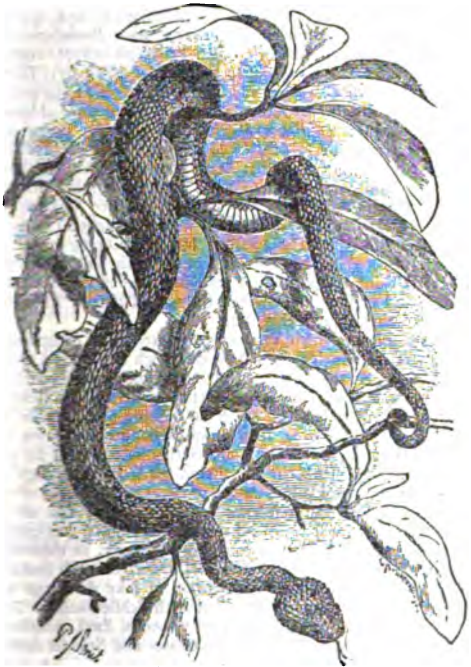
FIG. 2.—*Atheris burtoni*. (Length, 12 in.)

Vipera.—The head is covered with small scales and a few larger shields. The eye is separated from the labials by small scales; the nasals are in contact with the rostral shield or separated by one naso-rostral. The scales of the body are strongly keeled; two rows of subcaudals on the short tail. This genus of about ten species with numerous local varieties ranges over Europe, Asia and the greater part of Africa.

V. berus, the common European viper, ranging from Wales to Saghalien Island and from Caithness to the north of Spain, from the northern boundary of Persia to beyond the Arctic circle in Scandinavia. It inhabits all sorts of situations, but prefers heaths, moors and mixed woods with sunny slopes. It ascends the Alps up to 6000 or 7000 ft. The coloration is very variable, grey, brown, reddish or entirely black specimens occurring in the same country. The much-spoken-of black zigzag line along the back is so often indistinct, that it cannot be relied upon as a safe character. The full-grown males are smaller than the females, and have usually darker markings and a lighter ground colour. A specimen which is 2 ft. long is rare, and is invariably a female. The chief food is mice, which are hunted after sunset. They cannot climb and they avoid going into water. The pairing takes place from March to May and the young are born about four months later. During the pairing, and for hibernation, they often collect in considerable numbers. Whilst most snakes readily take proper food in captivity, these vipers prefer starving themselves to death, a feat which they accomplish within six to nine months according to conditions. As a rule their bite is not fatal to man, but the consequences are often serious and protracted. For treatment see SNAKES.

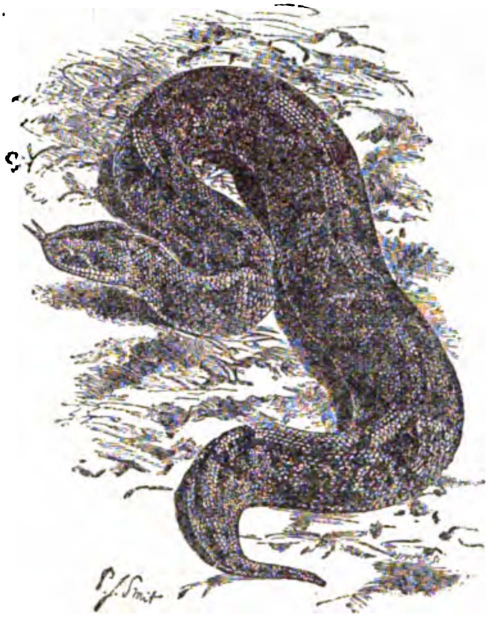
FIG. 3.—*Bitis nasicornis.*

V. aspis is the more southern and western continental European viper; it is slightly snub-nosed, and this feature is still more pronounced in *V. latastei* of Spain and Portugal. In *V. ammodytes* of south-eastern Europe the raised portion is produced into a soft, scaly appendage.

V. russelli, the "Daboia," is one of the most poisonous snakes of India, Ceylon, Java, Burma and Siam. It is pale brown with three longitudinal series of black, light-edged rings which sometimes encircle reddish spots. It grows to a length of about 5 ft.

(H. F. G.)

VIRBIUS, an old Italian divinity, associated with the worship of Diana at Aricia (see DIANA). Under Greek influence, he was identified with Hippolytus (*q.v.*), who after he had been trampled to death by the horses of Poseidon was restored to life by Asclepius and removed by Artemis to the grove at Aricia, which horses were not allowed to enter. Virbius was the oldest priest of Diana, the first "king of the grove" (*Rex Nemorensis*). He is said to have established the rule that any candidate for the office should meet and slay in single combat its holder at the time, who always went about armed with a drawn sword in anticipation of the struggle. Candidates had further to be fugitives (probably slaves), and as a preliminary had to break off a bough from a specified tree. By the eponymous nymph Aricia, Virbius had a son of the same name, who fought on the side of the Rutulian Turnus against Aeneas. J. G. Frazer formerly held Virbius to be a wood and tree spirit, to whom horses, in which form tree spirits were often represented, were offered in sacrifice. His identification with Hippolytus and the manner of the latter's death would explain the exclusion of horses from his grove. This spirit might easily be confounded with the sun, whose power was supposed to be stored up in the warmth-giving tree. Sauer (in Roscher's *Lexikon*) also identifies driven from his farm. By the influence of his powerful friends, and by personal application to the young Octavian, Virgil obtained the restitution of his land. In the meantime he had taken his father and family with him to the small country house of his old teacher Siron (*Catalepton* x.).

Soon afterwards we hear of him living in Rome, enjoying, in addition to the patronage of Pollio, the favour of Maecenas, intimate with Varius, who was at first regarded as the rising poet of the new era, and later on with Horace. His friendship with Gallus, for whom he indicates a warmer affection and more enthusiastic admiration than for any one else, was formed before his second residence in Rome, in the Cisalpine province, with which Gallus also was connected both by birth and office. The pastoral poems, or "eclogues," commenced in his native district, were finished and published in Rome, probably in 37 B.C. Soon afterwards he withdrew from habitual residence in Rome, and lived chiefly in Campania, either at Naples or in the neighbourhood of Nola. He was one of the companions of Horace in the famous journey to Brundisium; and it seems not unlikely that, some time before 23 B.C., he made the voyage to Athens which forms the subject of the third ode of the first book of the *Odes* of Horace.

The seven years from 37 to 30 B.C. were devoted to the composition of the *Georgics*. In the following year he read the poem to Augustus, on his return from Asia. The remaining years of his life were spent on the composition of the *Aeneid*. In 19 B.C., after the *Aeneid* was finished but not finally corrected, he set out for Athens, intending to pass three years in Greece and Asia and to devote that time to perfecting the poem. At Athens he met Augustus, and was persuaded by him to return with him to Italy. While visiting Megara under a burning sun, he was seized with illness, and, as he continued his voyage without interruption, he grew rapidly worse, and died on the 21st of September, in his fifty-first year, a few days after landing at Brundisium. In his last illness he called for the cases containing his manuscripts, with the intention of burning the *Aeneid*. He had previously left directions in his will that his literary executors, Varius and Tucca, should publish nothing of his which had not already been given to the world by himself. This pathetic desire that the work to which he had given so much care, and of which such great expectations were formed, should not survive him has been used as an argument to prove his own dissatisfaction with the poem. A passage from a letter of his to Augustus is also quoted, in which he speaks as if he felt that the undertaking of the work had been a mistake. This dissatisfaction with his work may be ascribed to his passion for perfection of workmanship, which death prevented him from attaining. The command of Augustus overrode the poet's wish and rescued the poem.

Virgil was buried at Naples, where his tomb was long regarded with religious veneration. Horace is our most direct witness of the affection which he inspired among his contemporaries. The qualities by which he gained their love were, according to his testimony, *candor*—sincerity of nature and goodness of heart—and *pietas*—the union of deep affection for kindred, friends and country with a spirit of reverence. The statement of his biographer, that he was known in Naples by the name "Parthenias," is a testimony to the exceptional purity of his life in an age of licence. The seclusion of his life and his devotion to his art touched the imagination of his countrymen as the finer qualities of his nature touched the heart of his friends. It had been, from the time of Cicero,[1] the ambition of the men of finest culture and most original genius in Rome to produce a national literature which might rival that of Greece; and the feeling that at last a poem was about to appear which would equal or surpass the greatest among all the works of Greek genius found a voice in the lines of Propertius—

> "Cedite Romani scriptores, cedite Graii;
> Nescio quid majus nascitur Iliade."

The feeling of his countrymen and contemporaries seems justified by the personal impression which he produces on modern readers—an impression of sanctity, as of one who habitually lived in a higher and serener sphere than that of this world. The veneration in which his name was held during the long interval between the overthrow of Western civilization and the revival of letters affords testimony of the depth of the impression which he made on the heart and imagination of the ancient world. The traditional belief in his pre-eminence has been on the whole sustained, though not with absolute unanimity, in modern times. By the scholars and men of letters of the 16th, 17th and 18th centuries it was never seriously questioned. During the first half of the 19th century his right to be ranked among the great poets of the world was disputed by some German and English critics.

The effect of this was a juster estimate of Virgil's relative position among the poets of the world. It may still be a matter of individual opinion whether Lucretius himself was not a more powerful and original poetical force, whether he does not speak more directly to the heart and imagination of our own time. But it can hardly be questioned, on a survey of Roman literature, as a continuous expression of the national mind, from the age of Naevius to the age of Claudian, that the position of Virgil is central and commanding, while that of Lucretius is in a great measure isolated. If we could imagine the place of Virgil in Roman literature vacant, it would be much the same as if we imagined the place of Dante vacant in modern Italian, and that of Goethe in German literature. The serious efforts of the early Roman literature—the efforts of the older epic and tragic poetry—found their fulfilment in him. The revelation of the power and life of Nature, first made to Lucretius, was able to charm the Roman mind, only after it had passed into the mind of Virgil.

Virgil is the only complete representative of the deepest sentiment and highest mood of his countrymen and of his time. In his pastoral and didactic poems he gives a living voice to the whole charm of Italy, in the *Aeneid* to the whole glory of Rome. He was in the maturity of his powers at the most critical epoch of the national life, one of the most critical epochs in the history of the world. Keeping aloof from the trivial daily life of his contemporaries, he was moved more profoundly than any of them by the deeper currents of emotion in the sphere of government, religion, morals and human feeling which were then changing the world; and in uttering the enthusiasm of the hour, and all the new sensibilities that were stirring in his own heart and imagination, he had, in the words of Sainte-Beuve, "divined at a decisive hour of the world what the future would love." He was also by universal acknowledgment the greatest literary artist whom Rome produced. Virgil had a more catholic sympathy with the whole range of Greek poetry, from Homer and Hesiod to Theocritus and the Alexandrians, than any one else at any period of Roman literature. The effort of the preceding generation to attain to beauty of form and finish of artistic execution found in him, at the most susceptible period of his life, a ready recipient of its influence. The rude dialect of Latium had been moulded into a powerful and harmonious organ of literary expression by a long series of orators; the Latin hexameter, first shaped by Ennius to meet the wants of his own spirit and of his high argument, had been smoothed and polished by Lucretius, and still more perfected by the finer ear and more careful industry of Catullus and his circle; but neither had yet attained their final development. It was left for Virgil to bring both diction and rhythm to as high a pitch of artistic perfection as has been attained in any literature. This great work was accomplished by the steady devotion of his genius to his appointed task. For the first half of his life he prepared himself to be the poet of his time and country with a high ambition and unresting industry. The second half of his career was a religious consecration of all his powers of heart, mind and spirit to his high office.

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[1] Cf. *Tusc. Disp.* ii. 2: "Quamobrem hortor omnes qui facere id possunt, ut hujus quoque generis laudem jam languenti Graeciae eripiant," &c. These words apply specially to philosophical literature; but other passages in the same and in other works imply that [illegible] that the Romans had equal aptitudes for other departments of literature; and the practice of the Augustan poets [illegible] to himself a special province of Greek literary [illegible] the same ambition.

Virgil's fame as a poet rests on the three acknowledged works of his early and mature manhood—the pastoral poems or *Eclogues*, the *Georgics* and the *Aeneid*—all written in that hexameter verse which Tennyson has called

"The stateliest measure ever moulded by the lips of man."

Eclogues.

The pastoral poems or *Eclogues*—a word denoting short selected pieces—were composed between the years 42 and 37 B.C., when Virgil was between the age of twenty-eight and thirty-three. By his invocation to the "Sicelides Musae" and "Arethusa," and by many other indications, he avows the purpose of eliciting from the strong Latin language the melody which the "Sicilian shepherd" drew out of the "Doric reed," and of expressing that tender feeling for the beauty of Italian scenes which Theocritus had expressed for the beauty of Sicily.

The earliest poems in the series were the second, third and fifth; and these, along with the seventh, are the most purely Theocritean in character. The first and ninth, which probably were next in order, are much more Italian in sentiment, are much more an expression of the poet's own feelings, and have a much more direct reference both to his own circumstances and the circumstances of the time. The first is a true poetical reflex of the distress and confusion which arose out of the new distribution of lands, and blends the poet's own deep love of his home, and of the sights and sounds familiar to him from childhood, with his Italian susceptibility to the beauty of nature. The ninth is immediately connected in subject with the first. It contains the lines which seem accurately to describe the site of Virgil's farm, at the point where the range of hills which accompany the river for some distance from the foot of the Lago di Garda sinks into the plain about 14 or 15 m. above Mantua. The sixth is addressed to Varus, who succeeded Pollio as governor of the Cisalpine district. Its theme is the creation of the world (according to the Epicurean cosmogony), and the oldest tales of mythology.[1] The fourth and eighth are both closely associated with the name of Virgil's earliest protector, Pollio. The fourth celebrates the consulship of his patron in 40 B.C., and also the prospective birth of a child, though it was disputed in antiquity, and still is disputed, who was meant by this child whose birth was to be coincident with the advent of the new era, and who, after filling the other great offices of state, was to "rule with his father's virtues the world at peace."[2] The main purpose of the poem, however, is to express the longing of the world for a new era of peace and happiness, of which the treaty of Brundisium seemed to hold out some definite hopes. There is no trace in this poem of Theocritean influence. The ideas are derived partly from Greek representations of the Golden Age, and partly, it is supposed, from the later Sibylline prophecies, circulated after the burning in the time of Sulla of the old Sibylline books, and possibly tinged with Jewish ideas. Some of the phraseology of the poem led to a belief in the early Christian church that Virgil had been an unconscious instrument of inspired prophecy. The date of the eighth is fixed by a reference to the campaign of Pollio against the Dalmatians in 39 B.C. It is founded on the *Φαρμακεύτρια* of Theocritus, but brings before us, with Italian associations, two love tales of homely Italian life. The tenth reproduces the Daphnis of Theocritus, and is a dirge over the unhappy love of Gallus and Lycoris. As in the other poems, the second and eighth, of which love is the burden, it is to the romantic and fantastic melancholy which the passion assumes in certain natures that Virgil gives a voice.

There is no important work in Latin literature, with the exception of the comedy of Terence, so imitative as the *Eclogues*. But they are not, like the comedies of Terence, purely exotic as well as imitative. They are rather composite, partly Greek and partly Italian, and, as a vehicle for the expression of feeling, hold an undefined place between the objectivity of the Greek idyll and the subjectivity of the Latin elegy. For the most part, they express the sentiment inspired by the beauty of the world, and the kindred sentiment inspired by the charm of human relationships. Virgil's susceptibility to the beauty of nature appears in the truth with which his work suggests the charm of Italy—the fresh life of an Italian spring, the delicate hues of the wild flowers and the quiet beauty of the pastures and orchards of his native district. The representative character of the poems is enhanced by the fidelity and grace with which he has expressed the Italian peasant's love of his home and of all things associated with it. The supreme charm of the diction and rhythm is universally recognized. The power of varied harmony is as conspicuous in Virgil's earliest poems as in the maturer and more elaborate workmanship of the *Georgics* and *Aeneid*. The Italian language, without sacrifice of the fulness, strength and majesty of its tones, acquired a more tender grace and more liquid flow from the gift—the "molle atque facetum"—which the Muses of country life bestowed on Virgil.

Georgics.

But these Muses had a more serious and dignified function to fulfil than that of glorifying the picturesque pastime, the "otia dia," of rural life. The Italian imagination formed an ideal of the happiness of a country life nobler than that of passive susceptibility to the sights and sounds of the outward world. It is stated that Maecenas, acting on the principle of employing the poets of the time in favour of the conservative and restorative policy of the new government, directed the genius of Virgil to the subject of the *Georgics*. No object could be of more consequence in the eyes of a statesman whose master inherited the policy of the popular leaders than the revival of the great national industry, associated with happier memories of Rome, which had fallen into abeyance owing to the long unsettlement of the revolutionary era as well as to other causes. Virgil's previous life and associations made it natural for him to identify himself with this object, while his genius fitted him to enlist the imagination of his countrymen in its favour. It would be a most inadequate view of his purpose to suppose that, like the Alexandrian poets or the didactic poets of modern times, he desired merely to make useful information more attractive by the aid of verse. His aim was rather to describe with realistic fidelity, and to surround with an atmosphere of poetry, the annual round of labour in which the Italian yeoman's life was passed; to bring out the intimate relation with nature into which man was brought in the course of that life, and to suggest the delight to heart and imagination which he drew from it; to contrast the simplicity, security and sanctity of such a life with the luxury and lawless passions of the great world; and to associate the ideal of a life of rustic labour with the beauties of Italy and the glories of Rome. This larger conception of the dignity of his subject separates the didactic poem of Virgil from all other didactic, as distinct from philosophic, poems. He has produced in the *Georgics* a new type of didactic, as in the *Aeneid* he has produced a new type of epic, poetry.

The subject is treated in four books, varying in length from 514 to 566 lines. The first treats of the tillage of the fields, of the constellations, the rise and setting of which form the farmer's calendar, and of the signs of the weather, on which the success of his labours largely depends. The second treats of trees, and especially of the vine and olive, two great staples of the national wealth and industry of Italy; the third of the rearing of herds and flocks and the breeding of horses; the fourth of bees.

As he had found in Theocritus a model for the form in which his idler fancies were expressed, he turned to an older page in Greek literature for the outline of the form in which his graver interest in rural affairs was to find its outlet. The *Works and Days* of Hesiod could not supply an adequate mould for the systematic treatment of all the processes of rural industry, and still less for the treatment of the larger ideas to which this was subsidiary, yet that Virgil considered him as his prototype is shown by the line which concludes one of the cardinal episodes of the poem—

"Ascraeumque cano Romana per oppida carmen."

Virgil accepts also the guidance of the Alexandrian poets who treated the science of their day—astronomy, natural history and geography—in the metre and diction of epic poetry. But, in availing himself of the work of the Alexandrians, Virgil is like a great master making use of mechanical assistants. A more powerful influence on the form, ideas, sentiment and diction of the *Georgics* was exercised by the great philosophical poem of Lucretius, of which Virgil had probably been a diligent student since the time of its first appearance, and with which his mind was saturated when he was engaged in the composition of the *Georgics*. Virgil is at once attracted and repelled by the genius and attitude of the philosophic poet. He is possessed by his imaginative conception of nature, as a living, all-pervading power; he shares his Italian love of the beauty of the world, and his sympathy with animal as well as human life. He recognizes with enthusiasm his contemplative elevation above the petty interests and passions of life. But he is repelled by his apparent separation from the ordinary beliefs, hopes and fears of his fellow-men Virgil is in thorough sympathy with the best restorative tendencies—religious, social and national—of his time; Lucretius was driven into isolation by the anarchic and dissolving forces of his.

So far as any speculative idea underlying the details of the *Georgics* can be detected, it is one of which the source can be traced to Lucretius—the idea of the struggle of human force with the forces of nature. In Virgil this idea is modified by Italian piety and by the Italian delight in the results of labour. In the general plan of the poem Virgil follows the guidance of Lucretius rather than that of any Greek model. The distinction between a poem addressed to national and one addressed to philosophical sympathies is marked by the prominence assigned in the one poem to Caesar as the supreme personality of the age, in the other to Epicurus as the supreme master in the realms of mind. The invocation to the "Di agrestes," to the old gods of mythology and art, to the living Caesar as the latest power added to the pagan Pantheon, is both a parallel and a contrast to the invocation to the all-pervading principle of life, personified as "Alma Venus." In the systematic treatment of his materials, and the interspersion of episodes dealing with the deeper poetical and human interest of the subject, Virgil adheres to the practice of the older poet. He uses his connecting links and formulas, such as "principio," "nunc age," &c., but uses them more sparingly, so as to make the logical mechanism of the poem less rigid, while he still keeps up the liveliness of a personal address. All his topics admit of being vitalized by attributing to natural processes the vivacity of human relationships and sensibility, and by association with the joy which the ideal farmer feels in the results of his energy. Much of the argument of Lucretius, on the other hand, is as remote from the genial presence of nature as from human associations. Virgil makes a much larger use than Lucretius of ornament borrowed from older poetry, art, science and mythology. There is uniformity of chastened excellence in the diction and versification of the *Georgics*, contrasting with the imaginative force of isolated expressions and the majesty of isolated lines and passages in Lucretius. The "vivida vis" of imagination is more apparent in the older poet; the artistic perfection of Virgil is even more conspicuous in the *Georgics* than in the *Eclogues* or the *Aeneid*.

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[1] In the *Georgics* also Virgil attempts to combine science with the poetic fancies which filled its place in older times.

[2] See *Virgil's Messianic Eclogue: Its Meaning, Occasion and Sources*, three studies by J B. Mayor, W. Warde Fowler and R. S. Conway (1907).

The principal episodes of the poem, in which the true dignity and human interest of the subject are brought out, occur in the first and second books. Other shorter episodes add variety to the different books. These episodes are not detached or isolated ornaments, but give a higher unity to the poem, and are the main ground of its permanent hold upon the world. There is indeed one marked exception to this rule. The long episode with which the whole poem ends—the tale of the shepherd Aristaeus, with which is connected the more poetical fable of Orpheus and Eurydice—has only the slightest connexion with the general ideas and sentiment of the poem. It is altogether at variance with the truthful realism and the Italian feeling which pervade it. But we are distinctly told that the original conclusion had contained the praises of Gallus, the friend of Virgil's youth, who, about the time when Virgil was finishing the poem, had gained distinction in the war against Cleopatra, and had in consequence been made the first governor of the new province of Egypt. Such a conclusion might well have been in keeping with the main purpose of the poem. After the fall of Gallus, owing to his ambitious failure in his Egyptian administration, and his death in 26 B.C., the poet, according to the story, in obedience to the command of the emperor, substituted for this encomium the beautiful but irrelevant fable of Orpheus and Eurydice, in which he first displayed the narrative skill, the pathos and the magical power of making the mystery of the unseen world present to the imagination which characterize the *Aeneid*.

The cardinal episodes of the poem, as it now stands, are the passages in bk. i. from line 464 to the end, and in bk. ii. from 136 to 176 and from 475 to 542. The first, introduced in connexion with the signs of the weather, recounts the omens which accompanied the death of Julius Caesar, and shows how the misery of Italy and the neglected state of the fields are the punishment for the great sin of the previous generation. In the second of these passages the true keynote of the poem is struck in the invocation to Italy—

> "Salve, magna parens frugum, Saturnia tellus,
> Magna virum."

The thought of the beauties of the land, of the abundance and variety of its products, of its ancient cities and mighty works of man, its brave and hardy races, the great men who had fought for her in old times, and of him, the greatest among her sons, who was then defending Rome against her enemies in the farthest East, inspires the poet, and gives dignity to the trivial details of farm life. But a still higher and more catholic interest is given to the subject in the greatest of the episodes—the most perfect passage in all Latin poetry—that from line 458, "O fortunatos nimium," to the end. The subject is there glorified by its connexion not only with the national well-being but with the highest life and purest happiness of man. The old delight in the labours of the field blends with the new delight in the beauty of nature, and is associated with that purity and happiness of family life which was an Italian ideal, and with the poetry of those religious beliefs and observances which imparted a sense of security, a constantly recurring charm, and a bond of social sympathy to the old rustic life.

The *Georgics* is not only the most perfect, but the most native of all the works of the ancient Italian genius. Even where he borrows from Greek originals, Virgil makes the Greek mind tributary to his national design. The *Georgics*, the poem of the land, is as essentially Italian as the *Odyssey*, the poem of the sea, is essentially Greek. Nature is presented to us as she is revealed in the soft luxuriance of Italian landscape, not in the clearly defined forms of Greek scenery. The poem shows the Italian susceptibility to the beauty of the outward world, the dignity and sobriety of the Italian imagination, the firm and enduring structure of all Roman workmanship, while it is essentially Italian in its religious and ethical feeling.

The work which yet remained for Virgil to accomplish was the addition of a great Roman epic to literature. This had been the [illegible] earliest effort of the national imagination, when it first departed from the mere imitative reproduction of Greek [illegible]. The work which had given the truest expression to [illegible] of Rome before the time of Virgil had been the *Annales* of Ennius. This had been supplemented by various historical poems but had never been superseded. It satisfied the national imagination as an expression of the national life in its vigorous prime, but it could not satisfy the newly developed sense of art; and the expansion of the national life since the days of Ennius, and the changed conditions into which it passed after the battle of Actium, demanded a newer and ampler expression. It had been Virgil's earliest ambition to write an heroic poem on the traditions of Alba Longa; and he had been repeatedly urged by Augustus to celebrate his exploits. The problem before him was to compose a work of art on a large scale, which should represent a great action of the heroic age, and should at the same time embody the most vital ideas and sentiment of the hour—which in substance should glorify Rome and the present ruler of Rome, while in form it should follow closely the great models of epic poetry and reproduce all their sources of interest. It was his ambition to be the Homer, as he had been the Theocritus and Hesiod, of his country.

Various objects had thus to be combined in a work of art on the model of the Greek epic: the revival of interest in the heroic foretime; the satisfaction of national sentiment; the expression of the deeper currents of emotion of the age; the personal celebration of Augustus. A new type of epic poetry had to be created. It was desirable to select a single heroic action which should belong to the cycle of legendary events celebrated in the Homeric poems, and which could be associated with Rome. The only subject which in any way satisfied these conditions was that of the wanderings of Aeneas and of his final settlement in Latium. The story, though not of Roman origin but of a composite growth, had long been familiar to the Romans, and had been recognized by official acts of senate and people. The subject enabled Virgil to tell again of the fall of Troy, and to weave a tale of sea-adventure similar to that of the wanderings of Odysseus. It was also recommended by the claim which the Julii, a patrician family of Alban origin, made to descent from Iulus, the supposed son of Aeneas and founder of Alba Longa.

The *Aeneid* is thus at once the epic of the national life under its new conditions and an epic of human character. The true keynote of the poem is struck in the line with which the proem closes—

> "Tantae molis erat Romanam condere gentem."

The idea which underlies the whole action of the poem is that of the great part played by Rome in the history of the world, that part being from of old determined by divine decree, and carried out through the virtue of her sons. The idea of universal empire is thus the dominant idea of the poem. With this idea that of the unbroken continuity of the national life is intimately associated. The reverence for old customs and for the traditions of the past was a large element in the national sentiment, and has a prominent place in the *Aeneid*. So too has the feeling of local attachment and of the power of local association over the imagination. The poem is also characteristically Roman in the religious belief and observances which it embodies. Behind all the conventional machinery of the old Olympic gods there is the Roman apprehension of a great inscrutable power, manifesting itself by arbitrary signs, exacting jealously certain observances, working out its own secret purposes through the agency of Roman arms and Roman counsels.

The poem is thus a religious as well as a national epic, and this explains the large part played in the development of the action by special revelation, omens, prophecies, ceremonial usages and prayer. But, while the predominant religious idea of the poem is that of a divine purpose carried out regardlessly of human feeling, in other parts of the poem, and especially in that passage of the sixth book in which Virgil tries to formulate his deepest convictions on individual destiny, the agency of fate seems to yield to that of a spiritual dispensation, awarding to men their portions according to their actions.

The idealization of Augustus is no expression of servile adulation. It is through the prominence assigned to him that the poem is truly representative of the critical epoch in human affairs at which it was written. The cardinal fact of that epoch was the substitution of personal rule for the rule of the old commonwealth over the Roman world. Virgil shows the imaginative significance of that fact by revealing the emperor as chosen from of old in the counsels of the supreme ruler of the world to fulfil the national destiny, as the descendant of gods and of heroes of old poetic renown; as one, moreover, who, in the actual work done by him, as victor in a great decisive battle between the forces of the Western and the Eastern world, as the organizer of empire and restorer of peace, order and religion, had rendered better service to mankind than any one of the heroes who in an older time had been raised for their great deeds to the company of the gods.

Virgil's true and yet idealizing interpretation of the imperial idea of Rome is the basis of the greatness of the *Aeneid* as a representative poem. It is on this representative character and on the excellence of its artistic execution that the claim of the *Aeneid* to rank as one of the great poems of the world mainly rests. The inferiority of the poem to the *Iliad* and the *Odyssey* as a direct representation of human life is so unquestionable that we are in danger of underrating the real though secondary interest which the poem possesses as an imitative epic of human action, manners and character. In the first place it should be remarked that the action is chosen not only as suited to embody the idea of Rome, but as having a peculiar nobleness and dignity of its own. It brings before us the spectacle of the destruction of the city of greatest name in poetry or legend, of the foundation of the imperial city of the western seas, in which Rome had encountered her most powerful antagonist in her long struggle for supremacy, and that of the first rude settlement on the hills of Rome itself. The scenes through which the action is carried are familiar, yet full of great memories and associations—Troy and its neighbourhood, the seas and islands of Greece, the coasts of Epirus, familiar to all travellers between Italy and the East, Sicily, the site of Carthage, Campania, Latium, the Tiber, and all the country within sight of Rome. The personages of the action are prominent in poetry and legend, or by their ethnical names stir the sentiment of national enthusiasm—Aeneas and Anchises, Dido, Acestes, Evander, Turnus. The spheres of activity in which they are engaged are war and sea-adventure. The passion of love is a powerful addition to the older sources of interest. The *Aeneid* revives, by a conventional compromise between the present and the remote past, some image of the old romance of Greece; it creates the romance of "that Italy for which Camilla the virgin, Euryalus, and Turnus and Nisus died of wounds." It might be said of the manner of life represented in the *Aeneid*, that it is no more true to any actual condition of human society than that represented in the *Eclogues*. But may not the same be said of all idealizing restoration of a remote past in an age of advanced civilization? The life represented in the *Oedipus Tyrannus* or in *King Lear* is not the life of the Periclean nor of the Elizabethan age, nor is it conceivable as the real life of a prehistoric age. The truth of such a representation is to be judged, not by its relation to any actual state of things ever realized in the world, but by its relation to an ideal of the imagination—the ideal conception of how man, endowed with the gifts and graces of a civilized time, but yet not without the buoyancy of a more primitive age, might play his part under circumstances which would afford scope for the passions and activities of a vigorous personality, and for the refined emotions and subtle reflection of an era of high intellectual and moral cultivation. The verdict of most readers of the *Aeneid* will be that Virgil does not satisfy this condition as it is satisfied by Sophocles and Shakespeare. Yet there is a courtesy, dignity and consideration for the feelings of others in the manners of his chief personages, such as might be exhibited by the noblest in an age of chivalry and in an age of culture. The charm of primitive simplicity is present in some passages of the *Aeneid*, the spell of luxurious pomp in others. The delight of voyaging past beautiful islands is enhanced by the suggestion of the adventurous spirit which sent the first explorers abroad. Where Virgil is least real, and most purely imitative, is in the battle-scenes of the later books. They afford scope, however, to his patriotic desire to do justice to the martial energy of the Italian races; and some of them have a peculiar beauty from the pathos with which the deaths of some of the heroes are described.

But the adverse criticisms of the *Aeneid* are chiefly based on Virgil's supposed failure in the crucial test of the creation of character. And his chief failure is pronounced to be the "pious Aeneas." Is Aeneas a worthy and interesting hero of a great poem of action? Not, certainly, according to the ideals realized in Achilles and Odysseus, nor according to the modern ideal of heroism. Virgil wishes to hold up in Aeneas an ideal of pious obedience and persistent purpose—a religious ideal belonging to the ages of faith combined with the humane and self-sacrificing qualities belonging to an era of moral enlightenment. His own sympathy is with his religious ideal rather than with that of chivalrous romance. Yet that there was in his own imagination a chord responsive to the chivalrous emotion of a later time is seen in the love and pathos which he has thrown into his delineations of Pallas, Lausus and Camilla. But he felt that the deepest need of his time was not military glory, but peace, reconciliation, the restoration of law, order and piety.

In Dido Roman poetry has added to the great gallery of men and women, created by the imaginative art of different times and peoples, the ideal of a true queen and a true woman. On the episode of which she is the heroine the most passionate human interest is concentrated. It has been objected that Virgil does not really sympathize with his own creation, that he gives his approval to the cold desertion of her by Aeneas. But if he does not condemn his hero, he sees in the desertion and death of Dido a great tragic issue in which a noble and generous nature is sacrificed to the larger purpose of the gods. But that Virgil really sympathized with the creation of his imagination appears, not only in the sympathy which she still inspires, but in the part which he assigns to her in that shadowy realm—

> "Conjunx ubi pristinus illi
> Respondet curis, aequatque Sychaeus amorem."

Even those who have been insensible to the representative and to the human interest of the *Aeneid* have generally recognized the artistic excellence of the poem. This is conspicuous both in the conception of the action and the arrangement of its successive stages and in the workmanship of details. Each of the first eight books has a large and distinct sphere of interest, and they each contribute to the impression of the work as a whole. In the first book we have the storm, the prophecy of Jove and the building of Carthage; in the second the destruction of Troy; in the third the voyage among the islands and coasts of the Mediterranean; in the fourth the tragedy of Dido; in the fifth the rest in the Sicilian bay, at the foot of Mount Eryx; in the sixth the revelation of the spiritual world of Virgil's imagination, and of the souls of those who built up the greatness of Rome in their pre-existent state; in the seventh the arrival of the Trojans at the mouth of the Tiber and the gathering of the Italian clans; in the eighth the first sight of the hills of Rome, and the prophetic representation of the great crises in Roman history, leading up to the greatest of them all, the crowning victory of Actium. Among these books we may infer that Virgil assigned the palm to the second, the fourth and the sixth, as he selected them to read to Augustus and the imperial family. The interest is generally thought to flag in the last four books; nor is it possible to feel that culminating sympathy with the final combat between Turnus and Aeneas that we feel with the combat between Hector and Achilles. Yet a personal interest is awakened in the adventures and fate of Pallas, Lausus and Camilla. Virgil may himself have become weary of the succession of battle-scenes—"eadem horrida bella"—which the requirements of epic poetry called upon him to portray. There is not only a less varied interest, there is greater inequality of workmanship in the later books, owing to the fact that they had not received their author's final revisal. Yet in them there are many lines and passages of great power, pathos and beauty. Virgil brought the two great instruments of varied and continuous harmony and of a rich, chastened and noble style to the highest perfection of which the Latin tongue was capable. The rhythm and style of the *Aeneid* is more unequal than the rhythm and style of the *Georgics*, but is a larger and more varied instrument. The note of his supremacy among all the poetic artists of his country is that subtle fusion of the music and the meaning of language which touches the deepest and most secret springs of emotion. He touches especially the emotions of reverence and of yearning for a higher spiritual life, and the sense of nobleness in human affairs, in great institutions, and great natures; the sense of the sanctity of human affections, of the imaginative spell exercised by the past, of the mystery of the unseen world. This is the secret of the power which his words have had over some of the deepest and greatest natures in all ages. (W. Y. S.; T. R. G.)

BIBLIOGRAPHY

Appendix Vergiliana.—Under this collective name there are current several poems of some little length and some groups of shorter pieces, all attributed to Virgil in antiquity. Virgil wrote a *Culex*, but not the *Culex* now extant, though it passed for his half a century after his death. The *Aetna*, the *Ciris* and the *Copa* are clearly not Virgil's. The *Moretum* is said to have been translated by him from a Greek poem by his teacher Parthenius; it is an exquisite piece of work, familiar perhaps to English readers in Cowper's translation. The case of the *Catalepton* (κατὰ λεπτόν) is peculiar. Two of these little poems (*Ite hinc inanes* and *Villula quae Sironis*) are generally accepted as Virgil's; opinion varies as to the rest, with very little to go upon, but generally rejecting them. The whole are printed in the larger editions of Virgil. For English readers the most obvious edition is that of Robinson Ellis (1907), who has also edited the *Aetna* separately.

Manuscripts.—Gellius (*Noctes Atticae*, ix. 14, 7) tells us of people who had inspected *idiographum librum Vergilii*, but this has of course in all probability long since perished. There are, however, seven very ancient MSS. of Virgil. (1) The Mediceus at Florence, with a note purporting to be by a man, who was consul in 494, to say he had read it. (2) The Palatinus Vaticanus of the 4th or 5th century. (3) The Vaticanus of the same period. (4) The "Schedae Vaticanae." (5) The "Schedae Berolinenses," perhaps of the 4th century. (6) The "Schedae Sangallenses." (7) The "Schedae rescriptae Veronenses"—the last three of insignificant extent. For a full account of the MSS., see Henry, *Aeneidea*, i., and Ribbeck, *Prolegomena ad Verg.*

Ancient Commentators.—Commentaries on Virgil began to be written at a very early date. Suetonius, *V. Verg.* 44, mentions an *Aeneidomastix* of Carvilius Pictor and other works on Virgil's "thefts" and "faults," besides eight "volumina" of Q. Octavius Avitus, setting out in parallel passages the "likenesses" (ὁμοιότητες was the name of the work) between Virgil and more ancient authors. M. Valerius Probus (latter part of 1st century A.D.) wrote a commentary, but it is doubtful for how much of what passes under his name he is responsible, if for any of it. At the end of the 4th century come the commentaries of Tiberius Claudius Donatus and of Servius, the former writing as a teacher of rhetoric, the latter of style and grammar. The work of Servius was afterwards expanded by another scholar, whose additions greatly added to its worth, as they are drawn from older commentators and give us very valuable information on the old Roman religion and constitution, Greek and Latin legends, old Latin and linguistic usages. In this enlarged form the commentary of Servius and the *Saturnalia* of Macrobius (also of the end of the 4th century) are both of great interest to the student of Virgil. There are, further, sets of Scholia in MSS. at Verona and Bern, which draw their material from ancient commentaries. See H. Nettleship, *Essays in Latin Literature*, xi., and Comparetti, *Vergil in the Middle Ages*, ch. 5.

Editions.—The editions of Virgil are innumerable; Heyne (1767–1800), Forbiger (1872–75) and Ribbeck (1859–66) in Germany, Benoist (1876) in France, and Conington (completed by Nettleship, and edited by Haverfield) in England, are perhaps the most important. Good school editions in English have been produced by Page, Sidgwick and Papillon. Conington's work, however, is without question the best in English.

Translations.—Famous English translations have been made by Dryden and by a host of others since his day. Since the middle of the 19th century the most important are Conington (*Aeneid* in verse, whole works in prose); J. W. Mackail (*Aeneid* and *Georgics* in prose); William Morris (*Aeneid* in verse); Lord Justice Bowen (*Eclogues* and *Aeneid*, i.–vi. in verse); Canon Thornhill (verse); C. J. Billson (verse, 1906); J. Rhoades (verse, new ed., 1907). For essays on translating Virgil, see Conington, *Miscellaneous Works*, vol. i.; R. Y. Tyrrell, *Latin Poetry* (appendix).

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Virgil-literature: Sainte-Beuve, *Étude sur Virgile* (one of the great books on Virgil); Comparetti, *Virgilio nel medio Evo* (1872)—Eng. tr., *Vergil in the Middle Ages*, by E. F. M. Benecke (1895) (a book of very great and varied interest); Heinze, *Virgil's epische Technik* (1902); W. Y. Sellar, *Roman Poets of the Augustan Age: Virgil* (2nd ed. 1883); Glover, *Studies in Virgil* (1904). Essays in the following: F. W. H. Myers, *Essays [Classical]* (1883), the most famous English essay on Virgil; J. R. Green, *Stray Studies* (1876) (an excellent study of Aeneas); W. Warde Fowler, *A Year with the Birds* (on Virgil's bird-lore); Nettleship, *Essays in Latin Literature* (1884); Tyrrell, *Latin Poetry* (1898); Patin, *Essais sur la poésie Latine* (4th ed. 1900) (one of the finest critics of Latin literature); Goumy, *Les Latins* (1892) (a volume of very bright essays); J. W. Mackail, *Latin Literature* (3rd ed. 1899). (T. R. G.)

The Virgil Legend.

Virgil's great popularity in the middle ages is to be partly explained by the fact that he was to a certain extent recognized by the Church. He was supposed to have prophesied the coming of Christ in the fourth *Eclogue*, and by some divines the *Aeneid* was held to be an allegory of sacred things. This position was sufficiently emphasized by Dante when he chose him from among all the sages of antiquity to be his guide in the *Divina Commedia*. Ancient poets and philosophers were commonly transformed by medieval writers into necromancers; and Virgil and Aristotle became popularly famous, not for poetry and science, but for their supposed knowledge of the black art. Naples appears to have been the home of the popular legend of Virgil, which represented him as the special protector of the city, but was probably never quite independent of learned tradition.

One of the earliest references to the magical skill of Virgil[1] occurs in a letter of the imperial chancellor Conrad of Querfurt (1194), reproduced by Arnold of Lübeck in the continuation of the *Chronica Slavorum* of Helmold. John of Salisbury alludes to the brazen fly fabricated by Virgil; Hélinand (d. 1227) speaks of similar marvels in a work from which Vincent of Beauvais has borrowed; and Gervase of Tilbury, in his *Otia Imperialia* (1212), and Alexander of Neckam (d. 1217), in *De Naturis Rerum*, have reproduced these traditions, with additions. German and French poets did not overlook this accessory to their repertory. The *Roman de Cléomadès* of Adenés li rois (12th century) and the *Image du Monde* of Gauthier de Metz (1245) contain numerous references to the prodigies of the enchanter. Reynard the Fox informs King Lion that he had from the wise Virgil a quantity of valuable receipts. He also plays a considerable part in the popular folk-tale *The Seven Wise Masters*, and appears in the *Gesta Romanorum* and that curious guidebook for pilgrims, the *Mirabilia Romae*. He is to be found in John Gower's *Confessio Amantis* and in John Lydgate's *Bochas*. A Spanish romance, *Vergilios*, is included by E. de Ochoa in his *Tesoro* (Paris, 1838), and Juan Ruiz, archpriest of Hita (d. *c.* 1360), also wrote a poem on the subject. Many of the tales of magic throughout Europe were referred to Virgil, and gradually developed into a completely new life, strangely different from that of the real hero. They were collected in French under the title of *Les Faits Merveilleux de Virgille* (*c.* 1499), a quarto chapbook of ten pages, which became extremely popular, and was printed, with more or less additional matter, in other languages. The English version, beginning "This is resonable to wryght the mervelus dedes done by Virgilius," was printed about 1520. We are told how Virgil beguiled the devil at a very early age, in the same fashion as the fisherman persuaded the jinnee in the *Arabian Nights* to re-enter Solomon's casket. Another reproduction of a widely spread tale was that of the lady who kept Virgil suspended in a basket. To revenge the affront the magician extinguished all the fires in the city, and no one could rekindle them without subjecting the lady to an ordeal highly offensive to her modesty. Virgil made for the emperor a castle in which he could see and hear everything done or said in Rome, an ever-blooming orchard, statues of the tributary princes which gave warning of treason or rebellion, and a lamp to supply light to the city. He abducted the soldan's daughter, and built for her the city of Naples upon a secure foundation of eggs. At last, having performed many extraordinary things, he knew that his time was come. In order to escape the common lot he placed all his treasures in a castle defended by images unceasingly wielding iron flails, and directed his confidential servant to hew him in pieces, which he was to salt and place in a barrel in the cellar, under which a lamp was to be kept burning. The servant was assured that after seven days his master would revive, a young man. The directions were carried out; but the emperor, missing his medicine-man, forced the servant to divulge the secret and to quiet the whirling flails. The emperor and his retinue entered the castle and at last found the mangled corpse. In his wrath he slew the servant, whereupon a little naked child ran thrice round the barrel, crying, "Cursed be the hour that ye ever came here," and vanished.

For the legends connected with Virgil see especially D. Comparetti, *Virgilio nel medio evo* (2nd ed., Florence, 1896; English trans., E. F. M. Benecke, 1895). The chief original source for the Neapolitan legends is the 14th-century *Cronica di Partenope*. See further W. J. Thoms, *Early Eng. Prose Romances* (1858); G. Brunet, *Les Faits merveilleux de Virgile* (Geneva, 1867); E. Duméril, "Virgile enchanteur" (*Mélanges archéologiques*, 1850); Gervase of Tilbury, *Otia Imper.* (ed. Liebrecht, 1856); P. Schwubbe, *Virgilius per mediam aetatem* (Paderborn, 1852); Siebenhaar, *De fabulis quae media aetate de Virgilio circumf.* (Berlin, 1837); J. G. T. Graesse, *Beiträge zur Litt. u. Sage des Mittelalters* (1850); Bartsch, "Gedicht auf. d. Zaub. Virgil" (Pfeiffer's *Germania*, iv. 1859); F. Liebrecht, "Der Zauberer Virgilius" (ibid. x. 1865); K. L. Roth, "Über d. Zaub. Virgilius" (ibid. iv. 1859); W. Victor, "Der Ursprung der Virgilsage" (*Zeit. f. rom. Phil.* i. 1877); A. Graf, *Roma nella memoria e nelle imaginazioni del medio evo* (Turin, 1882); F. W. Genthe, *Leben und Fortleben des Publius Virgilius Maro als Dichter und Zauberer* (2nd ed., Magdeburg, 1857). (M. Br.)

VIRGIL, POLYDORE (*c.* 1470–1555), English historian, of Italian extraction, otherwise known as P. V. CASTELLENSIS, was a kinsman of Cardinal Hadrian Castellensis, a native of Castro in Etruria. His father's name is said to have been George Virgil; his great-grandfather, Anthony Virgil, "a man well skilled in medicine and astrology," had professed philosophy at Paris, as did Polydore's own brother and protégé John Matthew Virgil, at Pavia, in 1517. A third brother was a London merchant in 1511. Polydore was born at Urbino, is said to have been educated at Bologna, and was probably in the service of Guido Ubaldo, duke of Urbino, before 1498, as in the dedication of his first work, *Liber Proverbiorum* (April 1498), he styles himself this prince's client. Polydore's second book, *De Inventoribus Rerum*, is dedicated to Guido's tutor,

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[1] The Irish apostle to Carinthia, St Virgilius, bishop of Salzburg (d. 784), who held original views on the subject of antipodes, may have been the real eponym of the legend.

Ludovicus Odaxius, from Urbino, in August 1499. After being chamberlain to Alexander VI. he came to England in 1501 as deputy collector of Peter's pence for the cardinal. As Hadrian's proxy, he was enthroned bishop of Bath and Wells in October 1504. It was at Henry VII.'s instance that he commenced his *Historia Anglica*—a work which, though seemingly begun as early as 1505, was not completed till August 1533, the date of its dedication to Henry VIII., nor published till 1534. In May 1514 he and his patron the cardinal are found supporting Wolsey's claims to the cardinalship, but he had lost the great minister's favour before the year was out. A rash letter, reflecting severely on Henry VIII. and Wolsey, was intercepted early in 1515, after which Polydore was cast into prison and supplanted in his collectorship (March and April). He was not without some powerful supporters, as both Catherine de' Medici and Leo X. wrote to the king on his behalf. From his prison he sent an abject and almost blasphemous letter to the offended minister, begging that the fast approaching Christmas—a time which witnessed the restitution of a world—might see his pardon also. He was set at liberty before Christmas 1515, though he never regained his collectorship. In 1525 he published the first edition of *Gildas*, dedicating the work to Tunstall, bishop of London. Next year appeared his *Liber de Prodigiis*, dedicated from London (July) to Francesco Maria, duke of Urbino. Somewhere about 1538 he left England, and remained in Italy for some time. Ill-health, he tells us, forbade him on his return to continue his custom of making daily notes on contemporary events. About the end of 1551 he went home to Urbino, where he appears to have died in 1555. He had been naturalized an Englishman in October 1510, and had held several clerical appointments in England. In 1508 he was appointed archdeacon of Wells, and in 1513 prebendary of Oxgate in St Paul's cathedral, both of which offices he held after his return to Urbino.

The first edition of the *Historia Anglica* (twenty-six books) was printed at Basel in 1534; the twenty-seventh book, dealing with the reign of Henry VIII. down to the birth of Edward VI. (October 1536), was added to the third edition of 1555. Polydore claims to have been very careful in collecting materials for this work, and takes credit for using foreign historians as well as English, for which reason, he remarks, the English, Scotch and French will find several things reported in his pages far differently from the way in which they are told in current national story. In his search after information he applied to James IV. of Scotland for a list of the Scottish kings and their annals; but not even his friendship for Gavin Douglas could induce him to give credit to the historical notions of this accomplished bishop, who traced the pedigree of the Scots down from the banished son of an Athenian king and Scotta the daughter of the Egyptian tyrant of the Israelites. A similar scepticism made him doubt the veracity of Geoffrey of Monmouth, and thus called forth Leland's *Defensio Gallofridi* and *Assertio Incomparabilis Arturii*. This doubting instinct led to his being accused of many offences against learning, such as that of burning cartloads of MSS. lest his errors should be discovered, of purloining books from libraries and shipping them off by the vesselful to Rome. As a matter of fact, it is of course mainly from the time of Henry VI., where our contemporary records begin to fail so sadly, that Polydore's work is useful. He must have been personally acquainted with many men whose memories could carry them back to the beginning of the Wars of the Roses. Dr Brewer speaks somewhat harshly of him as an authority for the reign of Henry VIII., and indeed his spite against Wolsey is evident; but it is impossible to read his social and geographical accounts of England and Scotland without gratitude for a writer who has preserved so many interesting details. Polydore's *Adagia* (Venice, April 1498) was the first collection of Latin proverbs ever printed; it preceded Erasmus's by two years, and the slight misunderstanding that arose for the moment out of rival claims gave place to a sincere friendship. A second series of Biblical proverbs (553 in number) was dedicated to Wolsey's follower, Richard Pace, and is preceded by an interesting letter (June 1519), which gives the names of many of Polydore's English friends, from More and Archbishop Warham to Linacre and Tunstall. The *De Inventoribus*, treating of the origin of all things whether ecclesiastical or lay (Paris, 1499), originally consisted of only seven books, but was increased to eight in 1521. It was exceedingly popular, and was early translated into French (1521), German (1537), English (1546) and Spanish (1551). All editions, however, except those following the text sanctioned by Gregory XIII in 1576, are on the Index Expurgatorius. The *De Prodigiis* also achieved a great popularity, and was soon translated into Italian (1543), English (1546) and Spanish (1550). This treatise takes the form of a Latin dialogue between Polydore and his Cambridge friend Robert Ridley. It takes place in the open air, at Polydore's country house near London. Polydore's duty is to state the problems and supply the historical illustrations; his friend's to explain, rationalize and depreciate as best he can. Here, as in the *Historia Anglica*, it is plain that the writer plumes himself specially on the excellence of his Latin, which in Sir Henry Ellis's opinion is purer than that of any of his contemporaries.

VIRGINAL, or Pair of Virginals, a name applied in England, and also recognized on the continent of Europe, to the spinet, and more especially to the small pentagonal and to the rectangular models. The word virginal, bestowed because it was pre-eminently the instrument for girls, denotes before all a keyboard instrument, having for each note one string only, plucked by means of a quill attached to a jack.[1] The fine instrument in the Victoria and Albert Museum, known as Queen Elizabeth's virginal, is an Italian pentagonal spinet, elaborately emblazoned with the coat of arms of the queen, and having a compass of just over four octaves. King Henry VIII. and his daughters, Queen Mary and Queen Elizabeth, were all accomplished performers on the virginal. (K. S.)

VIRGINIA, or Verginia, in Roman legendary history, daughter of L. Virginius, a plebeian centurion. Her beauty attracted the notice of the decemvir Appius Claudius, who instructed Marcus Claudius, one of his clients, to claim her as his slave. Marcus accordingly brought her before Appius, and asserted that she was the daughter of one of his female slaves, who had been stolen and passed off by the wife of Virginius as her own child. Virginius presented himself with his daughter before the tribunal of Appius, who, refusing to listen to any argument, declared Virginia to be a slave and the property of Marcus. Virginius thereupon stabbed her to the heart in the presence of Appius and the people. A storm of popular indignation arose and the decemvirs were forced to resign. The people for the second time "seceded" to the Sacred Mount, and refused to return to Rome until the old form of government was re-established.

See Livy iii. 44–58; Dion. Halic. xi. 28–45, whose account differs in some respects from Livy's; Cicero, *De finibus*, ii. 20; Val. Max. vi. 1, 2; for a critical examination of the story and its connexion with the downfall of the decemvirs, see Sir G. Cornewall Lewis, *Credibility of Early Roman History*, ii.; Schwegler, *Römische Geschickte*, bk. xxx. 4, 5; also E. Pais, *Ancient Legends of Roman History* (Eng. trans. 1906), p. 185, according to whom the legends of Virginia and Lucretia (two different versions of one and the same story, connecting the history of Roman liberty with the martyrdom of a woman) are nothing but late elaborations of legends connected with the cults of Ardea.

VIRGINIA, one of the more N. of the S.E. Atlantic states of the United States of America, lying between latitudes 36° 30′ and 39° 30′ N., and longitude 75° 15′ and 83° 40′ W. It is bounded on the N.W. by Kentucky and West Virginia, the irregular boundary line following mountain ridges for a part of its course; on the N.E. by Maryland, from which it is separated by the Potomac river; on the S. by North Carolina and Tennessee, the boundary line being nominally a parallel of latitude, but actually a more irregular line. Virginia has an area of 42,627 sq. m., of which 2365 sq. m. are water surface, including land-locked bays and harbours, rivers and Lake Drummond. The state has a length of about 440 m. E. and W., measured along its S. boundary; and an extreme breadth N and S. of about 200 m.

Physical Features.—Virginia is crossed from N to S. or N.E. to S.W by four distinct physiographic provinces. The easternmost is the Coastal Plain Province, and forms a part of the great Coastal Plain bordering the S.E. United States from New York Harbour to the Rio Grande. This province occupies about 11,000 sq. m. of the state, and is known as "Tidewater Virginia." After the plain had been raised above sea-level to a higher elevation than it now occupies, it was much dissected by streams and then depressed, allowing the sea to invade the stream valleys. Such is the origin of the branching bays or "drowned river valleys," among which may be noted the lower Potomac, Rappahannock, York and James rivers. Chesapeake Bay itself is the drowned lower course of the Susquehanna river, to which the other streams mentioned were tributary previous to the depression which transformed them into bays. The land between the drowned valleys is relatively flat, and varies in height from sea-level on the E. to 150–300 ft. on the W. border. Passing westward across the "fall-line," the next province is the Piedmont, a part of the extensive Piedmont Belt reaching from Pennsylvania to Alabama. This is the most extensive of the subdivisions of Virginia, comprising 18,000 sq. m. of its area, and varying in elevation from 150–300 ft. on the E. to 700–1200 ft. along the foot of the Blue Ridge at the W. The sloping surface is gently rolling, and has resulted from the uplift and dissection of a nearly level plain of erosion developed on folded, crystalline rocks. Occasional hard rock ridges rise to a moderate elevation above the general level, while areas of unusually weak Triassic sandstones have been worn down to form lowlands. W. of the Piedmont, and like it consisting of crystalline rocks, is the Blue Ridge, a mountain belt from 3 to 20 m. in breadth, narrowing toward the N., where it passes into Maryland, and broadening southward toward its great expansion in W. North Carolina and E. Tennessee, where it is transformed into massive mountain groups. In elevation the Blue Ridge of Virginia varies from 1460 ft. at Harper's Ferry, where the Potomac river breaks through it in a splendid water-gap, to 5719 ft. in Mt. Rogers, Grayson county. About 2500 sq. m. of the state are comprised in this province. W. of the Blue Ridge is the Newer Appalachian or Great Valley Province, characterized by parallel ridges and valleys developed by erosion on folded beds of sandstone, limestone and shales, and comprising an area of about 10,400 sq. m. in Virginia. The belts of non-resistant rock have been worn away, leaving longitudinal valleys separated by hard rock ridges. A portion of this province in which weak rocks predominate gives an unusually broad valley region, known as the Valley of Virginia, drained by the Shenandoah river, and the headwaters of the James, Roanoke, New, and Holston rivers, which dissect the broad valley floor into gently rolling low hills. At the N., near the mouth of the Shenandoah, the valley is about 250 ft. above sea-level, but rises south-westward to an elevation of more than 1600 ft. at the S. boundary of the state.

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[1] The mechanism is described under Pianoforte and Spinet.

The rivers of the state flow in general from N.W. to S.E., across the Blue Ridge, the Piedmont and the Coastal Plain, following courses which were established before erosion had produced much of the present topography. But in the Newer Appalachians the streams more often follow the trend of the structure until they empty into one of the larger, transverse streams. Thus the Shenandoah flows N.E. to the Potomac, the Holston S.W. toward the Tennessee. A part of this same province, in the S.W. part of the state, is drained by the New river, which flows N.W. across the ridges to the Kanawha and Ohio rivers in the Appalachian Plateau. In the limestone regions caverns and natural bridges occur, among which Luray Cavern and the Natural Bridge are well known. The drowned lower courses of the S.E. flowing streams are navigable, and afford many excellent harbours. Chesapeake Bay covers much land that might otherwise be agriculturally valuable, but repays this loss, in part at least, by its excellent fisheries, including those for oysters. In the S.E., where the low, flat Coastal Plain is poorly drained, is the Great Dismal Swamp, a fresh-water marsh covering 700 sq. m., in the midst of which is Lake Drummond, 2 m. or more in diameter. Along the shores of Chesapeake Bay and the Atlantic Ocean are low, sandy beaches, often enclosing lagoons or salt marshes.

Fauna.—Till about the middle of the 18th century the bison and the elk roamed the W. part of the state. The Virginia deer is common in the bottomlands; a few beaver still frequent the remoter streams; in the higher portions are still a few black bears and pumas, besides the lynx, the Virginia varying hare, the woodchuck, the red and the fox squirrel and flying squirrels. The grey squirrel is plentiful in wooded districts. On the Coastal Plain are the musk-rat, the eastern cotton-tail, chipmunk, grey fox, common mole and Virginia opossum. In colonial times the Atlantic right-whale was killed in some numbers off the coast.

Many species of water and shore birds migrate along the coast, where also others breed, as the royal, common and least terns and black skimmer; practically all the ducks are migrant species, though the wood-duck breeds. Swan, geese and brant winter on the coast. The yellow-crowned night-heron and the little blue heron nest rarely. The turkey-buzzard and the barn-owl are resident. Red-headed and red-bellied woodpeckers, orchard orioles, yellow-winged sparrows, the cardinal, the blue grosbeak, the Carolina wren and the mocking-bird are characteristic of the lower elevations. The ruffed grouse and wild turkey are found in the wooded mountainous districts, while the quail (here called "partridge") is a game bird of the open stubble fields.

Of reptiles, the rattlesnake and copperhead are the only poisonous species, but numerous harmless varieties are common. In the salt marshes of the coast occurs the diamond-backed terrapin. Trout abound in the mountain streams, and black bass in the rivers of the interior. The cat-fish grows to a large size in the sluggish streams. On the coast, the striped bass, sea-bass, drum, sheepshead, [illegible] bluefish and Spanish mackerel are important as food [illegible] are valuable oyster fisheries in Chesapeake Bay.

[illegible] Coastal Plain of Virginia is covered with pine forests which merge westward with the hard woods of the Piedmont Bel where oaks formerly prevailed, but where a second growth of pi now constitutes part of the forest. Even on the Coastal Pla the Jersey and oldfield pines of to-day replace more valuable spec of the original growth. The Blue Ridge and Newer Appalachi regions are covered with pine, hemlock, white oak, cherry a yellow poplar; while that portion of these provinces lying in t S.W. part of the state still contains valuable forests of hickory a walnut, besides oak and cherry. On the Coastal Plain the cypre grows in the Dismal Swamp, river birch along the streams, a sweet gum and black gum in swampy woods. Other characteris plants of the Coastal Plain are the cranberry, wild rice, wild ya wax myrtle, wistaria, trumpet flower, passion flower, holly and wh alder. Many of these species spread into the Piedmont Be Rhododendron, mountain laurel and azaleas are common in t mountains. The blackberry, black raspberry, huckleberry, bl berry, wild ginger and ginseng are widely distributed.

Climate.—The climate of Virginia is generally free from extrem of heat and cold. In the Coastal Plain region the temperature quite stable from day to day, as a result of the equalizing effect the numerous bays which indent this province. The mean win temperature is 39·8°, the mean summer temperature 77·2°, with mean annual of 58·6° Killing frosts do not occur before t middle of October, nor later than the last part of April. In t Piedmont Province temperature conditions are naturally less stab owing to the distance from the sea and to the greater inequali of surface topography. In autumn and winter sudden temperat changes are experienced, though not frequently. The mean win temperature of this province is 35·8°; mean summer temperatu 75°; mean annual, 55·9°. Killing frosts may occur as early the first of October and as late as the last of May. The great variability in temperature conditions in the state occurs in the Bl Ridge, Newer Appalachian Provinces, where the most rugged a variable topography is likewise found. The mean winter temperat for this section is 33·8°; mean summer temperature, 71·3°; me annual, 53·2°.

Soil.—Marshy soils are found along the lowest portions of t Coastal Plain, and are exceedingly productive wherever reclai by draining, as in portions of the Dismal Swamp. Other portio of the Coastal Plain afford more valuable soils, sandy loams ov lying sandy clays. On the higher elevations the soil is light a sandy, and such areas remain relatively unproductive. T crystalline rocks of the Piedmont area are covered with resid soils of variable composition and moderate fertility. Passing t high and rugged Blue Ridge, which is infertile except in the int vening valleys of its S.W. expansion, we reach the Newer App achians, where fertile limestone soils cover the valley floors. T Valley of Virginia is the most productive part of the state.

Forests.—The woodland area of Virginia was estimated in 19 at 23,400 sq. m., or 58% of the area of the state. The timber ar originally comprised three divisions: the mountain regions growi pine and hard woods and hemlock; the Piedmont region produci chiefly oaks with some pine; and the lands below the "Fall Lin which were forested with yellow pine. Most of the pine of t mountain region has been cut, and the yellow pine and hard woo have also largely disappeared. The production of timber h however, steadily increased. In 1900 the value of the product w $12,137,177, representing chiefly yellow pine.

Fisheries.—Oysters are by far the most valuable of the fisheri products, but, of the 400,000 acres of waters within the sta suitable for oyster culture, in 1909 only about one-third was us for that purpose. Next in importance were the catches of me haden, shad, clams, squeteague and alewives; while minor catch were made of crabs, croaker, bluefish, butterfish, catfish, perch a spotted and striped bass.

Agriculture.—Tobacco was an important crop in the earl history of the colony, and Virginia continued to be the leadi tobacco-producing state of the Union (reporting in 1850 28·4% the total crop) until after the Civil War, which, with the divisi of the state, caused it to fall into second place, Kentucky taki the lead; and in 1900 the crop of North Carolina also was larg The state's production of tobacco in 1909 was 120,125,000 valued at $10,210,625.

The production of Indian corn in 1909 was 47,328,000 bu valued at $35,023,000; of wheat, 8,848,000 bus., valued $10,175,000; of oats, 3,800,000 bus., valued at $2,052,000; rye, 184,000 bus., valued at $155,000; of buckwheat, 378,000 bu valued at $287,000; the hay crop was valued at $8,060,0 (606,000 tons). The amount of the cotton crop in 1909 w 10,000 500-lb bales.

The value of horses in 1910 was $34,561,000 (323,000 head) of mules, $7,020,000 (54,000 head); of neat cattle, $20,034,0 (875,000 head); of swine, $5,031,000 (774,000 head); of shee $2,036,000 (522,000 head).

Minerals.—The value of all mineral products in 1908 wa $13,127,395. By far the most valuable single product was bit minous coal ($3,868,524; 4,259,042 tons). The existence of th mineral in the vicinity of Richmond was known as early as 1770 and the mining of it there began in 1775, but it was practicall

discontinued about the middle of the 19th century. The most important coalfields of the state lie in the Appalachian regions in the S.W. part of the state, though there are also rich deposits in the counties of Henrico, Chesterfield and Goochland, and in parts of Powhatan and Amelia counties. In the S.E. portion of the Kanawha basin, including Tazewell, Russell, Scott, Buchanan, Wise and Lee counties, occur rich deposits of coal, which are of great value because of their proximity to vast deposits of iron ores. In Tazewell county is the famous Pocahontas bed, which produces one of the most valuable grades of coking and steam coal to be found in the United States. There are remarkably rich deposits of iron ore in the Alleghanies, and the W. foothills of the Blue Ridge, from which most of the iron ore of the state is procured, are lined with brown hematite. Iron-mining—perhaps the first in the New World—was begun in Virginia in 1608, when the Virginia Company shipped a quantity of ore to England; and in 1619 the Company established on Falling Creek, a tributary of the James river, a colony of about 150 iron-workers from Warwickshire, Staffordshire and Sussex, who had established there several ore-reducing plants under the general management of John Berkeley of Gloucester, England, when on the 22nd of March 1622 the entire colony, excepting a girl and a boy, were massacred by the Indians. The first blast-furnace in the colony seems to have been owned by Governor Spotswood, and was built and operated at the head of the Rappahannock river about 1715 by a colony of German Protestants. Immediately after the War of Independence Virginia became an important iron-producing state. The industry waned rapidly toward the middle of the 19th century, but was renewed upon the discovery of the high-grade ores in the S.W. part of the state and the development of railway facilities. The product of iron ore in 1908 was 692,223 long tons, valued at $1,465,691. The product of pig-iron in 1908 was 320,458 long tons, valued at $4,578,000

Manganese ore-mining began in Virginia in 1857 in the Shenandoah Valley, and the product increased from about 100 tons in that year to about 5000 tons (mined near Warminster, Nelson county) in 1868 and 1869. Thereafter Virginia and Georgia supplied most of this mineral produced in the United States, and the greater part of it has been shipped to England. Between 1885 and 1891 the average annual production was about 15,000 tons, the greatest output—20,567 tons—being mined in 1886. After 1891 the product declined rapidly, amounting in 1907 to 800 tons valued at $4800.

In the production of pyrite, which is found in Louisa county and is used for the manufacture of sulphuric acid employed in the treatment of wood pulp for paper-making and in the manufacture of superphosphates from phosphate rock, Virginia took first rank in 1902 with an output valued at $501,642, or 64·7% of the total yield of this mineral in the United States; and this rank was maintained in 1908, when the product was 116,340 long tons, valued at $435,522. Limestone is found in the region west of the Blue Ridge, and has been quarried extensively, the product, used chiefly for flux, being valued in 1908 at $645,385.

Virginia was by far the most important state in 1908 in the production of soapstone, nearly the whole product being taken from a long narrow belt running north-east from Nelson county into Albemarle county; more than 90% of the output was sawed into slabs for laundry and laboratory appliances. The product of talc and soapstone in 1908 was 19,616 short tons, valued at $458,252.

The value of mineral waters produced in 1908 was $207,115. The state has many mineral springs occurring in connexion with faults in the Appalachian chain of mountains; in 1908, 46 were reported, making the state third among the states of the United States in number of springs, and of these several have been in high medical repute. At 18 of these resorts are situated, some of which have at times had considerable social vogue. White Sulphur Springs, in Greenbrier county, impregnated with sulphur, with therapeutic application in jaundice, dyspepsia, &c.; Alleghany Springs, in Montgomery county, calcareous and earthy, purgative and diuretic; Rawley Springs in Rockingham county, Sweet Chalybeate Springs in Alleghany county, and Rockbridge Alum Springs in Rockbridge county, classed as iron springs and reputed of value as tonics, and the thermal springs, Healing Springs (88° F.) and Hot Springs (110 F.), both in Bath county are noted medicinal springs.

The value of metals produced in 1908 was as follows: gold (which is found in a belt that extends from the Potomac river to Halifax county and varies from 15 to 25 in. in width), $3600 (174 fine oz. troy); copper, $3312 (25,087 lb); and lead, $1092 (13 short tons). Minerals produced in small quantities include gypsum, millstones, salt and sandstone, and among those found but not produced (in 1902) in commercial quantities may be mentioned allanite, alum, arsenic, bismuth, carbonite, felspar, kaolin, marble, plumbago, quartz, serpentine and tin. Asbestos was formerly mined in the western and south-western parts of the state. Barytes is mined near Lynchburg; the value of the output in 1907 was $32,833, since which date the output has decreased.

Manufactures.—Virginia's manufacturing establishments increased very rapidly in number and in the value of their products during the last two decades of the 19th century. The number of all establishments increased from 5710 in 1880 to 8248 in 1900; the capital invested from $26,968,990 to $103,670,988, the average number of wage-earners from 40,184 to 72,702, the total wages from $7,425,261 to $22,445,720, and the value of products from $51,770,992 to $132,172,910. The number of factories[1] increased from 3186 in 1900 to 3187 in 1905, the capital invested from $92,299,589 to $147,989,182, the average number of wage-earners from 66,223 to 80,285, the total wages from $20,269,026 to $27,943,058, and the value of products from $108,644,150 to $148,856,525. The manufacture of all forms of tobacco is the most important industry; the value of its products in 1905 was $16,768,204. Since 1880 there has been a rapid development in textile manufacture, for which the water power of the Piedmont region is used. A peculiar industry is the grading, roasting, cleaning and shelling of peanuts.

Transportation and Commerce.—Four large railway systems practically originate in the state and radiate to the S. and W.: the Southern railway, with its main line traversing the state in the direction of its greatest length leaving Washington to run south-west through Alexandria, Charlottesville, Lynchburg and Danville to the North Carolina line, with connexions to Richmond and a line to Norfolk on the east; the Atlantic Coast line with its main lines running S. from Richmond and Norfolk; the Seaboard Air line, having its main lines also running to the S. from Richmond and Norfolk; the Norfolk & Western crossing the state from east to west in the southern part with Norfolk its eastern terminus, passing through Lynchburg and leaving the state at the south-western corner at Bristol, and the Chesapeake & Ohio crossing the state from east to west farther north than the Norfolk & Western from Newport News on the coast through Richmond to the West Virginia line. Of more recent construction is the Virginian railway, a project of H. H. Rogers, opened for traffic in 1909, which connects the coal region of West Virginia with Norfolk, crossing the southern part of the state from E. to W., and is designed chiefly for heavy freight traffic. The N. W. part of the state is entered by the Baltimore & Ohio, which has a line down the Shenandoah Valley to Lexington. Connexion between Richmond and Washington is by a union line (Richmond, Fredericksburg & Potomac and Washington Southern railways) operated jointly by the Southern, Atlantic Coast line, Seaboard Air line, Chesapeake & Ohio, Pennsylvania, and Baltimore & Ohio railways. In 1850 there were 384 m. of railway in Virginia; in 1880, 1839 m., and in 1890 it had nearly doubled, having increased to 3,359·54 m., a gain coincident with the newly awakened industrial activity of the Southern States and an era of railway building throughout this section. The railway mileage in 1900 was 3,789·58, and in January 1909 it was 4,348·53.

Hampton Roads at the mouth of the James river, which forms the harbour for the leading ports of the state, Norfolk and Newport News, affords one of the best anchorages of the Atlantic coast. It gives shelter not only to vessels plying to its adjoining ports but serves as a harbour of refuge for shipping bound up or down the Atlantic coast, and is frequently used for the assembling of naval fleets. There is a large foreign trade and a regular steamship service to Boston, Providence, New York, Philadelphia and Savannah from Norfolk, and there is a considerable traffic on Chesapeake Bay, the Rappahannock, York, James and Elizabeth rivers. Fredericksburg at the head of navigation on the Rappahannock and West Point on the York have traffic of commercial importance in lumber and timber, oysters and farm produce, cotton and tobacco especially being shipped in coastwise vessels from West Point. Petersburg and Richmond on the James are connected with regular steamship lines with Norfolk, Richmond's water trade being chiefly in coal, oil, logs and fertilizer. Steamboats plying on Chesapeake Bay connect Alexandria with Norfolk. From the Elizabeth river on which Norfolk is situated lead the Albemarle & Chesapeake Canal and the Dismal Swamp Canal, which connect with the waters of Albemarle Sound. Traffic through these canals consists chiefly of forest products, logs, lumber and shingles.

Population.—The population of Virginia in 1890 was 1,655,980; in 1900, 1,854,184; and in 1910, 2,061,612.[2] Of the total population in 1900, 1,173,787 were native whites, 19,461 were foreign-born, 660,722 (or 35·7% of the total population) were negroes, 354 were Indians, 243 were Chinese and 10 were Japanese. The state was fifth among the states and Territories in the number of negro inhabitants, but showed a marked decrease in the ratio of negroes to the total population in the decade from 1890 to 1900, the percentage of the total population in 1890 having been 38·4.

Of the inhabitants born in the United States 53,235 were natives of North Carolina, 12,504 were natives of Maryland, and 10,273 were natives of Pennsylvania. Of the foreign-born 4504 were

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[1] Statistics for 1890 represent the value of all manufactures; those for 1900 (from this point) and 1905 show values under the factory system, excluding neighbourhood industries and hand trades.

[2] According to previous censuses the population was as follows: (1790), 747,610; (1800), 880,200; (1810), 974,600; (1820), 1,065,366; (1830), 1,211,405; (1840), 1,239,797; (1850), 1,421,661; (1860), 1,596,318; (1870), 1,225,163; (1880), 1,512,565.

Germans, 3534 were natives of Ireland and 3425 of England. Of the total population 52,264 were of foreign parentage (*i.e.* either one or both parents were foreign-born) and 9769 were of German, 8235 of Irish and 4792 of English parentage, both on the father's and on the mother's side. Out of the total of 793,546 members of religious denominations in 1906, more than half, 415,987, were Baptists; the Methodists numbered 200,771; and there were 39,628 Presbyterians, 28,700 Roman Catholics, 28,487 Protestant Episcopalians, 26,248 Disciples of Christ, and 15,010 Lutherans. Virginia in 1900 had 46·2 inhabitants to the square mile. The principal cities of the state are: Richmond (the capital), Norfolk, Petersburg, Roanoke, Newport News, Lynchburg, Portsmouth and Danville.

Government.—Virginia has had six state constitutions: the first was adopted in 1776, the second in 1830, the third in 1851, the fourth in 1864, the fifth in 1869, and the sixth, the present, in 1902. Amendments to the present constitution may be proposed in either house of the General Assembly, and if they pass both houses of that and the succeeding General Assembly by a majority of the members elected to each house and are subsequently approved by a majority of the people who vote on the question at the next general election they become a part of the constitution. A majority of the members in each house of the General Assembly may at any time propose a convention to revise the constitution and, if at the next succeeding election a majority of the people voting on the question approve, the General Assembly must provide for the election of delegates. To be entitled to vote one must be a male citizen of the United States and twenty-one years of age; have been a resident of the state for two years, of the county, city, or town for one year, and of the election precinct for thirty days next preceding the election; have paid, at least six months before the election, all state poll taxes assessed against him for three years next preceding the election, unless he is a veteran of the Civil War; and have registered after the adoption of the constitution (1902). For registration prior to 1904 one of four additional qualifications was required: service in the army or navy of the United States, of the Confederate States, or of some state of the United States or of the Confederate States; direct descent from one who so served; ownership of property upon which state taxes amounting to at least one dollar were paid in the preceding year; or ability to read the constitution or at least to show an understanding of it. And to qualify for registration after 1904 one must have paid all state poll taxes assessed against him for the three years immediately preceding his application, unless he is a veteran of the Civil War; and unless physically unable he must "make application in his own handwriting, without aid, suggestion or memorandum, in the presence of the registration officers, stating therein his name, age, date and place of birth, residence and occupation at the time and for two years next preceding, whether he has previously voted, and, if so, the state, county and precinct in which he voted last"; and must answer questions relating to his qualifications.

Executive.—The governor, lieutenant-governor, attorney-general, secretary of the commonwealth, treasurer, superintendent of public instruction and commissioner of agriculture are elected for a term of four years, every fourth year from 1905, and each new administration begins on the 1st of February. The governor must be at least thirty years of age, a resident of the state for five years next preceding his election; and, if of foreign birth, a citizen of the United States for ten years. He appoints numerous officers with the concurrence of the Senate, has the usual power of vetoing legislative bills, and has authority to inspect the records of officers, or to employ accountants to do so, and to suspend, during a recess of the General Assembly, any executive officer at the seat of government except the lieutenant-governor; he must, however, report to the General Assembly at its next session the cause of any suspension and that body determines whether the suspended officer shall be restored or removed.

Legislature.—The General Assembly consists of a Senate and a House of Delegates. The Constitution provides that the number of [illegible] not be more than forty nor less than thirty-three, [illegible] delegates shall not be more than one hundred [illegible] and delegates are elected by single [illegible] apportioned once every ten years, [illegible] for a term of four years, [illegible] The only qualifications for senators and delegates are those required of an elector and residence in their districts; there are, however, a few disqualifications, such as holding certain offices in the state or a salaried Federal office. The General Assembly meets regularly at Richmond on the second Wednesday in January of each even-numbered year, and the governor must call an extra session on the application of two-thirds of the members of both houses, and may call one whenever he thinks the interests of the state require it. The length of a regular session is limited to sixty days unless three-fifths of the members of each house concur in extending it, and no extension may exceed thirty days. Senators and delegates are paid $500 each for each regular session and $250 for each extra session. Any bill may originate in either house, but a bill of special, private or local interest must be referred to a standing committee of five members appointed by the Senate and seven members appointed by the House of Delegates, before it is referred to the committee of the house in which it originated. The governor's veto power extends to items in appropriation bills, and to overcome his veto, whether of a whole bill or an item of an appropriation bill, a two-thirds vote in each house of the members present is required, and such two-thirds must include in each house a majority of the members elected to that house. Whenever the governor approves of the general purpose of a bill, but disapproves of some portion or portions, he may return the bill with his recommendations for amendment, and when it comes back to him, he may, whether his recommendations have been adopted or not, treat it as if it were before him for the first time.

Judiciary.—The administration of justice is vested principally in a supreme court of appeals, circuit courts, city courts and courts of a justice of the peace. The supreme court of appeals consists of five judges, but any three of them may hold a court. They are chosen for a term of twelve years by a joint vote of the Senate and the House of Delegates. The court sits at Richmond, Staunton and Wytheville. The concurrence of at least three judges is necessary to the decision of a case involving the constitutionality of a law. Whenever the docket of this court is crowded, or there is a case upon it in which it is improper for a majority of the judges to sit, the General Assembly may provide for a special court of appeals, to be composed of not more than five nor less than three judges of the circuit courts and city courts, in cities having a population of 10,000 or more. The state is divided into thirty judicial circuits and in each of these a circuit judge is chosen for a term of eight years by a joint vote of the Senate and the House of Delegates. The jurisdiction of the circuit courts was extended by the present Constitution to include that which, under the preceding Constitution, was vested in county courts, and the principal restriction is that they shall not have original jurisdiction in civil cases for the recovery of personal property amounting to less than $20. Similar to the circuit court is the corporation court in each city having a population of 10,000 or more; the judge of each of these corporation courts is chosen for a term of eight years by a joint vote of the Senate and the House of Delegates, and he may hold a circuit as well as a corporation court. Circuit courts and corporation courts appoint the commissioners in chancery. Three justices of the peace are elected in each magisterial district for a term of four years. There are also justices of the peace (elected) and police justices (appointed) in cities, and in various minor cases a justice's court has original jurisdiction, either exclusive or concurrent with the circuit and corporation courts. In each city having a population of 70,000 or more a special justice of the peace, known as a civil justice, is elected by a joint vote of the Senate and the House of Delegates for a term of four years.

Local Government.—Each county is divided into magisterial districts, varying in number from three to eleven. Each district elects a supervisor for a term of four years, and the district supervisors constitute a county board of supervisors, which represents the county as a corporation, manages the county property and county business, levies the county taxes, audits the accounts of the county, and recommends for appointment by the circuit court a county surveyor and a county superintendent of the poor. Each county also elects a treasurer, a sheriff, an attorney and one or more commissioners of the revenue, each for a term of four years, and a clerk, who is clerk of the circuit court, for a term of eight years. The coroner is appointed by the circuit court for a term of two years. Each magisterial district elects, besides a supervisor and justices of the peace, a constable and an overseer of the poor, each for a term of four years. The Constitution provides that all "communities" with a population less than 5000, incorporated after its adoption, shall be known as towns, and that those with a population of 5000 or more shall be known as cities. In each city incorporated after its adoption, the Constitution requires the election in each of a mayor, a treasurer and a sergeant, each for a term of four years, and the election or appointment of a commissioner of the revenue for an equal term; that in cities having a population of 10,000 or more the council shall be composed of two branches; that the mayor shall have a veto on all acts of the council and on items of appropriation, ordinances or resolutions, which can be overridden only by an affirmative vote of two-thirds of the members elected to each branch; and that no city shall incur a bonded indebtedness exceeding 18% of the assessed value of its real estate.

Miscellaneous Laws.—A married woman may manage her separate property as if she were single, except that she cannot by her sole act deprive her husband of his courtesy in her real estate. A widow is entitled to a dower in one-third of the real estate of which her husband was seized at any time during coverture If the husband dies intestate, leaving no descendants and no paternal or maternal kindred, the whole of his estate goes to his widow absolutely. If the husband dies intestate, leaving a widow and issue, either by her or by a former marriage, the widow is entitled to at least one-third of his personal estate; if he leaves no issue by her, she is entitled to so much of his personal estate as was acquired by him by virtue of his marriage with her prior to the 4th of April 1877; if he leaves no issue whatever, she is entitled to one-half of his personal estate. A widower is entitled by courtesy to a life interest in all his wife's real estate; if she dies intestate, he is entitled to all her personal estate; if she dies intestate, leaving no descendants and no paternal or maternal kindred, he is entitled to her whole estate absolutely. The causes for an absolute divorce are adultery; impotency; desertion for three years; a sentence to confinement in the penitentiary; a conviction of an infamous offence before marriage unknown to the other; or, if one of the parties is charged with an offence punishable with death or confinement in the penitentiary, and has been a fugitive from justice for two years; pregnancy of the wife before marriage unknown to the husband, or the wife's being a prostitute before marriage unknown to the husband. One party must be a resident of the state for one year preceding the commencement of a suit for a divorce. When a divorce is obtained because of adultery, permission of the guilty party to marry again is in the discretion of the court. Marriages between whites and negroes and bigamous marriages are void. The homestead of a householder or head of a family to the value of $2000 and property recorded is exempt from levy, seizure, garnishment or forced sale, except for purchase money, for services of a labouring person or mechanic, for liabilities incurred by a public officer, fiduciary or attorney for money collected, for taxes, for rent or for legal fees of a public officer. If the owner is a married man his homestead cannot be sold except by the joint deed of himself and his wife; neither can it be mortgaged without his wife's consent except for purchase money or for the erection or repair of buildings upon it. The exemption continues after his death so long as there is an unmarried widow or an unmarried minor child. The family library, family pictures, school books, a seat or pew in a house of worship, a lot in a burial ground, necessary wearing apparel, a limited amount of furniture and household utensils, some of a farmer's domestic animals and agricultural implements, and the wages of a labouring man who is a householder are exempt from levy or distress. A law enacted in 1908 forbids the employment of children under fourteen years of age in any factory, workshop, mercantile establishment, or mine within the state, except that orphans or other children dependent upon their own labour for support or upon whom invalid parents are dependent may be so employed after they are twelve years of age, and that a parent may work his or her own children in his or her own factory, workshop, mercantile establishment or mine.

Charitable and Penal Institutions.—Virginia has four hospitals for the insane: the Eastern State Hospital (1773), at Williamsburg; the South-Western State Hospital (1887), at Marion; the Western State Hospital (1828), with an epileptic colony, at Staunton; and the Central State Hospital (1870; for negroes), at Petersburg. For the care of the deaf and blind there is the Virginia School for Deaf and Blind (1839), at Staunton, and the Virginia School for Coloured Deaf and Blind Children (1908), at Newport News. The State Penitentiary is at Richmond. The Prison Association of Virginia with an Industrial School (1890) at Laurel Station, the Negro Reformatory Association of Virginia with a Manual Labour School (1897) at Broadneck Farm, Hanover, and the Virginia Home and Industrial School for white girls (1910) at Bon Air take care of juvenile offenders; these are all owned and controlled by self-perpetuating boards of trustees, but are supported by the state, receiving an allowance *per capita*. For each state hospital for the insane there is a special board of directors consisting of three members appointed by the governor with the concurrence of the Senate, one every two years, and over them all is the commissioner of state hospitals for the insane, who is appointed by the governor with the concurrence of the Senate for a term of four years. The members of the special boards under the chairmanship of the commissioner constitute a general board for all the hospitals, and the superintendent of each hospital is appointed by the general board. Each school for the deaf and blind is managed by a board of visitors appointed by the governor with the concurrence of the Senate. About five-sixths of the convicts are negroes. Some of them are employed on a state farm at Lassiter, Goochland county, on which there is a tuberculosis hospital, and some of them on the public roads; in 1909 there were 350 men at the state farm, 14 road camps with about 630 men, and 1273 men and 96 women in the penitentiary at Richmond. When a prisoner has served one-half of his term and his conduct has been good for two years (if he has been confined for that period) the board of directors may parole him for the remainder of his term, provided there is satisfactory assurance that he will not be dependent on public charity. The Prison Association of Virginia, the Negro Reformatory Association of Virginia and the Virginia Home and Industrial School for girls are each under a board of trustees appointed by the General Assembly, and each is authorized to establish houses of correction, reformatories and industrial schools. A general supervision of all state, county, municipal and private charities and corrections is vested by a law enacted in 1908 in a board of charities and corrections consisting of five members appointed by the governor with the concurrence of the Senate.

Education.—The public free school system is administered by a state board of education, a superintendent of public instruction, division superintendents, and district and county school boards. The state board of education consists of the governor; the attorney-general; the superintendent of public instruction, who is *ex officio* its president; three experienced educators chosen quadrennially by the Senate from members of the faculties of the University of Virginia, the Virginia Military Institute, the Virginia Polytechnic Institute, the State Female Normal School at Farmville, the School for the Deaf and Blind, and the College of William and Mary; and two division superintendents, one from a county and one from a city, chosen biennially by the other members of the board. This board prescribes the duties of the superintendent of public instruction and decides appeals from his decisions; keeps the state divided into school divisions, comprising not less than one county or city each; appoints quadrennially, with the concurrence of the Senate, one superintendent for each school division and prescribes his powers and duties; selects textbooks; provides for examination of teachers; and appoints school inspectors. In each county an electoral board, consisting of the attorney for the Commonwealth, the division superintendent and one member appointed by the judge of the circuit court, appoints a board of three school trustees for each district, one each year. The division superintendent and the school trustees of the several districts constitute a county school board. The elementary schools are maintained from the proceeds of the state school funds, consisting of interest on the literary fund, a portion of the state poll tax, a property tax not less than one mill nor more than five mills on the dollar, and special appropriations; county funds, consisting principally of a property tax; and district funds, consisting principally of a property tax and a dog tax. A law enacted in 1908 encourages the establishment of departments of agriculture, domestic economy and manual training in at least one high school in each congressional district. A law enacted in 1910 provides a fund for special aid from the state to rural graded schools with at least two rooms. With state aid normal training departments are maintained in several of the high schools in counties which adopt the provisions of the statute. All children between the ages of eight and twelve years are required to attend a public school at least twelve weeks in a year (six weeks consecutively) unless excused on account of weakness of mind or body, unless the child can read and write and is attending a private school, or unless the child lives more than two miles from the nearest school and more than one mile from an established public school wagon route. The State Female Normal School, at Farmville, is governed by a board consisting of the state superintendent and thirteen trustees appointed by the governor with the concurrence of the Senate for a term of four years. The Virginia Normal and Industrial Institute, at Petersburg, is governed by a board of visitors consisting of the superintendent of public instruction and four other members appointed by the governor with the concurrence of the Senate for four years. In 1908 the General Assembly made an appropriation for establishing two state normal and industrial schools for women, one at Harrisonburg and the other at Fredericksburg, both under a board of trustees consisting of the superintendent of public instruction and ten other members appointed by the governor with the concurrence of the Senate. The Virginia Agricultural and Mechanical College and Polytechnic Institute, at Blacksburg, is governed by a board consisting of the state superintendent and eight visitors appointed by the governor with the concurrence of the Senate. The Virginia Military Institute, at Lexington, is governed by a board of visitors consisting of the adjutant general, the superintendent of public instruction and nine other members appointed by the governor with the concurrence of the Senate. The University of Virginia (*q.v.*), at Charlottesville, was founded in 1817 and opened in 1825. The College of William and Mary (1693), at Williamsburg, became a state institution in 1906 and is likewise governed under a board appointed by the governor. Other institutions of higher learning which are not under state control are: Washington and Lee University (non-sectarian, 1749), at Lexington; Hampden-Sidney College (Presbyterian, 1776), at Hampden-Sidney; Richmond College (Baptist, 1832), at Richmond; Randolph-Macon College (Methodist Episcopal, 1832), at Ashland; Emory and Henry College (Methodist Episcopal, 1838), at Emory; Roanoke College (Lutheran, 1853), at Salem; Bridgewater College (German Baptist, 1879), at Bridgewater; Fredericksburg College (Presbyterian, 1893), at Fredericksburg; Virginia Union University (Baptist, 1899), at Richmond; and Virginia Christian College (Christian, 1903), at Lynchburg.

Finance.—Revenue for state, county and municipal purposes is derived principally from taxes on real estate, tangible personal property, incomes in excess of $1000, wills and administrations, deeds, seals, lawsuits, banks, trust and security companies, insurance companies, express companies, railway and canal corporations, sleeping-car, parlour-car and dining-car companies, telegraph and telephone companies, franchise taxes, poll taxes, an inheritance tax and taxes on various business and professional licences. The tax laws require that property shall be assessed at its full value by commissioners of the revenue elected by counties and cities. The revenue is collected by county and city treasurers, clerks of courts, and the state corporation commission, consisting of three members appointed by the governor with the concurrence of the General Assembly in joint session. The total receipts in the fiscal year 1908–1909 amounted to $5,536,510 and the total disbursements to $5,796,980. By the 1st of January 1861 Virginia had incurred a debt amounting to nearly $39,000,000, principally in aid of internal improvements. She was unable to pay the interest on this during the Civil War, and in March 1871 the principal together with the overdue interest amounted to about $47,000,000. The General Assembly passed an act at that time for refunding two-thirds of it, claiming that the other third should be paid by West Virginia. But the advocates of a "forcible readjustment" of the debt carried the election in 1879 with the aid of the negro vote, and after prolonged negotiations in 1892 a settlement was effected under which a debt amounting to about $28,000,000 was again refunded. In 1908 this had been reduced to about $24,000,000. The sinking fund consists of damages recovered against defaulting revenue collectors, railway stock and appropriations from time to time by the legislature.

History.—Virginia was the first permanent English settlement in North America. From 1583 to 1588 attempts had been made by Sir Walter Raleigh and others to establish colonies on the coast of what is now North Carolina. The only result was the naming of the country Virginia in honour of Queen Elizabeth. But glowing accounts were brought back by the early adventurers, and in 1606 an expedition was sent out by the London Company, which was chartered with rights of trade and settlement between 34° and 41° N. lat. It landed, at a place which was called Jamestown, on the 13th of May 1607, and resulted in the establishment of many plantations along the James river. The purpose of the company was to build up a profitable commercial and agricultural community; but the hostility of the natives, unfavourable climatic conditions and the character of the colonists delayed the growth of the new community. John Smith became the head of the government in September 1608, compelled the colonists to submit to law and order, built a church and prepared for more extensive agricultural and fishing operations. In 1609 the London Company was reorganized, other colonists were sent out and the boundaries of the new country were fixed, according to which Virginia was to extend from a point 200 m. south of Old Point Comfort, at the mouth of Chesapeake Bay, to another point 200 m. north, "west and northwest to the South Sea."

The government of the country was in the hands of the London Company, which in turn committed administrative and local affairs to a governor and council who were to reside in the colony. Before the arrival of the "government" and their shiploads of settlers the original colony was reduced to the direst straits. Captain Christopher Newport (d. 1618), Sir Thomas Gates and Sir George Somers, the new authorities, reached Jamestown at last with 150 men, but finding things in such a deplorable state all agreed (June 10, 1610) to give up the effort to found a colony on the James and set sail for Newfoundland. At the mouth of the river they met Lord Delaware, however, who brought other colonists and plentiful supplies; and they returned, set up a trading post at what is now Hampton and undertook to bring the hostile natives to subjection. In 1611, 650 additional colonists landed, the James and Appomattox rivers were explored and "plantations" were established at Henrico and New Bermuda. In 1617 Virginia fell into the hands of a rigid Puritan, Captain Samuel Argall. The colonists were compelled on pain of death to accept the doctrine of the trinity, respect the authority of the Bible and attend church. This rigid régime was superseded in 1619 by a milder system under Sir George Yeardley (d. 1627). Twelve hundred new colonists arrived in 1619. At the same time negro slaves and many "indentured" servants were imported as labourers.

At the beginning Virginia colonists had held their land and improvements in common. But in 1616 the land was parcelled out and the settlers were scattered along the shores of the James and Appomattox rivers many miles inland. Twenty thousand pounds of tobacco were exported in 1619. The community had now become self-supporting, and the year that witnessed these changes witnessed also the first representative assembly in North America, the Virginia House of Burgesses, a meeting of planters sent from the plantations to assist the governor in reforming and remaking the laws of the colony. In 1621 a constitution was granted whereby the London Company appointed the governor and a council, and the people were to choose annually from their counties, towns, hundreds and plantations delegates to the House of Burgesses. The popular assembly, like the English House of Commons, granted supplies and originated laws, and the governor and Council enjoyed the right of revision and veto as did the king and the House of Lords at home. The Council sat also as a supreme court to review the county courts. This system remained unchanged until the revolution of 1776. But in 1624 the king took the place and exercised the authority of the London Company.

Before 1622 there was a population of more than 4000 in Virginia, and the many tribes of Indians who were still the proprietors of the soil over a greater portion of the country naturally became jealous, and on the 22nd of March of that year fell upon the whites and slew 350 persons. Sickness and famine once again visited the colony, and the population was reduced by nearly one-half. These losses were repaired, however; the tobacco industry grew in importance, and the settlers built their cabins far in the interior of lowland Virginia. This rapid growth was scarcely retarded by a second Indian attack, in April 1641, which resulted in the death of about 350 settlers. By 1648 the population had increased to 15,000.

Virginia was neither cavalier nor roundhead, but both. Sir William Berkeley had been the governor since 1641, and though he was loyal enough to the crown, it was without difficulty that his authority was overthrown in March 1652 and that of Cromwell proclaimed in its stead. Richard Bennett, a Puritan from Maryland, now ruled the province. Bennett and his Puritan successors, Edward Digges and Samuel Mathews, made no serious change in the administration of the colony except to extend greatly the elective franchise. But this policy was reversed in 1660, when Berkeley was restored to power. The return of Berkeley was the beginning of a reaction which concentrated authority, both in the House of Burgesses and in the Council, in the hands of the older families, and thus created a privileged class. The governor, supported by the great families, retained the same House of Burgesses for sixteen years lest a new one might not be submissive. The increasing mass of the population dwelt along the western border or on the less fertile ridges which make up the major part of the land even in tide-water Virginia. These poorer people—who were not, however, "poor whites"—developed an abiding hostility towards the oligarchy. They desired a freer land-grant system, protection against the inroads of the Indians along the border, and frequent sessions of an assembly to be chosen by all the freeholders. But a new code of laws outlawed many of these people as dissenters, and in 1676 a burdensome tax was laid by the unrepresentative assembly. The Indians had again attacked the border farmers, and the governor had refused assistance, being willing, it was generally believed, that the border population should suffer while he and his adherents enjoyed a lucrative fur trade with the Indians. Under these circumstances, Nathaniel Bacon (1647–1676), whose grandfather was a cousin of Francis Bacon, took up the cause of the borderers and severely punished the Indians at the battle of Bloody Run. But Berkeley meanwhile had outlawed Bacon, whose forces now marched on the capital demanding recognition as the authorized army of defence. This was refused, and civil war began, in which the governor was defeated and Jamestown was burned. But Bacon fell a victim to malaria and died in October in Gloucester county. Berkeley closed the conflict with wholesale executions and confiscations. Censured by the king, he sailed to England to make his defence, but died in London in 1677 without having seen Charles. Virginia remained in the hands of the reactionary party and was governed by men whose primary purpose was to "make their fortunes" at the expense of the colonials. Even the accession of William and Mary scarcely affected the fortunes of the "fifth kingdom," though Middle Plantation, a hamlet not far from Jamestown, became Williamsburg and the capital of the province in 1691, and the clergy received a head, though not a bishop, in the person of James Blair (1656–1743), an able Scottish churchman, who as commissary of the bishop of London became a counterpoise to the arbitrary governors, and who as founder and head of the College of William and Mary (established at Williamsburg in 1693) did valiant service for Virginia. Under the stimulus of Blair's activity religion and education prospered as never before. The powers and duties of the vestry were defined, the position of the parish priest was fixed and his salary was regularly provided for at the public expense, and pedagogues were brought over from Scotland.

By 1700 the population of Virginia had reached 70,000, of whom 20,000 were negro slaves. The great majority of whites were small farmers whose condition was anything but desirable and who constantly encroached upon the Indian lands in the Rappahannock region or penetrated the forests south of the James, several thousand having reached North Carolina. Between 1707 and 1740 many Scottish immigrants, traders, teachers and tobacco-growers settled along the upper Rappahannock, and, uniting with the borderers in general, they offered strong resistance to the older planters on the James and the York.

Tobacco-growing was the one vocation of Virginia, and many of the planters were able to spend their winters in London or Glasgow and to send their sons and daughters to the finishing schools of the mother country. Negro slavery grew so rapidly during the first half of the eighteenth century that the blacks outnumbered the whites in 1740. The master of slaves set the fashion. Handsome houses were built along the banks of the sluggish rivers, and numerous slaves were employed. There was as great a social distance between the planters and their families on the one side and the masses of people in Virginia on the other as that which separated the nobles from the yeomanry in Europe; and there was still another chasm between the small farmers and the negroes.

In 1716 an expedition of Governor Alexander Spotswood over the mountains advertised to the world the rich back-country, now known as the Valley of Virginia; a migration thither from Pennsylvania and from Europe followed which revolutionized the province. The majority of blacks over whites soon gave way before the influx of white immigrants, and in 1756 there was a population of 292,000, of whom only 120,000 were negroes, and the small farmer class had grown so rapidly that the old tide-water aristocracy was in danger of being overwhelmed. The "West" had now appeared in American history. This first West, made up of the older small farmers, of the Scottish settlers, of the Germans from the Palatinate and the Scottish-Irish, far outnumbering the people of the old counties, demanded the creation of new counties and proportionate representation in the Burgesses. They did not at first succeed, but when the Seven Years' War came on they proved their worth by fighting the battles of the community against the Indians and the French. When the war was over the prestige of the up-country had been greatly enhanced, and its people soon found eastern leaders in the persons of Richard Henry Lee and Patrick Henry. In 1763–1765 an investigation of the finances of the colony, forced by the up-country party, showed widespread corruption, and resulted in the collapse of the tide-water oligarchy, which had been in power since 1660. In the meantime the Presbyterians, who had been officially recognized in Virginia under the Toleration Act in 1699, and had been guaranteed religious autonomy in the Valley by Governor Gooch in 1738, had sent missionaries into the border counties of eastern Virginia. The Baptists about the same time entered the colony both from the north and the south and established scores of churches. The new denominations vigorously attacked the methods and immunities of the established church, whose clergy had grown lukewarm in zeal and lax in morals. When the clergy, refusing to acknowledge the authority of the Burgesses in reducing their stipends, and, appealing to the king against the Assembly, entered the courts to recover damages from the vestries, Patrick Henry at Hanover court in 1763 easily convinced the jury and the people that the old church was well-nigh worthless. From this time the old order was doomed, for the up-country, the dissenters and the reformers had combined against it. But the passage of the Stamp Act hastened the catastrophe and gave the leaders of the new combination, notably Henry, an opportunity to humiliate the British ministry, whom not even the tide-water party could defend. The repeal of the Stamp Act, followed as it was by the Townshend scheme of indirect taxation, displeased Virginia quite as much as had the former more direct system of taxation. When the Burgesses undertook in May 1769 to declare in vigorous resolutions that the right and power of taxation, direct and indirect, rested with the local assembly, the governor hastily dissolved them, but only to find the same men assembling in the Raleigh tavern in Williamsburg and issuing forth their resolutions in defiance of executive authority. Patrick Henry and Richard Henry Lee, with Thomas Jefferson, a new up-country leader of great ability, were the leaders.

In 1774 Lord Dunmore, the governor, led an army to the Ohio river to break an Indian coalition which had been formed to check the rapid expansion of Virginia over what is now Kentucky and West Virginia. The up-country again furnished the troops and did the fighting at Point Pleasant (*q.v.*), where on the 10th of October the power of the Indians was completely broken. But the struggle with England had reached a crisis, and Virginia supported with zeal the revolutionary movement and took the lead in the Continental Congresses which directed the succeeding war (see UNITED STATES). In 1775 Patrick Henry organized a regiment of militia and compelled the governor to seek safety on board an English man-of-war in Chesapeake Bay. The war now assumed continental proportions, and the Virginia leaders decided in May 1776 that a declaration of independence was necessary to secure foreign assistance. When the Continental Congress issued the famous Declaration Virginia had already assembled in convention to draft a new Constitution. Although Henry, Lee and Jefferson exercised great power, they were unable to secure a Constitution which embodied the demands of their party: universal suffrage, proportional representation and religious freedom. A draft for such a Constitution was submitted by Jefferson, but the Conservatives rejected it. The system which was adopted allowed the older counties, which must be conciliated, a large majority of the representatives in the new Assembly, on the theory that the preponderance of property (slavery) in that section required this as security against the rising democracy. In place of the former governor, there was to be an executive chosen annually by the Assembly; the old Council was to be followed by a similar body elected by the Assembly; and the judges were likewise to be the creatures of the legislature. The Assembly was divided into two bodies, a Senate and a House of Delegates. The legislature would be all-powerful, and yet representation was so distributed that about one-third of the voters living in the tide-water region would return nearly two-thirds of the members of the legislature. The franchise, though not universal, was generously bestowed; it was a very liberal freehold system.

The recruiting ground for the American army in Virginia was the up-country among the Scottish-Irish and the Germans who had long fought the older section of the colony. In 1779 Norfolk was again attacked, and great damage was also done to the neighbouring towns. In January 1781 Benedict Arnold captured Richmond and compelled governor and legislature to flee beyond the Blue Ridge mountains, where one session of the Assembly was held. The last campaign of the war closed at Yorktown on the 19th of October 1781.

Virginia leaders, including Henry, were the first to urge the formation of a national government with adequate powers to supersede the lame confederacy. In 1787, under the presidency of Washington, the National Convention sat in Philadelphia, with the result that the present Federal Constitution was submitted to the states for ratification during 1787-1789. In Virginia the tide-water leaders urged adoption, while the up-country men, following Henry, opposed; but after a long and a bitter struggle, in the summer of 1788 the new instrument was accepted, the low-country winning by a majority of ten votes, partly through the influence of James Madison. Thus the eastern men, who had reluctantly supported the War of Independence, now became the sponsors for the national government, and Washington was compelled to rely on the party of slavery, not only in Virginia but in the whole South, in order to administer the affairs of the nation.

In 1784, Virginia, after some hesitation, ceded to the Federal government the north-west territory, which it held under the charter of 1609; in 1792 another large strip of the territory of Virginia became an independent state under the name of Kentucky. But the people of these cessions, especially of Kentucky, were closely allied to the great up-country party of Virginia, and altogether they formed the basis of the Jeffersonian democracy, which from 1794 opposed the chief measures of the Washington administration, and which on the passage of the Alien and Sedition laws in 1798 precipitated the first great constitutional crisis in Federal politics by the adoption in the Kentucky and Virginia legislatures of the resolutions, known by the names of those states, strongly asserting the right and duty of the states to arrest the course of the national government whenever in their opinions that course had become unconstitutional. Jefferson was the author of the Kentucky resolutions, and his friend Madison prepared those passed by the Virginia Assembly. But these leaders restrained their followers sharply whenever the suggestion of secession was made, and the question of what was meant by arresting the course of Federal legislation was left in doubt. The election of 1800 rendered unnecessary all further agitation by putting Jefferson in the President's chair. The up-country party in Virginia, with their allies along the frontiers of the other states, was now in power, and the radical of 1776 shaped the policy of the nation during the next twenty-five years. Virginia held the position of leadership in Congress, controlled the cabinet and supplied many justices of the Supreme Court.

Virginia played a leading rôle in the War of 1812, and up to 1835 her influence in the new Western and North-Western states was overwhelming. But the steady growth of slavery in the East and of a virile democracy in the West neutralized this influence and compelled the assembling of the constitutional convention of 1829, whose purpose was to revise the fundamental law in such a way as to give the more populous counties of the West their legitimate weight in the legislature. The result was failure, for the democracy of small farmers which would have taxed slavery out of existence was denied proportionate representation. The slave insurrection under Nat Turner (*q.v.*) in 1831 led to a second abortive effort, this time by the legislature, to do away with the fateful institution. The failure of these popular movements led to a sharp reaction in Virginia, as in the whole South, in favour of slavery. From 1835 to 1861 many leading Virginians defended slavery as a blessing and as part of a divinely established order.

In 1850 a third Convention undertook to amend the Constitution, and now that the West yielded its bitter hostility to slavery, representation was so arranged that the more populous section was enabled to control the House while the East still held the Senate; the election of judges was confided to the people; and the suffrage was broadened. Although the West was not pleased, the leaders of the slave-holding counties threatened secession.

In the national elections of 1860 Virginia returned a majority [illegible] as against the secession candidates, Breckin-[illegible] of the large planters voting for the [illegible], and many of the smaller slave-owners [illegible]ists. The governor called an extra session of the legislature soon after the Federal election, and this in turn called a Convention to meet on the 13th of February 1861. The majority of this body consisted of Unionists, but the Convention passed the ordinance of secession when the Federal government (April 17) called upon the state to supply its quota of armed men to suppress "insurrection" in the lower Southern states. An alliance was made with the provisional government of the Confederate States, on April 25, without waiting for the vote of the people on the ordinance. The Convention called out 10,000 troops and appointed Colonel Robert E. Lee of the United States army as commander-in-chief. On the 23rd of May the people of the eastern counties almost unanimously voted approval of the acts of the Convention, and the western counties took steps to form the state of West Virginia (*q.v.*). Richmond soon became the capital of the Confederacy.

The Civil War was already begun, and Virginia was of necessity the battle-ground. Of the six great impacts made upon the Confederacy, four were upon Virginian soil: the first Manassas campaign (1861), the Peninsular battles (1862), second Manassas (1862), Fredericksburg, Chancellorsville (1862-63) and the great Wilderness-Petersburg series of attacks (1864-65). About 50,000 men were killed in Virginia, and probably 100,000 died of wounds and disease. The principal battles were: the first Manassas, or Bull Run (July 21, 1861); those around Richmond (June 26-July 2, 1862); second Manassas (August 29-30); Fredericksburg (December 12, 1862); Mechanicsville (May 2 and 3, 1863); the Wilderness (May 5 and 6); Spottsylvania (May 8); North Anna and Bethesda church (May 29-30); Cold Harbor (June 3); the battles around Petersburg (June 15, July 30 and November 1, 1864); and Five Forks (April 1) and Appomattox (April 8-9, 1865).

With the surrender of the Confederate army under General Lee to Grant at Appomattox the task of reconstruction began. President Lincoln offered a very liberal plan of re-establishing the civil authority over the counties east of the Alleghany mountains, and Governor Francis H. Pierpont set up in Richmond a government, based upon the Lincoln plan and supported by President Johnson, which continued till the 2nd of March 1867, when the famous reconstruction order converting the state into Military District No. 1 was issued. General John M. Schofield was put in charge, and under his authority a constitutional Convention was summoned which bestowed the suffrage upon the former slaves, who, led by a small group of whites, who had come into the state with the invading armies, ratified the 14th and 15th amendments to the Federal Constitution and governed the community until 1869. Then the secessionists and Union men of 1861 united and regained control. Virginia was readmitted to the Union on the 26th of January 1870. The Constitution of the reconstruction years was unchanged until 1902, when the present fundamental law was adopted.

In national elections the state has supported the Democratic party, except in 1860, when its vote was cast for John Bell, the candidate of the Constitutional Union party.

GOVERNORS OF VIRGINIA

Under the Company

Edward Maria Wingfield, President of the Council	1607 (April to Sept.)
John Ratcliffe, President of the Council .	1607-1608
John Smith, " " " . .	1608-1609
George Percy, " " " . .	1609-1610
Thomas West, Lord Delaware, "Governor and Captain General"	1610-1618
George Percy, Deputy Governor . .	1611 (March to May)
Sir Thomas Dale, "High Marshal" and Deputy Governor	1611 (May to Aug.)
Sir Thomas Gates, Acting Governor . .	1611-1612
Sir Thomas Dale, " " . . .	1612-1616
George Yeardley, Lieutenant or Deputy Governor	1616-1617
Samuel Argall, Lieutenant or Deputy Governor	1617-1619
Nathaniel Powell, Acting Governor . .	1619 (April 9 to 19)
Sir George Yeardley, Governor . . .	1619-1621
Sir Francis Wyatt, " . . .	1621-1624

Under the Crown

Sir Francis Wyatt, Governor.	1624–1626
Sir George Yeardley, „	1626–1627
Francis West (elected by Council).	1627–1628
John Pott „	1628–1629
Sir John Harvey, Governor	1629–1635
John West (elected by Council)	1635–1636
Sir John Harvey, Governor	1636–1639
Sir Francis Wyatt, „	1639–1641
Sir William Berkeley, „	1641–1644
Richard Kemp (elected by Council)	1644–1645
Sir William Berkeley, Governor	1645–1652

Under the Commonwealth

Richard Bennett (elected by General Assembly)	1652–1655
Edward Digges (elected by House of Burgesses)	1655–1657
Samuel Mathews (elected by House of Burgesses)	1657–1660

Under the Crown

Sir William Berkeley, Governor	1660–1677
Francis Morrison (or Moryson), Deputy Governor	1661–1662
Herbert Jeffreys, Lieutenant Governor	1677–1678
Sir Henry Chicheley, Deputy Governor	1678–1680
Thomas, Lord Culpeper, Governor	1680–1683
Nicholas Spencer, President of the Council	1683–1684
Francis, Lord Howard of Effingham, Lieutenant Governor	1684–1687
Nathaniel Bacon, President of the Council	1687–1690
Francis Nicholson, Lieutenant Governor	1690–1692
Sir Edmund Andros, Governor	1692–1698
Francis Nicholson, Lieutenant Governor	1698–1704
George Hamilton Douglas, Earl of Orkney, Governor-in-Chief	1704–1737
Edward Nott, Lieutenant Governor	1705–1706
Edmund Jenings, President of the Council	1706–1710
Robert Hunter, Lieutenant Governor[1]	1707
Alexander Spotswood, Lieutenant Governor	1710–1722
Hugh Drysdale, „ „	1722–1726
Robert Carter, President of the Council	1726–1727
William Gooch, Lieutenant Governor	1727–1740
William Anne Keppel, Earl of Albemarle, Governor-in-Chief[1]	1737–1754
James Blair, President of the Council	1740–1741
Sir William Gooch, Governor	1741–1749
John Robinson, President of the Council	1749 (June to Sept.)
Thomas Lee, „ „ „	1749–1750
Lewis Burwell, „ „ „	1750–1751
Robert Dinwiddie, Lieutenant Governor	1751–1758
John Campbell, Earl of Loudon, Governor General of the American Colonies[1]	1756–1763
John Blair, President of the Council	1758 (Jan. to June)
Francis Fauquier, Lieutenant Governor	1758–1768
Sir Jeffrey Amherst, Governor-in-Chief[1]	1763–1768
John Blair, President of the Council	1768 (March to Oct.)
Norborne Berkeley, Baron de Botetourt, Governor-in-Chief	1768–1770
William Nelson, President of the Council	1770–1771
John Murray, Earl of Dunmore, Governor-in-Chief	1771–1775

State

Patrick Henry	1776–1779
Thomas Jefferson	1779–1781
Thomas Nelson, jun.	1781
Benjamin Harrison	1781–1784
Patrick Henry	1784–1786
Edmund Randolph	1786–1788
Beverley Randolph	1788–1791
Henry Lee	1791–1794
Robert Brooke	1794–1796
James Wood, Democratic-Republican	1796–1799
James Monroe, „ „	1799–1802
John Page, „ „	1802–1805
William H. Cabell, „ „	1805–1808
John Tyler, sen., „ „	1808–1811
James Monroe, „ „	1811
George Wm. Smith (acting), Democratic Republican	1811
Peyton Randolph (acting)	1811–1812
James Barbour, Anti-Democrat	1812–1814
Wilson Cary Nicholas, Republican	1814–1816
James Patton Preston, „	1816–1819
Thomas Mann Randolph, „	1819–1822
James Pleasants, jun., „	1822–1825
John Tyler, State Rights Democrat	1825–1827
William Branch Giles, Democrat	1827–1830
John Floyd, Democrat	1830–1834
Littleton Waller Tazewell, Democrat	1834–1836
Wyndham Robertson (acting), Democrat	1836–1837
David Campbell, Whig	1837–1840
Thomas W. Gilmer, Whig	1840–1841
John M. Patton (acting), „	1841
John Rutherford (acting), „	1841–1842
John Munford Gregory (acting), Whig	1842–1843
James McDowell, „	1843–1846
William Smith, Democrat	1846–1849
John Buchanan Floyd, Democrat	1849–1852
Joseph Johnson, „	1852–1856
Henry Alexander Wise, „	1856–1860
John Letcher, „	1860–1864
William Smith, „	1864–1865
Francis H. Pierpont (provisional), Republican	1865–1867
Henry Horatio Wells, „ „	1868–1870
Gilbert Carlton Walker, „	1870–1874
James Lawson Kemper, Conservative	1874–1878
Frederick Wm. Mackey Holliday, "Debt-Paying"	1878–1882
William Ewan Cameron, Readjuster	1882–1886
Fitzhugh Lee, Democrat	1886–1890
Philip W. McKinney, Democrat	1890–1894
Charles Triplett O'Ferrall, Democrat	1894–1898
James Hoge Tyler, „	1898–1902
Andrew Jackson Montague, „	1902–1906
Claude Augustus Swanson, „	1906–1910
William Hodges Mann, „	1910

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VIRGINIA, UNIVERSITY OF, a state institution for higher education, situated at Charlottesville among the foot-hills of the Blue Ridge Mountains. Its buildings, arranged around a large rectangular lawn and erected from a plan prepared by Thomas Jefferson, are noted for their architectural effect. At the head of the lawn is the Rotunda, modelled after the Roman Pantheon and now containing the university library; and at the foot of the lawn are three modern recitation and laboratory buildings. On the sides are grouped buildings for each individual professor and dormitories for students. There are also a chapel, a gymnasium, a hospital, and on the summit of Mount Jefferson Hill, a mile south-west of the campus, is the M'Cormick Observatory. The university comprises twenty-six independent schools, but the courses of instruction given in these are so co-ordinated as to form six departments: two academic—the college and the department of graduate studies; and four professional—law, medicine, engineering and agriculture. The institution owns 522 acres of land, has productive endowment funds amounting to $1,978,000, and receives from the state an annual appropriation of $80,000. It is governed by a rector, chosen by and from nine visitors, and a board of visitors appointed by the governor and two visitors *ex officio*, the state superintendent of public instruction and the president of the university; and the corporate name of the university is "The Rector and Visitors of the University of Virginia." In 1904 Edwin Anderson Alderman (b. 1861) was elected president. In 1910 the faculty and officers numbered 110, the students (men only) 803, and the number of volumes in the libraries 88,000.

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[1] Never in Virginia.

The university traces its beginning to an act of the legislature in January 1803 for incorporating the "Trustees of Albemarle Academy." In 1814, before the site of this proposed institution had been chosen, Thomas Jefferson was elected a trustee, and under his influence the legislature, in February 1816, authorized the establishment of Central College in lieu of Albemarle Academy. The corner-stone of Central College was laid in October 1817, and Jefferson, who was rector of its board of trustees, evolved a plan for its development into the university of Virginia. The legislature, thanks to the efforts of Joseph Carrington Cabell, a close personal friend of Jefferson, adopted the plan in 1818 and 1819, and seven independent schools—ancient languages, modern languages, mathematics, natural philosophy, moral philosophy, chemistry and medicine—were opened to students in March 1825; a school of law was opened in 1826. In 1837 the School of Medicine became a department of three individual schools; and in 1850 the School of Law became a department of two schools. After the gift of $500,000 by Andrew Carnegie there were established in 1909 the Andrew Carnegie School of Engineering, the James Madison School of Law, the James Monroe School of International Law, the James Wilson School of Political Economy, the Edgar Allan Poe School of English and the Walter Reed School of Pathology.

Under Jefferson's plan only two degrees were granted: "Graduate," to any student who had completed the course of any one school; and "Doctor" to a graduate in more than one school who had shown powers of research. But in 1831 for the Doctor's degree the faculty substituted, following British custom, the degree of Master of Arts. The college now grants the degrees of "Bachelor of Arts," "Cultural Bachelor of Science" and "Vocational Bachelor of Science"; the Department of Graduate Studies, the degrees of "Graduate in a School," "Master of Arts," "Master of Science" and "Doctor of Philosophy"; the Department of Law, the degree of "Bachelor of Laws"; the Department of Medicine, the degree of "Doctor of Medicine"; the Department of Engineering, the degrees of "Civil Engineer," "Mechanical Engineer," "Electrical Engineer," "Mining Engineer" and "Chemical Engineer"; and the Department of Agriculture, the degree of "Bachelor of Science in Agriculture."

See J. S. Patton, *Jefferson, Cabell and the University of Virginia* (New York, 1906).

VIRGIN ISLANDS, a group of small islands in the West Indies, about 100 in number, for the most part uninhabited. They extend E. from Puerto Rico, lying between 17° and 18° 30′ N., and 64° 20′ and 65° 30′ W., their total area being about 465 sq. m. The islands are mostly rocky, or sandy and barren, but such portions as are under cultivation yield sugar, maize, [illegible] cotton and indigo. Guinea grass grows abundantly [illegible], affording excellent pasturage; the forests, though few, include the mahogany and other useful trees. The coasts abound with fish. The climate is more healthy than that of the other West Indian islands, and the heat is not so great. Some of the islands belong to the United States, some to Denmark and some to Great Britain. The United States' possessions (once dependencies of Puerto Rico, but ceded by Spain in 1898) have an area of about 150 sq. m. and include Culebra or Snake Island, and Vieques or Crab Island. The chief Danish islands are St Thomas (*q.v.*), St Croix (*q.v.*) and St John (*q.v.*), the total area being about 240 sq. m. Of the British portion of the group the principal are Tortola, Anegada, Virgin Gorda, Jost van Dyke, Peter's Island and Salt Island, in all numbering 32, with an area of 58 sq. m. With the exception of the island of Sombrero they form one of the five presidencies in the colony of the Leeward Islands. The inhabitants are peasant proprietors, mainly engaged in raising cattle and in burning charcoal, but some are fishermen and boatmen. The chief town is Roadtown (pop. 400) at the head of a splendid harbour on the S. of Tortola, and what trade there is is mostly with St Thomas. Sombrero is maintained as a lighthouse by the British government. Population of the presidency, mostly negroes (1891) 4639; (1901) 4908.

The Virgin Islands were discovered by Columbus in his second voyage, in 1494, and named Las Virgenes, in honour of St Ursula and her companions. In 1666 the British established themselves on Tortola, which has ever since remained in their possession. In the 17th century the Virgin Islands were favourite resorts of the buccaneers. The Danish islands of St Thomas and St John were taken by the British in 1801, but restored in the following year. In 1807 they surrendered to the British, and continued in their hands till 1815, when they were again restored.

VIRGINIUS RUFUS, LUCIUS (A.D. 15–97), Roman patriot and soldier, three times consul (A.D. 63, 69, 97), was born near Comum, the birthplace of the two Plinys. When governor of upper Germany under Nero (68), after he had put down the revolt of Julius Vindex in Gaul, he was more than once urged by his troops to assume the supreme power; but he firmly refused, and further declared that he would recognize no one as emperor who had not been chosen by the senate. Galba, on his accession, aware of the feelings of the German troops and uncertain as to the intentions of Virginius, induced him to accompany him to Rome. But Virginius, as always, remained loyal to the head of the state. After the death of Otho, the soldiers again offered the throne to Virginius, but he again refused it. Considering themselves slighted, they drew their swords upon him, and he only saved himself from their hands by making his escape through the back of the tent. But the soldiers never forgave the fancied insult. Under Vitellius, during a military disturbance at Ticinum, one of Virginius's slaves was arrested and charged with the design of murdering the emperor. Virginius was accused of being implicated in the conspiracy, and his death was loudly demanded by the soldiers. To his credit Vitellius refused to sacrifice so valuable a servant, on whose loyalty he could depend, to the vengeance of a capricious army. Virginius subsequently lived in retirement, chiefly in his villa at Alsium, on the coast of Etruria, till his death in 97, in which year he held the consulship, together with the emperor Nerva. At the public burial with which he was honoured, the historian Tacitus (then consul) delivered the funeral oration. The younger Pliny, his neighbour and ward, has recorded the lines which Virginius had ordered to be engraved upon his tomb:

> "Hic situs est Rufus, pulso qui Vindice quondam
> Imperium asseruit non sibi sed patriae."

See Tacitus, *Hist.* i. ii.; Dio Cassius lxiii. 24–27, lxiv. 4, lxviii. 2; Pliny, *Epp.* ii. 1, vi. 10; Juvenal viii. 221, with Mayor's note; L. Paul in *Rheinisches Museum* (1899), liv. pp. 602–30.

VIRGO ("the Virgin"), in astronomy, the sixth sign of the zodiac (*q.v.*), denoted by the symbol ♍. It is also a constellation mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); Ptolemy catalogued 32 stars, Tycho Brahe 33.

Hevelius 50. The Greeks represented this constellation as a virgin, but different fables are current as to the identity of the maid. She is variously considered to be: Justitia, daughter of Astraeus and Ancora, who lived before man sinned, and taught him his duty, and when the golden age ended she returned to heaven; according to Hesiod the virgin is the daughter of Jupiter and Themis; others make her to be Erigone, daughter of Icarius, or Parthene, daughter of Apollo. The most interesting stars of this constellation are: α *Virginis*, or Spica, a star of the first magnitude with a very faint companion; and γ *Virginis*, a binary star, having components of the third magnitude.

VIRUÉS, CHRISTÓBAL DE (1550?–1615?), Spanish dramatist and poet, was born at Valencia about the middle of the 16th century, joined the army, fought at Lepanto, and retired to his native place with the rank of captain shortly before 1586. The first-fruit of his leisure was *El Monserrate* (1587), a dull poem on a repulsive subject which had the honour of being praised by Cervantes, and of being reprinted in 1601. Shortly afterwards Virués returned to Italy and issued a recast of his poem entitled *El Monserrate segundo* (1602). His *Obras trágicas y líricas* (1609) include five tragedies: *La Gran Semíramis*, *La Cruel Casandra*, *Atila furioso*, *La Infelice Marcela* and *Elisa Dido*. The date of his death is unknown, but he is conjectured to have been alive as late as 1614. Virués belongs to the school of dramatists displaced by Lope de Vega, and his methods were out of fashion before his plays were printed; yet he is an interesting figure, chiefly because of the very extravagances which destroy the effect of his best scenes.

VISBY, or Wisby, the capital of the Swedish island and administrative district (*län*) of Gotland, in the Baltic Sea. Pop. (1900) 8376. It is the seat of a bishop, the port of the island, and a favourite watering-place. It is picturesquely situated on the west coast, 150 m. S. by E. of Stockholm by sea. The houses cluster beneath and above a cliff (*klint*) 100 ft. high, and the town is thoroughly medieval in appearance. The remains from its period of extraordinary prosperity from the 11th to the 14th century are of the highest interest. Its walls date from the end of the 13th century, replacing earlier fortifications, and enclose a space much larger than that now covered by the town. Massive towers rise at close intervals along them, and nearly forty are in good preservation. Between them are traces of bartizans. The cathedral church of St Mary dates from 1190–1225, but has been much altered in later times: it has a great square tower at the west end and two graceful octagonal towers at the east, and contains numerous memorials of the 17th century. There are ten other churches, in part ruined, none of which is used for service. Among those of chief interest St Nicholas', of the early part of the 13th century, formerly belonged to a Dominican monastery. It retains two beautiful rose-windows in the west front. The church of the Holy Ghost (*Helgeonds-Kyrka*) in a late Romanesque style (*c.* 1250) is a remarkable structure with a nave of two storeys. The Romanesque St Clement's has an ornate south portal, and the churches of St Drotten and St Lars, of the 12th century, are notable for their huge towers. St Catherine's, of the middle of the 13th century, is Gothic, with a pentagonal apse. It belonged to a Franciscan convent, of the buildings of which there are slight ruins. Among ancient remains in the vicinity may be mentioned Galgberget, the place of execution, with tall stone pillars still standing; and the remarkable stone labyrinth of Tröjeborg. Modern buildings include the Gotland museum of antiquities, and the high school, with a museum and library. The artificial harbour, somewhat exposed, lies south of the ancient Hanseatic harbour, now filled up and covered with gardens. The town is the terminus of railways to north and south. It is the headquarters of the army division of Gotland troops, and there are some modern forts.

The name Visby is derived from the old Norse *ve* (sanctuary) and *by* (town). This was no doubt a place of religious sacrifice in heathen times. At any rate it was a notable trading-place and emporium as early as the Stone Age, and continued to enjoy its importance as such through the Bronze and Iron Ages, as is proved, *inter alia*, by the large number of Arabic, Anglo-Saxon and other coins which have been found on the island. See Gotland and Sea Laws.

VISCACHA, or Biscacha, a large South American burrowing rodent mammal belonging to the family Chinchillidae and commonly known as *Lagostomus trichodactylus*, although some writers prefer the name *Viscacia*. With the cheek-teeth formed of a number of parallel plates in the manner characteristic of the family, the viscacha is distinguished from the other members of that group by having only three hind toes; while it is also the heaviest-built and largest member of the group, with smaller ears than the rest. It has a long tail and shaggy fur; the general colour of the latter being dark grey, with conspicuous black and white markings on the face. Viscachas inhabit the South American pampas between the Uruguay river and the Rio Negro in Patagonia, where they dwell in warrens covering from 100 to 200 sq. ft. and forming mounds penetrated by numerous burrows. The ground around the "viscachera" is cleared from vegetation, the refuse of which is heaped upon the mound. Anything the rodents may meet with on their journeys, such as thistle-stalks or bones, are collected and deposited on the viscachera. Deep down in the burrows dwell the viscachas, from which in frequented districts they seldom emerge till evening, unless to drink after a shower. Their chief food is grass and seeds, but they also consume roots. When alarmed, they rush to their burrows, and if these are disturbed utter a growling sound. A pair of prairie burrowing owls (*Speotyto*) are almost invariably inhabitants of a viscachera (see Rodentia). (R. L.*)

VISCHER, the name of a family of Nuremberg sculptors, who contributed largely to the masterpieces of German art in the 15th and 16th centuries.

1. Hermann, the elder, came to Nuremberg as a worker in brass in 1453 and there became a "master" of his gild. There is only one work that can be ascribed to him with certainty, the baptismal font in the parish church of Wittenberg (1457). This is decorated with figures of the Apostles.

2. His son, Peter, the elder, was born about 1455 in Nuremberg, where he died on the 7th of January 1529. He became "master" in 1489, and in 1494 was summoned by the Electoral Prince Philipp of the Palatinate to Heidelberg. He soon returned, however, to Nuremberg, where he worked with the help of his five sons, Hermann, Peter, Hans, Jakob and Paul. His works are: the tomb of Bishop Johannes IV., in the Breslau cathedral (1496); the tomb of Archbishop Ernest, in Magdeburg cathedral (1497); the shrine of Saint Sebald in the Sebalduskirche at Nuremberg, between 1508 and 1519; a large grille ordered by the Fugger brothers in Augsburg (lost); a relief of the "Crowning of the Blessed Virgin" in the Erfurt cathedral (a second example in the Wittenberg Schlosskirche, 1521); the tombstones for Margareta Tucherin in the Regensburg cathedral (1521), and for the Eisen family in the Ägidienkirche at Nuremberg (1522); the epitaph for the cardinal Albrecht of Brandenburg in the collegiate church at Aschaffenburg (1525); the tomb of the electoral prince Frederick the Wise in the Schlosskirche at Wittenberg (1521); the epitaph of the duchess Helene of Mecklenburg in the cathedral at Schwerin. Besides these works there are a number of others ascribed to Peter the elder with less certainty. In technique few bronze sculptors have ever equalled him, but his designs are marred by an excess of mannered realism and a too exuberant fancy. His chief early work, the tomb of Archbishop Ernest in Magdeburg cathedral (1495), is surrounded with fine statuettes of the Apostles under semi-Gothic canopies; it is purer in style than the magnificent shrine of St Sebald, a tall canopied bronze structure, crowded with reliefs and statuettes in the most lavish way. The general form of the shrine is Gothic,[1] but the details are those of the 16th-century Italian Renaissance treated

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[1] This great work is really a canopied pedestal to support and enclose the shrine, not the shrine itself, which is a work of the 14th century, having the gabled form commonly used in the middle ages for metal reliquaries.

with much freedom and originality. Some of the statuettes of saints attached to the slender columns of the canopy are modelled with much grace and even dignity of form. A small portrait figure of Peter himself, introduced at one end of the base, is a marvel of clever realism: he has represented himself as a stout, bearded man, wearing a large leathern apron and holding some of the tools of his craft. This gorgeous shrine is a remarkable example of the uncommercial spirit which animated the artists of that time, and of the evident delight which they took in their work. Dragons, grotesques and little figures of boys, mixed with graceful scroll foliage, crowd every possible part of the canopy and its shafts, designed in the most free and unconventional way and executed with an utter disregard of the time and labour which were lavished on them.

See R. Bauer, *Peter Vischer und das alte Nürnberg* (1886); C. Headlam, *Peter Vischer* (1901).

VISCHER, FRIEDRICH THEODOR (1807–1887), German writer on the philosophy of art, was born at Ludwigsburg on the 30th of June 1807, and was the son of a clergyman. He was educated at Tübingen, and began life in his father's profession. In 1835 he became *Privatdozent* in aesthetics and German literature at his old university, was advanced in 1837 to extraordinary professor, and in 1844 to full professor. In consequence, however, of his outspoken inaugural address, he was suspended for two years by the Württemberg government, and in his enforced leisure wrote the first two volumes of his *Aesthetik, oder Wissenschaft des Schönen* (1846), the fourth and last volume of which did not appear till 1857. Vischer threw himself heartily into the great German political movement of 1848–49, and shared the disappointment of patriotic democrats at its failure. In 1855 he became professor at Zürich. In 1866, his fame being now established, he was invited back to Germany with a professorship at Tübingen combined with a post at the Polytechnikum of Stuttgart. He died at Gmunden on the 14th of September 1887. His writings include literary essays collected under the titles *Kritische Gänge* and *Altes und Neues*, poems, an excellent critical study of Goethe's *Faust* (1875), and a successful novel, *Auch Einer* (1878; 25th ed., 1904). Vischer was not an original thinker, and his monumental *Aesthetik*, in spite of industry and learning, has not the higher qualities of success. He attempts the hopeless task of explaining art by the Hegelian dialectic. Starting with the definition of beauty as "the idea in the form of limited appearance," he goes on to develop the various elements of art (the beautiful, sublime and comic), and the various forms of art (plastic art, music and poetry) by means of the Hegelian antitheses—form and content, objective and subjective, inner conflict and reconciliation. The shape of the work also is repellently Hegelian, consisting of short highly technical paragraphs containing the main argument, followed by detailed explanations printed in different type. Still, Vischer had a thorough knowledge of every branch of art except music, and much valuable material is buried in his volumes. In later life Vischer moved considerably away from Hegelianism, and adopted the conceptions of sensuous completeness and cosmic harmony as criteria of beauty; but he never found time to rewrite his great book. His own work as a literary artist is of high quality; vigorous, imaginative and thoughtful without academic technicality.

See O. Keindl, *F. T. Vischer, Erinnerungsblätter* (1888); J. E. von Günthert, *F. T. Vischer, ein Charakterbild* (1888); I. Frapan, *Vischer-Erinnerungen* (1889); T. Ziegler, *F. T. Vischer* (*Vortrag*) (1893); J. G. Oswald, *F. T. Vischer als Dichter* (1896). (H. St.)

VISCONTI, the name of a celebrated Italian family which long ruled Milan; they claimed descent from King Desiderius, and in the 11th century possessed estates on Lakes Como and Maggiore. A certain Ottone, who distinguished himself in the First Crusade, is mentioned in 1078 as viscount of Milan. The real basis for the family's dominion was laid, however, by another Ottone, a canon of Desio, appointed archbishop of Milan by Pope Urban IV. in 1262 through the influence of [illegible]. The Della Torre family, who then controlled the city, opposed the appointment, and not until his victory at Desio in 1277 was Ottone able to take possession of his see. He imprisoned Napoleone Della Torre and five of his relatives in iron cages, and directed his later efforts toward the advancement of his nephew Matteo. He died on the 18th of August 1295, aged eighty years. Matteo, born at Invorio on the 15th of August 1255, succeeded his uncle as political leader of Milan, and although an uprising of the Della Torre in 1302 compelled him to take refuge at Verona, his steadfast loyalty to the imperial cause in Italy earned him the gratitude of Henry VII., who restored him to Milan in 1310 and made him imperial vicar of Lombardy. He brought under his rule Piacenza, Tortona, Pavia, Bergamo, Vercelli, Cremona and Alessandro. An able general, he yet relied for his conquests more on diplomacy and bribery, and was esteemed as a model of the prudent Italian despot. Persevering in his Ghibelline policy, and quarrelling with Pope John XXII. over an appointment to the archbishopric of Milan, he was excommunicated by the papal legate Bertrand du Puy in 1322. He at once abdicated in favour of his son Galeazzo, and died at Crescenzago on the 24th of June of the same year. He left besides Galeazzo several sons: Marco, Lucchino, Giovanni and Stefano. Galeazzo I. (1277–1328), who ruled at Milan from 1322 to 1328, met the Holy Army which the pope had sent against the Visconti at Vaprio on the Adda (1324), and defeated it with the aid of the emperor Louis the Bavarian. In 1327 he was imprisoned by the emperor at Monza because he was thought guilty of making peace with the church, and was released only on the intercession of his friend Castruccio Castracane. By his wife Beatrice d'Este he had the son Azzo who succeeded him. His brother Marco commanded a band of Germans, conquered Pisa and Lucca and died in 1329. Azzo (1302–1339), who succeeded his father in 1328, bought the title of imperial vicar for 25,000 florins from the same Louis who had imprisoned Galeazzo I. He conquered ten towns, murdered his uncle Marco (1329), suppressed a revolt led by his cousin Lodrisio, reorganized the administration of his estates, built the octagonal tower of S. Gottardo, and was succeeded in turn by his uncles Lucchino and Giovanni. Lucchino made peace with the church in 1341, bought Parma from Obizzo d'Este and made Pisa dependent on Milan. Although he showed ability as general and governor, he was jealous and cruel, and was poisoned in 1349 by his wife Isabella Fieschi. Giovanni, brother of the preceding, archbishop of Milan and lord of the city from 1349 to 1354, was one of the most notable characters of his time. He befriended Petrarch, extended the Visconti sway over Bologna (1350), defied Pope Clement VI., annexed Genoa (1353), and died on the 5th of October 1354 after having established the rule of his family over the whole of northern Italy except Piedmont, Verona, Mantua, Ferrara and Venice. The Visconti from the time of Archbishop Giovanni were no longer mere rivals of the Della Torre or dependants on imperial caprice, but real sovereigns with a recognized power over Milan and the surrounding territory. The state was partitioned on the death of Giovanni among his brother Stefano's three sons, Matteo II., Galeazzo II. and Bernabo. Matteo II., who succeeded to Bologna, Lodi, Piacenza and Parma, abandoned himself to the most revolting immorality, and was assassinated in 1355 by direction of his brothers, who thenceforth governed the state jointly and with considerable ability. Galeazzo II., who held his court at Pavia, was handsome and distinguished, the patron of Petrarch, the founder of the university of Pavia and a gifted diplomat. He married his daughter Violante to the duke of Clarence, son of Edward III. of England, giving a dowry of 200,000 gold florins; and his son Gian Galeazzo to Isabella, daughter of King John of France. He died in 1378. Bernabo, who held his court at Milan, was involved in constant warfare, to defray the expenses of which he instituted very oppressive taxes. He fought Popes Innocent VI. and Urban V., who proclaimed a crusade against him. He fought the emperor Charles IV., who declared the forfeiture of his fief. He endeavoured to exercise sole power in the state after the death of his brother, but his young nephew Gian Galeazzo plotted against him and put him to death (1385). GIAN GALEAZZO, the most powerful of the Visconti, became joint ruler of the Milanese territories on the death of his father in 1378 and sole ruler on the death of his uncle seven years later. He founded the cathedral of Milan, built the Certosa and the bridge across the Ticino at Pavia, improved the university of Pavia and established the library there, and restored the university at Piacenza. His bureaucratic government was excellent; he was an able and economical administrator, and was reputed to be one of the wealthiest princes of his time. He was ambitious to reduce all Italy under the sway of the Visconti. He conquered Verona in 1387; and in the following year, with the aid of the Venetians, took Padua. He plotted successfully against the rulers of Mantua and Ferrara, and now that the whole of Lombardy lay prostrate before him he turned his attention to Tuscany. In 1399 he bought Pisa and seized Siena. The emperor Wenceslaus had already conferred on him the title of duke of Milan for 100,000 florins, reserving only Pisa, and refused to take arms against him. Gian Galeazzo took Perugia, Lucca and Bologna (1400–1), and was besieging Florence when he died of the plague (3rd of September 1402) at the age of fifty-five years. His sons, Giovanni Maria and Filippo Maria, were mere boys at the time of his death, and were taken under the protection of the celebrated condottiere Facino Cane de Casale; but most of Gian Galeazzo's conquests were lost to his self-seeking generals. GIOVANNI MARIA was proclaimed duke of Milan in 1402, displayed an insane cruelty, and was killed in 1412 by Ghibelline partisans. FILIPPO MARIA, who became nominal ruler of Pavia in 1402, succeeded his brother as duke of Milan. Cruel and extremely sensitive about his personal ugliness, he nevertheless was a great politician, and by employing such powerful condottieri as Carmagnola, Piccinino and Francesco Sforza he managed to recover the Lombard portion of his father's duchy. From his marriage with the unhappy widow of the above-mentioned Facino Cane he received a dowry of nearly half a million florins. He died in 1447, the last of the Visconti in direct male line, and was succeeded in the duchy, after the shortlived Ambrosian republic, by Francesco Sforza, who had married his daughter Bianca in 1441 (see SFORZA). VALENTINA (1366–1408), a daughter of Gian Galeazzo and a sister of the preceding, married Louis of Orleans in 1387, and it was from her that Louis XII. of France derived his claims to the duchy of Milan. GABRIELE, an illegitimate brother, gained possession of Pisa and other towns, but was despoiled and beheaded (1407) by Charles VI.'s governor of Genoa, under whose protection he had placed himself. Among collateral branches of the Visconti family were the counts of Saliceto, counts of Zagnano, lords of Brignano, marquis of San Giorgio di Borgoratto, marquis of Invorio and Marquis Della Motta. Other branches attained to some prominence in the local history of Bari and of Tarento. Tebaldo Visconti of Piacenza became Pope Gregory X. in 1271. Among the Visconti lords of Fontaneto was Gasparo, who died in 1595 archbishop of Milan. An Ignatius Visconti was sixteenth general of the Jesuits (1751–55).

There is a contemporary history of the principal members of the family by Paolo Giovio, bishop of Nocera, which may be had in several editions. See J. Burckhardt, *The Civilisation of the Renaissance in Italy*, trans. by S. G. C. Middlemore (London, 1898); J. A. Symonds, *Age of the Despots* (New York, 1888); C. Magenta, *I Visconti e gli Sforza nel Castello di Pavia* (1883); A. Medin, *I Visconti nella poesia contemporanea* (Milan, 1891); F. Mugnier, "Lettres des Visconti de Milan" in *Mémoires et documents de la société savoisienne d'histoire et d'archéologie*, vol. x. of the second series (1896). (C. H. HA.)

VISCONTI-VENOSTA, EMILIO, MARQUIS (1829–), Italian statesman, was born at Milan on the 22nd of January 1829. A disciple of Mazzini, he took part in all the anti-Austrian conspiracies until the ineffectual rising at Milan on the 6th of February 1853, of which he had foretold the failure, induced him to renounce his Mazzinian allegiance. Continuing, nevertheless, his anti-Austrian propaganda, he rendered good service to the national cause, but being molested by the Austrian police, was obliged in 1859 to escape to Turin, and during the war with Austria of that year was appointed by Cavour royal commissioner with the Garibaldian forces. Elected deputy in 1860, he accompanied Farini on diplomatic missions to Modena and Naples, and was subsequently despatched to London and Paris to acquaint the British and French governments with the course of events in Italy. As a recompense for the tact displayed on this occasion, he was given by Cavour a permanent appointment in the Italian foreign office, and was subsequently appointed under-secretary of state by Count Pasolini. Upon the latter's death he became minister of foreign affairs (24th March 1863) in the Minghetti cabinet, in which capacity he negotiated the September Convention for the evacuation of Rome by the French troops. Resigning office with Minghetti in the autumn of 1864, he was in March 1866 sent by La Marmora as minister to Constantinople, but was almost immediately recalled and reappointed foreign minister by Ricasoli. Assuming office on the morrow of the second battle of Custozza, he succeeded in preventing Austria from burdening Italy with a proportion of the Austrian imperial debt, in addition to the Venetian debt proper. The fall of Ricasoli in February 1867 deprived him for a time of his office, but in December 1869 he entered the Lanza-Sella cabinet as foreign minister, and retained his portfolio in the succeeding Minghetti cabinet until the fall of the Right in 1876. During this long period he was called upon to conduct the delicate negotiations connected with the Franco-German War, the occupation of Rome by the Italians, and the consequent destruction of the temporal power of the pope, the Law of Guarantees and the visits of Victor Emmanuel II. to Vienna and Berlin. Upon the occasion of his marriage with the daughter of the marquis Alfieri di Sostegno, grand-niece of Cavour, he was created marquis by the king. For a time he remained a member of the parliamentary opposition, and in 1886 was nominated senator. In 1894, after eighteen years' absence from active political life, he was chosen to be Italian arbitrator in the Bering Sea question, and in 1896 once more accepted the portfolio of foreign affairs in the Di Rudini cabinet at a juncture when the disasters in Abyssinia and the indiscreet publication of an Abyssinian Green Book had rendered the international position of Italy exceedingly difficult. His first care was to improve Franco-Italian relations by negotiating with France a treaty with regard to Tunis. During the negotiations relating to the Cretan question and the Graeco-Turkish War, he secured for Italy a worthy part in the European Concert and joined Lord Salisbury in saving Greece from the loss of Thessaly. Resigning office in May 1898, on a question of internal policy, he once more retired to private life, but in May 1899 again assumed the management of foreign affairs in the second Pelloux cabinet, and continued to hold office in the succeeding Saracco cabinet until its fall in February 1901. During this period his attention was devoted chiefly to the Chinese problem and to the maintenance of the equilibrium in the Mediterranean and the Adriatic. In regard to the Mediterranean he established an Italo-French agreement by which France tacitly undertook to leave Italy a free hand in Tripoli, and Italy not to interfere with French policy in the interior of Morocco; and, in regard to the Adriatic, he came to an understanding with Austria guaranteeing the *status quo* in Albania. Prudence and sagacity, coupled with unequalled experience of foreign policy, enabled him to assure to Italy her full portion of influence in international affairs, and secured for himself the unanimous esteem of European cabinets. In recognition of his services he was created Knight of the Annunziata by Victor Emmanuel III. on the occasion of the birth of Princess Yolanda Margherita of Savoy (1st of June 1901). In February 1906 he was Italian delegate to the Morocco conference at Algeciras.

An account of Visconti-Venosta's early life (down to 1859) is given in an interesting volume by his brother Giovanni Visconti-Venosta, *Ricordi di Gioventù* (Milan, 1904).

VISCOUNT (through O. Fr. *viscomte*, mod. *vicomte*, from Low Lat. *vice-comes*, cf. Portug. *visconde*, Ital. *visconte*), the title of the fourth rank of the European nobility. In the British peerage it intervenes between the dignities of earl and baron. The title is now purely one of honour, having long been dissociated from any special office or functions.

In the Carolingian epoch the *vice-comites*, or *missi comitis*, were the deputies or vicars of the counts, whose official powers they exercised by delegation, and from these the viscounts of the feudal period were undoubtedly derived. Soon after the counts became hereditary the same happened in the case of their lieutenants; *e.g.* in Narbonne, Nîmes and Alby the viscounts had, according to A. Molinier, acquired hereditary rights as early as the beginning of the 10th century. Viscountcies thus developed into actual fiefs, with their own jurisdiction, domain and seigniorial rights, and could be divided or even transmitted to females. Viscounts, however, continued for some time to have no more than the status of lieutenants, calling themselves either simply *vice-comites*, or adding to this title the name of the countship from which they derived their powers. It was not till the 12th century that the universal tendency to territorialize the feudal dominions affected the viscountcies with the rest, and that the viscounts began to take the name of the most important of their patrimonial domains. Thus the viscounts of Poitiers called themselves viscounts of Thouars, and those of Toulouse viscounts of Bruniquel and Montelar. From this time the significance of the title was extremely various. Some viscounts, notably in the duchy of Aquitaine and the county of Toulouse, of which the size made an effective centralized government impossible, were great barons, whose authority extended over whole provinces, and who disputed for power on equal terms with counts and dukes. Elsewhere, on the other hand, *e.g.* in the Île de France, Champagne, and a great part of Burgundy, the *vicomtes* continued to be half feudatories, half officials of the counts, with the same functions and rank in the feudal hierarchy as the chatelains; their powers were jealously limited and, with the organization of the system of *prévôts* and *baillis* in the 12th century, practically disappeared. In the royal domains especially, these petty feudatories could not maintain themselves against the growing power of the crown, and they were early assimilated to the *prévôts*; thus there is no record of a *vicomte* at Paris after 1027.

In Normandy, where from the first the central power had been strong, *vicomtes* appeared at a very early date as deputies of the counts (afterwards dukes) of the Normans: "They are both personal companions and hereditary nobles." When local Norman counts began in the 11th century, some of them had *vicomtes* under them, but the normal *vicomte* was still a deputy of the duke, and Henry I. largely replaced the hereditary holders of the *vicomtés* by officials. "By the time of the Conqueror the judicial functions of the viscount were fully recognized, and extended over the greater part of Normandy." Eventually almost the whole of Normandy was divided into administrative viscountcies or bailiwicks by the end of the 12th century. When the Normans conquered England, they applied the term *viscounte* or *vicecomes* to the sheriffs of the English system (see SHERIFF), whose office, however, was quite distinct and was hardly affected by the Conquest.

Nearly four centuries later "viscount" was introduced as a peerage style into England, when its king was once more lord of Normandy. John, Lord Beaumont, K.G., who had been created count of Boulogne in 1436, was made Viscount Beaumont, February 12, 1440, and granted precedence over all barons, which was doubtless the reason for his creation. Within a year the feudal *vicomté* of Beaumont in Normandy was granted to him and the heirs male of his body on the ground that he traced his descent from that district. In 1446 Lord Bourchier, who held the Norman countship of Eu, was similarly made a viscount. The oldest viscountcy now on the roll is that of Hereford, created in 1550; but the Irish viscountcy of Gormanston is as old as 1478. The dignity was sparingly conferred in the peerage of England till recent times, when the number of viscounts was increased by bestowing the dignity on retiring speakers (*e.g.* Viscounts Canterbury, Hampden, Peel, Selby) and ministers who accepted peerages (*e.g.* Viscounts Melville, Halifax, Knutsford, Llandaff, Cross, Ridley, Goschen, St Aldwyn, Morley of Blackburn, Wolverhampton).

A viscount is "Right Honourable," and is styled "My Lord." His wife, also "Right Honourable," is a "viscountess," and is styled "My Lady." All their sons and daughters are "Honourable." The coronet first granted by James I. has on the golden circlet a row of fourteen small pearls set in contact, of which number in representations nine are shown. The scarlet parliamentary robe of a viscount has two and a half doublings of ermine.

See A. Luchaire, *Manuel des institutions françaises* (Paris, 1892), bibliography on p. 282; Stapleton's *Rotuli Scaccarii Normanniae*; Powicke's "The Angevin Administration of Normandy" (*Eng. Hist. Rev.* vols. xxi., xxii.); *Lords' Reports on the Dignity of a Peer*; Courthope Nicolas's *Historic Peerage*.

VISHNU (Sanskrit, "the worker," from root *vish*, "to work"), a solar deity, in later Hindu mythology a god of the first importance, one of the supreme trinity with Brahma and Siva, but in the Rig Veda only a minor deity. In the Vedic scriptures his only anthropomorphic characteristics are the frequently mentioned strides that he takes, and his being a youth vast in body. His essential feature is the three strides (*vi-kram*) with which he traverses the universe. Two of these steps are visible to men, but the third or highest is beyond mortal sight. These steps are symbolic of the rising, culminating and setting of the sun, or alternatively the course of the solar deity through the three divisions of the universe. To-day Vishnu is adored by the Vishnavite sects as the equal or even the superior of Brahma, and is styled the Preserver. He is represented with four arms, and black in colour; in one hand he holds a club and in the others a shell, a discus and a lotus respectively. He rides on the Garuda, half man and half bird, having the head, wings, beak and talons of an eagle, and human body and limbs, its face being white, its wings red and its body golden. In his character as preserver of men Vishnu has from time to time become incarnate to rid the world of some great evil (see also BRAHMANISM and HINDUISM).

See A. A. Macdonell, *Vedic Mythology* (Strassburg, 1897); Sir W. Muir, *Original Sanskrit Texts*, iv. 63–298; Sir M. Monier-Williams, *Brahmanism and Hinduism*, iii. v. vi.

VISION (from Lat. *videre*, to see), or SIGHT, the function, in physiology, of the organ known as the eye (*q.v.*). The sense of vision is excited by the influence of light on the retina, the special terminal organ connected with the optic nerve. By excitation of the retina, a change is induced in the optic nerve fibres, and is conveyed by these to the brain, the result being a luminous perception, or what we call a sensation of light or colour. If light were to act uniformly over the retina, there would be no image of the source of the light formed on that structure, and consequently there would be only a general consciousness of light, without reference to any particular object. One of the first conditions, therefore, of vision for useful purposes is the formation of an image on the retina. To effect this, just as in a photographic camera, refractive structures must be placed in front of the retina which will so bend luminous rays as to bring them to a focus on the retina, and thus produce an image. Throughout the animal kingdom various arrangements are found for this purpose; but they may be all referred to three types, namely—(1) eye-specks or eye-dots, met with in Medusae, Annelidae, &c.; (2) the compound eye, as found in insects and crustaceans; and (3) the simple eye, common to all vertebrates. The *eye-specks* may be regarded simply as expansions of optic nerve filaments, covered by a transparent membrane, but having no refractive media, so that the creature would have the consciousness of light only, or a simple luminous impression, by which it might distinguish light from darkness. The *compound eye* consists essentially of a series of transparent cone-like bodies, arranged in a radiate manner against the inner surface of the cornea, with which their bases are united, while their apices are connected with the ends of the optic filaments. As each cone is separated from its neighbours, it admits only a ray of light parallel with its axis, and its apex represents only a portion of the image, which must be made up, like a mosaic-work, of as many parts as there are cones in the eye. When the cones are of considerable length, it is evident, from their form and direction, their apices being directed inwards, that the oblique rays emanating from a luminous surface will be cut off, and that only those rays proceeding along the axis of the cone will produce an effect. Thus distinctness or sharpness of definition will be secured. The size of the visual field will depend on the form of the eye, the outermost cones marking its limits. Consequently the size of the visual field will depend on the size of the segment of the sphere forming its surface. The eyes of many insects have a field of about half a sphere, so that the creature will see objects before and behind it as well as those at the side. On the other hand, in many the eyes have scarcely any convexity, so that they must have a narrow field of vision. For anatomical details, and diseases of the eye, see EYE; the pathological aspects of vision itself are treated at the end of this article.

1. PHYSICAL CAUSES OF VISION

A luminous sensation may be excited by various modes of irritation of the retina or of the optic nerve. Pressure, cutting or electrical shocks may act as stimuli, but the normal excitation is the influence of light on the retina. From a physical point of view, light is a mode of movement occurring in a medium, termed the aether, which pervades all space; but the physiologist studies the operation of these movements on the sentient organism as resulting in consciousness of the particular kind which we term a luminous impression. Outside of the body, such movements have been studied with great accuracy; but the physiological effects depend upon such complex conditions as to make it impossible to state them in the same precise way. Thus, when we look at the spectrum, we are conscious of the sensations of red and violet, referable to its two extremities: the physicist states that red is produced by 392 billions of impulses on the retina per second, and that violet corresponds to 757 billions per second; but he has arrived at this information by inductive reasoning from facts which have not at present any physiological explanation. We cannot at present trace any connexion, as cause and effect, between 392 billions of impulses on the retina per second and a sensation of red. Below the red and above the violet ends of the spectrum there are vibrations which do not excite luminous sensations. In the first case, below the red, the effect as a sensation is heat; and above the violet the result is that of chemical activity. Thus the method of dispersion of light, as is followed in passing a ray through a prism, enables us to recognize these general facts: (1) rays below the red excite thermal impressions; (2) from the lower red up to the middle of the violet, the thermal rays become gradually weaker until they have no effect; (3) from the lower red to the extreme violet, they cause luminous impressions, which reach their greatest intensity in the yellow; and (4) from about the end of the yellow to far beyond the extreme violet, the rays have gradually a less and less luminous effect, but they have the power of exciting such chemical changes as are produced in photography. In general terms, therefore, the lower end of the spectrum may be called thermal, the middle luminous, and the upper actinic or chemical; but the three merge into and overlap one another. It may be observed that the number of vibrations in the extreme violet is not double that of the low red, so that the sensibility of the eye to vibrations of light does not range through an octave. The ultra-violet rays may act on the retina in certain conditions, as when they are reflected by a solution of sulphate of quinine, constituting the phenomenon of fluorescence. Far above the violet are the Röntgen radiations and probably others.

2. OPTICAL ARRANGEMENTS OF THE EYE

1. *General.*—When light traverses any homogeneous transparent medium, such as the air, it passes on in a straight course with a certain velocity; but if it meet with any other transparent body of a different density, part of it is reflected or returned to the first medium; whilst the remainder is propagated through the second medium in a different direction and with a different velocity. Thus we may account for the phenomena of reflection of light (*q.v.*) and of refraction (*q.v.*). Let *ab*, in fig. 1, be a plane surface of some transparent substance, say a sheet of glass; a ray, *cd*, perpendicular to the surface, will pass through without refraction; but an oblique ray, *ef*, will be sent in the direction *eh*. If the ray *eh* had passed from a dense into a rarer medium, then the direction would have been *eg*. It might also be shown that the sine of the angle of incidence always bears a certain ratio to the sine of the angle of refraction; this ratio is termed the *index of refraction*. Thus, if a ray pass from air into water, the sine of the angle of incidence will have to the sine of the angle of the refraction the ratio of 4:3, or $\frac{4}{3}$.

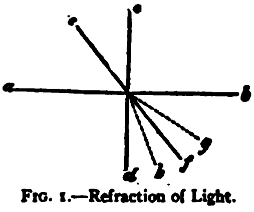

FIG. 1.—Refraction of Light.

Before a ray of light can reach the retina, it must pass through a number of transparent and refractive surfaces. The eye is a nearly spherical organ, formed of transparent parts situated behind each other, and surrounded by various membranous structures, the anterior part of which is also transparent. The transparent parts are—(1) the *cornea*; (2) the *aqueous humour*, found in the anterior chamber of the eye; (3) the *crystalline lens*, formed by a transparent convex body, the anterior surface of which is less convex than the posterior; and (4) the *vitreous humour*, filling the posterior chamber of the eye. The ray must therefore traverse the cornea, aqueous humour, lens and vitreous humour. As the two surfaces of the cornea are parallel, the rays practically suffer no deviation in passing through that structure, but they are bent or refracted during their transmission through the other media.

From the optical point of view, the eye may be regarded as a *dioptric system* consisting of various refractive media. In such a system, as shown by K. F. Gauss, there are six cardinal points, which have a certain relation to each other. These are—

(1) *Two focal points*: every ray passing through the *first* focal point becomes, after its refraction, parallel to the axis, and every ray which before refraction is parallel to the axis passes after its refraction to the *second* focal point; (2) *two principal points*: every ray which passes through the first point before refraction passes after refraction through the second, and every ray which passes through any point of a plane elevated on a perpendicular axis from the first principal point (the *first principal plane*) passes through the corresponding point of an analogous plane raised upon the axis at the second principal point (the *second principal plane*); and (3) *two nodal points*, which correspond to the optical centres of the two principal planes just alluded to. The distance of the first principal point from the first focal point is called the *anterior focal length*, and the term *posterior focal length* is applied to the distance of the posterior focal point from the second principal point. Listing has given the following measurements in millimetres from the centre of the cornea for the cardinal points in an ideal eye:—

Anterior focal point .	12·8326	First nodal point .	7·2420
Posterior focal point .	22·6470	Second nodal point .	7·6398
First principal point .	2·1746	Anterior focal length .	15·0072
Second principal point .	2·5724	Posterior focal length .	20·0746

A view of such an ideal eye is shown in fig. 2.

The remaining measurements of such an eye are as follows:—

Radii of Curvature

Of *anterior* face of cornea = 8 millimetres.
Of *anterior* face of lens = 10 "
Of *posterior* face of lens = 6 "

Indices of Refraction

Aqueous humour . . . . . W = 1·3379
Crystalline lens . . . . . JJ = 1·4545
Vitreous humour . . . . . W = 1·3379

The optical constants of the human eye may be still further simplified by assuming that the two principal points and the two

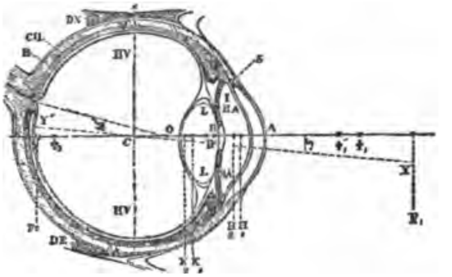

FIG. 2.—Transverse Section of an Ideal or Schematique Eye.

A, summit of cornea; SC, sclerotic; S, Schlemm's canal; CH. choroid; I, iris; M, ciliary muscle; R, retina; N, optic nerve; HA, aqueous humour; L, crystalline lens, the anterior of the double lines on its face showing its form during accommodation; HV, vitreous humour; DN, internal rectus muscle; DE, external rectus; YY′, principal optical axis; ΦΦ, visual axis, making an angle of 5° with the optical axis; C, centre of the ocular globe. *The cardinal points of Listing*: H_1H_2, principal points; K_1K_2, nodal points; F_1F_2, principal focal points. *The dioptric constants according to Giraud-Teulon*: H, principal points united; $\Phi_1\Phi_2$, principal foci during the repose of accommodation; $\Phi'_1\Phi'_2$, principal foci during the maximum of accommodation; O, fused nodal points.

nodal points respectively are identical. Thus we may construct a *reduced eye*, in which the principal point is 2·3448 mm. behind the cornea and the single nodal point is 1·4764 mm. in front of the posterior surface of the lens. The refracting surface, or lens, has a radius of 5 mm and is 3 mm. behind the cornea; and the index of refraction is that of the aqueous humour, or $\frac{103}{77}$, or 1·3379.

2. *The Formation of an Image on the Retina.*—This may be well illustrated with the aid of a photographic camera. If properly focused, an inverted image will be seen on the glass plate at the back of the camera. It may also be observed by bringing the eyeball of a rabbit near a candle flame. The action of a lens in forming an inverted image is illustrated by fig. 3, where the pencil of rays proceeding from *a* is brought to a focus at *a′*, and those from *b* at *b′*; consequently the image of *ab* is inverted as at *b′a′*. The three characteristic features of the retinal image are: (1) it is reversed; (2) it is sharp and well defined if it be accurately focused on the retina; and (3) its size depends on the visual angle. If we look at a distant object, say a star, the rays reaching the eye are parallel, and in passing through the refractive media they are focused at the posterior focal point—that is, on the retina. A line from the luminous point on the retina passing through the nodal point is called the *line of direction*. If the luminous object be not nearer than, say, 60 yds. the image is still brought to a focus on the retina without any effort on the part of the eye. Within this distance, supposing the condition of the eye to be the same as in looking at a star, the image would be formed somewhat behind the posterior focal point, and the effect would be an indistinct impression on the retina. To obviate this, for near distances, accommodation, so as to adapt the eye, is effected by a mechanism to be afterwards described.

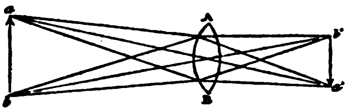

FIG. 3.—Inversion by Action of a Lens.

When rays, reflected from an object or coming from a luminous point, are not brought to an accurate focus on the retina, the image is not distinct in consequence of the formation of *circles of diffusion*, the production of which will be rendered evident by fig. 4. From the point A luminous rays enter t[illegible] of a cone, the kind of which will depend on the pupil. Thus it may be circular, or oval, or even triangular. If the pencil is focused in front of the retina, as at *d*, or behind it as at *f*, or, in other words, if the retina, in place of being at F, be in the positions G or H, there will be a luminous circle or a luminous triangular space, and many elements of the retina will be affected. The size of these diffusion circles depends on the distance from the retina of the point where the rays are focused: the greater the distance, the more extended will be the diffusion circle. Its size will also be affected by the greater or less diameter of the pupil. Circles of diffusion may be studied by the following experiment, called the experiment of Scheiner:—

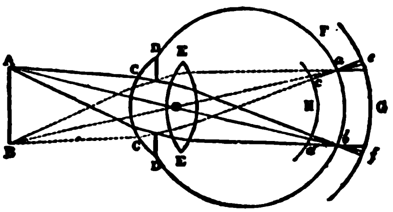

FIG. 4.—Formation of Circles of Diffusion.

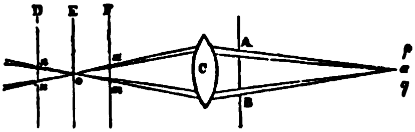

FIG. 5.—Diagram illustrating the Experiment of Scheiner.

Let C be a lens, and DEF be screens placed behind it. Hold in front of the lens a card perforated by two holes A and B, and allow rays from a luminous point *a* to pass through these holes. The point *o* on the screen E will be the focus of the rays emanating from *a*; if *a* were removed farther from the lens, the focus would be on F, and if it were brought near to C, the focus would then be on D. The screens F and D show two images on the point *a*. If, then, we close the upper opening in AB, the *upper* image *m* on F and the *lower* image *n* on D disappear. Suppose now that the retina be substituted for the screens D and F, the contrary will take place, in consequence of the reversal of the retinal image. If the eye be placed at *o*, only one image will be seen; but if it be placed either in the plane of F or D, then two images will be seen, as at *mm*, or *nn*; consequently, in either of these planes there will be circles of diffusion and indistinctness, and only in the plane E will there be sharp definition of the image.

To understand the formation of an image on the retina, suppose a line drawn from each of its two extremities to the nodal point and continued onwards to the retina, as in fig. 6, where the visual angle is *x*. It is evident that its size will depend on the size of the object and the distance of the object from the eye. Thus, also, objects of different sizes, *c*, *d*, *e* in fig. 6, may be included in the same visual angle, as they are at different distances from the eye. The size of the retinal image may be calculated if we know the size of the object, its distance from the nodal point *o*, and the distance of the nodal point from the posterior focus. Let A be the size of the object, B its distance from the nodal point, and C the distance of *o* from the retina, or 15 mm.; then the size of the retinal image $x=(A+15)/B$. The smallest visual angle in which two distinct points may be observed is 60 seconds; below this, the two sensations fuse into one; and the size of the retinal image

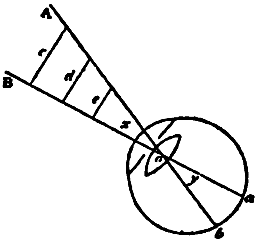

FIG. 6.—The Visual Angle.

corresponding to this angle is ·004 mm., nearly the diameter of a single retinal rod or cone. Two objects, therefore, included in a visual angle of less than 60 seconds, appear as one point. A small visual angle is in most eyes a condition of sharpness of definition. With a large angle, objects appear less sharply marked. Acuteness is determined by a few retinal elements, or even only one, being affected. A very minute image, if thrown on a single retinal element, is apparently sufficient to excite it. Thus it is possible to see a brilliant point in an angle even so small as $\frac{1}{4}$ of a second, and a sharp eye can see a body the $\frac{1}{36}$th of a line in diameter—that is, about the $\frac{1}{432}$th part of an inch.

3. *The Optical Defects of the Eye.*—As an optical instrument, the eye is defective; but from habit, and want of attention, its defects are not appreciated, and consequently they have little or no influence on our sensations. These defects are chiefly of two kinds—(1) those due to the curvature of the refractive surfaces, and (2) those due to the dispersion of light by the refractive media.

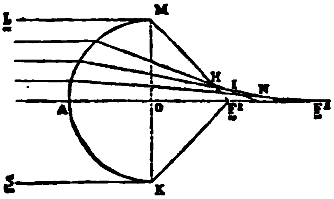

FIG. 7.—Spherical Aberration.

(*a*) *Aberration of Sphericity.*—Suppose, as in fig. 7, M A K to be a refractive surface on which parallel rays from L to S impinge, it will be seen that those rays passing near the circumference are brought to a focus at F¹, and those passing near the centre at F²—intermediate rays being focused at N. Thus on the portion of the axis between F¹ and F² there will be a series of focal points, and the effect will be a blurred and bent image. In the eye this defect is to a large extent corrected by the following arrangements: (1) the iris cuts off the outer and more strongly refracted rays; (2) the curvature of the cornea is more ellipsoidal than spherical, and consequently those farthest from the axis are least deviated; (3) the anterior and posterior curvatures of the lens are such that the one corrects, to a certain extent, the action of the other; and (4) the structure of the lens is such that its power of refraction diminishes from the centre to the circumference, and consequently the rays farthest from the axis are less refracted.

(*b*) *Astigmatism.*—Another defect of the eye is due to different meridians having different degrees of curvature. This defect is known as *astigmatism*. It may be thus detected. Draw on a sheet of white paper a vertical and a horizontal line with ink, crossing at a right angle; at the point of distinct vision, it will be found impossible to see the lines with equal distinctness at the same time; to see the horizontal line distinctly the paper must be brought near the eye, and removed from it to see the vertical. In the cornea the vertical meridian has generally a shorter radius of curvature, and is consequently more refractive than the horizontal. The meridians of the lens may also vary; but, as a rule, the asymmetry of the cornea is greater than that of the lens. The optical explanation of the defect will be understood with the aid of fig. 8. Thus, suppose the vertical meridian C A D to be more strongly curved than the horizontal F A E, the rays which fall on C A D will be brought to a focus G, and those falling on F A E at B. If we divide the pencil of rays at successive points, G, H, I, K, B, by a section perpendicular to A B, the various forms it would present at these points are seen in the figures underneath, so that if the eye were placed at G, it would see a horizontal line *a a'*; if at H, an ellipse with the long axis *a a'* parallel to A B; if at I, a circle; if at K, an ellipse, with the long axis, *b c*, at right angles to A B; and if at B, a vertical line *b c*. The degree of astigmatism is ascertained by measuring the difference of refraction in the two chief meridians; and the defect is corrected by the use of cylindrical glasses, the curvature of which, added to that of the minimum meridian, makes its focal length equal to that of the maximum meridian.

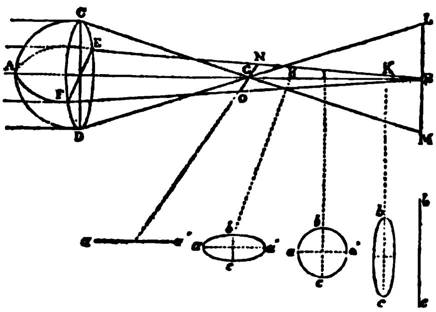

FIG. 8.—Diagram illustrating Astigmatism.

(*c*) *Aberration of Refrangibility.*—When a ray of white light traverses on a lens, the different rays composing it, being unequally refrangible, are dispersed: the violet rays (see fig. 9), the most refrangible, are brought to a focus at *e*, and the red rays, less refrangible, at *d*. If a screen were placed at *e*, a series of concentric coloured circles would be formed, the central being of a violet, and the circumference of a red colour. The reverse effect would be produced if the screen were placed at *d*. Imagine the retina in place of the screen in the two positions, the sensational effects would be those just mentioned. Under ordinary circumstances, the error of refrangibility due to the optical construction of the eye is not observed, as for vision at near distances the interval between the focal point of the red and violet rays is very small. If, however, we look at a candle flame through a bit of cobalt blue glass, which transmits only the red and blue rays, the flame may appear violet surrounded by blue, or blue surrounded by violet, according as we have accommodated the eye for different distances. Red surfaces always appear nearer than violet surfaces situated in the same plane, because the eye has to be accommodated more for the red than for the violet, and consequently we imagine them to be nearer. Again, if we contemplate red letters or designs on a violet ground the eye soon becomes fatigued, and the designs may appear to move.

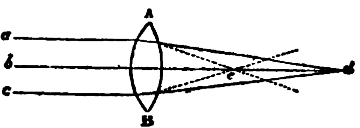

FIG. 9.—Diagram illustrating the Dispersion of Light by a Lens.

(*d*) *Defects due to Opacities, &c., in the Transparent Media.*—When small opaque particles exist in the transparent media, they may cast their shadow on the retina so as to give rise to images which are projected outwards by the mind into space, and thus appear to exist outside of the body. Such phenomena are termed entoptic. They may be of two kinds: (1) *extra-retinal*, that is, due to opaque or semi-transparent bodies in any of the refractive structures anterior to the retina, and presenting the appearance of drops, striae, lines, twisted bodies, forms of grotesque shape, or minute black dots dancing before the eye; and (2) *intra-retinal*, due to opacities, &c., in the layers of the retina, in front of Jacob's membrane. The intra-retinal may be produced in a normal eye in various ways. (1) Throw a strong beam of light on the edge of the sclerotic, and a curious branched figure will be seen, which is an image of the retinal vessels. The construction of these images, usually called *Purkinje's figures*, will be understood from fig. 10. Thus, in the figure to the left, the rays passing through the sclerotic at *b''*, in the direction *b'' c*, will throw a shadow of a vessel at *c* on the retina at *b'*, and this will appear as a dark line at B. If the light move from *b''* to *a''*, the retinal shadow will move from *b'* to *a'*, and the line in the field of vision will pass from B to A.

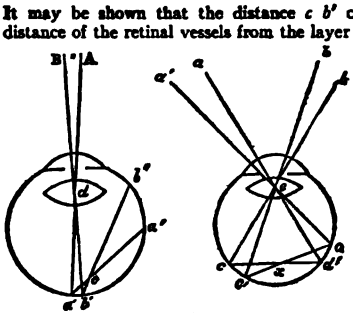

FIG. 10.—Purkinje's Figures.
In the eye to the right the illumination is through the sclerotic, and in the one to the left through the cornea.

It may be shown that the distance *c b'* corresponds to the distance of the retinal vessels from the layer of rods and cones. If the light enter the cornea, as in the figure to the right, and if the light be moved, the image will be displaced in the same direction as the light, if the movement does not extend beyond the middle of the cornea, but in the opposite direction to the light when the latter is moved up and down. Thus, if *a* be moved to *a'*, *d* will be moved to *d'*, the shadow on the retina from *c* to *c'*, and the image *b* to *b'*. If, on the other hand, *a* be moved above the plane of the paper, *d* will move below, consequently *c* will move above, and *b'* will appear to sink. (2) The retinal vessels may also be seen by looking at a strong light through a minute aperture, in front of which a rapid to-and-fro movement is made. Such experiments prove that the sensitive part of the retina is its deepest and most external layer (Jacob's membrane).

4. *Accommodation, or the Mechanism of Adjustment for Different Distances.*—When a camera is placed in front of an object, it is necessary to focus accurately in order to obtain a clear and distinct image on the sensitive plate. This may be done by moving either the lens or the sensitive plate backwards or forwards so as to have the posterior focal point of the lens corresponding with the sensitive plate. For similar reasons, a mechanism of adjustment, or accommodation for different distances, is necessary in the human eye. In the normal eye, any number of parallel rays, coming from a great distance, are focused on the retina. Such an eye is termed *emmetropic* (fig. 11, A). Another form of eye (B) may be such that parallel rays are brought to a focus *in front of* the retina. This form of eye is *myopic* or short-sighted, inasmuch as, for distinct vision, the object must be brought near the eye, so as to catch the divergent rays, which are then focused on the retina. A third form is seen in C, where the focal point, for ordinary distances, is *behind* the retina, and consequently the object must be held far off, so as to allow only the less divergent or parallel rays to reach the eye. This kind of eye is called *hypermetropic*, or far-sighted. For ordinary distances, at which objects must be seen distinctly in everyday life, the fault of the myopic eye may be corrected by the use of concave and of the hypermetropic by convex glasses. In the first case, the concave glass will move the posterior focal point a little farther back, and in the second the convex glass will bring it farther forwards; in both cases, however, the glasses may be so adjusted, both as regards refractive index and radius of curvature, as to bring the rays to a focus on the retina, and consequently secure distinct vision.

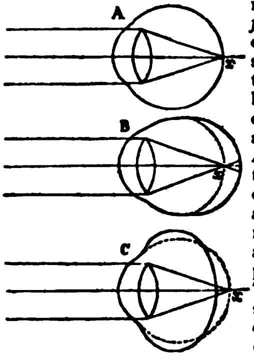

FIG. 11.
A, Emmetropic or normal eye; B, Myopic or short-sighted eye; C, Hypermetropic or long-sighted eye.

From any point 65 metres distant, rays may be regarded as almost parallel, and the point will be seen without any effort of accommodation. This point, either at this distance or in infinity, is called the *punctum remotum*, or the most distant point seen without accommodation. In the myopic eye it is much nearer, and for the hypermetropic there is really no such point, and accommodation is always necessary. If an object were brought too close to the eye for the refractive media to focus it on the retina, circles of diffusion would be formed, with the result of causing indistinctness of vision, unless the eye possessed some power of adapting itself to different distances. That the eye has some such power of accommodation is proved by the fact that, if we attempt to look through the meshes of a net at a distant object, we cannot see both the meshes and the object with equal distinctness at the same time. Again, if we look continuously at very near objects, the eye speedily becomes fatigued. Beyond a distance of 65 metres, no accommodation is necessary; but within it, the condition of the eye must be adapted to the diminished distance until we reach a point near the eye which may be regarded as the limit of visibility for near objects. This point, called the *punctum proximum*, is usually 12 centimetres (or 4·8 inches) from the eye. The range of accommodation is thus from the *punctum remotum* to the *punctum proximum*.

The mechanism of accommodation has been much disputed, but there can be no doubt it is chiefly effected by a change in the curvature of the anterior surface of the crystalline lens. If we hold a lighted candle in front and a little to the side of an eye to be examined, three reflections may be seen in the eye, as represented in fig. 12. The first, *a*, is erect, large and bright, from the anterior surface of the cornea; the second, *b*, also erect, but dim, from the anterior surface of the crystalline lens; and the third, *c*, inverted, and very dim, from the posterior surface of the lens, or perhaps the concave surface of the vitreous humour to which the convex surface of the lens is adapted. Suppose the three images to be in the position shown in the figure for distant vision, it will be found that the middle image *b* moves towards *a*, on looking at a *near* object. The change is due to an alteration of the curvature of the lens, as shown in fig. 13. The changes occurring during accommodation are: (1) the curvature of the anterior surface of the crystalline lens increases, and may pass from 10 to 6 mm.; (2) the pupil contracts; and (3) the intraocular pressure increases in the posterior part of the eye. An explanation of the increased curvature of the anterior surface of the lens during accommodation has been thus given by H. von Helmholtz. In the normal condition, that is, for the emmetropic eye, the crystalline lens is flattened anteriorly by the pressure of the anterior layer of the capsule; during accommodation, the radiating fibres of the ciliary muscles pull the ciliary processes forward, thus relieving the tension of the anterior layer of the capsule, and the lens at once bulges forward by its elasticity.

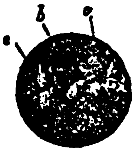

FIG. 12.—Reflected Images in the Eye.

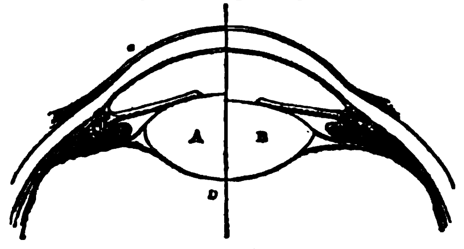

FIG. 13.—Mechanism of Accommodation.
A, The lens during accommodation, showing its anterior surface advanced; B, The lens as for distant vision; C, Position of the ciliary muscle.

By this mechanism the radius of curvature of the anterior surface of the lens, as the eye accommodates from the far to the near point, may shorten from 10 mm. to 6 mm. The ciliary muscle, however, contains two sets of fibres, the longitudinal or meridional, which run from before backwards, and the circular or equatorial (Müller's muscle), which run, as their name indicates, around the band of longitudinal fibres forming the muscle. Direct observation on the eye of an animal immediately after death shows that stimulation of the ciliary nerves actually causes a forward movement of the ciliary processes, and there can be little doubt that the explanation above given applies to man, probably most mammals, and to birds and most reptiles. In birds, which are remarkable for acuteness of vision, the mechanism is somewhat peculiar. In them the fibres of the ciliary muscle have a strong attachment posteriorly, and when these contract they pull back the inner posterior layers of the cornea, and thus relax that part of the ciliary zone called the ligamentum pectinatum. In a state of rest this structure in the bird's eye is tense, but in accommodation it becomes relaxed. Thus by a somewhat different mechanism in the bird, accommodation consists in allowing the anterior surface of the lens to become more and more convex. In reptiles generally the mechanism resembles that of the bird; but it is said that in snakes and amphibia there is a movement forwards of the lens as a whole, so as to catch rays at a less divergent angle. When the eye is directed to a distant object, such as a star, the mechanism of accommodation is at rest in mammals, birds, reptiles and amphibia, but in fishes and cephalopods the eye at rest is normally adjusted for near vision. Consequently accommodation in the latter is brought about by a mechanism that carries the lens as a whole backwards. There is still some difficulty in explaining the action of the equatorial (circular) fibres. Some have found that the increased convexity of the anterior surface of the lens takes place only in the central portions of the lens, and that the circumferential part of the lens is actually flattened, presumably by the contraction of the equatorial fibres. Seeing, however, that the central part of the lens is the portion used in vision, as the pupil contracts during accommodation, a flattening of the margins of the lens can have no optical effect. Further, another explanation can be offered of the flattening. As just stated, during accommodation the pupil contracts, and the pupillary edge of the iris, thinned out, spreads over the anterior surface of the capsule of the lens, which it actually touches, and this part of the iris, along with the more convex central part of the lens, bulges into the anterior chamber, and must thus displace some of the aqueous humour. To make room for this, however, the circumferential part of the iris, related to the ligamentum pectinatum, moves backwards very slightly, while the flattening of the circumferential part of the lens facilitates this movement.

Helmholtz succeeded in measuring with accuracy the sizes of these reflected images by means of an instrument termed an *ophthalmometer*, the construction of which is based on the following optical principles: When a luminous ray traverses a plate of glass having parallel sides, if it fall perpendicular to the plane of the plate, it will pass through without deviation; but if it fall obliquely on the plate (as shown in the left-hand diagram in fig. 14) it undergoes a lateral deviation, but in a direction parallel to that of the incident ray, so that to an eye placed behind the glass plate, at the lower A, the luminous point, upper A, would be in the direction of the prolonged emergent ray, and thus there would be an apparent lateral displacement of the point, the amount of which would increase with the obliquity of the incident ray. If, instead of one plate, we take two plates of equal thickness, one placed above the other, two images will be seen, and by turning the one plate with reference to the other, each image may be displaced a little to one side. The instrument consists of a small telescope (fig. 14) T, the axis of which coincides with the plane separating the two glass plates C C and B B. When we look at an object X Y, and turn the plates till we see two objects *xy*, *xy* touching each other, the size of the image X Y will be equal to the distance the one object is displaced to the one side and the other object to the other side. Having thus measured the size of the reflection, it is not difficult, if we know the size of the object reflecting the light and its distance from the eye, to calculate the radius of the curved surface (Appendix to M'Kendrick's *Outlines of Physiology*, 1878). The general result is that, in accommodation for near objects, the middle reflected image becomes smaller, and the radius of curvature of the anterior surface of the lens becomes shorter.

5. *Absorption and Reflection of Luminous Rays from the Eye.*—When light enters the eye, it is partly absorbed by the black pigment of the choroid and partly reflected. The reflected rays are returned through the pupil, not only following the same direction as the rays entering the eye, but uniting to form an image at the same point in space as the luminous object. The pupil of an eye appears black to an observer, because the eye of the observer does not receive any of those reflected rays. If, however, we strongly illuminate the retina, and hold a lens in front of the eye, so as to bring the reflected rays to a focus nearer the eye, then a virtual and erect, or a real and reversed, image of the retina will be seen. Such is the principle of the ophthalmoscope, invented by Helmholtz in 1851. Eyes deficient in pigment, as in albinos, appear luminous, reflecting light of a red or pink colour; but if we place in front of such an eye a card perforated by a round hole of the diameter of the pupil, the hole will appear quite dark, like the pupil of an ordinary eye. In many animals a portion of the fundus of the eyeball has no pigment, and presents an iridescent appearance. This is called a *tapetum*. It probably renders the eye more sensitive to light of feeble intensity.

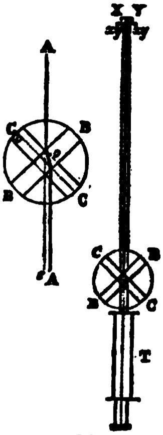

Fig. 14.—Diagrammatic View of the Ophthalmometer of Helmholtz.

6. *Functions of the Iris.*—The iris constitutes a diaphragm which regulates the amount of light entering the eyeball. The aperture in the centre, the *pupil*, may be dilated by contraction of a system of radiating fibres of involuntary muscle, or contracted by the action of another system of fibres, forming a sphincter, at the margin of the pupil. The radiating fibres are controlled by the sympathetic, while those of the circular set are excited by the third cranial nerve. The variations in diameter of the pupil are determined by the greater or less intensity of the light acting on the retina. A strong light causes contraction of the pupil; with light of less intensity, the pupil will dilate. In the human being, a strong light acting on one eye will often cause contraction of the pupil, not only in the eye affected, but in the other eye. These facts indicate that the phenomenon is of the nature of a reflex action, in which the fibres of the optic nerve act as sensory conductors to a centre in the encephalon, whence influences emanate which affect the pupil. It has been ascertained that if the fibres of the optic nerve be affected in any way, contraction of the pupil follows. The centre is in the anterior pair of the corpora quadrigemina, as destruction of these bodies causes immobility of the pupil. On the other hand, the dilating fibres are derived from the sympathetic; and it has been shown that they come from the lower part of the cervical, and upper part of the dorsal, region of the cord. But the iris seems to be directly susceptible to the action of light. Thus the pupil of the eye of a dead animal will contract if exposed to light for several hours, whereas, if the eye on the opposite side be covered, its pupil will remain widely dilated, as at the moment of death.

The pupil *contracts* under the influence—(1) of an increased intensity of light; (2) of the effort of accommodation for near objects; (3) of a strong convergence of the two eyes; and (4) of such active substances as nicotine, morphia and physostigmine; and it *dilates* under the influence—(1) of a diminished intensity of light; (2) of vision of distant objects; (3) of a strong excitation of any sensory nerve; (4) of dyspnoea; and (5) of such substances as atropine and hyoscyamine. The chief function of the iris is to so moderate the amount of light entering the eye as to secure sharpness of definition of the retinal image. This it accomplishes by (1) diminishing the amount of light reflected from near objects, by cutting off the more divergent rays and admitting only those approaching a parallel direction, which, in a normal eye, are focused on the retina; and (2) preventing the error of spherical aberration by cutting off divergent rays which would otherwise impinge near the margins of the lens, and would thus be brought to a focus in front of the retina.

3. Specific Influence of Light on the Retina

The retina is the terminal organ of vision, and all the parts in front of it are optical arrangements for securing that an image will be accurately focused upon it. The natural stimulus of the retina is light. It is often said that it may be excited by mechanical and electrical stimuli; but such an observation really applies to the stimulation of the fibres of the optic nerve. It is well known that such stimuli applied to the optic nerve behind the eye produce always a luminous impression; but there is no proof that the retina, strictly speaking, is similarly affected. Pressure or electrical currents may act on the eyeball, but in doing so they not only affect the retina, consisting of its various layers and of Jacob's membrane, but also the fibres of the optic nerve. It is possible that the retina, by which is meant all the layers except those on its surface formed by the fibres of the optic nerve, is affected only by its *specific* kind of stimulus, light. This stimulus so affects the terminal apparatus as to set up actions which in turn stimulate the optic fibres. The next question naturally is—What is the specific action of light on the retina? A. F. Holmgren, and also J. Dewar and J. G. M'Kendrick, have shown that when light falls on the retina it excites a variation of the electrical current obtained from the eye by placing it on the cushions of a sensitive galvanometer. One electrode touches the vertex of the cornea and the other the back of the eyeball. The corneal vertex is positive to the back of the eye, or to the transverse section of the optic nerve. Consequently a current passes through the galvanometer from the cornea to the back. Then the *impact* of light causes an increase in the natural electrical current—during the *continuance* of light the current diminishes slowly and falls in amount even below what it was before the impact—and the *withdrawal* of light is followed by a rebound, or second increase, after which the current falls in strength, as if the eye suffered from fatigue.

It was also observed in this research that the amount of electrical variation produced by light of various intensities corresponded pretty closely to the results expressed by G. T. Fechner's law, which regulates the relation between the stimulus and the sensational effect in sensory impressions. This law is, that the sensational effect does not increase proportionally to the stimulus, but as the logarithm of the stimulus. Thus, supposing the stimulus to be 10, 100 or 1000 times increased, the sensational effect will not be 10, 100 or 1000 times, but only 1, 2 and 3 times greater.

Such electrical phenomena probably result either from thermal or chemical changes in the retina. Light produces chemical changes in the retina. If a frog be killed in the dark, and if its retina be exposed only to *yellow* rays, the retina has peculiar purple colour, which is at once destroyed by exposure to ordinary light. The purple matter apparently is decomposed by light. An image may actually be *fixed* on the retina by plunging the eye into a solution of alum immediately after death. Thus it would appear that light affects the purple-matter of the retina, and the result of this chemical change is to stimulate the optic filaments; if the action be arrested, we may have a picture on the retina, but if it be not arrested, the picture is evanescent; the purple-matter is used up, and new matter of a similar kind is formed to take its place. The [illegible] might, therefore, be compared to a sensitive photographic [illegible] the sensitive matter quickly removed and replaced; [illegible] that the electrical expression of the chemical [illegible] has been above described.

(*a*) *Phosgenes.*—Luminous impressions may also be produced by pressure on the eyeball. Such impressions, termed *phosgenes*, usually appear as a luminous centre surrounded by coloured or dark rings. Sometimes they seem to be small bright scintillations of various forms. Similar appearances may be observed at the moments of opening or of closing a strong electrical current transmitted through the eyeball.

(*b*) *The Retina's Proper Light.*—The visual field, even when the eyelids are closed in a dark room, is not absolutely dark. There is a sensation of faint luminosity which may at one moment be brighter than at another. This is often termed the *proper light of the retina*, and it indicates a molecular change, even in darkness.

(*c*) *The Excitability of the Retina.*—The retina is not equally excitable in all its parts. At the entrance of the optic nerve, as was shown by E. Mariotte in 1668, there is no sensibility to light. Hence, this part of the retina is called the *blind spot*. If we shut the left eye, fix the right eye on the cross seen in fig. 15, and move the book towards and away from the eye, a position will be found when the round spot disappears, that is when its image falls on the entrance of the optic nerve. There is also complete insensibility to colours at that spot. The diameter of the optic papilla is about 1·8 mm., giving an angle of 6°; this angle determines the apparent size of the blind spot in the visual field, and it is sufficiently large to cause a human figure to disappear at a distance of two metres.

Fig. 15.—Diagram for the Study of the *Blind Spot*.

The *yellow spot* in the centre of the retina is the most sensitive to light, and it is chiefly employed in direct vision. Thus, if we fix the eye on a word in the centre of this line, it is distinctly and sharply seen, but the words towards each end of the line are vague. If we wish to see each word distinctly, we "run the eye" along the line—that is, we bring each successive word on the yellow spot. This spot has a horizontal diameter of 2 mm., and a vertical diameter of ·8mm.; and it corresponds in the visual field to an angle of from 2 to 4°. The fossa in the spot, where there are no retinal elements except Jacob's membrane, consisting here entirely of cones (2000 in number), is the area of most acute sensibility. This fossa has a diameter of only ·2 mm., which makes the angle ten times smaller. Thus the field of distinct vision is extremely limited, and at the same moment we see only a very small portion of the visual field. Images of external objects are brought successively on this minute sensitive area, and the different sensations seem to be fused together, so that we are conscious of the object as a whole.

Towards the anterior margin of the retina sensitiveness to light becomes diminished; but the diminution is not uniform, and it varies in different persons.

(*d*) *Duration and Persistence of Retinal Impressions.*—To excite the retina, a feeble stimulus must act for a certain time; when the retina is excited, the impression lasts after the cessation of the stimulus; but if the stimulus be strong, it may be of very short duration. Thus the duration of an electrical spark is extremely short, but the impression on the retina is so powerful, and remains so long, as to make the spark visible. If we rotate a disk having white and black sectors we see continuous dark bands. Even if we paint on the face of the disk a single large round red *spot*, and rotate rapidly, a continuous red *band* may be observed. Here the impressions of red on the same area of retina succeed each other so rapidly that before one disappears another is superadded, the result being a fusion of the successive impressions into one continuous sensation. This phenomenon is called the *persistence of retinal impressions*. An impression lasts on the retina from $\frac{1}{50}$ to $\frac{1}{10}$ of a second. The cinematograph owes its effects to persistence of retinal impressions.

(*e*) *The Phenomena of Irradiation.*—If we look at fig. 16, the white square in the black field appears to be larger than the black square in the white field, although both are of precisely the same size. This is due to *irradiation*. The borders of clear surfaces advance in the visual field and encroach on obscure surfaces. Probably, even with the most exact accommodation, diffusion images form round the image of a white surface on a black ground, forming a kind of penumbra, thus causing it to appear larger than it really is.

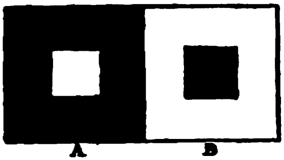

FIG. 16.—Illustrating the Effect of Irradiation.

(*f*) *Intensity of Light required to excite the Retina.*—Light must have a certain intensity to produce a luminous impression. It is impossible to fix the minimum intensity necessary, as the effect will depend, not only on the intensity of the stimulus, but on the degree of retinal excitability at the time. Thus, after the retina has been for some time in the dark, its excitability is increased; on the other hand, it is much diminished by fatigue. Aubert has stated that the minimum intensity is about 300 times less than that of the full moon. The sensibility of the eye to light is measured by the *photometer*.

(*g*) *Consecutive Retinal Images.*—Images which persist on the retina are either positive or negative. They are termed *positive* when the bright and obscure parts of the image are the same as the bright and obscure parts of the object; and *negative* when the bright parts of the object are dark in the image, and vice versa. Positive images are strong and sharply marked when an intense light has acted for not less than ⅓ of a second. If the excitation be continued much longer, a negative and not a positive image will be seen. If, when the positive image is still visible, we look on a very brilliantly illuminated surface, a negative image appears. Negative images are seen with greatest intensity after a strong light has acted for a considerable time. These phenomena may be best studied when the retina is very excitable, as in the morning after a sound sleep. On awakening, if we look steadily *for an instant* at the window and then close the eyes, a *positive* image of the window will appear; if we then gaze fixedly at the window for one or two minutes, close the eyes two or three times, and then look at a dark part of the room, a *negative* image will be seen floating before us. The positive image is due to excitation of the retina, and the negative to fatigue. If we fatigue a small area of the retina with white light, and then allow a less intense light to fall on it, the fatigued area responds feebly, and consequently the object, such as the window-pane, appears to be dark.

4. SENSATIONS OF COLOUR

1. *General Statement.*—Colour (*q.v.*) is a special sensation excited by the action on the retina of rays of light of a definite wave-length. On the most likely hypothesis as to the physical nature of light, colour depends on the rate of vibration of the luminiferous aether, and white light is a compound of all the colours in definite proportion. When a surface reflects solar light into the eye without affecting this proportion, it is white, but if it absorbs all the light so as to reflect nothing, it appears to be black. If a body held between the eye and the sun transmits light unchanged, and is transparent, it is colourless, but if translucent it is white. If the medium transmits or reflects some rays and absorbs others, it is coloured. Thus, if a body absorbs all the rays of the spectrum but those which cause the sensation of green, we say the body is green in colour; but this green can only be perceived if the rays of light falling on the body contain rays having the special rate of vibration required for this special colour. For if the surface be illuminated by any other pure ray of the spectrum, say red, these red rays will be absorbed and the body will appear to be black. As a white surface reflects all the rays, in red light it will be seen to be red, and in a green light, green. Colour depends on the nature of the body and on the nature of the light falling on it, and a *sensation of colour* arises when the body reflects or transmits the special rays to the eye. If two rays of different rates of vibration, that is to say, of different colours, affect a surface of the retina at the same moment, the effects are fused together and we have the sensation of a third colour different from its cause. Thus, if red be removed from the solar spectrum, all the other colours combined cause a sensation of greenish yellow. Again red and violet give purple, and yellow and blue, white. Yellow and blue, however, only give white when pure spectral colours are mixed. It is well known that a mixture of yellow and blue *pigments* do not produce white, but green; but, as was explained by Helmholtz, this is because the blue pigment absorbs all the rays at the red end of the spectrum up to the green, while the yellow pigment absorbs all the rays at the violet end down to the green, and as the only rays reflected into the eye are the green rays, the substance appears green. Finally, if colours are painted on a disk in due proportions and in a proper order, the disk will, when quickly rotated, appear white, from the rapid fusion of colour effects.

When we examine a spectrum, we see a series of colours merging by insensible gradations the one into the other, thus:—red, orange, yellow, green, blue and violet. These are termed *simple* colours. If two or more coloured rays of the spectrum act simultaneously on the same spot of the retina, they may give rise to sensations of *mixed colours*. These mixed colours are of two kinds: (1) those which do not correspond to any colour in the spectrum, such as purple and white, and (2) those which do exist in the spectrum. White may be produced by a mixture of two simple colours, which are then said to be *complementary*. Thus, red and greenish blue, orange and cyanic blue, yellow and indigo blue, and greenish yellow and violet all produce white. Purple is produced by a mixture of red and violet, or red and bluish violet. The following table by Helmholtz shows the compound colours produced by mixing other colours:—

	Violet	Indigo blue	Cyanic blue	Greenish blue	Green	Yellowish green	Yellow.
Red	Purple	Deep rose	White rose	*White*	Whitish yellow	Golden yellow	Orange
Orange	Deep rose	White rose	*White*	Whitish yellow	Yellow	Yellow	
Yellow	White rose	*White*	Whitish green	Whitish green	Yellowish green		
Yellowish green	*White*	Green	Green	Green			
Green	Blue	Water blue	Greenish blue				
Greenish blue	Water blue	Water blue					
Cyanic blue	Indigo blue						

This table shows that if we mix two simple colours not so far separated in the spectrum as the complementary colours, the mixed colour contains more white as the interval between the colours employed is greater, and that if we mix two colours farther distant in the spectrum than the complementary colours, the mixture is whiter as the interval is smaller. By mixing more than two simple colours, no new colours are produced, but only different *shades* of colour.

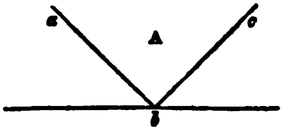

FIG. 17.—Form of Double Slit for the Partial Superposition of Two Spectra.

2. *Modes of Mixing Colour Sensations.*—Various methods haye been adopted for studying the effect of mixing colours.

(*a*) *By Superposing Two Spectra.*—This may be done in a simple way by having a slit in the form of the letter V (see fig. 17), of which the two portions *ab* and *bc* form a right angle; behind this slit is placed a vertical prism, and two spectra are obtained.

as seen in fig. 18, in which *bfea* is the spectrum of the slit *ab*, and *cefd* that of the slit *cd*; the coloured spectra are contained in the triangle *gef*, and, by arrangement, the effects of mixture of any two simple colours may be observed.

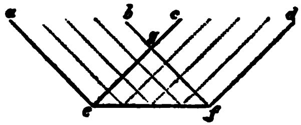

FIG. 18.—Diagram of Double Spectrum partially superposed.

(*b*) *By Method of Reflection.*—Place a red wafer on *b*, in fig. 19, and a blue wafer on *d*, and so angle a small glass plate *a* as to transmit to the eye a reflection of the blue wafer on *d* in the same line as the rays transmitted from the red wafer on *b*. The sensation will be that of purple; and by using wafers of different colours, many experiments may thus be performed.

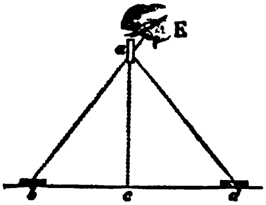

FIG. 19.—Diagram showing Lambert's Method of mixing Sensations of Colour.

(*c*) *By Rotating Disks which quickly superpose on the same Area of Retina the Impressions of Different Wave-lengths.*—Such disks may be constructed of cardboard, on which coloured sectors are painted, as shown in fig. 20, representing diagrammatically the arrangement of Sir Isaac Newton. The angles of the sectors were thus given by him:—

Red	60° 45·5′	Green	60° 45·5′
Orange	34° 10·5′	Blue	54° 41′
Yellow	54° 41′	Indigo	34° 10·5′
Violet	60° 45·5′		

With sectors of such a size, *white* will be produced on rotating the disk rapidly. This method has been carried out with great efficiency by the colour-top of J. Clerk-Maxwell. It is a flat top, on the surface of which disks of various colours may be placed. Dancer has added to it a method by which, even while the top is rotating rapidly and the sensation of a mixed colour is strongly perceived, the eye may be able to see the *simple* colours of which it is composed. This is done by placing on the handle of the top, a short distance above the coloured surface, a thin black disk, perforated by holes of various size and pattern, and weighted a little on one side. This disk vibrates to and fro rapidly, and breaks the continuity of the colour impression; and thus the constituent colours are readily seen.

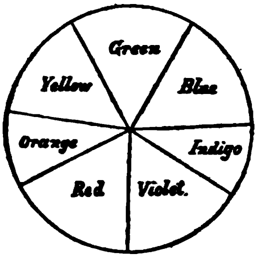

FIG. 20.—Diagram of the Colour Disk of Sir Isaac Newton.

3. *The Geometric Representation of Colours.*—Colours may be arranged in a linear series, as in the solar spectrum. Each point of the line corresponds to a determinate impression of colour; the line is not a straight line, as regards luminous effect, but is better represented by a curve, passing from the red to the violet. This curve might be represented as a circle in the circumference of which the various colours might be placed, in which case the complementary colours would be at the extremities of the same diameter. Sir Isaac Newton arranged the colours in the form of a triangle, as shown in fig. 21. If we place three of the spectral colours at three angles, thus—green, [illegible] sides of the triangle include the inter[illegible] spectrum, except purple.

[illegible] is white, consequently, from the inter[illegible] the complementary colours, the [illegible] RS and VS represent the amount of [illegible] to form white; the same holds good for the complementary colours; for example, for blue and red, the line SB = the amount of blue, and the line SR = the amount of red required to form white. Again, any point, say M, on the surface of the triangle, will represent a mixed colour, the composition of which may be obtained by mixing the three fundamental colours in the proportions represented by the length of the lines M to green, MV and MR. But the line VM passes on to the yellow Y; we may then replace the red and green by the yellow, in the proportion of the length of the line MY, and mix it with violet in the proportion of SV. The same colour would also be formed by mixing the amount MY of yellow with MS of white, or by the amount RM of red with the amount MD of greenish blue.

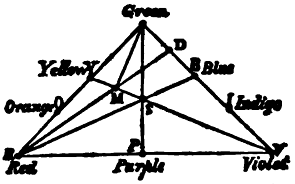

FIG. 21.—Geometrical Representation of the Relations of Colours as shown by Newton.

The following list shows characteristic complementary colours, with their wave-lengths (λ) in millionths of a millimetre:—

Red, λ 656.	Blue-green, λ 492.
Orange, λ 608.	Blue, λ 490.
Gold-yellow, λ 574.	Blue, λ 482.
Yellow, λ 567.	Indigo-blue, λ 464.
Greenish yellow, λ 564.	Violet, λ 433.

By combining colours at opposite ends of the spectrum, the effect of the intermediate colours may be produced; but the lowest and the highest, red and violet, cannot thus be formed. These are therefore fundamental or primary colours, colours that cannot be produced by the fusion of other colours. If now to red and violet we add green, which has a rate of vibration about midway between red and violet, we obtain a sensation of white. Red, green and violet are therefore the three fundamental colours.

4. *Physiological Characters of Colours.*—Colour physiologically is a sensation, and it therefore does not depend only on the physical stimulus of light, but also on the part of the retina affected. The power of distinguishing colours is greatest when they fall on, or immediately around, the yellow spot, where the number of cones is greatest. In these regions more than two hundred different tints of colour may be distinguished. Outside of this area lies a middle zone, where fewer tints are perceived, mostly confined to shades of yellow and blue. If intense coloured stimuli are employed, colours may be perceived even to the margin of the periphery of the retina, but with weak stimuli coloured objects may seem to be black, or dark like shadows. In passing a colour from the periphery to the centre of the yellow spot, remarkable changes in hue may be observed. Orange is first grey, then yellow, and it only appears as orange when it enters the zone sensitive to red. Purple and bluish green are blue at the periphery, and only show the true tint in the central region. Four tints have been found which do not thus change: a red obtained by adding to the red of the spectrum a little blue (a purple), a yellow of 574·5 λ, a green of 495 λ and a blue of 471 λ.

The question now arises, How can we perceive differences in colour? We might suppose a molecular vibration to be set up in the nerve-endings synchronous with the undulations of the luminiferous aether, without any change in the chemical constitution of the sensory surface, and we might suppose that where various series of waves in the aether corresponding to different colours act together, these may be fused together, or to interfere so as to give rise to a vibration of modified form or rate that corresponded in some way to the sensation. Or, to adopt another line of thought, we might suppose that the effect of different rays (rays differing in frequency of vibration and in physiological effect) is to promote or retard chemical changes in the sensory surface, "which again so affect the sensory nerves as to give rise to differing states in the nerves and the nerve centres, with differing concomitant sensations." The former of these thoughts is the foundation of the Young-Helmholtz theory, while the latter is applicable to the theory of E. Hering.

5. *Theories of Colour-Perception.*—A theory widely accepted by physicists was first proposed by Thomas Young and afterwards revived by Helmholtz. It is based on the assumption that three kinds of nervous elements exist in the retina, the excitation of which give respectively sensations of red, green and violet. These may be regarded as fundamental sensations. Homogeneous light excites all three, but with different intensities according to the length of the wave. Thus long waves will excite most strongly fibres sensitive to red, medium waves those sensitive to green, and short waves those sensitive to violet. Fig. 22 shows graphically the irritability of the three sets of fibres. Helmholtz thus applies the theory:—

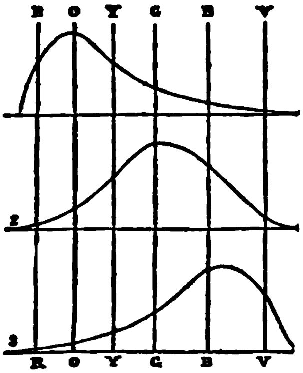

Fig. 22.—Diagram showing the Irritability of the Three Kinds of Retinal Elements.

1, red; 2, green; 3, violet. R, O, Y, G, B, V, initial letters of colours.

"1. Red excites strongly the fibres sensitive to red and feebly the other two—sensation: *Red.*
2. Yellow excites moderately the fibres sensitive to red and green, feebly the violet—sensation: *Yellow.*
3. Green excites strongly the green, feebly the other two—sensation: *Green.*
4. Blue excites moderately the fibres sensitive to green and violet, and feebly the red—sensation: *Blue.*
5. Violet excites strongly the fibres sensitive to violet, and feebly the other two—sensation: *Violet.*
6. When the excitation is nearly equal for the three kinds of fibres, then the sensation is *White.*"

The Young-Helmholtz theory explains the appearance of the consecutive coloured images. Suppose, for example, that we look at a red object for a considerable time; the retinal elements sensitive to red become fatigued. Then (1) if the eye be kept in *darkness*, the fibres affected by red being fatigued do not act so as to give a sensation of red; those of green and of violet have been less excited, and this excitation is sufficient to give the sensation of pale greenish blue; (2) if the eye be fixed on a *white* surface, the red fibres, being fatigued, are not excited by the red rays contained in the white light; on the contrary, the green and violet fibres are strongly excited, and the consequence is that we have an intense complementary image; (3) if we look at a *bluish green* surface, the complementary of red, the effect will be to excite still more strongly the green and violet fibres, and consequently to have a still more intense complementary image; (4) if we regard a *red* surface, the primitive colour, the red fibres are little affected in consequence of being fatigued, the green and violet fibres will be only feebly excited, and therefore only a very feeble complementary image will be seen; and (5) if we look at a surface of a *different* colour altogether, this colour may combine with that of the consecutive image, and produce a mixed colour, thus, on a yellow surface, we will see an image of an orange colour.

Every colour has three qualities: (1) *hue*, or tint, such as red, green, violet; (2) *degree of saturation*, or purity, according to the amount of white mixed with the tint, as when we recognize a red or green as pale or deep; and (3) *intensity*, or luminosity, or brightness as when we designate the tint of a red rose as dark or bright. Two colours are identical when they agree as to these three qualities. Observation shows, however, that out of one hundred men ninety-six agree in identifying or in discriminating colours, while the remaining four show defective appreciation. These latter are called *colour-blind*. This defect is about ten times less frequent in women. Colour-blindness is congenital and incurable, and it is due to an unknown condition of the retina or nerve centres, or both, and must be distinguished from transient colour-blindness, sometimes caused by the excessive use of tobacco and by disease. When caused by tobacco, the sensation of blue is the last to disappear Absolute inability to distinguish colour is rare, if it really exists; in some rare cases there is only one colour sensation; and in a few cases the colour-blind fails to distinguish blue from green, or there is insensibility to violet. Daltonism, or red-green blindness, of which there are two varieties, the red-blind and the green-blind, is the more common defect. Red appears to a red-blind person as a dark green or greenish yellow, yellow and orange as dirty green, and green is green and brighter than the green of the yellow and orange. To a green-blind person red appears as dark yellow, yellow is yellow, except a little lighter in shade than the red he calls dark yellow, and green is pale yellow.

According to the Young-Helmholtz theory, there are three fundamental colour sensations, red, green and violet, by the combination of which all other colours may be formed, and it is assumed that there exist in the retina three kinds of nerve elements, each of which is specially responsive to the stimulus of waves of a certain frequency corresponding to one colour, and much less so to waves of other frequencies and other colours. If waves corresponding to pure red alone act on the retina, only the corresponding nerve element for red would be excited, and so with green and violet. But if waves of different frequencies are mixed (corresponding to a mixture of colours), then the nerve elements will be set in action in proportion to the amount and intensity of the constituent excitant rays in the colour. Thus if all the nerve elements were simultaneously set in action, the sensation is that of white light; if that corresponding to red and green, the resultant sensation will be orange or yellow; if mainly the green and violet, the sensation will be blue and indigo. Then red-blindness may be explained by supposing that the elements corresponding to the sensation of red are absent; and green-blindness, to the absence of the elements sensitive to green. If to a red-blind person the green and violet are equal, and when to a green-blind person the red and violet are equal, they may have sensations which to them constitute white, while to the normal eye the sensation is not white, but bluish green in the one case and green in the other. In each case, to the normal eye, the sensation of green has been added to the sensations of red and blue. It will be evident, also, that whiteness to the colour-blind eye cannot be the same as whiteness to the normal eye. No doubt this theory explains certain phenomena of colour-blindness, of after-coloured images, and of contrast of colour, but it is open to various objections. It has no anatomical basis, as it has been found to be impossible to demonstrate the existence of three kinds of nerve elements, or retinal elements, corresponding to the three fundamental colour sensations. Why should red to a colour-blind person give rise to a sensation of something like green, or why should it give rise to a sensation at all ? Again, and as already stated, in cases of colour-blindness due to tobacco or to disease, only blue may be seen, while it is said that the rest of the spectrum seems to be white. It is difficult to understand how *white* can be the sensation if the sensations of red and green are lost. On the other hand, it may be argued that such colour-blind eyes do not really see white as seen by a normal person, and that they only have a sensation which they have been accustomed to call white. According to this theory, we never actually experience the primary sensations. Thus we never see primary red, as the sensation is more or less mixed with primary green, and even with primary blue (violet). So with regard to primary green and primary violet. Helmholtz, in his last work on the subject, adopted as the three primary colours a red bluer than spectral red, (*a*) a green lying between 540 λ and 560 λ (*b*, like the green of vegetation), and a blue at about 470 λ (*c*, like ultramarine), all, however, much more highly saturated than any colours existing in the spectrum.

In *Handbuch der Physiologischen Optik* (Hamburg and Leipzig, 1896) Helmholtz pointed out that luminosity or brightness plays a more important part in colour perception than has been supposed. Each spectral colour is composed of certain proportions of these fundamental colours, or, to put it in another way, a combination of two of them added to a certain amount of white.

Hering's theory proceeds on the assumption of chemical changes in the retina under the influence of light. It also assumes that certain fundamental sensations are excited by light or occur during the absence of light. These fundamental sensations are white, black, red, yellow, green and blue. They are arranged in pairs, the one colour in each pair being, in a sense, complementary to the other, as white to black, red to green, and yellow to blue. Hering also supposes that when rays of a certain wave-length fall on visual substances assumed to exist in the retina, destructive or, as it is termed, katabolic changes occur, while rays having other wave-lengths cause constructive or anabolic changes. Suppose that in a red-green substance katabolic and anabolic changes occur in equal amount, there may be no sensation, but when waves of a certain wave-length or frequency cause katabolic changes in excess, there will be a sensation of red, while shorter waves and of greater frequency, by exciting anabolic changes, will cause a sensation of green. In like manner, katabolism of a yellow-blue visual substance gives rise to a sensation we call yellow, while anabolism by shorter waves acting on the same substance, causes the sensation of blue. Again, katabolism of a white-black visual substance gives white, while anabolism, in the dark, gives rise to the sensation of blackness. Thus blackness is a sensation as well as whiteness, and the members of each pair are antagonistic as well as complementary. In the red end of the spectrum the rays cause katabolism of the red-green substance, while they have no effect on the yellow-blue substance. Here the sensation is red. The shorter waves of the spectral yellow cause katabolism of the yellow-blue material, while katabolism and anabolism of the red-green substance are here equal. Here the sensation is yellow. Still shorter waves, corresponding to green, now cause anabolism of the red-green substance, while their influence on the yellow-blue substance, being equal in amount as regards katabolism and anabolism, is neutral. Here the sensation is green. Short waves of the blue of the spectrum cause anabolism of the yellow-blue material, and as their action on the red-green matter is neutral, the sensation is blue. The very short waves at the blue end of the spectrum excite katabolism of the red-green substance, and thus give violet by adding red to blue. The sensation orange is experienced when there is excess of katabolism, and greenish blue when there is excess of anabolism in both substances. Again, when all the rays of the spectrum fall on the retina, katabolism and anabolism in the red-green and yellow-blue matters are equal and neutralize each other, but katabolism is great in the white-black substance, and we call the sensation white. Lastly, when no light falls on the retina, anabolic changes are going on and there is the sensation of black.

Hering's theory accounts satisfactorily for the formation of coloured after-images. Thus, if we suppose the retina to be stimulated by red light, katabolism takes place, and if the effect continues after withdrawal of the red stimulus, we have a positive after-image. Then anabolic changes occur under the influence of nutrition, and the effect is assisted by the anabolic effect of shorter wave-lengths, with the result that the negative after-image, green, is perceived. Perhaps the distinctive feature of Hering's theory is that white is an independent sensation, and not the secondary result of a mixture of primary sensations, as held by the Young-Helmholtz view. The greatest difficulty in the way of the acceptance of Hering's theory is with reference to the sensation of black. Black is held to be due to anabolic changes occurring in the white-black substance. Suppose that anabolism and katabolism of the white-black substance are in equilibrium, unaccompanied by stimulation of either the red-green or the yellow-blue substances, we find that we have a sensation of darkness, but not one of intense blackness. This "darkness" has still a certain amount of luminosity, and it has been termed the "intrinsic light" of the retina. Sensations of black differing from this darkness may be readily experienced, as when we expose the retina to bright sunshine for a few moments and then close the eye. We then have a sensation of intense blackness, which soon, however, is succeeded by the darkness of the "intrinsic light." The various degrees of blackness, if it is truly a sensation, are small compared with the degrees in the intensity of whiteness. In the consideration of both theories changes in the cerebral centres have not been taken into account, and of these we know next to nothing.

6. *The Contrast of Colours.*—If we look at a small white, grey or black object on a coloured ground, the object appears to have the colour complementary to the ground. Thus a circle of grey paper on a *red* ground appears to be of a greenish-blue colour, whilst on a blue ground it will appear pink. This effect is heightened if we place over the paper a thin sheet of tissue paper; but it disappears at once if we place a black ring or border round the grey paper. Again, if we place two complementary colours side by side, both appear to be increased in intensity. Various theories have been advanced to explain these facts. Helmholtz was of opinion that the phenomena consist rather in modifications of judgment than in different sensory impressions; J. A. F. Plateau, on the other hand, attempted to explain them by the theory of consecutive images.

5. The Movements of the Eye

1. *General Statement.*—The globe of the eye has a *centre of rotation*, which is not exactly in the centre of the optic axis, but a little behind it. On this centre it may move round *axes of rotation*, of which there are three—an antero-posterior, a vertical and a transverse. In normal vision, the two eyes are always placed in such a manner as to be fixed on one point, called the *fixed point* or the *point of regard*. A line passing from the centre of rotation to the point of regard is called the *line of regard*. The two lines of regard form an angle at the point of regard, and the base is formed by a line passing from the one centre of rotation to the other. A plane passing through both lines of regard is called the *plane of regard*. With these definitions, we can now describe the movements of the eyeball, which are of three kinds: (1) *First position*. The head is erect, and the line of regard is directed towards the distant horizon. (2) *Second position*. This indicates all the movements round the transverse and horizontal axes. When the eye rotates round the first, the line of regard is displaced above or below, and makes with a line indicating its former position an angle termed by Helmholtz the angle of vertical displacement, or the *ascensional angle*; and when it rotates round the vertical axis, the line of regard is displaced from side to side, forming with the median plane of the eye an angle called the *angle of lateral displacement*. (3) *Third order of positions*. This includes all those which the globe may assume in performing a rotatory movement along with lateral or vertical displacements. This movement of rotation is measured by the angle which the plane of regard makes with the transverse plane, an angle termed the *angle of rotation* or of *torsion*.

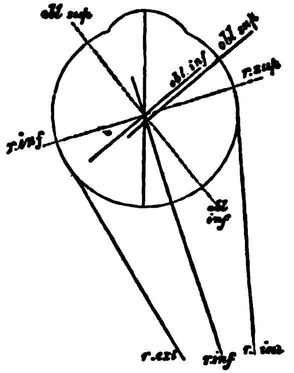

FIG. 23.—Diagram of the Attachments of the Muscles of the Eye and of their Axes of Rotation, the latter being shown by dotted lines. (Fick.)
The axis of rotation of the rectus internus and rectus externus being vertical, that is, perpendicular to the plane of the paper, cannot be shown.

The two eyes move together as a system, so that we direct the two lines of regard to the same point in space.

The eyeball is moved by six muscles, which are described in the article EYE (*Anatomy*). The relative attachments and the axes of rotation are shown in fig. 23.

The term *visual field* is given to the area intercepted by the extreme visual lines which pass through the centre of the pupil, the amount of dilatation of which determines its size. It follows the movements of the eye, and is displaced with it. Each point in the visual field has a corresponding point on the retina, but the portion, as already explained, which secures our attention is that falling on the yellow spot.

2. *Simple Vision with Two Eyes.*—When we look at an object with both eyes, having the optic axes parallel, its image falls upon the two yellow spots, and it is seen as one object. If, however, we displace one eyeball by pressing it with the finger, then the image in the displaced eye does not fall on the yellow spot, and we see two objects, one of them being less distinct than the other. It is not necessary, however, in order to see a single object with two eyes that the two images fall on the two yellow spots; an object is always single if its image fall on *corresponding points* in the two eyes.

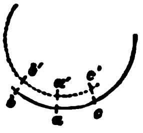

FIG. 24.—Diagram to illustrate the Physiological Relations of the two Retinae.

The eye may rotate round three possible axes, a vertical, horizontal and antero-posterior. These movements are effected by four straight muscles and two oblique. The four straight muscles arise from the back of the orbit, and pass forward to be inserted into the front part of the eyeball, or its equator, if we regard the anterior and posterior ends of the globe as the poles. The two obliques (one originating at the back of the orbit) come, as it were, from the nasal side—the one goes above the eyeball, the other below, while both are inserted into the eyeball on the temporal side, the superior oblique above and the inferior oblique below. The six muscles work in pairs. The internal and external recti turn the eye round the vertical axis, so that the line of vision is directed to the right or left. The superior and inferior recti rotate the eye round the horizontal axis, and thus the line of vision is raised or lowered. The oblique muscles turn the eye round an axis passing through the centre of the eye to the back of the head, so that the superior oblique muscle lowers, while the inferior oblique raises, the visual line. It was also shown by Helmholtz that the oblique muscles sometimes cause a slight rotation of the eyeball round the visual axis itself. These movements are under the control of the will up to a certain point, but there are slighter movements that are altogether involuntary. Helmholtz studied these slighter movements by a method first suggested by F. C. Donders. By this method the apparent position of after-images produced by exhausting the retina, say with a red or green object, was compared with that of a line or fixed point gazed at with a new position of the eyeball. The ocular spectra soon vanish, but a quick observer can determine the coincidence of lines with the spectra. After producing an after-image with the head in the erect position, the head may be placed into any inclined position, and if the attention is then fixed on a diagram having vertical lines ruled upon it, it can easily be seen whether the after-image coincides with these lines. As the after-image must remain in the same position on the retina, it will be evident that if it coincides with the vertical lines there must have been a slight rotation of the eyeball. Such a coincidence always takes place, and thus it is proved that there is an involuntary rotation. This minute rotation enables us to judge more accurately of the position of external objects.

3. The *horopter* is the locus of those points of space which are projected on retinal points. While geometrically it may be conceived as simple, as a matter of fact it is generally a line of double curvature produced by the intersection of two hyperboloids, or, in other words, it is a twisted cubic curve formed by the intersection of two hyperboloids which have a common generator. The curves pass through the nodal point of both eyes. An infinite number of lines may be drawn from any point of the horopter, so that the point may be seen as a single point, and these lines lie on a cone of the second order, whose vertex is the point. When we gaze at the horizon, the horopter is really a horizontal plane passing through our feet. The horopter in this instance is the ground on which we stand. Experiments show "that the forms and the distances of these objects which are situated in, or very nearly in, the horopter, are perceived with a greater degree of accuracy than the same forms and distances would be when not situated in the horopter" (M'Kendrick, *Life of Helmholtz*, 1899, p. 172 *et seq.*).

An object which is not found in the horopter, or, in other words, does not form an image on corresponding points of the retinae, is seen double. When the eyeballs are so acted upon by their muscles as to secure images on non-corresponding points, and consequently double vision, the condition is termed *strabismus*, or squinting, of which there are several varieties treated of in works on ophthalmic surgery. It is important to observe that in the fusion of double images we must assume, not only the correctness of the theory of corresponding points of the retina, but also that there are corresponding points in the brain, at the central ends of the optic fibres. Such fusion of images may occur without consciousness—at all events, it is possible to imagine that the cerebral effect (except as regards consciousness) would be the same when a single object was placed before the two eyes, in the proper position, whether the individual were conscious or not. On the other hand, as we are habitually conscious of a single image, there is a psychical tendency to fuse double images when they are not too dissimilar.

4. *Binocular Perception of Colour.*—This may be studied as follows. Take two No. 3 eye-pieces of a Hartnack's microscope, or two eye-pieces of the same optical value from any microscope, place one in front of each eye, direct them to a clear window in daylight, keep them parallel, and two luminous fields will be seen, one corresponding to each eye. Then converge the two eye-pieces, until the two luminous circles cross, and the central part, like a bi-convex lens, will appear clear and bright, while the outer segments will be much less intense, and may appear even of a dim grey colour. Here, evidently, the sensation is due to a fusion of impressions in the brain. With a similar arrangement, blue light may be admitted by the one eye-piece and red by the other, and on the convergence of the two, a resultant colour, purple, will be observed. This may be termed the binocular vision of colours. It is remarkable that by a mental effort this sensation of a compound colour may be decomposed into its constituents, so that one eye will again see blue and the other red.

6. THE PSYCHICAL RELATIONS OF VISUAL PERCEPTIONS

1. *General Characters of Visual Perceptions.*—All visual perceptions, if they last for a sufficient length of time, appear to be external to ourselves, erect, localized in a position in space and more or less continuous.

(*a*) *Visual Sensations are referred to the Exterior.*—This appears to be due, to a large extent, to habit. Those who have been born blind, on obtaining eyesight by an operation, have imagined objects to be in close proximity to the eye, and have not had the distinct sense of exteriority which most individuals possess. Slowly, and by a process of education, in which the sense of touch played an important part, they gained the knowledge of the external relations of objects. Again, phosgenes, when first produced, appear to be in the eye, but when conscious of them, by an effort of imagination, we may transport them into space, although they never appear very far off.

(*b*) *Visual Sensations are referred to Erect Objects.*—Although the images of objects are *inverted* on the retina we see them erect. The explanation of the effect is that we are conscious not of the image on the retina, but of the luminous object from which the rays proceed, and we refer the sensation in the *direction* of these rays. Again, in running the eye over the object, say a tall pole, from base to apex, we are not conscious of the different images on the retina, but of the muscular movements necessary to bring the parts successively on the yellow spot.

(*c*) *Visual Sensations are referred to a Position in Space.*—The localization of a luminous point in space can only be determined by observing its relations to other luminous points with a given position of the head and of the eye. For example, in a perfectly dark room, if we look at a single luminous point, we cannot fix its exact position in space, but we may get some information of a vague character by moving the head or the eye. If, however, a second luminous point appears in the darkness, we can tell whether it is nearer or farther distant, above or below the first. So with regard to other luminous points we observe their reciprocal relations, and thus we localize a number of visual impressions. There are three principal directions in space: the *transverse* (breadth), the *vertical* (height) and the *sagittal* (depth). Luminous points may be localized either in the transverse or vertical directions. Here we have to do simply with localization on a surface. A number of points may be observed simultaneously (as when the eye is fixed) or successively (as when the eye moves). If the movement of the eye be made rapidly, the series of impressions from different points may be fused together, and we are conscious of a *line*, the direction of which is indicated chiefly by the muscular sensations felt in following it. The case is different as regards points in the sagittal direction. We see only a single point of this line at a time; it may be a transverse series of retinal elements, A B, and each of these formed by a number of smaller elements, 1, 2, 3, 4, situated in the axis of each principal element; it may be, on the other hand, the transverse line *a b* situated in space and formed by a series of points in juxtaposition.

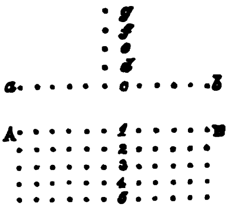

FIG. 25.—Diagram illustrating the Localization of Visual Perceptions.

Each of these points will impress a retinal element, and the result will be the perception of a transverse line; but this will not be the same for the points *c*, *d*, *e*, *f*, *g*, situated in space in a linear series, in the sagittal direction; only one of those points, *c*, will impress the corresponding retinal element, and we can see only *one* point at a time in the line *cg*. By accommodating successively, however, for the various points at different and considerable distances along the line *cg*, we may excite retinal elements in rapid succession. Thus, partly by the fusion of the successive impressions on the retina, and partly from the muscular sensations caused by repeated accommodations and possibly of ocular movements, we obtain a notion of *depth* in space, even with the use of only one eye. It is, however, one of the chief effects of binocular vision to give precision to the notion of space in the sagittal direction.

(*d*) *Visual Sensations are Continuous.*—Suppose the image of a luminous line falls on the retina, it will appear as a line although it is placed on perhaps 200 cones or rods, each of which may be separately excited, so as to cause a *distinct* sensation. Again, on the same principle, the impression of a superficial surface may be regarded as a kind of *mosaic*, made up of individual portions corresponding to the rods or cones on which the image of the surface falls. But in both cases the sensation is continuous, so that we see a line or a surface. The individual images are fused together.

2. *Notions derived from Visual Perceptions.*—When we look at any object, we judge of its size, the direction of its surfaces (unless it be a point), its distance from the eye, its apparent movement or fixedness and its appearance of solidity.

(*a*) *Apparent Size.*—This, so far as regards a comparatively small object, depends on the size of the retinal image, as determined by the visual angle. With a very large object, there is an appreciation of size from the muscular sensations derived from the movements of the eyeball as we "range" the eye over it. It is difficult to appreciate the distance separating two points between which there are other points, as contrasted with an apparently similar distance without intermediate points. For example, the distance A to B appears to be greater than from B to C, in fig. 26.

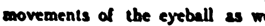

FIG. 26.—Diagram to illustrate Illusions of Size and Distance.

(*b*) *Direction.*—As the retina is a curved surface, a long straight line, especially when seen from a distance, appears curved. In fig. 27 a curious illusion of direction, first shown by J. K. F. Zoellner, is depicted. If these lines be looked at somewhat obliquely, say from one corner, they will appear to converge or diverge, and the oblique lines, on each side of the vertical lines, will appear not to be exactly opposite each other. But the vertical lines are parallel, and the oblique lines are continuous across them. The effect is evidently due to an error of judgment, as it may be controlled by an intense effort, when the lines will be seen as they really are.

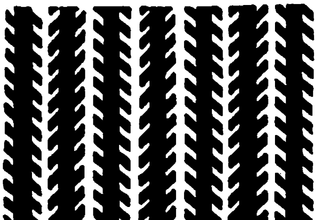

FIG. 27.—Zoellner's Figure showing an Illusion of Direction.

(*c*) *Apparent Distance.*—We judge of distance, as regards large objects at a great distance from the eye—(1) from their apparent size, which depends on the dimensions of the visual angle, and (2) from the interposition of other objects between [illegible] the distant object. Thus, at sea, we cannot form, without great experience, an accurate estimate of how many miles we are off the coast, and all know how difficult it is to estimate accurately the width of a river. But if objects be interposed between the eye and the distant object say a few vessels at different distances at sea, or a boat in the river, then we have certain materials on which to form a judgment, the accuracy of which, however, even with these aids, will depend on experience. When we look at a near object, we judge of its distance chiefly by the sense of effort put forth in bringing the two lines of regard to converge upon it.

(*d*) *The Movement of a Body.*—If the eye be fixed, we judge of movement by successive portions of the retina being affected, and possibly also by a feeling of an *absence* of muscular contractions necessary to move the eyeballs. When the eye moves, so as to "follow" the object, there is a sense of muscular effort, which is increased when, in addition, we require to move the head.

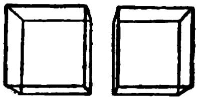

FIG. 28.—Illustrating Stereoscopic Vision.

(*e*) *The Apparent Solidity of an Object.*—If we look at an object, say a cube, first with the right eye and then with the left, it will be found that the two images of the object are somewhat different, as in fig. 28. If, then, by means of a stereoscope, or by holding a card between the two eyes, and causing a slight convergence of the eyes, the two images are brought upon corresponding points of the two retinae, the image will at once be seen in relief.

See also article "Vision" by W. H. R. Rivers in Schäfer's *Text-Book of Physiology*, vol. ii. p. 1026. (J. G. M.)

7. ERRORS OF REFRACTION AND ACCOMMODATION AND THEIR CURATIVE TREATMENT

The following is a classification of the diseases of vision, from a medical point of view (see also EYE: *diseases*):—

a. Errors of refraction: hyperopia, myopia, astigmatism, anisometropia, aphakia.

b. Errors of accommodation:—
  (1) Loss of accommodation
    (*a*) From advancing years (presbyopia), or from debility.
    (*b*) From paralysis (cycloplegia) due to—
      1. Drugs such as atropine.
      2. Systemic poisons: diphtheria, influenza, syphilis, &c.
      3. Diseases of the nervous system, concussion of the brain.
  (2) Spasm of accommodation.
  (3) Meridional asymmetrical accommodation by means of which low errors of astigmatism are corrected, producing eye-strain.

Hyperopia or *Hypermetropia* (H.) (Far-sight; German = *Übersicht*).—This is a condition of the refraction of the eye in which, with the eye at rest, parallel rays of light focus beyond the retina, which means that the image of a distant object is not in focus when it meets the retina, because the eye is too short antero-posteriorly. Most eyes at birth are hyperopic, but as the child grows the eye also grows; when, however, this does not take place, or does not take place sufficiently, normal development is thus arrested. There are other conditions that cause hyperopia, but this shortening of the antero-posterior axis is by far the commonest.

Hyperopia is corrected by convex glasses (fig. 29), and the measurement of the hyperopia is that convex glass which enables the hyperopic eye, at rest, to see distinctly objects at a distance. When the hyperopia is not too high it can also be corrected by the eye itself by means of the ciliary muscle (muscle of accommodation) which causes the crystalline lens to become more convex, and thus brings about the same result as placing a convex glass before the eye.

In young people when the error is not too high this work is done unconsciously, vision appears to be perfect, and it is only by placing the eye under the influence of atropine that the defect is revealed. In the normal eye distant objects are focused on the retina without the use of the ciliary muscle, which is only employed when looking at near objects; but the hyperope has to use this muscle all his waking hours for both near and distant vision, so that his eyes are never at rest. Fortunately he has some compensation for this extra work, for in most hyperopes the ciliary muscle becomes more or less hypertrophied; but even so, if near work is at all excessive, or if the defect is associated with astigmatism or anisometropia, symptoms of eye-strain will sooner or later show themselves (see *Eye-strain*, below).

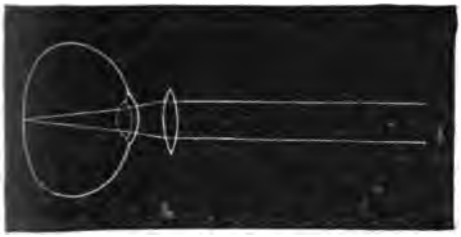

Fig. 29.—Showing Parallel Rays focused on the Retina of a Hyperopic Eye by means of a Convex Lens.

In older people a very common symptom is blurring of the type while reading; the book has to be put down and the eyes rested for some minutes before reading can be resumed. This is due to the fatigued ciliary muscle giving way and becoming unable to focus.

As we advance in years we lose accommodation power (see *Presbyopia*, below), so that the time comes to every hyperope, if he live long enough, when he not only has to use glasses for reading (at an earlier period than the normal person), but he also finds that he is gradually losing his distant vision. This is very alarming to many, until it is explained that all that has happened is the loss of power to correct the defect, which defect, of course, has always existed, and which in future will have to be corrected by suitable glasses. The higher the hyperopia the sooner will these symptoms manifest themselves.

In quite young children, sometimes the earliest sign of the presence of hyperopia is a convergent strabismus (internal squint). As a rule, this squint is nothing more than an over-convergence brought about by over-accommodation in those who cannot dissociate their convergence and accommodation; if we remove the necessity for over-accommodation by correcting the defect with suitable glasses, the over-convergence disappears and the squint is cured.

The total hyperopia of the eye is divided into manifest hyperopia and latent hyperopia. Manifest hyperopia is expressed in amount by the strongest convex glass that allows clear distant vision when the eye is not under atropine. Latent hyperopia is the additional hyperopia which is revealed under atropine. With advancing years the latent hyperopia becomes more and more manifest, and between the ages of 45 and 50 the total hyperopia is entirely manifest.

In addition to the symptoms already described, a very common one among young hyperopes is *spasm of the ciliary muscle*. This cramp of the muscle causes distant objects to be very indistinct, improvement only taking place with a *concave* glass, and near work has to be approached very close to the eyes, thus giving a wrong idea that the child is suffering from myopia; by paralysing the ciliary muscle with atropine the spasm disappears and the true nature of the defect is revealed.

The treatment essentially consists in ascertaining the total hyperopia of the eye, and this can only be done satisfactorily, when latent hyperopia is present, by paralysing the accommodation, using atropine for those under 25, and homatropine for those between the ages of 25 and 35 or 40. Over 40 (and when the hyperopia is high, even at an earlier age) no cycloplegic is necessary—in fact it is in many cases dangerous, as an attack of glaucoma may be induced. (See Eye: *diseases*.)

Having found the total hyperopia, we learn the amount of the latent hyperopia, and, roughly speaking, the convex glass required is equal to the whole of the manifest hyperopia added to, from one-third to a half, of the latent; but the treatment varies with the age of the individual and the amount of the hyperopia, and is too complicated to be detailed here.

Myopia (M.) (Short-sight).—Typical myopia is due to an elongation of the antero-posterior diameter of the eye, so that the retina is situated behind the principal focus, and only divergent rays of light from a near point (fig. 30), or parallel rays made divergent by a concave glass (fig. 31), can come to a focus on the retina. In other words, the far point of a myope is at a short distance in front of the eye, the distance being the measure of the myopia.

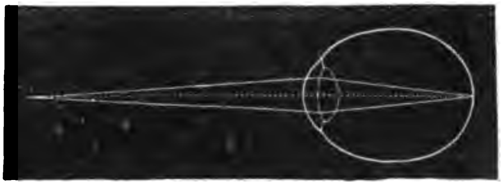

Fig. 30.

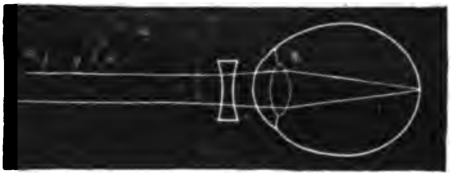

Fig. 31.

A myope can see distinctly at a distance when the eye is at rest (*i.e.* when accommodation is not being used), with that concave glass whose focal length is equal to the distance of the far point from the eye, and the converse is true; the measurement of myopia is that concave glass with which the myopic eye sees distinctly objects at a distance, and its focal length is equal to the distance of the myope's far point from the eye.

The Causes of Myopia.—Although myopia is hereditary, it is, with few exceptions, not congenital. We have seen that almost all eyes are hyperopic at birth. The savage is rarely myopic: it is civilization that is responsible for it; the necessity for constantly adapting the eye for near objects means undue convergence. We find that myopia generally first shows itself at the age of 8 to 10, when school work begins in earnest—that is, when convergence is first used in excess—and there is no doubt that it is excessive convergence that is mostly responsible for the development of myopia. The over-used internal recti constantly pulling at the sclerotic tend to lengthen the antero-posterior diameter of the eye, and as this lengthening of the antero-posterior axis necessitates greater convergence still, a vicious circle is produced, and the myopia gradually increases. The hereditary character of myopia is explained by the existence in such eyes of an "anatomical predisposition" to myopia. The sclera is unusually thin, and consequently less able to resist the pull of the internal recti, and the relative position of the recti and the position of the optic nerve, both of which may be hereditary, may be factors in the production of this defect. Anything which causes young subjects to approach their work too near the eyes may be the starting-point. Bad illumination, or the light coming from the wrong direction (for instance, in front), or defective vision produced by corneal nebulae, or lamellar cataract, &c., all necessitate over-convergence in order to obtain clearer images, and myopia may be produced.

It is interesting to note that when the work is approached very near the eye, but convergence is not used, as in the case of watchmakers, who habitually use a strong convex glass in one eye, there is no special tendency to myopia.

Some of the more common *symptoms* of myopia are:—(1) Distant objects are seen indistinctly. (2) Near objects are seen distinctly, and the near point is much nearer than in the normal eye. (3) Acuteness of vision is often lowered, and especially is this the case in high myopia. (4) Eye-strain is often present, due to overuse of the muscles of convergence, and this may lead to (5) an external or divergent squint. (6) Floating black specks are often complained of, these are generally muscae volitantes, but often, especially in high myopia, may be actual opacities floating in the vitreous. (7) Myopes often stoop and become "round shouldered" from their habit of poring over their work.

A small amount of myopia, if it is stationary, is in no sense a serious defect of the eye, the possessors of it are often quite unconscious of any deficiency in vision, and in fact brag that they have better vision than their fellows. The reason of this is that they learn in early life to recognize indistinct distant objects by the aid of other senses in a way that the ordinary individual can hardly understand, and in later life they can postpone the wearing of glasses for near work for many years, and sometimes until extreme old age. Unfortunately myopia is, as a rule, *not* stationary; it almost always tends to increase, and if this increase leads to very high myopia such serious changes may occur in the eyes as to lower the visual acuity enormously and sometimes lead to total loss of vision.

The treatment of myopia is general and local.

General Treatment.—The most important part of this is the preventive treatment (prophylaxis), especially in its application to children. All children who have one or both parents myopic are specially "marked down" for this defect, for they have probably inherited an anatomical predisposition. Bearing in mind that excessive convergence is the most potent cause of myopia, the most rigid attention should be paid to the ophthalmic hygiene of the schoolroom. This room should be large, lofty and well ventilated, and have good-sized high windows on one wall, preferably on the north side. Each scholar should have an adjustable seat and desk so arranged that his head is upright and the work not too near his eyes. These desks should be arranged in rows so placed that the pupils sit with the light on their left. Schoolbooks must be clearly printed and the type should not be too small. The school work that needs close application of the eyes should be continued only for a short period at a time, the period alternating with other work which does not require the use of the eyes, such as mental arithmetic, black-board demonstrations, recitation, or play. Schoolmasters should teach more—that is, they should explain and impart knowledge by demonstrations and simple lectures, and reduce as much as possible the time spent in "home preparations," which is usually work done by bad light and when the student is physically and mentally tired. Even in the nursery the greatest care should be taken. The little ones should be supplied with large toys, a large box of plain wooden bricks being the best form; picture books should be discouraged, and close work that entails undue convergence, such as sewing, threading beads, &c., ought to be forbidden. The nursery governess can teach the alphabet, small words and even simple arithmetic with the bricks. No child with a tendency to myopia, or with a myopic family history should be allowed to learn to write or draw until at least seven years old. The child's bed should not be allowed to face the window, preferably it should be back to the light. Students, or those engaged in literary or other work which entails close application for many hours a day, should be advised to regulate their work, if they are free to do so, by working for shorter periods and taking longer intervals of rest, they should be specially careful not to approach their work too near to the eyes and they should always work in a good light.

Local Treatment.—This consists in correcting the error with a concave glass. The testing must be done when the eye is under *atropine* in all those under 25, and under homatropine between the ages of 25 and 35 or 40. Over 40 no cycloplegic is required. Except when playing rough games the glasses must be worn always. The wearing of glasses for near work produces at first considerabl[illegible] tern, ho[illegible] see near work so mu[illegible] ing this treatmen[illegible] proper work, a[illegible] h the exer[illegible] make [illegible] o, the [illegible] m the [illegible] rmal, and it is only by doing this that we can prevent the increase of myopia. Adults who have never worn their correction (especially if the myopia is high) must have a weaker glass for near work. Each case must be treated on its own merits. So-called malignant myopia, which is high myopia with serious changes in the eye, must be treated in a special manner and with the greatest care.

Astigmatism.[1]—The principal seat of astigmatism is the cornea, the curvature of one meridian being greater than that of the other. In regular astigmatism, which is the only form that can as a rule be treated by glasses, the meridians of greatest and least curvature are at right angles to each other, and the intermediate meridians pass by regular gradations from one to the other. Rays of light passing through such an astigmatic surface do not focus at one point, but form many points, with the result that the image is more or less indistinct according to the amount of the error. In uncorrected astigmatism a clock-face viewed at a distance of 4 or 5 yds. will appear to have certain figures distinct, and others (at right angles) indistinct; for instance, figures **XI** and **V** may appear quite black, while figures **II** and **VIII** are grey and indistinct. If one of the principal meridians be emmetropic the astigmatism is *simple*; if both be hyperopic, or if both be myopic, it is compound; and if one meridian be hyperopic and the other myopic, it is styled *mixed* astigmatism. Generally the vertical meridian or one near it is the most convex, and this is called *direct* astigmatism (astigmatism "according to the rule"). When the horizontal meridian or one near it is the most convex, the term *inverse* astigmatism is used (astigmatism "against the rule"). When the meridians are oblique, that is, about 45°, it is called *oblique* astigmatism. Low degrees of astigmatism (of the cornea) are corrected by the ciliary muscle, producing an astigmatism of the crystalline lens, the opposite of that of the cornea, and so neutralizing the defect. This work is done unconsciously, vision is generally quite good and no suspicion is entertained of anything wrong until some symptom of eye-strain shows itself (see *Eye-strain*, below), and the detection of it is one of the most important duties of the oculist. The only certain method of detecting and consequently correcting a low error of astigmatism, in all below the age of 50, is by paralysing the ciliary muscle with atropine or homatropine and thus preventing it from correcting the defect, and revealing the true refraction of the eye. Astigmatism is corrected by cylindrical glasses combined with spherical convex or concave glasses if hyperopia or myopia co-exist, and the correction must be worn always in the form of rigid pince-nez or spectacles.

Presbyopia (Old Sight).—A normal-sighted child at the age of ten has his near point of accommodation 7 cms. from the eye, and as age advances this near point recedes gradually. At the age of 40 it has receded to 22 cms., in other words at this age fine print cannot be read nearer to the eye than 22 cms. Between the ages of 45 and 50 the person who has apparently enjoyed good sight up till then, both for distance and near, finds that by artificial light he cannot read the newspaper unless he holds it some distance from the eyes, and he has to give up consulting "Bradshaw" because he cannot distinguish between 3's and 8's. Another symptom often complained of is the "running together of letters," so that the book has to be closed and the eyes rested before work can be resumed. This loss of accommodation power is due to the gradual hardening of the crystalline lens from age, and convex glasses have to take its place, in order to make reading possible and comfortable. In hyperopia the presbyopic period is earlier, and in myopia it is later than normal (see above).

It is unwise for the presbyope to select the glasses for himself, as astigmatism or anisometropia may be present and must, of course, be corrected; the eyes should be properly tested, and this testing should be repeated every two or three years, as, not only does the old sight increase, but changes in the static refraction of the eyes are probably taking place. When an error of refraction exists with the presbyopia, glasses for distance, as well as reading, have to be worn, and to avoid the trouble of constantly changing, the two should be combined as bi-focal glasses. The upper portion of the bi-focal corrects the distant, and the lower the near vision, and in the best form the division between the two is invisible. When properly fitted these bi-focals prove the greatest boon to the presbyope.

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[1] See also § *Astigmatism*, above.

Anisometropia (Odd Sight) is a condition in which the refraction of the two eyes is different. There are three varieties. (1) Binocular vision exists. As a rule a very small difference is present, and the difference is generally in the astigmatism; consequently eye-strain is very commonly manifested, and the correction by suitable glasses is imperative. (2) The eyes are used alternately. For instance, one eye may be hyperopic or emmetropic, and the other myopic; in such a case the former will be used for distant and the latter for near vision, and although binocular or stereoscopic vision is lost, glasses may never be required and any attempt at a correction of the defect may be useless. However, if eye-strain is present, the attempt should be made. (3) One of the eyes is permanently excluded. When the difference between the eyes is great the most defective eye is little used and tends to become amblyopic (partially blind), if it is not so already. This condition is very common in squint, and the treatment in such cases consists in providing the defective eye with its correcting glass, completely covering up the good eye and practising for certain periods every day, and thus forcing the defective eye to work. This eye may never take its share in binocular vision, but it may become very useful, especially if disease or damage should affect the good eye; and the improvement of the vision of the eye materially assists the treatment of the squint. When one eye is irremediably lost, the other should be very carefully tested, and if any error exists it ought to be corrected and the glass worn always.

Aphakia is the absence of the crystalline lens through dislocation, or removal by operation, or injury. A strong convex glass has to be worn in front of such an eye in order to obtain clear vision even for distance, and a still stronger one for near vision; after cataract operation astigmatism is generally present and the convex glass must be combined with a cylinder: these glasses are best worn in the form of bi-focals (see *Presbyopia*, above).

Eye-Strain.—Eye-strain is a symptom, or group of symptoms, produced by the correction, or attempt at correction, by the ciliary muscle of an error of refraction, or a want of balance between the external muscles of the eye (heterophoria). Where gross errors exist either in the refraction or in the muscular equilibrium, the correction cannot be made, and consequently no attempt is made to correct the defect, and eye-strain is not produced. The smaller the error the more likely is the eye-strain to be present, and also, unfortunately, the more likely is it to be overlooked. It is important to recognize what may be the different manifestations of eye-strain. They may be grouped under three headings: (1) manifestations on the eye and lids, such as conjunctivitis, blepharitis, iritis, cyclitis, glaucoma and cataract. (2) Peripheral irritation: (*a*) with pain: headaches and megrim; (*b*) without pain: epileptic attacks and choreiform movements of the facial muscles: vertigo, nausea, vomiting. (3) Nerve waste: nerve exhaustion, neurasthenia, brain-fag. This last form of eye-strain is as common as it is subtle. It is subtle because the sufferer never suspects the eyes to be at fault; all his waking hours he is unconsciously correcting a low degree of astigmatism, or anisometropia, or heterophoria, which means a constant nerve waste; and when he begins near work he starts with a big deficit, and further strain results.

Insomnia is a prominent symptom of eye-strain; this leads to depression, which in its turn may lead to the alcoholic or morphia habit. There is no form of functional nerve disorder that may not be caused by, or aggravated by, eye-strain.

The treatment of eye-strain consists in correcting all errors of refraction (and in the case of astigmatism and anisometropia, even the smallest) and in wearing the correction always. A small amount of heterophoria will generally, in a short time, disappear when the error is corrected; if not, it must be corrected by prisms or decentring. (E. C.*)

VISITATION (Lat. from *visitare*, frequentative form of *visere*, to look at, go to see, visit, *videre*, to see), an act of visiting, or going to see, a formal visit. The use of the word for an act of divine retributive justice, or generally of an occurrence of grave import, such as a plague or famine, is due mainly to Biblical phraseology, as in "the day of visitation" (Isa. x. 3). For the duty of bishops of the Roman Church to visit periodically the tombs of the apostles Peter and Paul at Rome, the *Visitatio Liminium Apostolorum*, see Bishop. The specific application of the term is to a formal periodical visit paid by a superior authority to an institution or to a district for the purpose of investigation, examination or the like. There are three classes of such visitations: ecclesiastical, charitable and heraldic. Ecclesiastical visitations, originally the periodical journeys of personal inspection to ascertain the temporal and spiritual condition of each parish, form part of the functions of an archbishop, a bishop and an archdeacon. All charitable corporations are at law subject to visitation; the functions of the "visitors" have been largely taken over by the Board of Charity Commissioners. Colleges at a university are regarded in law as charitable institutions, and each college has a "visitor" whose duty it is to represent the founder and see that his wishes are carried out. Heraldic visitations were perambulations made by a king-at-arms or other high heraldic officer with a commission under the Great Seal to examine into pedigrees and claims to bear arms. The results of these visitations were entered in "Visitation Books," which are in the nature of official records; their admissibility as evidence, though claimed, is judicially questioned as containing merely experts' statements from the families to whom they refer (D'Arcy de Knayth Peerage Case, 1901). These heraldic visitations ceased about 1686.

In addition to these specific meanings may be mentioned the festival of the "Visitation of Mary," in commemoration of the visit of the Virgin to Elizabeth, mother of St John the Baptist, celebrated in the Roman, Greek and other churches on the 2nd of July, and the office of the English Church, the "Visitation of the Sick," ordered for the spiritual comfort and benefit of sick persons.

For the international law relating to the right of belligerent vessels to "visit and search" neutral vessels in time of war, see Search, Right of.

VISITING CARDS. The use of cards of personal identification for social purposes is generally supposed to have had its origin at the court of Louis XIV. of France, that centre of the etiquette of the 17th century. But there appears to be little doubt that, in a rougher and ruder form, this mark of intercourse dates from much earlier times, and that the Chinese, and possibly other Oriental nations also, had in bygone ages employed such mediums of communication on calling at the houses of absent friends. When and where visiting cards first came into vogue in Europe is a matter of some uncertainty. It is probable, however, that they were first used in Germany—and as early as the 16th century. A German visiting card recently discovered in Venice bears this inscription: *Johannes Westerholt Westphalus scribebat, Patavii, 4 Martii 15 x 60.* Concerning this, Professor Dr Kirmis (*Daheim*, September 30th, 1905) remarks that the German students in Padua were wont, on quitting the university, to pay farewell calls at the houses of the professors, and, in the event of not finding them within, to leave their names on paper billets; and he adds that the custom must, until that time, have been unknown in Italy, for this card of the student Westerholt was sent by Professor Giacomo Contarini on the 15th of January 1572 to Venice as a curiosity. Under the reign of Louis XIV., however, the fashion appears to have become firmly established in France. Small strips of paper were at first employed for the purpose of the communication; but gradually they attained a more elaborate finish and execution. Ladies especially seem to have been the pioneers in this direction, and to have embellished their cards with hand drawings, sometimes taking the form of "hearts" and other amorous tokens of affection. Under Louis XV., the reign of exquisite extravagance and refined taste, visiting cards were furnished with delicate engravings, frequently masterpieces of that art, showing some fanciful landscape, or a view of the town or place where the person resided. A further stage in the development of this custom was the autograph signature at the foot of the card beneath the engraved view. England followed the lead of France, and visiting cards became a universal fashion in Europe towards the close of the 18th century. But though in almost every European country there are variations in the size and shape of the card and the way of describing the quality of the person whom it represents, the modern tendency is everywhere in favour of simplicity and the avoidance of ostentation.

A valuable collection of visiting cards is that of the Gabinetto della Stampe in Rome and the Museo Civico in Venice.

VISOKO (or Visoki), a town of Bosnia, on the river Bosna, 15 m. N.W. of Serajevo by rail. Pop. (1895), about 5000. Visoko has a brisk trade in leather, carpets and tobacco.

Between the 13th and 16th centuries Visoko was only second to Jajce as a stronghold of the Bosnian rulers. There were fortified palaces at Sutječka, and Bobovac, among the mountains on the north. Bobovac, which had withstood many previous assaults, was betrayed to the Turks in 1463; at Sutječka there is a Franciscan monastery, founded in 1391, often razed by the Turks, and finally rebuilt in 1821. Just below Visoko lay the town of Podvisoko, called *Sotto Visochi* by the Ragusans, which was the chief mart of the country from 1348 to 1430.

VISOR (also spelled viser, vizor, vizard or visard), a term now used generally of the various forms of movable face-guards in the helmet of medieval and later times. It meant properly a mask for the face, and is an adaptation of the O.Fr. *visiere*, mod. *visière*, as is seen by the M.E. forms *viser*, *visere*. It is thus to be referred to the Fr. *vis*, face, Lat. *visus*, from *videre*, to see. In this sense the word "visor" is modern, the movable guard for the upper part of the face being known as an "aventail" or "ventail," and that for the lower part a "beaver" (see Helmet).

VISTULA (Ger. *Weichsel*, Polish *Wisla*), one of the chief rivers of Europe, rising in Austria and flowing first through Russian and then through Prussian territory. Its source is in Austrian Silesia on the northern slopes of the West Beskiden range of the Carpathian mountains.

The stream runs through a mountain valley, in a N.N.W. direction to Schwarzwasser, where it leaves the mountains, turns E. and N.E., and forms part of the Austro-German frontier. Returning within Austrian territory (Galicia), it passes Cracow, and thereafter forms a long stretch of the frontier with Russia (Poland), bending gradually towards the north, until at Zawichost it runs due N. and enters Poland. Here it at first bisects the high-lying plateau of southern Poland, but leaves this near Jozefow, and flows as far as the junction with the Pilica in a broad valley between wooded bluffs. Crossing the plain of central and northern Poland, it passes Warsaw, and at the junction of the Bug sweeps W. and N.W. to pass Plock and Wloclawek (see further Poland for its course within this territory). It enters Prussia 10 m. above Thorn, turns N.E. on receiving the Brahe, passes Graudenz and turns towards the north. From this point it throws off numerous branches and sweeps from side to side of a broad valley, having steep banks on the side upon which it impinges, and on the other being bordered by extensive flat lands. Nearing the Baltic Sea it forms a delta, dividing into two main arms, the left or western of which bears the name of Vistula, and flows directly to Danzig Bay, while the right is called the Nogat, and flows into the Frisches Haff. The enclosed deltaic tract is very fertile. Parts of it are known as *Werder* (cf. the English "islands" or "holms" in the Fens and other low-lying tracts of the east). In the lower part of the delta the Haff Canal leads from the main river to the Frisches Haff; there are also various natural channels in that direction, but the main river passes on towards the N.W., having a tendency to run parallel to the coast, and reaching Danzig Bay with a direct course only through an artificial cut constructed in 1888–96. The river broke a new channel into the bay, at a point between this cut and the old mouth at Neufahrwasser, on the night of the 1st–2nd of February 1840. The important seaport of Danzig, however, is on the old channel, and this channel is used by shipping, which enters [illegible] Neufahrwasser. The Nogat, formerly inconsider- [illegible] much deepened and broadened by natural [illegible] the 19th century that it carried more [illegible] (i.e. the other main deltaic branch) [illegible] Nogat was stopped and an artificial channel was formed for it, so as to restore the proper head of water to the Vistula.

Shifting banks form a serious impediment to navigation, and these and floods (principally in spring and midsummer) necessitate careful works of regulation. The river is ice-bound at Warsaw, on an average, from about the 20th of December to the 10th of March. The navigation of the Vistula is considerable up to Cracow, and the river forms a very important highway of commerce in Poland (*q.v.*) and Prussia. For small craft it is navigable above Cracow up to the Austro-German frontier, where the Przemsa enters it. This river and the Pilica, Bzura, Brahe, Schwarzwasser and Ferse are the chief left-bank tributaries; on the right the Vistula receives the Skawa, Raba, Dunajec, Wisloka and San before reaching Poland, the Wieprz and Bug in Poland, and the Drewenz in Prussia. The Brahe and the Bromberg Canal give access from the Vistula to the Netze and so to the Oder. The river is rich in fish. Its total length is about 650 m., and its drainage area approaches 74,000 sq. m.

See H. Keller, *Memel-, Pregel- und Weichselstrom, ihre Stromgebiete*, &c., vols. iii. and iv. (Berlin, 1900).

VITALIANUS, bishop of Rome from 657 to 672, succeeded Eugenius I. and was followed by Adeodatus. In the monothelite controversy then raging he acted with cautious reserve, refraining at least from express condemnation of the *Typus* of Constans II. The chief episode in his uneventful pontificate was the visit of Constans to Rome; the pope received him "almost with religious honours," a deference which he requited by stripping all the brazen ornaments of the city—even to the tiles of the Pantheon—and sending them to Constantinople. Archbishop Theodore was sent to Canterbury by Vitalian.

VITEBSK, a government of western Russia, with the government of Pskov on the N., Smolensk on the E., Mogilev, Minsk and Vilna on the S., and Courland and Livonia on the W., having an area of 16,978 sq. m. Except on its south-eastern and northern borders, where there are low hills, deeply eroded by the rivers, its surface is mostly flat, or slightly undulating, and more than a million acres are occupied by immense marshes, while there are as many as 2500 small lakes. It is mainly built up of Devonian red sandstones and red clays, but the Carboniferous formations—both the Lower, characterized by layers of coal, and the Upper—crop out in the east. The whole is covered with Glacial and post-Glacial formations, in which remains of extinct mammals and stone implements are found in large quantities. There are numerous burial-mounds containing bones and iron implements and ornaments. The soil is for the most part unproductive. The W. Dvina rises not far from the north-eastern angle of the government, and flows through it, or along its southern boundary, for 530 m. From its confluence with the Kasplya, *i.e.* for more than 450 m., it is navigable; and, through a tributary, the Ulyanka, it is connected with the Dnieper by the Berezina Canal. The Mezha and Kasplya, tributaries of the W. Dvina, are navigable in spring. The climate is relatively mild, the average yearly temperature at the city of Vitebsk being 40° F. (January 16°·4; July 64°·3). The population was estimated at 1,740,700 in 1906. The government is divided into eleven districts, the chief towns of which are Vitebsk, Drisa, Dvinsk, formerly Dünaburg, Gorodok, Lepel, Lyutsyn, Nevel, Polotsk, Ryezhitsa, Sebezh and Velizh.

VITEBSK, a town of Russia, capital of the government of the same name, on both banks of the W. Dvina, and on the railway from Smolensk to Riga, 85 m. N.W. from the former. Pop. (1885) 54,676; (1897) 65,871. It is an old town, with decaying mansions of the nobility, and dirty Jewish quarters, half of its inhabitants being Jews. There are two cathedrals, founded in 1664 and 1777 respectively. The church of St Elias, a fine example of the Old Russian style of architecture, founded in 1643, was burned down in 1904. The manufactures are insignificant, and the poorer classes support themselves by gardening, boat-building and the flax trade, while the merchants carry on an active business with Riga in corn, flax, hemp, tobacco, sugar and timber.

Vitebsk (Dbesk, Vitbesk and Vitepesk) is mentioned for the first time in 1021, when it belonged to the Polotsk principality. Eighty years later it became the chief town of a separate principality, and so continued until 1320, when it came under the dominion of the Lithuanians. In the 16th century it fell to Poland. Under the privileges granted to the city by the Polish sovereigns it flourished, but it soon began to suffer from the wars between Russia and Poland, during which it was thrice taken by the Russians and burned. Russia annexed it finally in 1772.

VITELLI, VITELLOZZO (?–1502), Italian *condottiere*. Together with his father, Niccolò, tyrant of Città di Castello, and his brothers, who were all soldiers of fortune, he instituted a new type of infantry armed with sword and pike to resist the German men-at-arms, and also a corps of mounted infantry armed with arquebuses. Vitellozzo took service with Florence against Pisa, and later with the French in Apulia (1496) and with the Orsini faction against Pope Alexander VI. In 1500 Vitellozzo and the Orsini made peace with the pope, and the latter's son Cesare Borgia, being determined to crush the petty tyrants of Romagna and consolidate papal power in that province, took the *condottieri* into his service. Vitellozzo distinguished himself in many engagements, and in 1501 he advanced against Florence, moved as much by a desire to avenge his brother Paolo, who while in the service of the republic had been suspected of treachery and put to death (1499), as by Cesare's orders. In fact, while the latter was actually negotiating with the republic, Vitelli seized Arezzo. Forced by Borgia and the French, much against his will, to give up the city, he began from that moment to nurture hostile feelings towards his master and to aspire to independent rule. He took part with the Orsini, Oliverotto da Fermo and other captains in the conspiracy of La Magione against the Borgia; but mutual distrust and the incapacity of the leaders before Cesare's energy and the promise of French help, brought the plot to naught, and Vitelli and other *condottieri*, hoping to ingratiate themselves with Cesare once more, seized Senigallia in his name. There they were decoyed by him and arrested while their troops were out of reach, and Vitelli and Oliverotto were strangled that same night (31st of December 1502).

See vol. iii. of E. Ricotti's *Storia della compagnie di ventura* (Turin, 1845), in which Domenichi's MS. *Vita di Vitellozzo Vitelli* is quoted; C. Yriarte, *César Borgia* (Paris, 1889); P. Villari, *Life and Times of N. Machiavelli* (English ed., London, 1892); see also under ALEXANDER VI. and CESARE BORGIA.

VITELLIUS, AULUS, Roman emperor from the 2nd of January to the 22nd of December A.D. 69, was born on the 24th of September A.D. 15. He was the son of Lucius Vitellius, who had been consul and governor of Syria under Tiberius. Aulus was consul in 48, and (perhaps in 60–61) proconsul of Africa, in which capacity he is said to have acquitted himself with credit. Under Galba, to the general astonishment, at the end of 68 he was chosen to command the army of Lower Germany, and here he made himself popular with his subalterns and with the soldiers by outrageous prodigality and excessive good nature, which soon proved fatal to order and discipline. Far from being ambitious or scheming, he was lazy and self-indulgent, fond of eating and drinking, and owed his elevation to the throne to Caecina and Valens, commanders of two legions on the Rhine. Through these two men a military revolution was speedily accomplished, and early in 69 Vitellius was proclaimed emperor at Colonia Agrippinensis (Cologne), or, more accurately, emperor of the armies of Upper and Lower Germany. In fact, he was never acknowledged as emperor by the entire Roman world, though at Rome the senate accepted him and decreed to him the usual imperial honours. He advanced into Italy at the head of a licentious and ruffianly soldiery, and Rome became the scene of riot and massacre, gladiatorial shows and extravagant feasting. As soon as it was known that the armies of the East, Dalmatia and Illyricum had declared for Vespasian, Vitellius, deserted by many of his adherents, would have resigned the title of emperor. It was said that the terms of resignation had actually been agreed upon with Primus, one of Vespasian's chief supporters, but the praetorians refused to allow him to carry out the agreement, and forced him to return to the palace, when he was on his way to deposit the insignia of empire in the temple of Concord. On the entrance of Vespasian's troops into Rome he was dragged out of some miserable hiding-place, driven to the fatal Gemonian stairs, and there struck down. "Yet I was once your emperor," were the last and, as far as we know, the noblest words of Vitellius. During his brief administration Vitellius showed indications of a desire to govern wisely, but he was completely under the control of Valens and Caecina, who for their own ends encouraged him in a course of vicious excesses which threw his better qualities into the background.

See Tacitus, *Histories*; Suetonius, *Vitellius*; Dio Cassius lxv.; Merivale, *Hist. of the Romans under the Empire*, chs. 56, 57; H. Schiller, *Geschichte der römischen Kaiserzeit*, i. pt. 1; W. A. Spooner's ed. of the *Histories* of Tacitus (introduction); B. W. Henderson, *Civil War and Rebellion in the Roman Empire, A.D. 69–70* (1908).

VITERBO, a city and episcopal see of the province of Rome, Italy, 54 m. by rail N.N.W. of Rome, 1073 ft. above sea-level. Pop. (1901) 17,344 (town), 21,258 (commune). It lies on the old high road between Florence and Rome, and besides the railway to Rome it has a branch line (25 m.) going N.E. to Attigliano, on the railway from Rome to Florence. It is picturesquely surrounded by luxuriant gardens, and enclosed by walls and towers, which date partly from the Lombard period. The streets are paved with large lava blocks, of which the town is also built. It has many picturesque medieval towers and other edifices (the Palazzo degli Alessandri is perhaps the most interesting), for which indeed it is one of the best towns in central Italy, and some elegant fountains; among the latter may be mentioned the Gothic Fontana Grande (1279, restored in 1424) and Fontana della Rocca by Vignola (1566). The citadel (Rocca) itself, erected by Cardinal Albornoz in 1345, is now a barrack. The Palazzo Patrizi is a building of the early Renaissance in the Florentine style. The cathedral, a fine basilica, of the 12th (?) century, with columns and fantastic capitals of the period, originally flat-roofed and later vaulted, with 16th-century restorations, contains the tomb of Pope John XXI., and has a Gothic campanile in black and white stone. It is more probable that it was S. Silvestro (now Chiesa del Gesù) and not the cathedral that, in 1271, was the scene of the murder, on the steps of the high altar, during public worship, of Henry, son of Richard of Cornwall, by Guy de Montfort (see Dante, *Inf.* xii. 118). In front of the cathedral Pope Adrian IV. (Nicholas Breakspear) compelled the emperor Frederick I. to hold his stirrup as his vassal. The old episcopal palace with a double loggia built on to it (recently restored to its original form) is a Gothic building of the 13th century, in which numerous conclaves have been held. The church of S. Rosa exhibits the embalmed body of that saint, a native of Viterbo, who died in her eighteenth year, after working various miracles and having distinguished herself by her invectives against Frederick II. (1251), some ruins of whose palace, destroyed after his death, exist. S. Francesco, a Gothic church (before 1256), contains the fine Gothic tombs of Popes Clement IV. and Adrian V., and has an external pulpit of the 15th century. The town also contains a few small Romanesque churches (S. Maria Nuova, S. Andrea, S. Giovanni in Zoccoli, S. Sisto, &c.) and several other Gothic churches. S. Maria della Cella is noteworthy among the former as having one of the earliest campanili of any size in Italy (9th century). The town hall, with a medieval tower and a 15th-century portico, contains some Etruscan sarcophagi from sites in the neighbourhood, and a few good paintings. At one corner of the picturesque square in front of it is a Roman sarcophagus with a representation of the hunt of Meleager, with an inscription in honour of the fair Galiana, to win whom, it is said, a Roman noble laid siege to Viterbo in 1135. Close by is the elegant Gothic façade of S. Maria della Salute, in white and red marble with sculptures. The Gothic cloisters of S. Maria della Verità just outside the town are strikingly beautiful. The church contains frescoes by Lorenzo da Viterbo (1469) and a fine majolica pavement. A mile and a half to the north-east is the handsome early Renaissance pilgrimage church of the Madonno della Quercia; the façade is adorned with three lunettes by Andrea della Robbia. The fine wooden roof of the interior is by Antonio da Sangallo the younger (1519–25). The adjoining monastery has a pleasing cloistered court. A mile and a quarter farther is the town of Bagnaia, with the Villa Lante, still belonging to the family of that name, with fine fountains and beautiful trees, ascribed to Vignola. The inhabitants of Viterbo are chiefly dependent on agriculture; hemp is a specialty of the district, and tobacco and various grains are largely grown, as well as the olive and the vine. There are in the vicinity numerous mineral springs; the warm sulphur spring of Bollicame, about 2 m. off, is alluded to by Dante (*Inf.* xiv. 79).

Viterbo is by some identified with *Surrina nova*, which is only mentioned in inscriptions, while some place it at the sulphur springs, called the Bollicame, to the west of Viterbo on the line of the Via Cassia, where Roman remains exist. This might well be the site of the Roman town. Here the Via Cassia was joined by the Via Ciminia, passing east of the Lacus Ciminius, while a road branched off to Ferentum. See E. Bormann in *Corp. Inscr. Lat.* xi. (Berlin, 1888), p. 454; H. Nissen, *Italische Landeskunde* (Berlin, 1902), ii. 343. The forgeries of the Dominican Annio da Viterbo (d. 1502) were directed to prove that Viterbo was the site of the Fanum Voltumnae (see, however, MONTEFIASCONE). There are no archaeological remains in Viterbo itself, except a few courses of masonry under the bridge which connects the cathedral with the city, near the cathedral, possibly the pier of an older bridge. But the site is not unreasonably considered to be ancient, and the name to be derived from *Vetus urbs*; tombs, too, have been found in the neighbourhood, and it is not an unlikely assumption that here, as elsewhere, the medieval town occupies the Etruscan site. It was fortified by the Lombard king Desiderius (the decree ascribed to him, now in the municipal palace, has long been recognized as a forgery of Annio). It is the centre of the territory of the "patrimony of Peter," which the countess Matilda of Tuscany gave to the papal see in the 12th century; in the 13th century it became a favourite papal residence. Popes Urban IV. (1261), Gregory X. (1271), John XXI. (1276), Nicholas III. (1277) and Martin IV. (1281) were elected here, and it was at Viterbo that Alexander IV. (1261), Clement IV. (1268), Adrian V. (1276) and John XXI. (1277) died. (T. As.)

VITET, LUDOVIC (1802–1873), French dramatist and politician, was born in Paris on the 18th of October 1802. He was educated at the École Normale. His politics were liberal, and he was a member of the society "Aide-toi, le ciel t'aidera." On the triumph of liberal principles in 1830 Guizot created an office especially for Vitet, who became inspector-general of historical monuments. In 1834 he entered the Chamber of Deputies, and two years later was made a member of the Council of State. He was consistent in his monarchist principles, and abstained from taking any part in politics during the second empire. The disasters of 1870–71 reawakened Vitet's interest in public affairs, and he published in the *Revue des deux mondes* his optimistic "Lettres sur le siège de Paris." He died in 1873.

Vitet was the author of some valuable works on the history of art, and his *Monographie de l'Église Notre Dame de Noyon* (1845) especially did much to awaken popular interest in architecture. In the early days of the Romantic movement he wrote some vivid dramatic sketches of the time of the League. They are: *Les Barricades, scènes historiques* (1826), *Les États de Blois, scènes* (1827), and *La Mort de Henri III.* (1829), all three being published together in 1844 with the title of *La Ligue*. The best of these is the *États de Blois*, in which the murder of the duke of Guise is described in the most convincing manner.

VITORIA, an episcopal [illegible] ain, and capital of the province of Álava, [illegible] section of the Norther[illegible] of the [illegible]

[illegible]

of Álava. Its oldest part, the Campillo or Villa-Suso, occupies the top of the hill; some of the walls and towers by which it was formerly defended still remain. Below it is Vitoria Antigua, with narrow tortuous lanes; on the still lower level ground is the modern town, with wide streets, an arcaded market-place and shady promenades. The cathedral of Santa Maria in the Campillo dates from 1181, but has been considerably spoiled by late additions: the church of San Miguel also dates from the 12th century; it has an exceptionally beautiful altar, carved in wood by J. Velazquez and G. Hernandez, in the 16th century. The town hall and the palace of the provincial assembly contain some fine paintings and interesting relics connected with the history of Álava. Vitoria, from its favourable position on the main lines from Madrid to France and to the port of San Sebastian, is an important centre of trade in wine, wool, horses, mules and hardware; other industries are paper-making, carriage-building, cabinet-making, tanning and the manufacture of earthenware. There is a branch railway from Vitoria to Villarreal. The city is lighted by electricity; its trade and population have largely increased since 1875.

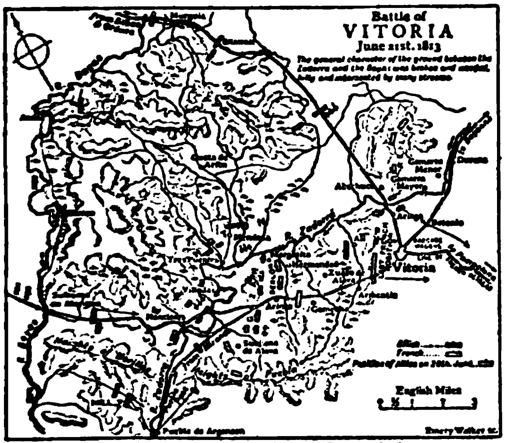
Vitoria was founded in 581 by Leovigild, king of the Visigoths; but its importance dates from the 10th century. In 1181 Sancho the Wise of Navarre granted it a charter and fortified it.

Battle of Vitoria.—For the operations which preceded the battle of Vitoria see PENINSULAR WAR. On June 21st, 1813, the French army in Spain (about 65,000 men with 150 guns), under King Joseph Bonaparte, held an extended position in the basin of Vitoria, south (with the exception of the extreme right) of the river Zadorra. The left rested on the heights of Puebla, north of the Puebla Pass, and Puebla de Arganzon, through which ran the Miranda-Vitoria-Bayonne road, Joseph's line of communication with France. Thence the line stretched to the ridge of Margarita, the troops so far being under General Gazan, with a second supporting line under D'Erlon between Arinez and Hermandad and a reserve behind Arinez. The right under Reille guarded the Bilbao-Vitoria road, occupying heights on the north bank of the Zadorra, and also the villages and bridges of Abechuco and Gamarra Mayor, as well as a ridge near Ariaga on the south bank.

There were no troops between Hermandad and Ariaga, except a mass of cavalry near Ali. The Zadorra, fordable in certain spots only, was spanned by bridges at Puebla de Arganzon, Nanclares, Villodas, Tres Puentes, Mendoza, Abechuco and Gamarra Mayor, which French guns commanded; but, for some reason, none of these had been destroyed. The faults of the French position and their occupation of it were its extension; that it was in prolongation of and (on the right especially) very close to their line of retreat, so that if the right were driven back this line could be at once seized; that the centre was not strongly held; and that all bridges were left intact.

The Allies (nearly 80,000, with 90 guns), under Wellington, had moved from the river Bayas at daylight to attack Joseph, in four columns, the right being under Hill (20,000, including Morillos's Spaniards), the right centre and left centre under Wellington (30,000) and the left under Graham (20,000, including Longa's Spaniards). As the columns marched across the intersected country between the Bayas and Zadorra, extending from near Puebla de Arganzon to the Bilbao-Vitoria road, they kept touch with each other; and as they neared the Zadorra the battle opened all along the line soon after 10 a.m. Wellington's instructions to Graham were to undertake no manœuvre which would separate his column from those on the right; but, with this proviso, to seize the Vitoria-Bayonne road if the enemy appeared decidedly in retreat. Hill after a sharp contest gained the Puebla heights, too weakly held; and pushing through the [illegible] carried the village of Subijana de Álava. The right centre [illegible] having reached Villodas, was waiting for Hill to gain [illegible] ground, when the bridge at Tres Puentes was observed [illegible] unguarded, probably because it was commanded from the [illegible] bank; and, the French attention being now turned towards [illegible] flanks, it was surprised and rushed by Wellington with the

Light division, supported quickly by cavalry and other troops, who maintained themselves on the south bank. Joseph's centre was partially forced, while his left was hard pressed by Hill; and, fearing that Gazan and D'Erlon might be cut off from Reille, he ordered them to withdraw to a ridge farther back, which they did, holding Arinez in front. Here there was no hard fighting; but, as Wellington had now passed three divisions, many guns and the cavalry (which, however, from the nature of the ground could be but little used) across the Zadorra, Margarita, Hermandad and Arinez soon fell to the Allies.



Redrawn from Major-General C. W. Robinson's *Wellington's Campaigns*, by permission of Hugh Rees, Ltd.

On the left, Graham, having turned the heights north of Zadorra with Longa's Spaniards, seized Gamarra Menor close to the Bayonne road. He also with heavy loss carried Gamarra Mayor and Abechuco, but the bridges south of these villages, though more than once taken, were always recaptured by Reille. At length, when a brigade from the Allied centre had been pushed up from Hermandad against Reille's flank, he withdrew from the obstinately defended bridges, and before this Gazan and D'Erlon had also fallen back, fighting, to a third position on a ridge between Armentia and Ali west of Vitoria. Here, at about 6 p.m., they made a last stand, being compelled in the end to yield; and as Graham having now crossed the bridges was close to the Bayonne road, the main body of Joseph's army fled by a bad cross road towards Pampeluna, abandoning artillery, vehicles and baggage (of which an enormous quantity was parked near Vitoria), Reille afterwards joining it through Betonia. The Allies then occupied Vitoria and pursued the French until nightfall. All Joseph's equipages, ammunition and stores, 143 guns, a million sterling in money, and various trophies fell into Wellington's hands, the French loss in men being nearly 7000, that of the Allies over 5000, of whom 1600 were Portuguese and Spaniards. This decisive victory practically freed Spain from French domination. (C. W. R.)

VITRÉ, a town of north-western France, capital of an arrondissement in the department of Ille-et-Vilaine, situated on a hill rising from the left bank of the Vilaine, 24 m. E. of Rennes by rail. Pop. (1906) town, 7106; commune, 10,092. The town largely retains its feudal aspect. The ramparts on the north side and on the west, consisting of a machicolated wall with towers at intervals, are still standing. Only one gateway remains of the original castle, founded towards the end of the 11th century; the rest was rebuilt in the 14th and 15th centuries (the best period of Breton military architecture) and restored in recent times. It is now occupied by a prison, a museum of natural history and painting and the town library. The church of Notre-Dame, formerly a priory of the abbey of St Mélaine of Rennes, dates from the 15th and 16th centuries. An outside stone pulpit is a fine example of 16th-century sculpture. The church possesses a fine enamelled triptych of the 16th century. A tower of the 16th century is all that remains of the church of St Martin. The château of Les Rochers 3 m. from Vitré was the residence of Madame de Sévigné.

Vitré was formerly a Breton barony, and belonged in the 10th century to the younger branch of the counts of Rennes. In 1295 it passed to Guy IX., baron of Laval, on his marriage with the heiress, and afterwards successively belonged to the families of Rieux, Coligny and La Trémoille. The town was seized by Charles VIII. in 1488. Protestantism spread under the rule of the houses of Rieux and Coligny; Vitré became a Huguenot stronghold; and a Protestant church was established, which was not suppressed till the revocation of the edict of Nantes in 1685. Philip Emmanuel, duke of Mercœur, the head of the members of the League in Brittany, besieged the town in vain for five months in 1589. The estates of Brittany, over which the barons of Vitré and of Léon alternately presided, met here several times.

VITRIFIED FORTS, the name given to certain rude stone enclosures whose walls have been subjected in a greater or less degree to the action of fire. They are generally situated on hills offering strong defensive positions. Their form seems to have been determined by the contour of the flat summits which they enclose. The walls vary in size, a few being upwards of 12 ft. high, and are so broad that they present the appearance of embankments. Weak parts of the defence are strengthened by double or triple walls, and occasionally vast lines of ramparts, composed of large blocks of unhewn and unvitrified stones, envelop the vitrified centre at some distance from it. No lime or cement has been found in any of these structures, all of them presenting the peculiarity of being more or less consolidated by the fusion of the rocks of which they are built. This fusion, which has been caused by the application of intense heat, is not equally complete in the various forts, or even in the walls of the same fort. In some cases the stones are only partially melted and calcined; in others their adjoining edges are fused so that they are firmly cemented together; in many instances pieces of rock are enveloped in a glassy enamel-like coating which binds them into a uniform whole; and at times, though rarely, the entire length of the wall presents one solid mass of vitreous substance.

Since John Williams—one of the earliest of British geologists, and author of *The Mineral Kingdom*—first described these singular ruins in 1777, about fifty examples have been discovered in Scotland. The most remarkable are Dun Mac Uisneachain (Dun Macsnoichan), the ancient Beregonium, about 9 m. N.N.E. of Oban; Tap o' Noth, in Aberdeenshire; Craig Phadraic, or Phadrick, near Inverness; Dun Dhardhail (Dunjardil) in Glen Nevis; Knockfarrail, near Strathpeffer; Dun Creich, in Sutherland; Finhaven, near Aberlemno; Barryhill, in Perthshire; Laws, near Dundee; Dun Gall and Burnt Island, in Buteshire; Anwoth, in Kirkcudbright; and Cowdenknowes, in Berwickshire. Dun Mac Uisneachain is the largest in area, being 250 yds. long by 50 yds. broad. In the Tap o' Noth the walls are about 8 ft. high and between 20 and 30 ft. thick. In Dun Mac Uisneachain, Barryhill and Laws the remains of small rectangular dwellings have been found.

For a long time it was supposed that these forts were peculiar to Scotland; but they are found also in Londonderry and Cavan, in Ireland; in Upper Lusatia, Bohemia, Silesia, Saxony and Thuringia; in the provinces on the Rhine, especially in the neighbourhood of the Nahe; in the Ucker Lake, in Brandenburg, where the walls are formed of burnt and smelted bricks; in Hungary; and in several places in France, such as Châteauvieux, Peran, La Courbe, Sainte Suzanne, Puy de Gaudy and Thauron. They have not been found in England or Wales.

In some continental forts the vitrified walls are supported by masses of unvitrified stone built up on each side. This, in all probability, constituted an essential feature in the Scottish forts. Except on the hypothesis of buttresses of a similar kind, it is impossible to explain the vast quantities of loose stones which are found both inside and outside many of the vitrified walls.

The method by which the fusion of such extensive fortifications was produced has excited much conjecture. Williams maintained that the builders found out, either during the process of smelting bog-ore, or whilst offering sacrifices, the power of fire in vitrifying stone, and that they utilized this method to cement and strengthen their defences. This view has been keenly controverted, and it has been suggested that the vitrified summits were not forts but the craters of extinct volcanoes, an hypothesis long since abandoned; that they are not so much forts as vitrified sites, and that the vitrescence was produced by fires lighted during times of invasion, or in religious celebrations; and, lastly, that if they were forts they must originally have been built of wood and stone, and that their present appearance is due to their being set on fire by a besieging enemy. The theory of Williams has, with modifications, been accepted by the principal authorities. It is supported by the following facts:—

(1) The idea of strengthening walls by means of fire is not singular, or confined to a distinct race or area, as is proved by the burnt-earth enclosure of Aztalan, in Wisconsin, and the vitrified stone monuments of the Mississippi valley. (2) Many of the Primary rocks, particularly the schists, gneisses and traps, which contain large quantities of potash and soda, can be readily fused in the open air by means of wood fires—the alkali of the wood serving in some measure as a flux. (3) The walls are chiefly vitrified at the weakest points, the naturally inaccessible parts being unvitrified. (4) When the forts have been placed on materials practically infusible, as on the quartzose conglomerates of the Old Red Sandstone, as at Craig Phadraic, and on the limestones of Dun Mac Uisneachain, pieces of fusible rocks have been selected and carried to the top from a considerable distance. (5) The vitrified walls of the Scottish forts are invariably formed of small stones which could be easily acted upon by fire, whereas the outer ramparts, which are not vitrified, are built of large blocks. (6) Many of the continental forts are so constructed that the fire must have been applied internally, and at the time when the structure was being erected. (7) Daubrée, in an analysis which he made on vitrified materials taken from four French forts, and which he submitted to the Academy of Paris in February 1881, found the presence of natron in such great abundance that he inferred that sea-salt was used to facilitate fusion. (8) In Scandinavia, where there are hundreds of ordinary forts, and where for centuries a system of signal fires was enforced by law, no trace of vitrifaction has yet been detected.

A great antiquity has been assigned to vitrified forts, without sufficient proof. Articles of bronze and iron have been found in the Scottish forts, while in Puy de Gaudy a Roman tile has been discovered soldered to a piece of vitrified rock. In a few of the German forts Professor Virchow found some of the logs used as fuel in vitrifying the walls, and he concluded from the evenness of their cut surfaces that iron and not stone implements must have been used. These results indicate that these structures were possibly in use as late as the early centuries of the Christian era. It has been suggested that they were built as refuges against the Norsemen. Much in the situation and character of the forts favours this supposition. This is especially the case with reference to the Scottish forts. Here the vitrified summits are invariably so selected that they not only command what were the favourite landing-places of the vikings, but are the best natural defences against attacks made from the direction of the seacoast. In Saxony and Lusatia the forts are known as *Schwedenburgen*, and in the Highlands of Scotland as the fortresses of the *Feinne*—designations which also seem to point to an origin dating back to the times of the vikings.

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VITRIOL, a name given to sulphuric acid and to certain sulphates. Oil of vitriol is concentrated sulphuric acid. Blue or Roman vitriol is copper sulphate; green vitriol, ferrous sulphate (copperas); white vitriol, zinc sulphate; and vitriol of Mars is a basic iron sulphate.

VITRUVIUS (Marcus Vitruvius Pollio), Roman architect and engineer, author of a celebrated work on architecture. Nothing is known concerning him except what can be gathered from his own writings. Owing to the discovery of inscriptions relating to the Gens Vitruvia at Formiae in Campania (Mola di Gaeta), it has been suggested that he was a native of that city, and he has been less reasonably connected with Verona on the strength of an existing arch of the 3rd century, which is inscribed with the name of a later architect of the same family name—"Lucius Vitruvius Cerdo, a freedman of Lucius." From Vitruvius himself we learn that he was appointed, in the reign of Augustus, together with three others, a superintendent of *balistae* and other military engines, a post which, he says, he owed to the friendly influence of the emperor's sister, probably Octavia (*De Architectura*, i. pref.). In another passage (v. 1) he describes a basilica and adjacent aedes Augusti, of which he was the architect. From viii. 3 it has been supposed that he had served in Africa in the time of Julius Caesar, probably as a military engineer, but the words hardly bear this interpretation. He speaks of himself as being low in stature, and at the time of his writing bowed down by age and ill-health (ii. pref.). He appears to have enjoyed no great reputation as an architect, and, with philosophic contentment, records that he possessed but little fortune. Though a great student of Greek philosophy and science, he was unpractised in literature, and his style is very involved and obscure. To a great extent the theoretical and historical parts of his work are compiled from earlier Greek authors, of whom he gives a list at i. 1 and viii. 3. The practical portions, on the contrary, are evidently the result of his own professional experience, and are written with much sagacity, and in a far clearer style than the more pedantic chapters, in which he gives the somewhat fanciful theories of the Greeks. Some sections of the latter, especially those on the connexion between music and architecture, the scale of harmonic proportions, and the Greek use of bronze vases to reverberate and strengthen the actors' voices in the theatre, are now almost wholly unintelligible. Vitruvius's name is mentioned by Frontinus in his work on the aqueducts of Rome; and most of what Pliny says (*Hist. Nat.* xxxv. and xxxvi.) about methods of wall-painting, the preparation of the stucco surface, and other practical details in building is taken almost word for word from Vitruvius, especially from vi. 1, though without any acknowledgment of the source.

The treatise [illegible] *Libri Decem* is dedicated to Augustus. [illegible] in the [illegible] from [illegible] com- [illegible] been [illegible] revival

Vitruvius was the chief authority studied by architects, and in every point his precepts were accepted as final. In some cases a failure to understand his meaning led to curious results; for example, the medieval custom, not uncommon in England, of placing rows of earthenware jars under the floor of the stalls in church choirs, appears to have been an attempt to follow out suggestions raised by Vitruvius as to the advantages of placing bronze vases round the auditorium of theatres. Bramante, Michelangelo, Palladio, Vignola and earlier architects were careful students of the work of Vitruvius, which through them has largely influenced the architecture of almost all European countries.

Bk. i. opens with a dedication to Augustus. C. 1 is on the science of architecture generally, and the branches of knowledge with which the trained architect ought to be acquainted, viz. grammar, music, painting, sculpture, medicine, geometry, mathematics and optics; c. 2 is on the general principles of architectural design; c. 3 on the considerations which determine a design, such as strength, utility, beauty; c. 4 on the nature of different sorts of ground for sites; c. 5 on walls of fortification; c. 6 on aspects towards the north, south and other points; c. 7 on the proper situations of temples dedicated to the various deities.

Bk. ii. relates to materials (preface about Dinocrates, architect to Alexander the Great). C. 1 is on the earliest dwellings of man; c. 2 on systems of Thales, Heraclitus, Democritus, &c.; c. 3 on bricks, c. 4 on sand; c. 5 on lime; c. 6 on pozzolana; c. 7 on kinds of stone for building; c. 8 on methods of constructing walls in stone, brick, concrete and marble, and on the materials for stucco; c. 9 on timber, time for felling it, seasoning, &c.; and c. 10 on the fir trees of the Apennines.

Bk. iii., on styles, has a preface on ancient Greek writers. C. 1 is on symmetry and proportion; c. 2 on various forms of Greek temples, *e.g* in antis, prostyle, peripteral, dipteral, hypaethral;[1] c. 3 on inter-columniation—pycnostyle, systyle, eustyle, &c.; c. 4 on foundations, steps and stylobates; c. 5 on the Ionic order, its form and details.

Bk. iv., on styles and orders, has a preface to Augustus on the scope of the work. The subjects of its nine chapters are—(1) the Corinthian, Ionic and Doric orders; (2) the ornaments of capitals, &c.; (3) the Doric order; (4) proportions of the cella and pronaos; (5) sites of temples; (6) doorways of temples and their architraves; (7) the Etruscan or Tuscan order of temples; (8) circular temples; (9) altars.

Bk. v., on public buildings, has a preface on the theories of Pythagoras, &c. Its twelve chapters treat—(1) of fora and basilicae, with a description of his own basilica at Fanum; (2) of the adjuncts of a forum (aerarium, prison and curia); (3) of theatres, their site and construction; (4) of laws of harmonics; (5) of the arrangement of tuned bronze vases in theatres for acoustic purposes; (6) of Roman theatres; (7) of Greek theatres; (8) of the selection of sites of theatres according to acoustic principles; (9) of porticus and covered walks; (10) of baths, their floors, hypocausts, the construction and use of various parts; (11) of palaestrae, xysti and other Greek buildings for the exercise of athletes; (12) of harbours and quays.

Bk. vi. is on sites and planning, and the preface treats of various Greek authors. C. 1 is on selection of sites; c. 2 on the planning of buildings to suit different sites; c. 3 on private houses, their construction and styles, the names of the different apartments; c. 4 on the aspects suited for the various rooms; c. 5 on buildings fitted for special positions; c. 6 on farms and country houses; c. 7 on Greek houses and the names of various parts; c. 8 on construction of houses in wood, stone, brick or concrete.

Bk. vii., mostly on methods of decoration, has a preface (as usual) on the opinions of ancient Greek writers, with lists of Greek sculptors, architects and writers on architecture, and of Roman architects. C. 1 has for its subject pavements and roads, their construction, mosaic floors; c. 2 is on white stucco for walls (*opus albarium*); c. 3 on concrete vaults, gypsum mouldings, stucco prepared for painting; c. 4 on building of hollow walls to keep out the damp, wall decoration by various processes; c. 5 on methods and styles of wall painting, the debased taste of his time; c. 6 on fine stucco made of pounded marble—three coats to receive wall paintings; c. 7 on colours used for mural decoration; c. 8 on red lead (*minium*) and mercury, and how to use the latter to extract the gold from worn-out pieces of stuff or embroidery; c. 9 on the preparation of red lead and the method of encaustic painting with hot wax, finished by friction; cc. 10–14 on artificial colours—black, blue, purple; c. 10 white lead and *ostrum*, *i.e.* murex purple and imitations of murex dye.

Bk. viii. is on hydraulic engineering, and the preface on theories of the ancients. C. 1 treats of the finding of good water; c. 2 of rain-water and rivers—rivers in various countries; c. 3 of hot springs, mineral waters, with an account of the chief medicinal springs of the world; c. 4 of selection of water by observation and experiment; c. 5 of instruments for levelling used by aqueduct engineers; c. 6 of construction of aqueducts, pipes of lead, clay, &c., and other matter on the subject of water-supply.

Bk. ix. is on astronomy. The preface treats of Greek sciences, geometry, the discovery of specific gravity by Archimedes, and other discoveries of the Greeks, and of Romans of his time who have vied with the Greeks—Lucretius in his poem *De Rerum Natura*, Cicero in rhetoric, and Varro in philology, as shown by his *De Lingua Latina*.[2] The subjects of the eight chapters are—(1) the signs of the zodiac and the seven planets; (2) the phases of the moon; (3) the passage of the sun through the zodiac; (4) and (5) various constellations; (6) the relation of astrological influences to nature; (7) the mathematical divisions of the gnomon; (8) various kinds of sundials and their inventors.

Bk. x. is on machinery, with a preface concerning a law at ancient Ephesus compelling an architect to complete any public building he had undertaken; this, he says, would be useful among the Romans of his time.[3] The chapters are—(1) on various machines, such as scaling-ladders, windmills, &c.; (2) on windlasses, axles, pulleys and cranes for moving heavy weights, such as those used by Chersiphron in building the great temple of Diana at Ephesus, and on the discovery by a shepherd of a quarry of marble required to build the same temple; (3) on dynamics; (4) on machines for drawing water; (5) on wheels for irrigation worked by a river; (6) on raising water by a revolving spiral tube; (7) on the machine of Ctesibius for raising water to a height; (8) on a very complicated water engine, the description of which is not intelligible, though Vitruvius remarks that he has tried to make the matter clear; (9) on machines with wheels to register the distance travelled, either by land or water; (10) on the construction of *scorpiones* for hurling stones, (11) and (12) on *balistae* and catapults; (13) on battering-rams and other machines for the attack of a fortress; (14) on shields (*testudines*) to enable soldiers to fill up the enemy's ditches; (15) on other kinds of *testudines*; (16) on machines for defence, and examples of their use in ancient times. (J. H. M.)

The best edition is by Rose (2nd ed., Leipzig, 1899); see also Nohl, *Index Vitruvianus* (1876); Jolles, *Vitruvs Aesthetik* (1906); Sontheimer, *Vitruv und seine Zeit* (1908). There is a good translation by Gwilt (1826; reprinted, 1874).

The name of Vitruvius has been given to several works on modern architecture, such as Campbell, *Vitruvius Britannicus* (London, 1715–71), a series of illustrations of the chief buildings of the 18th century in England, including many works of the brothers Adam; one of these brothers, William Adam, produced a similar work illustrating the buildings which he had designed for Scotland, under the title of *Vitruvius Scoticus* (Edinburgh, 1790). Thurah, *Le Vitruve danois* (Copenhagen, 1746–49), is a similar collection of modern buildings in Denmark.

VITRY-LE-FRANÇOIS, a town of north-eastern France, capital of the department of Marne, on the right bank of the Marne, 20 m. S.E. of Châlons, on the railway from Paris to Strassburg. Pop. (1906) 7985. The Marne-Rhine canal, the Haute-Marne canal, and the lateral canal of the Marne unite at Vitry. Its church of Notre-Dame is a 17th-century building with fine 18th-century monuments. A convent of the Récollets now contains the town hall, the court-house, a library and a small museum. There is a bronze statue of P. P. Royer-Collard (1763–1845), the politician and philosopher, a native of the district. The industrial establishments include important cement works and the manufacture of faïence is carried on. The present town was built in 1545 on a uniform plan by Francis I. to replace the older one of Vitry-en-Perthois, 2½ m. to the north-east, burned in the previous year by Charles V.

VITTEL, a watering-place of north-eastern France, in the department of Vosges, 31 m. W. of Epinal by rail. Pop. (1906) 1954. The waters resemble those of Contrexéville, but are lighter in character; they are bottled and exported in large quantities. They are prescribed in cases of gravel, gout, &c. Vittel has been considerably developed in recent years, and is well supplied with hotels, a fine casino and park, &c.

VITTORIA, a town of Sicily in the province of Syracuse, 95 m. W.S.W. of Syracuse by rail (42 m. direct), founded in 1605 by Giovanni Alphonso Henriquez, who named it after his mother, the famous Vittoria Colonna. It is a prosperous town in the centre of a fertile district, with the largest wine trade in Sicily. Pop. (1901) 30,832 (town), 32,219 (commune).

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[1] The [illegible] in 1887 have shown that Vitruvius was [illegible] great temple of Olympian Zeus at Athens as [illegible]viously almost universal opinion that it [illegible] the needless theory that the passage con[illegible] corrupt.

[2] Vitruvius names Cicero and Lucretius as *post nostram memoriam nascentes*.

[3] The architect being at that time also the contractor.

VITTORIO, a town and episcopal residence of the province of Treviso, Venetia, Italy, 25 m. by rail N. of Treviso, 466 ft. above sea-level. Pop. (1901) 2977 (town), 19,133 (commune). It is a summer resort, with sulphur and saline springs (51·8° to 59° F.), and was formed in 1879 by the union of Ceneda (the episcopal see) and Serravalle. The cathedral contains paintings by Pomponio Amalteo (a pupil of Pordenone) and others. At Serravalle is a church with a fine altar-piece (1547) by Titian. It is a seat of the silkworm breeding and silk-throwing industries.

VITUS, ST (German, Veit; French, Guy). According to the legend, where he is associated with Modestus and Crescentia, by whom he had been brought up, St Vitus suffered martyrdom at a very early age under the emperor Diocletian. Son of a Sicilian nobleman who was a worshipper of idols, Vitus was converted to the Christian faith without the knowledge of his father, was denounced by him and scourged, but resisted all attacks on his profession. Admonished by an angel, he crossed the sea to Lucania and went to Rome, where he suffered martyrdom. His festival is celebrated on the 15th of June. The *Passion* of St Vitus has no historical value, but his name occurs in the *Martyrologium hieronymianum*. In 836 the abbey of Corvey, in Saxony, received his relics, and became a very active centre of his cult. In the second half of the 9th century the monks of Corvey, according to Helmold's *Chronica Slavorum*, evangelized the island of Rügen, where they built a church in honour of St Vitus. The islanders soon relapsed, but they kept up the superstitious cult of the saint (whom they honoured as a god), returning to Christianity three centuries later. At Prague, too, there are some relics of the saint, who is the patron of Bohemia and also of Saxony, and one of the fourteen "protectors" (*Nothhelfer*) of the church in Germany. Among the diseases against which St Vitus is invoked is chorea, also known as St Vitus's Dance.

See *Acta sanctorum*, June, iii. 1013–42 and vi. 137–40; *Bibliotheca hagiographica Latina* (Brussels, 1899), n. 8711–23; J. H. Kessel, "St Veit, seine Geschichte, Verehrung und bildliche Darstellungen," in *Jahrbücher des Vereins von Alterthumsfreunden im Rheinlande* (1867), pp. 152–83. (H. De.)

VIVALDO, UGOLINO and **SORLEONE DE** (fl. 1291–1315), Genoese explorers, connected with the first known expedition in search of an ocean way from Europe to India. Ugolino, with his brother Guido or Vadino Vivaldo, was in command of this expedition of two galleys, which he had organized in conjunction with Tedisio Doria, and which left Genoa in May 1291 with the purpose of going to India "by the Ocean Sea" and bringing back useful things for trade. Planned primarily for commerce, the enterprise also aimed at proselytism. Two Franciscan friars accompanied Ugolino. The galleys were well armed and sailed down the Morocco coast to a place called Gozora (Cape Nun), in 28° 47′ N., after which nothing more was heard of them. Early in the next (14th) century, Sorleone de Vivaldo, son of Ugolino, undertook a series of distant wanderings in search of his father, and even penetrated, it is said, to Magadoxo on the Somali coast. In 1455 another Genoese seaman, Antoniotto Uso di Mare, sailing with Cadamosto in the service of Prince Henry the Navigator of Portugal, claimed to have met, near the mouth of the Gambia, with the last descendant of the survivors of the Vivaldo expedition. The two galleys, he was told, had sailed to the Sea of Guinea; in that sea one was stranded, but the other passed on to a place on the coast of Ethiopia-Mena or Amenuan, near the Gihon (here probably meaning the Senegal)—where the Genoese were seized and held in close captivity.

See Jacopo Doria, "Annales" (under A.D. 1291) in Pertz, *Monumenta Germaniae historica. Scriptores*, xviii. 335 (1863); the "Conoçimiento de todos los Reinos," ed. Marcos Jimenez de la Espada in the *Boletin* of the Geographical Society of Madrid, vol. ii., No. 2, pp. 111. '13, 117–18 (Madrid, February, 1877); Canale, *Degli antichi navigatori e scopritori Genovesi* (Genoa, 1846), G. H. Pertz, *Der älteste Versuch zur Entdeckung des Seeweges nach Ostindien* (Berlin, 1859); *Annali di Geografia e di Statistica composti . . . da Giacomo Gråberg* (Genoa, 1802); Belgrano, ". . . Annali . . . di Caffaro," in *Archiv. Stor. Ital.*, 3rd series. ii. 124, &c., and in *Atti della Soc. Lig. di Storia Patria*, xv. 320 (1881); W. Heyd, *Histoire du commerce du Levant* (the improved French edition of the *Geschichte des Levantehandels*), ii. 140–43 (Paris, 1886); C. R. Beazley, *Dawn of Modern Geography*, iii. 413–19, 551 (Oxford, 1906).

VIVARINI, the surname of a family of painters of Murano (Venice), who produced a great quantity of work in Venice and its neighbourhood in the 15th century, leading on to that phase of the school which is represented by Carpaccio and the Bellinis.

ANTONIO VIVARINI (Antonio of Murano) was probably the earliest of this family. He came from the school of Andrea da Murano, and his works show the influence of Gentile da Fabriano. The earliest known date of a picture of his, an altar-piece in the Venetian academy, is 1440; the latest, in the Lateran museum, 1464, but he appears to have been alive in 1470. He worked in company with a certain "Joannes de Alemania," who has been (with considerable doubt) regarded as a brother (Giovanni of Murano), but no trace of this painter exists of a date later than 1447. After 1447 Antonio painted either alone or in combination with his younger brother Bartolommeo. The works of Antonio are well drawn for their epoch, with a certain noticeable degree of softness, and with good flesh and other tints. Three of his principal paintings are the "Virgin Enthroned with the Four Doctors of the Church," the "Coronation of the Virgin," and "Sts Peter and Jerome." The first two (in which Giovanni co-operated) are in the Venetian academy, the third in the National Gallery, London. This gallery contains also specimens of the two under-named painters.

BARTOLOMMEO VIVARINI is known to have worked from 1450 to 1499. He learned oil-painting from Antonello da Messina, and is said to have produced, in 1473, the first oil picture done in Venice. This is in the church of S. Giovanni e Paolo—a large altar-piece in nine divisions, representing Augustine and other saints. Most of his works, however, including one in the National Gallery, are in tempera. His outline is always hard, and his colour good; the figures have much dignified and devout expression. As "vivarino" means in Italian a goldfinch, he sometimes drew a goldfinch as the signature of his pictures.

LUIGI or ALVISE VIVARINI, born about 1446, painted in 1475 and on to 1502, when he died. It has sometimes been supposed that, besides the Luigi who was the latest of this pictorial family, there had also been another Luigi who was the earliest, this supposition being founded on the fact that one picture is signed with the name, with the date 1414. There is good ground, however, for considering this date to be a forgery of a later time. The works of Luigi show an advance on those of his predecessors, and some of them are productions of high attainment; one of the best was executed for the Scuola di S. Girolamo in Venice, representing the saint caressing his lion, and some monks decamping in terror. The architecture and perspective in this work are superior. Other works by Luigi are in Treviso and in Milan. He painted some remarkable portraits. (W. M. R.)

VIVERO, a town of north-western Spain, in the province of Lugo; on the Ria de Vivero, an estuary formed by the river Landrove, which here enters the Bay of Biscay. Pop. (1900) 12,843. Vivero is an old-fashioned and picturesque town, connected with the opposite bank of the estuary by a bridge of twelve arches and a causeway. Its fishing fleet, its [illegible] trade and the agricultural products of the fertile country around are important. The only means of communication with the interior is by the road to Cabreiros, for Lugo and Ferrol.

VIVES, JUAN LUIS (1492–1540), Spanish scholar, was born at Valencia on the 6th of March 1492. He studied at Paris from 1509 to 1512, and in 1519 was appointed professor of humanities at Louvain. At the instance of his friend Erasmus he prepared an elaborate commentary on Augu[illegible] *Civitate Dei*, which was published in 152[illegible] to Henry VIII. Soon afterwards h[illegible] and is said to ha[illegible] whose [illegible]

(1523). While in England he resided at Corpus Christi College, Oxford, where he was made doctor of laws and lectured on philosophy. Having declared himself against the king's divorce from Catherine of Aragon, he lost the royal favour and was confined to his house for six weeks. On his release he withdrew to Bruges, where he devoted himself to the composition of numerous works, chiefly directed against the scholastic philosophy and the preponderant authority of Aristotle. The most important of his treatises is the *De Causis corruptarum Artium*, which has been ranked with Bacon's *Organon*. He died at Bruges on the 6th of May 1540.

A complete edition of his works was published by Gregorio Mayáns y Siscar (Valencia, 1782). Adolfo Bonilla y San Martin's *Luis Vives y la filosofía del renacimiento* (Madrid, 1903) is a valuable and interesting study which includes an exhaustive bibliography of Vives's writings and a critical estimate of previous monographs. The best of these are A. J. Namèche, "Mémoire sur la vie et les écrits de Jean Louis Vives" in *Mémoires couronnés par l'Académie Royale des sciences et belles-lettres de Bruxelles* (Brussels, 1841), vol. xv.; A. Lange's article in the *Encyklopädie des gesammten Erziehungs- und Unterrichtswesens* (Leipzig, 1887), vol. ix.; Berthe Vadier, *Un Moraliste du XVI^me siècle: Jean-Louis Vives et son livre de l'éducation de la femme chrétienne* (Geneva, 1892); G. Hoppe, *Die Psychologie von Juan Luis Vives* (Berlin, 1901).

VIVIAN, RICHARD HUSSEY VIVIAN, 1st Baron (1775–1842), British cavalry leader, came of a Cornish family. Educated at Harrow and Exeter College, Oxford, Vivian entered the army in 1793, and less than a year later became a captain in the 28th foot. Under Lord Moira he served in the campaign of 1794 in Flanders and Holland. At the end of the expedition, the 28th bore a distinguished part in Lord Cathcart's action of Gueldermalsen. In 1798 Vivian was transferred to the 7th Light Dragoons (now Hussars), and in Sir Ralph Abercromby's division was present at the battles of Bergen and Alkmaar (19th September to 6th October 1799). In 1800 he received his majority, and in 1804 he became lieut.-colonel of the 7th. In command of this regiment he sailed to join Baird at Corunna in 1808, and took part in Lord Paget's cavalry fights at Sahagun and Benavente. During the retreat of Moore's army the 7th were constantly employed with the rearguard. Vivian was present at Corunna, and returned with the remainder of the army to England. It was not until late in 1813 that the 7th returned to the Peninsula, and Vivian (now colonel and A.D.C. to the prince regent) was soon taken away to command a cavalry brigade under Hill. With this corps he served throughout the fighting on the Nive (9th–13th December). At the beginning of 1814 he was transferred to a cavalry brigade of Beresford's corps, and took a marked part in the action of Gave de Pau and the battle of Orthes. In the advance on Toulouse Vivian fought a brilliant action at Croix d'Orade on the Ers (8th April), when he was very severely wounded. At the beginning of 1815 he was made K.C.B.; he had been a major-general for several months. In April Sir Hussey Vivian was appointed to command a brigade of Uxbridge's cavalry, and at Waterloo his regiments, with those of Vandeleur's brigade, made the final charge of the day between Hougoumont and La Haye Sainte, sweeping everything before them. This service was rewarded by the thanks of both houses of parliament, the K.C.H. and the orders of Maria Theresa and St Vladimir from the emperors of Austria and Russia. He sat in the House of Commons as member for Truro from 1821 to 1831; he was then made commander of the forces in Ireland, and [illegible] the G.C.H. In 1835 he became master-general of the ordnance. In 1837 he received the G.C.B., and in 1841, being [illegible] M.P. for East Cornwall, was created Baron Vivian in the [illegible] peerage. A year later he died at Baden-Baden. He [illegible] twice married (first in [illegible]) and the title descended in the [illegible] line. His natural [illegible] John H[illegible]vian [illegible], was a [illegible] India, [illegible] K.C.S. and [illegible] general.

VIVIANITE, [illegible] symmetry and are usually bladed in habit; they are soft (H = 2), flexible and sectile. The specific gravity is 2·6. When unaltered and containing no ferric oxide, the mineral is colourless, but on exposure to the light it very soon becomes of a characteristic indigo-blue colour. Crystals were first found in Cornwall (at Wheal Jane, near Truro, associated with pyrrhotite) by J. G. Vivian, after whom the species was named by A. G. Werner in 1817. The mineral had, however, been earlier known as a blue powdery substance, called "blue iron-earth," met with in peat-bogs, in bog iron-ore, or with fossil bones and shells. (L. J. S.)

VIVISECTION, literally the cutting (*sectio*) of living (*vivus*) animals, a word which might be applied to all surgical operations whether practised upon the lower animals or on man. As conventionally used, however, it has exclusive reference to experiments upon the lower animals undertaken for the advancement of medical sciences. There are a number of people who, calling themselves anti-vivisectionists, strongly object to these experiments on the lower animals; and it must be conceded that the humane reasons which they advance against it can only be set aside as "sentimental" if considerations of a wider humanity can show that the arguments of the anti-vivisectionists really run counter to human progress. The supporters of vivisection, properly considered, must not be confused with those who would make a barbarous use of this means of research. What is at stake here is the right to use it properly and at all. It would be possible for cruelty of an unnecessary kind to result if the practice of vivisection were unrestricted; and the purpose of this article is to give some account of the method of experiments on animals as sanctioned by law in the United Kingdom, and to justify that method by setting forth the chief historical discoveries that have been made by the help of vivisection. Such experiments have for their object the advancement of the sciences of physiology and pathology. From the earliest periods experimental vivisections have occasionally been practised, but before the days of anaesthetics it was difficult to execute them, and not less difficult to draw conclusions. The invention of anaesthetics has greatly extended the scope of the experimental method, because an animal can be kept unconscious and quiet, without even a quiver of a muscle, during prolonged operations. Further, the introduction of the antiseptic method has made it possible to subject all tissues and regions of the body to surgical interference, and this has also had the effect of increasing the possibilities of experimental research.

In 1906 a British Royal Commission was appointed to inquire into the whole subject under the chairmanship of Lord Selby, on whose death Mr A. J. Ram, K.C., took the chair. The Commission sat from October 1906 to March 1908, and heard no fewer than 21,761 questions and answers. In view of attempts on the part of the anti-vivisectionists to misrepresent the nature of the evidence given before the Commission, in January 1908 the supporters of experiments on animals founded the Research Defence Society, under the presidency of Lord Cromer; by July 1910 this society had some 3500 members. Its official address is 21 Ladbroke Square, London, W.

I. Methods Employed.—The present act relating to experiments on animals was passed in 1876. At that time the majority of these experiments were physiological. There was, it may be fairly said, no such thing as bacteriology, no general following up of Pasteur's work. A few experiments were made in pathology, for instance in tubercle; and a few in surgery, in pharmacology, and in the action of poisons, especially snake venom. But the chief use of experiments on animals was for the advancement of physiology. The evidence given before the Royal Commission (1875) was almost entirely on physiological matters, on the discoveries of Harvey, Bell, Magendie and Claude Bernard, on the *Handbook for the Physiological Laboratory*, and so forth. The act, therefore, was drafted with a view to physiology, without much concern for pathology, and without foreknowledge of bacteriology. At the time of writing (1910), 95% of the experiments are inoculations. Every experiment must be made in a registered place open to government inspection. But inoculation experiments are sometimes fistula thus established is not afterward painful, though there may be some discomfort now and again.

The classical instance is the case of Alexis St Martin, who was shot in the stomach in 1822, and recovered, but with a fistula. He let Dr Beaumont make experiments on him for nine years: "During the whole of these periods, from the spring of 1824 to the present time (1833), he has enjoyed general good health . . . active, athletic and vigorous; exercising, eating and drinking like other healthy and active people. For the last four months he has been unusually plethoric and robust, though constantly subjected to a continuous series of experiments on the interior of the stomach; allowing to be introduced or taken out at the aperture different kinds of food, drinks, elastic catheters, thermometer tubes, gastric juice, chyme, &c., almost daily, and sometimes hourly. Such have been this man's condition and circumstances for several years past; and he now enjoys the most perfect health and constitutional soundness, with every function of the system in full force and vigour" (Beaumont, *Experiments and Observations on the Gastric Juice*, 1838).

We come now to the question, What anaesthetics are used in these experiments, and are they properly administered? The anaesthetics used are—(1) chloroform, ether, or a mixture containing chloroform and ether; (2) morphia, chloral, urethane. It is sometimes said that morphia is not an anaesthetic. That depends on the quantity given. Not a month passes in this country without somebody killing himself or herself with morphia or chloral. They die profoundly anaesthetized: they cannot be roused; even the pain of a strong electric shock is not enough to rouse them. So it is with animals. The doses given to them are enormous and produce complete insensibility. On this point the evidence given before the Royal Commission of 1906–8 by Mr Thane, Professor Schäfer, Sir Lauder Brunton, Sir Henry Morris, Professor Dixon, Dr Dudley Buxton and Professor Starling is absolutely conclusive. "As to the statements," says Sir Lauder Brunton, "that chloral and opium or morphia are not narcotics, and do not remove pain, there is no other word for it, it is simply a lie; you may as well say that chloroform does not remove pain. If you give any animal a sufficiently large dose of chloral or opium, you so completely abolish sensibility that there is nothing you can do that will awaken its sensibility. The animal is as senseless as a piece of board."

With regard to chloroform, ether and the A.C.E. mixture (alcohol, chloroform and ether) it is absolutely certain that animals can be kept, with these anaesthetics, profoundly unconscious for three or four or more hours. Nothing on this point is more worthy of consideration than the evidence in veterinary surgery, given before the Royal Commission by Mr Hobday, one of the very foremost veterinary surgeons in this country (*Reports of Evidence*, vol. iv. Q. 16284–16523). The opponents of all experiments on animals are apt to believe that dogs and cats must be bound and fastened on boards, and then have the anaesthetic given to them. That is not the case. They can take the anaesthetic first, and then be put in position; just as we, for many of the operations of surgery, are bound in position. And, of course, dogs and cats cannot lie on their backs as we can. "The usual thing we do," said Professor Starling, in his evidence before the Royal Commission, "is to give the animal, half an hour before the experiment, a hypodermic injection of morphia, of about a quarter of a grain—from a quarter to a third. The effect of that is, that the dog becomes sleepy and stupid, and then sometimes it will lie down quietly, and if it is very sleepy you can put a mask over its nose containing the chloroform, alcohol and ether mixture, which it takes quite quietly. If, at the time one wants to begin the operation, the animal is not fully under the influence of morphia—if it still seems restless—it is put in a box, and there it has some wool saturated with the A.C.E. mixture put in the box. The air gradually gets saturated, the dog gets more and more sleepy, and finally subsides at the bottom of the box."

A few words must be said here about curare. It was said, some years ago, by an opponent of experiments on animals, that "curare is used daily throughout England," whereas, it is seldom used at all, and is never used alone in any sort or kind of operation on any animal in this country: in every such case a recognized anaesthetic must be given, and is given. In large doses curare not only abolishes the movement of the voluntary muscles, but also acts as an anaesthetic: in small doses it acts only on the voluntary muscles, *i.e.* on the endings of the motor nerves going to these muscles. For example, suppose that the object of the experiment is to observe and record the action of a nerve on the contraction of certain blood vessels. The nerve gives off some branches to muscles, and other branches to blood vessels. If the animal be anaesthetized, and the nerve stimulated, muscles and vessels will both contract; but, if curare be given, as well as an anaesthetic, the vessels alone will contract, without the muscles: for curare does not act on the endings of motor nerves going to blood vessels. But, as a practical matter, curare is very hard to obtain, and is often impure, and is very seldom used. One of the inspectors said to the Royal Commission that he had once seen it used, fifteen years ago. Professor Gotch said that he had not used it, in his own work, for twenty years. Professor Schäfer said that he had not used it for years. And Sir Lauder Brunton said that he did not think he had used it at all since the passing of the act of 1876. The fear that, in a case where curare was being used, the effect of the anaesthetic might "pass off," and the animal be left under curare alone, is not reasonable. The dosage and administration of anaesthetics is not left to chance. If, for example, an animal is receiving a definite percentage of chloroform vapour, it is of necessity under the influence of the chloroform: and the anaesthesia will gradually become not less but more profound. (See the evidence given before the Royal Commission by Professor Langley and Professor Waller.)

It may be interesting to compare the pain, or death, or discomfort among 86,277 animals used for experiments in Great Britain in 1909, with the pain, or death, or discomfort of an equal number of the same kinds of animals, either in a state of nature, or kept for sport, or used for the service of human profit or amusement. But it would be outside the purpose of this article to describe the cruelties which are inseparable from sport, and from the killing of animals for food, and from fashion; neither is this the place to describe the millions of mutilations which are practised on domestic animals by farmers and breeders. As one of the Royal Commissioners recently said, the farmyards, at certain times of the year, simply "seethe with vivisection." The number of animals wounded in sport, or in traps, cannot be guessed. Against this vast amount of suffering we have to put an estimate of the condition of 86,277 animals used for medical science. Ninety-five per cent. of them were used for inoculation. In many of these inoculations the result was negative: the animal did not take any disease, and thus did not suffer any pain. In many more, *e.g.* cancer in mice, tubercle in guinea-pigs, the pain or discomfort, if any, may fairly be called trivial or inconsiderable. It could hardly be said that these small animals suffer much more than an equal number of the same kind of animals kept in little cages to amuse children. There remain 3888 animals which were submitted to operation under an anaesthetic. In the greater number of these cases the animal was killed then and there under the anaesthetic, without recovering consciousness. In the remaining cases the animal was allowed to recover, and to be kept for observation; but no further observation of any kind, which could cause pain, was allowed to be made on it, unless it were again placed under an anaesthetic. Many of these cases, thus allowed to recover after an operation, may fairly be compared to an equal number of domestic animals after one of the formal operations of veterinary surgery. These observations made under Certificate B form but a very small proportion of the total number of experiments on animals in the United Kingdom; and they have led, in recent years, to discoveries of the very utmost importance for human life and health.

II. SCIENTIFIC RESULTS.—We come now to consider the results of experiments on animals, but we must remember that not we alone, but animals also, owe a great debt to them. Great epizootic diseases like anthrax, swine-fever, chicken cholera, silkworm disease, pleuro-pneumonia, glanders, Texas cattle fever, blackleg, tuberculosis in cattle, have killed yearly millions of animals, and have been brought under better control by these experiments. The advantages that have been obtained for man may be arranged under two heads—(A) Physiology, (B) Pathology, Bacteriology and Therapeutics.

A. PHYSIOLOGY

1. *The Blood.*—Galen (A.D. 131) confuted the doctrine of Erasistratus, that the arteries contained πνεῦμα, the breath of life, proving

by experiment that they contain blood. "Ourselves, having tied the exposed arteries above and below, opened them, and showed that they were indeed full of blood." Realdus Columbus (1559), though he did not discover the general or "systematic" circulation of the blood, yet seems to have discovered, by experiment, the pulmonary circulation. "The blood is carried through the pulmonary artery to the lung, and there is attenuated; thence, mixed with air, it is carried through the pulmonary vein to the left side of the heart. Which thing no man hitherto has noted or left on record, though it is most worthy of the observance of all men. . . . And this is as true as truth itself; for if you will look not only in the dead body but also in the living animal, you will always find this pulmonary vein full of blood, which assuredly it would not be if it were designed only for air and vapours. . . . Verily I pray you, O candid reader, studious of authority, but more studious of truth, to make experiment on animals. You will find the pulmonary vein full of blood, not air or *fuligo*, as these men call it, God help them." Harvey's treatise *De Motu Cordis et Sanguinis in Animalibus* was published at Frankfort in 1621. It begins thus: "When by many dissections of living animals, as they came to hand,—*Cum multis vivorum dissectionibus, uti ad manum dabantur*,—I first gave myself to observing how I might discover, with my own eyes, and not from books and the writings of other men, the use and purpose of the movement of the heart in animals, forthwith I found the matter hard indeed and full of difficulty; so that I began to think, with Frascatorius, that the movement of the heart was known to God alone. . . . At last, having daily used greater disquisition and diligence, by frequent examination of many and various living animals—*multa frequenter et varia animalia viva introspiciendo*—I came to believe that I had succeeded, and had escaped and got out of this labyrinth, and therewith had discovered what I desired, the movement and use of the heart and the arteries. And from that time, not only to my friends but also in public in my anatomical lectures, after the manner of the Academy, I did not fear to set forth my opinion in this matter." Here, and again at the end of the Preface, and again in the eighth chapter of the *De Motu*, he puts his experiments in the very foreground of the argument. Take the headings of his first four chapters: 1. *Causae, quibus ad scribendum auctor permotus fuerit.* 2. *Ex vivorum dissectione, qualis fit cordis motus.* 3. *Arteriarum motus qualis, ex vivorum dissectione.* 4. *Motus cordis et auricularum qualis, ex vivorum dissectione.* He had, of course, help from other sources—from anatomy and from physics; but it is certain, from his own words, that he attributed his discovery, in a very great measure, to experiments on animals. Malpighi (1661), professor of medicine at Bologna, by examining with a microscope the lung and the mesentery of the live frog, made out the capillary vessels. He writes to Borelli, professor of mathematics at Pisa, that he has failed in every attempt to discover them by injecting fluids into the larger vessels, but has succeeded by examining the tissues with the microscope: "Such is the divarication of these little vessels coming off from the vein and the artery, that the order in which a vessel ramifies is no longer preserved, but it looks like a network woven from the offshoots of both vessels" (*De Pulmonibus*, 1661). Stephen Hales (1733), rector of Farringdon and minister of Teddington, and a Fellow of the Royal Society, made the first exact estimates of the blood pressure, the real force of the blood, by inserting one end of a vertical glass tube into the crural artery of a mare, and noting the rise of the blood in the tube (*Statical Essays, containing Haemastaticks, &c., 1733*). John Hunter, born 1738, made many observations on the nature and processes of the blood; and, above all, he discovered the facts of collateral circulation. These facts were fresh in his mind when he first ventured, in December 1785, to tie the femoral artery in "Hunter's canal" for the cure of aneurism in the popliteal space. The experiment that gave him his knowledge of the collateral circulation was made on one of the deer in Richmond Park: he tied its external carotid artery, to see what effect would be produced on the shedding of the antler. Some days later he found that the circulation had returned in the antler. He had the buck killed, and found that the artery had been completely closed by the ligature, but the small branches coming from it, between the heart and the ligature, were enlarged and were in communication with others of its branches beyond the ligature; and by this collateral circulation the flow of blood to the antler had been restored. Among later observations on the circulation must be mentioned the use of the mercurial manometer by Poiseuille (1828) and Ludwig (1849), the study of the blood pressure within the heart by Hering (1849) and the permanent tracing of the pressure curves by Chauveau and Marey (1863). Finally came the study of those more abstruse problems of the circulation that the older physiologists had left alone—the influences of the central nervous system, the relations between blood pressure and secretion, the automatism of the heart-beat, and the influence of gravitation. Professor Starling, in 1906, writes as follows of this part of physiology: "Among the researches of the last thirty years, those bearing on the circulation of the blood must take an important place, both for their physiological interest and for the weighty influence they have exerted on our knowledge and treatment of disorders of the vascular system, such as heart disease. We have learned to measure accurately the work done by the great heart-pump; and by studying the manner in which this work is affected by different conditions, we are enabled to increase or diminish it, according to the needs of the organ. Experiments in what is often regarded as the most transcendental department of physiology—*i.e.* that which treats of muscle and nerve—have thrown light on the wonderful process of 'compensation' by which a diseased heart is able to keep up a normal circulation" And Dr James Mackenzie, writing in 1910 of certain irregularities of the circulation during pregnancy (venous pulse in the neck and irregular beat of the heart), says, very emphatically, that these conditions in patients have been interpreted by experiments on animals. "The outcome of these researches [Wenckebach's clinical studies], as well as those of a great number of other observers, has been to elucidate the nature and meaning of a great number of abnormal conditions of the heart. It might be said with truth that, whereas a few years ago irregular action of the heart was one of the most obscure symptoms in clinical medicine, it is now one of the best understood. It is needless to repeat that this advance would have been absolutely impossible without the knowledge gained by experiment" (Research Defence Society, May 1910).

2. *The Lacteals.*—Asellius (1622) by a single experiment demonstrated the flow of chyle along the lacteals. The existence of these minute vessels had been known even to Galen and Erastistratus, but they had made nothing of their knowledge. Asellius says: "I observed that the nerves of the intestines were quite distinct from these white threads, and ran a different course. Struck with this new fact, I was silent for a time, thinking of the bitter warfare of words among anatomists as to the mesenteric veins and their purposes. When I came to myself, to satisfy myself by an experiment, I pierced one of the largest cords with a scalpel. I hit the right point, and at once observed a white liquid like milk flowing from the divided vessel." Jehan Pecquet (1647), in the course of an experiment on the heart, observed the flow of chyle into the subclavian vein, and its identity with the chyle in the lacteals; and by further experiment found the thoracic duct, and the chyle flowing up it: "I perceived a white substance, like milk, flowing from the vena cava ascendens into the pericardium, at the place where the right auricle had been. . . . I found these vessels (the thoracic duct) all along the dorsal vertebrae, lying on the spine, beneath the aorta. They swelled below a ligature; and when I relaxed it, I saw the milk carried to the orifices that I had observed in the subclavian vein." The existence of this duct, which is empty and collapsed after death, had been overlooked by Vesalius and all the great anatomists of his time.

3. *The Gastric Juice.*—Our knowledge about digestion dates back to the end of the 17th century, when Valisnieri first observed that the stomach of a dead animal contained a fluid which acted on certain bodies immersed in it—"a kind of *aqua fortis*." In 1752 Réaumur began his observations on this fluid, making birds swallow fine fenestrated tubes containing grain or meat, or sponges with threads attached; and observed that digestion consists in the dissolution of food, not in any sort of mechanical action or trituration. His observations were extended and perfected by Spallanzani (1777). Then came a period of uncertainty, without further advance; until in 1823 the French Academy offered a prize for the best work on the subject, and Tiedemann and Gmelin submitted their observations to them: "The work of Tiedemann and Gmelin is of especial interest to us on account of the great number of their experiments, from which came not only the absolute proof of the existence of the gastric juice, but also the study of the transformation of starch into glucose. Thus the theory of digestion entered a new phase: it was finally recognized, at least for certain substances, that digestion is not simply dissolution, but a true chemical transformation" (Claude Bernard, *Physiologie opératoire*, 1879). Beaumont's experiments on Alexis St Martin (*vide supra*) were published in 1838. They were, of course, based on the work of the physiologists: "I make no claim to originality in my opinions as respects the existence and operation of the gastric juice. My experiments confirm the doctrines (with some modifications) taught by Spallanzani and many of the most enlightened physiological writers" (Beaumont's preface to his book). Eberlé, in 1834, showed how this knowledge of the gastric juice might be turned to a practical use, by extracting it from the mucous membrane of the stomachs of animals after death: hence came the invention of the various preparations of pepsin. Later, Blondlot of Nancy, in 1842, studied the gastric juice by the method of a fistula, like that of St Martin. More recent observations have been made on the movements of the stomach during digestion, and on the influences of the nervous system on the process.

The stomach is, of course not the only organ of digestion: the liver, the pancreas and the intestinal glands, all are concerned. The recent work of Pawlow and of Starling has greatly advanced our knowledge of the actions of the secretions from these organs. The whole chain of processes, nervous and chemical, psychical and physical, from the taking of food into the mouth to the expulsion of the waste residue, is now viewed in its entirety: and especial study has been given to the influences, nervous or chemical, which are exercised, as it were, on a particular tract of the digestive system, at the bidding of another tract. Pawlow, recognizing the importance of keeping the animals under the most normal conditions that were possible, and of studying the different tracts of the digestive system in animals not anaesthetized, yet free from pain or distress, made use of fistulae established at different points of the digestive canal, and was able to study the digestive juices at different stages during digestion, without causing pain to the animals. The work of Pawlow has been further developed by Professor Starling's recent work on the chemical substances produced in the body, during the act of digestion, to promote digestion.

4. *Glycogen.*—Claude Bernard's work on the assimilation and destruction of sugar in the body was begun in 1843. His discovery of the glycogenic action of the liver was made by keeping two dogs on different diets, one with sugar, the other without it, then killing them during digestion, and testing the blood in the veins coming from the liver: "What was my surprise when I found a considerable quantity of sugar in the hepatic veins of the dog that had been fed on meat only, and had been kept for eight days without sugar! Finally, after many attempts—*après beaucoup d'essais et plusieurs illusions que je fus obligé de rectifier par des tâtonnements*—I succeeded in showing, that in dogs fed on meat the blood passing through the portal vein (from the stomach) does not contain sugar before it reaches the liver; but when it leaves the liver and comes by the hepatic veins into the inferior vena cava, this same blood contains a considerable quantity of a sugary substance (glucose)" (*Nouvelle fonction du foie*, Paris, 1853).

5. *The Pancreas.*—The 17th century was a time of very fanciful theories about the pancreas (Lindanus, Wharton, Bartholini), which need not be recalled here. But Sylvius (François de Bois) had the wisdom to see that the pancreas must be estimated, not according to its position, but according to its structure, as of the nature of the salivary glands. He urged his pupil, Regnier de Graaf, to study it by experiment, and de Graaf says: "I put my hand to the work; and though many times I despaired of success, yet at last, by the blessing of God on my work and prayers, in the year 1662 I discovered a way of collecting the pancreatic juice" By the method of a fistula he collected and studied the secretion of the pancreas; and by further experiment he refuted Bartholini's theory that the pancreas was a sort of appanage or "biliary vesicle" of the spleen. But he got no help from the chemistry of his time; he could no more discover the amylolytic action of the pancreatic secretion than Galvani could discover wireless telegraphy. Still, he did good work; and Claude Bernard, 180 years later, went back to de Graaf's method of the fistula. His observations, begun in 1846, received a prize from the French Academy in 1850. Sir Michael Foster says of them: "Valentin, it is true, had in 1844 not only inferred that the pancreatic juice had an action on starch, but confirmed his view by actual experiment with the juice expressed from the gland; and Eberlé had suggested that the juice had some action on fat; but Bernard at one stroke made clear its threefold action. He showed that it on the one hand emulsified, and on the other hand split up into fatty acids and glycerine, the neutral fats; he clearly proved that it had a powerful action on starch, converting it into sugar; and lastly, he laid bare its remarkable action on proteid matters." At a later date it was discovered that the pancreas, beside its work in digestion, has an "internal secretion": that it, like the thyroid gland and the suprarenal capsules, helps to keep the balance of the general chemistry of the whole body. Professor Schäfer, writing in 1894, says on this subject: "It was discovered a few years ago by von Mering and Minkowski that if, instead of merely diverting its secretion, the pancreas is bodily removed, the metabolic processes of the organism, and especially the metabolism of carbo-hydrates, are entirely deranged, the result being the production of permanent diabetes. But if even a very small part of the gland is left within the body, the carbo-hydrate metabolism remains unaltered, and there is no diabetes. The small portion of the organ which has been allowed to remain (and which need not even be left in its proper place, but may be transplanted under the skin or elsewhere) is sufficient, by the exchanges which go on between it and the blood generally, to prevent those serious consequences to the composition of the blood, and the general constitution of the body, which result from the complete removal of this organ." This fact, that complete removal of the pancreas, in a cat or a dog, may cause fatal diabetes, is of importance, because the pancreas in some cases of diabetes in man is diseased: but, at present, experiments on animals have not led to any certain or specific cure of diabetes in man.

6. *The Growth of Bone.*—The experiments made by du Hamel (1739–1843) on the growth of bone by deposit from the periosteum (the thin membrane ensheathing each bone) rose out of Belchier's observation (1735) that the bones take up the stain of madder mixed with the food. Du Hamel studied the whole subject very [illegible] discovered this bone-producing power of the peri- [illegible] important fact in all operations on the bones. [illegible] one of his own memoirs *Les os croissent* [illegible] *couches osseuses qui tirent leur origine* [illegible] *des Arbres augmente en grosseur* [illegible] *qui se forment dans l'écorce.* By feeding pigs at one time with dyed food, at another with undyed food, he obtained their bones in concentric layers alternately stained and unstained. His facts were confirmed by Bazan (1746) and Boehmer (1751); but his conclusions, unfortunately, were opposed by Haller. Still, he brought men to study the whole subject of the growth of bones, in length as well as in thickness, and the whole modelling of the bones, in adult life, by deposit and absorption. Bichat, John Hunter, Troja and Cruveilhier took up his work in physiology and in surgery. Later, from the point of view of surgery, Syme (1837) and Stanley (1849) made experiments on the growth of bone, and on the exfoliation of dead bone; and, after them, Ollier, whose influence on this part of surgical practice has been of the very highest value.

7. *The Nervous System.*—*A*. The Nerve-Roots.—Through all the centuries between Galen, who lived in the time of Commodus, and Sir Charles Bell, who lived in the time of George III., no great advance was made in our knowledge of the nervous system. The way of experiment, which had led Galen far ahead of his age, was neglected, and everything was overwhelmed by theories. Bell in London and Magendie in Paris took up the experimental study of the nervous system about where Galen had left it. The question of priority of discovery does not concern us here: we may take Sir Michael Foster's judgment, that Magendie brought exact and full proof of the truth which Bell had divined rather than demonstrated, that the anterior and posterior roots of spinal nerves have essentially different functions—"a truth which is the very foundation of the physiology of the nervous system." The date of Bell's work is 1811, *An Idea of a New Anatomy of the Brain, submitted for the Observation of the Author's Friends.* In it he says: "Considering that the spinal nerves have a double root, and being of opinion that the properties of the nerves are derived from their connexions with the parts of the brain, I thought that I had an opportunity of putting my opinion to the test of experiment, and of proving at the same time that nerves of different endowments were in the same cord (the same nerve-trunk) and held together by the same sheath. On laying bare the roots of the spinal nerves I found that I could cut across the posterior fasciculus of nerves, which took its origin from the spinal marrow, without convulsing the muscles of the back; but that on touching the anterior fasciculus with the point of the knife, the muscles of the back were immediately convulsed. Such were my reasons for concluding that the cerebrum and cerebellum were parts distinct in function, and that every nerve possessing a double function obtained that by having a double root. I now saw the meaning of the double connexion of the nerves with the spinal marrow, and also the cause of that seeming intricacy in the connexions of nerves throughout their course, which were not double at their origins." His other work, on the cranial nerves, which are "not double at their origins," bore fruit at once in surgery. Sir John Erichsen says of it: "Up to the time that Sir Charles Bell made his experiments on the nerves of the face, it was the common custom of surgeons to divide the facial nerve for the relief of neuralgia, *tic douloureux*; whereas it exercises, and was proved by Sir Charles Bell to exercise, no influence over sensation, and its division consequently for the relief of pain was a useless operation."

B. Reflex Action.—The observations made by Sir Robert Boyle, Redi, Le Gallois and others on the reflex movements of decapitated vipers, frogs, eels and butterflies were of no great use from the point of view of physiology; but they led toward the discovery that nerve-power is stored in the spinal cord, and is liberated thence in action independent of the higher cerebral centres. Marshall Hall (1832–1837) discovered, by his experiments, that reflex actions are the work of definite groups of cells, set at certain points or levels in the cord; he proved the segmental structure of the cord, the existence of nerve-centres in it, and thus foreshadowed the discovery of the like centres in the brain. In his earlier writings (1832–33) he extended the principles of the doctrines of reflex action to the larynx, the pharynx and the sphincter muscles; later, in 1837, he demonstrated the course of nerve-impulses within the cord, from one level to another, and the effects of direct stimulation of the cord. Also he noted the effects of opium and of strychnine on reflex action; and the reflex character of the convulsions that occur in certain diseases.

C. The Medulla Oblongata and the Cerebellum.—Flourens, who was among the earliest students of the use of chloroform, is best known for his experiments on the respiratory centre and the cerebellum. He localized the cells in the medulla that govern the reflex movement of respiration. Afterward came the discovery of cardiac and other centres in the neighbourhood of the respiratory centre. He showed also that the cerebellum is concerned with the equilibration and co-ordination of the muscles; that an animal, a few days old, deprived of sensation and consciousness by removal of the cerebral hemispheres, was yet able to stand and to move forward, but when the cerebellum also was removed, lost all power of co-ordination (*Recherches expérimentales*, Paris, 1842). And from the observations made by him and by others, it was found that the semicircular canals of the internal ears are the terminal organs of the sense of equilibration.

D. The Vaso-Motor Nerves.—Claude Bernard, studying the sympathetic nervous system, discovered the vaso-motor nerves that control the calibre of the arteries. The question of priority between him and Brown Séquard need not be considered here. His first account of his work was communicated to the *Société de Biologie* in December 1851. The following account of it is from his *Leçons de physiologie opératoire* (1879):—

"Let me remind you how I was led to discover the vaso-motor nerves. Starting from the clinical observation, made long ago, that in paralysed limbs you find at one time an increase of cold and at another an increase of heat, I thought that this contradiction might be explained by supposing that, side by side with the general action of the nervous system, the sympathetic nerve might have the function of presiding over the production of heat; that is to say, that in the case where the paralysed limb was chilled, I supposed the sympathetic nerve to be paralysed, as well as the motor nerves; while in the paralysed limbs that were not chilled the sympathetic nerve had retained its function, the systematic nerves alone having been atracked. This was a theory, that is to say, an idea, leading me to make experiments; and for these experiments I must find a sympathetic nerve-trunk of sufficient size, going to some organ that was easy to observe; and must divide the trunk to see what would happen to the heat-supply of the organ. You know that the rabbit's ear, and the cervical sympathetic of this animal, offered us the required conditions. So I divided this nerve; and, at once, the experiment gave the lie direct to my theory—*Je coupai donc ce filet et aussitôt l'expérience donna à mon hypothèse le plus éclatant démenti.* I had thought that the section of the nerve would suppress the function of nutrition, of calorification, over which the sympathetic system had been supposed to preside, and would cause the hollow of the ear to become chilled; and here was just the opposite, a very warm ear, with great dilatation of its vessels." The experiments of Budge and Waller (1853) and of Schiff (1856) threw light on the action of these vaso-motor nerves, and on the place of the vaso-motor centre in the cord; and in 1858 Claude Bernard, by his experiments on the chorda tympani and the submaxillary gland, demonstrated their twofold influence, either to dilate or to constrict the vessels. "It is almost impossible to exaggerate the importance of these labours of Bernard on the vaso-motor nerves, since it is almost impossible to exaggerate the influence which our knowledge of the vaso-motor system, springing as it does from Bernard's researches as from its fount and origin, has exerted, is exerting, and in widening measure will continue to exert, on all our physiological and pathological conceptions, on medical practice, and on the conduct of human life. There is hardly a physiological discussion of any width in which we do not sooner or later come on vaso-motor questions" (Foster, *Life of Claude Bernard*).

E. Cerebral Localization.—The study of the motor and sensory centres of the cerebral hemispheres began in clinical observation. Observation of cases, and examination of the brain after death (Bouillard, 1825, Dax, 1836, Broca, 1861), led men to believe that a particular area of the left frontal lobe of the brain did indeed govern and permit the use of speech. Physiological experiments had nothing to do with the discovery of the speech centres. "Bouillard in 1825 collected a series of cases to show that the faculty of speech resided in the frontal lobes. In 1861 his views were brought by Aubertin before the notice of the Anthropological Society of Paris. Broca, who was present at the meeting, had a patient under his care who had been aphasic for twenty-one years, and who was in an almost moribund state. The autopsy proved of great interest, as it was found that the lesion was confined to the left side of the brain, and to what we now call the third frontal convolution. . . . In a subsequent series of fifteen typical cases examined, it was found that the lesion had destroyed, among other parts, the posterior part of the third frontal in fourteen" (Hamilton, *Text-Book of Pathology*). From this clinical fact, that the movements of speech depend on the integrity of a special area of the brain's surface, and from the facts of "Jacksonian epilepsy," and similar observations in medicine and surgery, began the experimental work of cerebral localization, by Hitzig, Goltz, Schiff, Ferrier, Yeo, Horsley, Beevor and many more. It would be hard to find a more striking instance of the familiar truth that science and practice work hand in hand.

Again, the experimental method has thrown a flood of light on the minute anatomy of the central nervous system. For example, we have what is called Marchi's method; it was described to the Royal Commission (1906–8) by Dr Head and Sir Victor Horsley. It was found, by Professor Waller, that nerve-fibres, separated from the nerve-cells which nourish them, degenerate in a definite way. The application of this law experimentally has been of great value. "Let me," says Dr Head, "just take a simile. Imagine a wall covered with creepers arising from several stems. If we wished to know from which of these stems any one branch takes its origin, we could cut one stem, and every leaf arising from it would die, marking out among the healthy foliage the offshoots of the divided stem. This is the principle that has been used in tracing the paths in the nervous system. Gowers, by applying this method, discovered the ascending tracts in the lateral columns of the spinal cord." If a microscopic section of a spinal cord, containing some fibres thus degenerate, be treated with osmic acid (Marchi's method), the degenerate fibres show dark: and in this way their course may be traced at all levels of the cord.

Indeed, it may truly be said that, alike in anatomy and in physiology, the whole present knowledge of the brain, the spinal cord and the nerves, is in great measure due to the use of experiments on animals. And this knowledge is daily applied to the diagnosis and treatment of diseases and injuries of the central nervous system. "In the case of operations on the brain, you have to form your opinion as to what is going on entirely from your knowledge of the physiology of the brain. and that we owe, of course, in the greatest measure to the discoveries of Hitzig and Fritsch and Ferrier. That has all happened since 1870; and we are now able to cure epilepsy, we are able to cure abscess of the brain, and we are able to cure tumours of the brain. Then, in operations on the spinal cord, the same thing prevails. In fact, the first operation on the spinal cord I am responsible for, so that I know the history of the subject. The technique of that operation I owe entirely to experiments on animals. As regards operations on the peripheral nerves, Bell's operative treatment of neuralgia was guided entirely by his experiments on animals. Then we come to the great subject of nerve suture. The initial work bearing upon that subject was carried out by Flourens, who was the first, to my knowledge, to make experiments on animals, to suture nerves together, to investigate their function" (Sir Victor Horsley, evidence before the Royal Commission, vol. iv. p. 124).

[These notes cover a part only of the results that have been obtained in physiology by the help of experiments on animals. The work of Boyle, Hunter, Lavoisier, Despretz, Regnault and Haldane, on animal heat and on respiration; of Petit, Dupuy, Breschet and Reid, on the sympathetic system; of Galvani, Volta, Haller, du Bois-Reymond and Pflüger, on muscular contraction—all these subjects have been left out, and many more. In his evidence before the Royal Commission (1875), Mr Darwin said: "I am fully convinced that physiology can progress only by the aid of experiments on living animals. I cannot think of any one step which has been made in physiology without that aid."]

B. PATHOLOGY, BACTERIOLOGY AND THERAPEUTICS

1. *Inflammation.*—Pathology is so intimately associated with the work of the microscope that it is a new study, in comparison with physiology. In 1850 the microscope was not in general use as it is now; nor did men have the lenses, microtomes and staining fluids that are essential to modern histology. Bacteriology, again, is even younger than pathology. In 1875 it had hardly begun to exist. For example, in the evidence before the Royal Commission (1875) one of the witnesses said that they "believed they were beginning to get an idea of the nature of tubercle." Anthrax was the first disease studied by the methods of bacteriology; and in his evidence concerning this disease, Sir John Simon speaks of bacteriology as of a discovery wholly new and unexplored. Then, in 1881, came Koch's discovery of the bacillus of tubercle. But a great advance was made, in days before 1875, by the more general use of the microscope. Every change in the tissues during inflammation—the slowing of the blood stream in the capillary vessels, the escape of the leucocytes through their walls into the surrounding tissues, the stagnation of the blood in the affected part—all these were observed in such transparent structures as the web or the mesentery of the frog, the bat's wing, or the tadpole's tail, irritated by a drop of acid, or a crystal of salt, or a scratch with a needle. It was in the course of observations of this kind that Wharton Jones observed the rhythmical contraction of veins, and Waller and Cohnheim observed the escape of the leucocytes, *diapedesis*, through the walls of the capillaries. From these simple experiments under the microscope arose all our present knowledge of the minute processes of inflammation. Later came the work of Metschnikoff and others, showing the importance of *diapedesis* in relation to the presence of bacteria in the tissues.

2. *Suppuration and Wound-Infection.*—Practically every case of suppuration. wound-infection or "blood-poisoning," all abscesses, boils, carbuncles, and all cases of puerperal fever, septicaemia, or pyaemia, are due to infection, either from without or from within the body, by various forms of micro-organisms. The same is true of every case of erysipelas, or cellulitis, or acute gangrene—in short, of the whole multitude of "septic" diseases. The work done on these micrococci, and on other pathogenic micro-organisms, involved the study of the phases, antagonisms and preferences of each kind, their range of variation and of virulence, their products, and the influences on them of air, light, heat and chemical agents. The beginning of Lister's work was in Pasteur's study of the souring of milk, about 1856. Pasteur's discovery, that lactic fermentation was due to a special micro-organism, opened the way for modern surgery. Lister had been long studying the chemical changes in decomposing blood and other animal fluids; now he brought these studies into line with Pasteur's work. Thus, in 1867, in his first published writing on the antiseptic treatment of compound fractures, he speaks as follows: "We find that a flood of light has been thrown upon this most important subject by the philosophic writing of M. Pasteur, who has demonstrated, by thoroughly convincing evidence, that it is not to its oxygen, or to any of its gaseous constituents, that the air owes this property (of producing decomposition), but to minute particles suspended in it, which are the germs of various low forms of life long since revealed by the microscope, and regarded

as merely accidental concomitants of putrescence; but now shown by Pasteur to be its essential cause." The present antiseptic method includes the aseptic method. That is to say, the instruments and other accessories of an operation are "sterilized" by heat; and, where heat cannot be applied, as to the patient's skin and the surgeon's hands, antiseptics are used. Modern surgery is both antiseptic and aseptic.

3. *Anthrax.*—The bacillus of anthrax (charbon, malignant pustule, wool-sorter's disease) was the first specific micro-organism discovered. Rayer and Davaine (1850) observed the *petits bâtonnets* in the blood of sheep dead of the disease; and in 1863, when Pasteur's observations on lactic-acid fermentation were published, Davaine recognized that the *bâtonnets* were not blood crystals, but living organisms. Koch afterward succeeded in cultivating the bacillus, and in reproducing the disease in animals by inoculation from these cultures. Pasteur's discovery of preventive inoculation of animals against the disease was communicated to the Académie des Sciences in February 1881; and in May of that year he gave his public demonstration at Pouilly-le-Fort. Two months later, at the International Medical Congress in London, he spoke as follows of this discovery: ". . . La méthode que je viens de vous exposer pour obtenir des vaccins du charbon était à peine connue qu'elle passait dans la grande pratique pour prévenir l'affection charbonneuse. La France perd chaque année pour une valeur de plus de vingt millions d'animaux frappés du charbon, plus de 30 millions, m'a dit une des personnes autorisées de notre Ministère de l'Agriculture; mais des statistiques exactes font encore défaut. On me demanda de mettre à l'épreuve les résultats qui précèdent par une grande expérience publique, à Pouilly-le-Fort, près de Melun. . . . Je la résume en quelques mots; 50 moutons furent mis à ma disposition, nous en vaccinâmes 25, les 25 autres ne subirent aucun traitement. Quinze jours après environ, les 50 moutons furent inoculés par le microbe charbonneux le plus virulent. Les 25 vaccinés résistèrent; les 25 non-vaccinés moururent, tous charbonneux, en cinquante heures. Depuis lors, dans mon laboratoire, on ne peut plus suffire à préparer assez de vaccin pour les demandes des fermiers. En quinze jours, nous avons vacciné dans les départements voisins de Paris près de 20,000 moutons et un grand nombre de bœufs, de vaches et de chevaux." The extent of this preventive vaccination may be judged from the fact that a single institute, the Sero-Therapeutic Institute of Milan, in a single year (1897–98) sent out 165,000 tubes of anti-charbon vaccine, enough to inoculate 33,734 cattle and 98,792 sheep. In France, during the years 1882–93, more than three million sheep and nearly half a million cattle were inoculated. In the *Annales de l'Institut Pasteur*, March 1894, M. Chamberland published the results of these twelve years in a paper entitled "Résultats pratiques des vaccinations contre le charbon et le rouget en France." The mortality from charbon, before vaccination, was 10% among sheep and 5% among cattle, according to estimates made by veterinary surgeons all over the country. With vaccination, the whole loss of sheep was about 1%: the average for the twelve years was 0·94. The loss of vaccinated cattle was still less; for the twelve years it was 0·34, or about one-third %. The annual reports sent to M. Chamberland by the veterinary surgeons represent not more than half of the work. "A certain number of veterinary surgeons neglect to send their reports at the end of the year. The number of reports that come to us even tends to become less each year. The fact is, that many veterinary surgeons who perform vaccinations every year content themselves with writing, 'The results are always very good: it is useless to send you reports that are always the same.' We have every reason to believe, as a matter of fact, that those who send no reports are satisfied; for if anything goes wrong with the herds, they do not fail to let us know it at once by special letters."

The following tables, from M. Chamberland's paper, give the results of Pasteur's treatment against *charbon* during 1882–93, and against *rouget* (swine-measles) during 1886–92. It is to be noted that the mortality from *rouget* among swine, in years before vaccination, was much higher than that from *charbon* among sheep and cattle: "It was about 20%; a certain number of reports speak of losses of 60 and even 80%; so that almost all the veterinary surgeons are loud in their praises of the new vaccination."

It would be too much to say that every country, in every year, has obtained results with this anthrax-vaccine equal to those which have been obtained in France. Nor would it be reasonable to advocate the compulsory or wholesale use of the vaccine in the British Islands, where anthrax is rare. For the general value of the vaccine, however, we have this striking fact, that the use of it has steadily increased year by year. A note from the Pasteur Institute, dated November 29, 1909, says: "Depuis 1882 jusqu'au 1er Janvier 1909, il a été expédié, pour la France, 8,400,000 doses de vaccin anti-charbonneux pour moutons, 1,300,000 pour bœufs. Pour l'étranger, 8,500,000 doses pour moutons, 6,200,000 pour bœufs. Le nombre de doses augmente d'année en année, de sorte que pour l'année 1908 seule il faut compter en tout 1,500,000 doses pour moutons (France et étranger) 1,100,000 pour bœufs." (Two doses are used for each animal.) It remains to be added that a serum-treatment, introduced by Sclavo, has been found of considerable value in cases of anthrax (malignant pustule) occurring in man.

VACCINATION AGAINST CHARBON (FRANCE)

Years.	Total Number of Animals Vaccinated.	Number of Reports.	Animals Vaccinated according to Reports received.	Mortality.			Total.	Total Loss per 100.	Average Loss before Vaccination.
				After First Vaccination.	After Second Vaccination.	During the Rest of the Year.			
				Sheep.					
1882	270,040	112	243,199	756	847	1037	2,640	1·08	10%
1883	268,505	103	193,119	436	272	784	1,492	0·77	"
1884	316,553	109	231,693	770	444	1033	2,247	0·97	"
1885	342,040	144	280,107	884	735	990	2,609	0·93	"
1886	313,288	88	202,064	652	303	514	1,469	0·72	"
1887	293,572	107	187,811	718	737	968	2,423	1·29	"
1888	269,574	50	101,834	149	181	300	630	0·62	"
1889	239,974	43	88,483	238	285	501	1,024	1·16	"
1890	223,611	69	69,865	331	261	244	836	1·20	"
1891	218,629	65	53,640	181	102	77	360	0·67	"
1892	259,696	70	63,125	319	183	126	628	0·99	"
1893	281,333	30	73,939	234	56	224	514	0·69	"
Total:	3,296,815	990	1,788,879	5668	4406	6798	16,872	0·94	"
				Cattle.					
1882	35,654	127	22,916	22	12	48	82	0·35	5%
1883	26,453	130	20,501	17	1	46	64	0·31	"
1884	33,900	139	22,616	20	13	52	85	0·37	"
1885	34,000	192	21,073	32	8	67	107	0·50	"
1886	39,154	135	22,113	18	7	39	64	0·29	"
1887	48,484	148	28,083	23	18	68	109	0·39	"
1888	34,464	61	10,920	8	4	35	47	0·43	"
1889	32,251	68	11,610	14	7	31	52	0·45	"
1890	33,965	71	11,057	5	4	14	23	0·21	"
1891	40,736	68	10,476	6	4	4	14	0·13	"
1892	41,609	71	9,757	8	3	15	26	0·26	"
1893	38,154	45	9,840	4	1	13	18	0·18	"
Total:	438,824	1255	200,962	177	82	432	691	0·34	"

VACCINATION AGAINST ROUGET (FRANCE)

Years.	Total Number of Animals Vaccinated.	Number of Reports.	Animals Vaccinated according to Reports received.	Mortality.			Total.	Total Loss per 100.	Average Loss before Vaccination.
				After First Vaccination.	After Second Vaccination.	During the Rest of the Year.			
1886	For these two years France and other countries are put together.	49	7,087	91	24	56	171	2·41	20%
1887		49	7,467	57	10	23	90	1·21	"
1888	15,958	31	6,968	31	25	38	94	1·35	"
1889	19,338	41	11,257	92	12	40	144	1·28	"
1890	17,658	41	14,992	118	64	72	254	1·70	"
1891	20,583	47	17,556	102	34	70	206	1·17	"
1892	37,900	38	10,128	43	19	46	108	1·07	"
Total:	111,437	296	75,455	534	188	345	1067	1·45	"

4. *Tubercle.*—Laennec, who in 1816 invented the stethoscope, recognized the fact that tubercle is a specific disease, not a simple degeneration of the affected tissues. Villemin, in 1865, communicated to the Académie des Sciences the fact that he had produced the disease in rabbits by inoculating them with tuberculous matter; and he appealed to these inoculations—*en voici les preuves*—to show that *La tuberculose est une affection spécifique: Sa cause réside dans un agent inoculable: L'inoculation se fait très-bien de l'homme au lapin: La tuberculose appartient donc à la classe des maladies virulentes.* In 1868 Chauveau produced the disease not by inoculation but by admixture of tuberculous matter with the animals' food. In 1880, after a period of some uncertainty and confusion

of doctrines, Cohnheim reaffirmed the infectivity of the disease, and even made the proof of tubercle depend on inoculation alone: "everything is tuberculous that can produce tuberculous disease by inoculation in animals that are susceptible to the disease; and nothing is tuberculous that cannot do this." In 1881 Koch discovered the tubercle bacillus, and, in spite of the tragic failure of his tuberculin in 1890–91, a vast amount of practical advantage has already issued out of Koch's discovery, both by way of cure and by way of prevention. It has been proved, by experiment on animals, that the sputa of phthisical patients are infective; and this and the like facts have profoundly influenced the nursing and general care of such cases. Bacteriology has brought about (under the safeguard of modern methods of surgery) a thorough and early surgical treatment of all primary tuberculous sores or deposits—the excision of tuberculous ulcers, the removal of tuberculous glands and the like. It has helped us to make an early diagnosis, in obscure cases, by finding tubercle bacilli in the sputa, or in the discharges, or in a particle of the tissues. It has proved, past all reasonable doubt, that *tabes mesenterica*, a disease that kills every year in England alone many thousands of children, may arise from infection of the bowels by the milk of tuberculous cows. And it has helped to bring about the present rigorous control of the milk trade and the meat trade.

The "new tuberculin," now that the use of the opsonic index has guided physicians to a better understanding of the tuberculin treatment, has been found of great value, and is giving excellent results in suitable cases. Moreover, tuberculin is used, because of the reaction that it causes in tuberculous animals, as a test for the detection of latent tuberculosis in cattle. An injection of one to two cubic centimetres under the skin of the neck is followed by a high temperature if the animal be tuberculous. If it be not, there is no rise of temperature, or only a very slight rise. For example, in 1899 this test was applied to 270 cows on farms in Lancashire: 180 reacted to the test, 85 did not, 5 were "doubtful." Tuberculous disease was actually found in 175 out of the 180. Eber of Dresden used the test on 174 animals, of whom 136 reacted, 32 did not react and 6 were doubtful. Of the 136, 22 were slaughtered, and were all found to have tubercle; of the 32, 3 were slaughtered, and were found free. The opinion of Professor M'Fadyean, one of the highest authorities on the subject, is as follows: "I have most implicit faith in tuberculin as a test for tuberculosis when it is used on animals standing in their own premises and undisturbed. It is not reliable when used on animals in a market or slaughter-house. A considerable number of errors at first were found when I examined animals in slaughter-houses after they had been conveyed there by rail, &c. Since that, using it on animals in their own premises, I have found that it is practically infallible. I have notes of one particular case where 25 animals in one dairy were tested, and afterwards all were killed. There was only one animal which did not react, and it was the only animal not found to be tuberculous when killed." This test has now been in regular use for many years in many countries, and it is accepted everywhere as of national importance.

5. *Diphtheria.*—The *Bacillus diphtheriae* (Klebs-Löffler bacillus) was described by Klebs in 1875, and obtained in pure culture by Löffler in 1884. Behring and Kitasato, in 1890, succeeded in immunizing animals against the disease. The first cases treated with diphtheria antitoxin were published in 1893 by Behring, Kossel and Hübner. In England the antitoxin treatment was begun in the latter part of 1894. Besides its curative use, the antitoxin has also been used as a preventive, to stop an outbreak of diphtheria in a school or institute or hospital or village, and with admirable success. (See DIPHTHERIA.)

6. *Tetanus* (lock-jaw).—Experiments on animals have taught us the true nature of this disease, and have led to the discovery of an antitoxin which has given fairly good results. We possess, moreover, a preventive treatment against the disease; though, unfortunately, the time of latency, when the antitoxin is most needed, cannot be recognized. The old, mischievous doctrine that tetanus was due to acute inflammation of a nerve, tracking up from a wound to the central nervous system, was abolished once and for ever by Sternberg (1880), Carle and Rattone (1884) and Nicolaier (1884), who proved that the disease is due to infection by a specific flagellate organism in superficial soil. "It is said to be present in almost all rich garden soils, and that the presence of horse-dung favours its occurrence. There seems to be no doubt as to the ubiquity of the tetanus germ" (Poore, *Milroy Lectures*, 1899). The work of discovering and isolating the bacillus was full of difficulty. Nicolaier, starting from the familiar fact that the disease mostly comes from wounds or scratches contaminated with earth, studied the various microbes of the soil, and inoculated rabbits with garden mould. He produced the disease, and succeeded in finding and cultivating the bacillus, but failed to obtain a pure culture. Kitasato, in 1899, obtained a pure culture. Others studied the chemical products of the bacillus, and were able to produce the symptoms of the disease by injection of these chemical products obtained from cultures, or from the tissues in cases of tetanus. It has been proved that the infection tends to remain local; that the bacilli in and near the wound pour thence into the blood their chemical products, and that these have a selective action, like strychnine, on the cells of the central nervous system. Therefore the rule that the wounded tissues should be at once excised, in all cases where this can possibly be done, has received confirmation. Before Nicolaier, while men were still free to believe that tetanus was the result of an acute ascending neuritis, this rule was neither enforced nor explained.

As a preventive against tetanus, in man or in animals, the antitoxin has proved of the very utmost value. This has been shown in a striking way in America. "One of the wounds most commonly followed by lock-jaw is the blank-cartridge wound of the hand common on the glorious Fourth of July. The death-rate from these wounds is appalling. An active campaign has been conducted throughout the medical profession to reduce this mortality. All over the country, surgeons and medical journals have advised the injection of tetanus antitoxin in every case of blank-cartridge wound. The American Medical Association has compiled statistics of Fourth of July fatalities for the past six years. In 1903, the Fourth of July tetanus cases numbered 416. Then physicians began a more general use of antitoxin in all cases of blank-cartridge and common cracker wounds. As a result of this campaign of prophylaxis by antitoxin injections, from 416 cases of tetanus in 1903 the number dropped to 105 cases in 1904, 104 cases in 1905, 89 cases in 1906, 73 cases in 1907 and 55 cases in 1908. This reduction in the number of tetanus cases took place while the number of accidents remained practically the same each year, and while the number of deaths from causes other than tetanus was steadily rising from 60 in 1903 to 108 in 1908. It is thus evident that the saving of at least 300 lives from tetanus has been accomplished each year through the prophylactic use of antitoxin in the cases of Fourth of July wounds alone" (James P. Warbasse, M.D., *The Conquest of Disease through Animal Experimentation*, Appleton & Co., 1910).

The preventive use of the serum in veterinary practice has yielded admirable results. In some parts of the world tetanus is terribly common among horses. Nocard of Lille has reported as follows: "The use of anti-tetanus serum as a preventive has been in force for some years in veterinary practice in cases of wounds or surgical procedures. To this end the Pasteur Institute has supplied 7000 doses of anti-tetanus serum, a dose being 10 cubic centimetres; a quantity which has sufficed to treat preventively 3100 horses in those parts of the country where tetanus is endemic. Among these there has been no death from tetanus. In the case of one horse, injected five days after receiving a wound, tetanus developed, but the attack was slight. During the same time that these animals were injected, the same veterinary surgeon observed, among animals not treated by injection, 259 cases of tetanus" (*Lancet*, August 7, 1897).

7. *Rabies* (hydrophobia).—The date of the first case treated by Pasteur's preventive method—Joseph Meister, an Alsatian shepherd-boy—is July 1885. The existence of a specific micro-organism of rabies was a matter of inference. The incubation period of the disease is so variable that no preventive treatment was possible unless this incubation period could be regulated. Inoculations of the saliva of a rabid animal, introduced under the skin of animals, sometimes failed; and if they succeeded, the incubation period of the disease thus induced was hopelessly variable. Next, Pasteur used not saliva, but an emulsion of the brain or the spinal cord; because the central nervous system is the chief seat of the poison. But this emulsion, introduced under the skin, was also uncertain in action, and gave no fixed incubation period. Therefore, he argued, as the poison has a selective action on the nerve cells of the central nervous system, and a sort of natural affinity with them, it must be introduced directly into them, where it will have its proper environment; the emulsion must be put not under the skin, but under the *dura mater* (the membrane enveloping the brain). These subdural inoculations were the turning-point of his work. By transmitting the poison through a series of rabbits, by subdural inoculation of each rabbit with a minute quantity of nerve tissue from the rabbit that had died before it, he was able to intensify the poison, to shorten its period of incubation, and to fix this period at six days. Thus he obtained a poison of exact strength, a definite standard of virulence, *virus fixe*: the next rabbit inoculated would have the disease in six days, neither more nor less. By gradual drying, after death, of the cords of rabid animals, he was able to attenuate the poison contained in them. The spinal cord of a rabbit that has died of rabies slowly loses virulence by simple drying. A cord dried for four days is less virulent than a cord dried for three, and more virulent than a cord dried for five. A cord dried for a fortnight has lost all virulence; even a large dose of it will not produce the disease. By this method of drying, Pasteur was able to keep going one or more series of cords, of known and exactly graduated strengths, according to the length of time they had been dried, ranging from absolute non-virulence through every shade of virulence.

As with fowl cholera and anthrax, so with rabies: the poison, attenuated till it is innocuous, can yet confer immunity against a stronger dose of the same poison. A man, bitten by a rabid animal, has at least some weeks of respite before the disease can break out; and during that time of respite he can be immunized against the disease, while it is still dormant. He begins with a dose of poison attenuated past all power of doing harm, and advances day by day to more active doses, guarded each day by the dose of the day before, till he has manufactured within himself enough antitoxin to make him proof against any outbreak of the disease. (See Hydrophobia.)

8. *Cholera.*—The specific organism of Asiatic cholera, the "comma-bacillus," was discovered by Koch in 1883; but such a multitude of difficulties arose over it that it was not universally recognized as the real cause of the disease before 1892, the year of the epidemic at Hamburg. The discovery of preventive inoculation was the work of many men, but especially of Haffkine, one of Pasteur's pupils. Ferran's earlier inoculations in Spain (1885) were a failure. Haffkine's first inoculations were made in 1893. At Agra, in April 1893, he vaccinated over 900 persons; and from Agra went to many other cities of India. Altogether, in twenty-eight months (April 1893–July 1895) no less than 42,179 persons were vaccinated (many of them twice) in towns, cantonments, gaols, tea estates, villages, schools, &c., "without having to record a single instance of mishap or accident of any kind produced by our vaccines." (See Cholera.)

9. *Bubonic Plague.*—The *Bacillus pestis* was discovered in 1894 by Kitasato and Yersin, working independently. The preventive treatment was worked out by Haffkine in 1896: "Twenty healthy rabbits were put in cages. Ten of them were inoculated with Haffkine's plague vaccine. Then both the vaccinated rabbits and the other ten rabbits that had not been vaccinated were infected with plague. The unprotected rabbits all died of the disease, and in their bodies innumerable quantities of the microbes were found. But the vaccinated rabbits remained in good health. Professor Haffkine then vaccinated himself and his friends. This produced some fever, from which, after a day or two, they recovered. Plague broke out in Byculla Gaol, in Bombay, in January 1897. About half the prisoners volunteered to be inoculated. Of these, 3 developed plague on the day of inoculation, and it is probable that they had already plague before the treatment was carried out. Of the remaining 148 who were inoculated, only 2 were afterwards attacked with plague, and both of them recovered. At the same time, of the 173 who had not been vaccinated, 12 were attacked, and out of these 6 died." (See Plague.)

10. *Typhoid Fever.*—The *Bacillus typhosus* was discovered by Klebs, Eberth and Koch in 1880–81. The first protective inoculations in England were made at Netley Hospital in 1896 by Sir Almroth Wright and Surgeon-Major Semple: 16 medical men and 2 others offered themselves as subjects. The first use of the vaccine during an actual outbreak of typhoid was in October 1897 at the Kent County Asylum: "All the medical staff and a number of attendants accepted the offer. Not one of those vaccinated—84 in number—contracted typhoid fever; while of those unvaccinated, and living under similar conditions, 16 were attacked. This is a significant fact, though it should in fairness be stated that the water was boiled after a certain date, and other precautions were taken, so that the vaccination cannot be said to be altogether responsible for the immunity. Still, the figures are striking" (*Lancet*, March 1898). In 1899 Wright vaccinated against typhoid more than 3000 of the Indian army, at Bangalore, Rawal Pindi and Lucknow. Government has now sanctioned voluntary inoculation against typhoid, at the public expense, among the British troops. "All regiments leaving for the tropics are offered this inoculation, and each year a larger percentage of the soldiers are accepting it. Here are some of the statistics: In August and September 1905, 150 men of a single regiment were inoculated: of these, 23 refused to accept a second inoculation. The regiment reached India, September 28. A month later, typhoid fever broke out; and during the following few months 63 cases were observed in the regiment. With but two exceptions, the disease attacked only the men who had not been inoculated, and both of these exceptions were men who had refused a second inoculation. Careful experiments were made with the second battalion of Royal Fusiliers in India in 1905 and 1906. The average strength of this regiment was 948 men. During the two years, 284 were inoculated with Wright's anti-typhoid vaccine. The regiment had a total of 46 cases of typhoid. Thirty-five of these were men who had not been inoculated; 9 had been inoculated. Five of the uninoculated died: none of the inoculated died. Another Indian regiment, the 17th Lancers, in 1905, 1906 and 1907 inoculated about one-third of its men. During the three years it had 293 cases of typhoid fever. There were 44 deaths, with not a single death of an inoculated man. During the first half of 1908, in the largest seven Indian stations where careful records were kept, out of a total of 10,420 soldiers, 2207 volunteered for inoculation. Typhoid developed in 2% of the uninoculated, and in less than 1% of the inoculated men. Forty-five deaths occurred. Five per cent of these deaths were among the uninoculated and 1% was among the inoculated men. . . . In the United States army, a medical board has strongly recommended anti-typhoid vaccinations, and vaccination is now offered to those who desire it. Already 2000 soldiers have voluntarily received inoculation. The German army has adopted the same means of prophylaxis, and is pushing it vigorously" (Warbasse, *loc. cit.*).

Beside the preventive treatment, bacteriology has given us "Widal's reaction" for the early diagnosis of the disease—a matter of the very highest practical importance. A drop of blood, from the finger of a patient suspected to be suffering from typhoid fever, is diluted fifty or more times, that the perfect delicacy of the test may be ensured; a drop of this dilution is mixed with a nutrient fluid containing living bacilli of typhoid, and a drop of this mixture is observed under the microscope. The motility of the bacilli is instantaneously or very quickly arrested, and in a few minutes the bacilli begin to aggregate together into clumps. This "clumping" is also made visible to the naked eye by the subsidence of the agglutinated bacilli to the bottom of the containing vessel. The amazing delicacy of "Widal's test" is but a part of the wonder. Long after recovery, a fiftieth part of a drop of the blood will still cause clumping: it has even been obtained from an infant whose mother had typhoid shortly before the child was born. A drop of blood from a case suspected to be typhoid can now be sent by post to be tested a hundred miles away, and the answer telegraphed back.

11. *Malta Fever* (Mediterranean fever).—The *Micrococcus Melitensis* was discovered in 1887 by Sir David Bruce. The work of discovering and preparing an immunizing serum was done at Netley Hospital. In this fever, as in typhoid and some others, Widal's test is of great value: "The diagnosis of Malta fever from typhoid is, of course, a highly important practical matter. It is exceedingly difficult in the early stages" (Manson). Even in a dilution of 1 in 1000, the blood of Malta fever can give the typical reaction with the *Micrococcus Melitensis*; and this occurred in a case at Netley of accidental inoculation with Malta fever: one of three cases that have happened there. The case is reported in the *British Medical Journal*, October 16, 1897: "It appears that he had scratched his hand with a hypodermic needle on September 17, when immunizing a horse for the preparation of serum-protective against Malta fever; and his blood, when examined, had a typical reaction with the micrococcus of Malta fever in 1000-fold dilution. The horse, which has been immunized for Malta fever for the last eight months, was immediately bled, and we are informed that the patient has now had two injections, each of 30 cub. cm. of the serum. He is doing well, and it is hoped that the attack has been cut short." About 50 cases of the fever, by April 1899, had been treated at Netley. The *Lancet*, April 15, 1899, says that the treatment was "with marked benefit: whereas they found that all drug treatment failed, the antitoxin treatment had been generally successful." Happily, it has now been proved that the usual source of infection with Malta fever is the drinking of the milk of infected goats: thus, by the avoidance, or by the careful and thorough boiling of the milk, the fever may be prevented: and prevention is better than cure. In 1904 a commission was sent out to Malta by the Royal Society, at the request of our government, to discover how the fever is conveyed to man. They found that it is not conveyed by air, or by drinking-water, or by pollution of sewage, or by contact; nor are its germs carried, like those of malaria, yellow fever and sleeping sickness, by insects. They found that it might be conveyed in food. Therefore Bruce examined the milch-goats, since goats' milk is universally drunk in Malta. The goats looked healthy enough, but it was found that the blood of 50% of them gave the Widal reaction, and that some 10% of them were actively poisonous: monkeys fed on milk from one of them, even for one day, almost invariably got the disease. On the 1st of July 1906, an official order was issued forbidding the supply of goats' milk to our garrison. The year before, there had been 643 cases among our soldiers alone. In 1906, up to the 1st of July, there were 123 cases. During the rest of the year, including the three worst months for the fever, there were 40 cases. In 1907 there were 11 cases; in 1908 there were 5 cases; in 1909 there was 1 case; in 1910, by latest accounts, none.

12. *Epidemic Meningitis.*—The history of the serum treatment of epidemic meningitis affords an admirable example of the place of experiments on animals in the advancement of medical practice. This form of meningitis is one of the worst ways in which a man can die. Dr Robb, who had charge of the Belfast fever hospitals during an epidemic in Belfast, calls it "the most terrible in its manifestations, and the most disastrous in its death-rate, of all the epidemic diseases met with in English-speaking countries." Very little is known as to the way in which it spreads, and the public health authorities cannot prevent its sudden appearance in a town. "Many of those attacked," says Dr Robb, "died within a few hours of the onset, and that after terrible suffering; while many of those who survived the acute attack lingered on for weeks and months, going steadily downhill in spite of every effort to save them. Again, many of those who did survive were left permanently maimed." That is the usual picture of the disease when it is left to the older methods of treatment.

By means of inoculation experiments, Dr Flexner and Dr Jobling, of the Rockefeller Institute, proved that the disease is due to a particular kind of germ, diplococcus intracellularis. They obtained these germs from the bodies of patients who had died of the disease; they cultivated the germs all by themselves, in test tubes, apart from all other kinds of germs: and they were able to reproduce the disease in monkeys by injecting under the skin a minute quantity of this pure culture of the germs. It may be worth noting that the disease in monkeys is less violent and less painful than it is in man. By the help of these experiments, Flexner and Jobling were able to prepare a serum for the treatment of the disease, in the same way as the serum is prepared which has been such a blessing to the world in cases of diphtheria. This serum for the treatment of epidemic meningitis was first used in the spring of 1907.

The contrast between cases without serum treatment and cases with serum treatment is very plain. We may first give the records before the use of the serum. Of 4000 cases in New York in 1904, 75% died; Baker reports from Greater New York 2113 cases with 1636 deaths, giving 77·4% mortality; Chalmers reports from Glasgow (1907) 998 cases with 683 deaths, giving 68·4% mortality; Bailie reports in Belfast (1907) 623 cases with 493 deaths, giving 79·2% mortality; Ker reports that in the Edinburgh epidemic there was 78% mortality; Robertson reports from Leith (1907) 62 cases with 74·4% mortality; Turnour reports from the Transvaal 200 cases with 74% mortality. Amongst patients treated in hospitals the death-rate was no better. Of 202 cases in Ruchill Hospital, Glasgow, 79·2% died; of 108 cases in Edinburgh Fever Hospital, 80·5% died; of 275 cases in Belfast Fever Hospital, 72·3% died; and Dunn reports that in the Boston Children's Hospital, during the eight years 1899–1907, the mortality varied from 69% to 80%. Contrast with these the results in cases treated with Flexner's and Jobling's Serum:—

	Cases.	Died.	Mortality per cent.
City Hospital, Cincinnati. . . .	45	14	31·1
Dr Dunn, Boston	40	9	22·5
Johns Hopkins Hospital, Baltimore .	22	4	18·1
Rhode Island Hospital . . .	17	6	35·2
Lakeside Hospital, Cleveland . .	29	11	37·7
Edinburgh Fever Hospital . .	33	13	43·3
Mount Sinai Hospital (Children) .	15	2	13·3
Municipal Hospital, Philadelphia .	21	9	42·7
Belfast Fever Hospital . . .	98	29	29·6

These figures speak for themselves. Similar results have been obtained with similar treatment in France and Germany. "From these figures," says Dr Robb, "it will be seen that the death-rate in cases not treated with serum averaged some 75%. This has been reduced in cases treated with the serum to less than half, and in many instances much below that figure." "My own experience has been that of 275 cases under my care in hospital, before the use of the serum was commenced, 72·3% died; while of the 98 cases treated with serum 29·6% died. No selection of cases was made: every case sent into hospital since September 1907 has been treated in this way. No change in the severity of the attack was observed: in the three months immediately before the serum arrived with us 45 cases came under treatment, of whom 37, or 82%, died; and in the first four months after we began its use in hospital 30 cases were treated, of whom 8 died, a mortality of 26·6%; while of the 34 cases occurring in the city in the same period, but not sent into hospital, and not treated with the serum, over 80% died. Great as this change in the death-rate has been, it is not more striking than the improvement in the course run by the cases; for whereas it was common to have cases running on into weeks and even months, such cases are no longer met with" (R. D. S. pamphlet, 1909).

13. *Malaria.*—Laveran, in 1880, discovered the *Plasmodium malariae*, an amoeboid organism, in the blood of malarial patients. In 1894 Manson took, as a working theory of malaria, the old belief that the mosquito is the intermediate host of the parasite. In 1895 came MacCullum's observations on an allied organism, *Halteridium*. In 1897, after two years' work, Ross found bodies, pigmented like the *Plasmodium*, in the outer coat of the stomach of the grey or "dapple-winged" mosquito, after it had been fed on malarial blood. In February 1898 he started work in Calcutta: "Arriving there at a non-fever season, he took up the study of what may be called 'bird malaria.' In birds, two parasites have become well known—(1) the *Halteridium*, (2) the *Proteosoma* of Labbé. Both have flagellate forms, and both are closely allied to the *Plasmodium malariae*. Using grey mosquitoes and proteosoma-infected birds, Ross showed by a large number of observations that it was only from blood containing the proteosoma that pigmented cells in the grey mosquito could be got; therefore that this cell is derived from the proteosoma, and is an evolutionary stage of that parasite" (Manson, 1898). These pigmented cells give issue to innumerable swarms of spindle-shaped bodies, "germinal rods"; and in infected mosquitoes Ross found these rods in the glands of the proboscis. Finally, he completed the circle of development, by infecting healthy sparrows by causing mosquitoes to bite them. It would be hard to surpass Ross's work, and that done in Italy by Grassi and others, for fineness and carefulness. He says, for instance, "out of 245 grey mosquitoes fed on birds with proteosoma, 178, or 72%, contained pigmented cells; out of 249 fed on blood containing halteridium, immature proteosoma, &c., not one contained a single pigmented cell. . . . Ten mosquitoes fed on the sparrow with numerous proteosoma contained 1009 pigmented cells, or an average of 101 each. Ten mosquitoes fed on the sparrow with moderate proteosoma contained 292 pigmented cells, or an average of 29 each. Ten mosquitoes fed on the sparrow with no proteosoma contained no pigmented cells."

By these and the like observations it was made practically certain that malaria is transmitted from man to man by a special kind of mosquito. Then came the final experiments on man. In 1900 Sambon, Low and Terzi made their famous experiment on themselves in the neighbourhood of Ostia. They put up a little mosquito-proof hut in a neighbourhood "saturated with malaria." In this little hut they lived through the whole of the malaria season, without taking a grain of quinine, and not one of them had a touch of the fever. Then another experiment was made. A consignment of mosquitoes containing blood from a case of malaria was sent from Rome to the London School of Tropical Medicine. Dr Manson and Dr Warren then submitted themselves to being bitten by these mosquitoes, and in due time suffered malarial fever. On these proven facts was founded the whole plan of campaign against malaria. The nature, habits and breeding-places of the mosquito of malaria (*Anopheles maculipennis*) have been studied with infinite care, and are now thoroughly recognized. The task is to destroy its eggs and its larvae, to break the cycle of its life, and to do away with its favourite breeding-places.

14. *Yellow Fever.*—A special mosquito (*Stegomyia*) conveys yellow fever from man to man. The germ, like the germ of rabies, has not yet been made visible under the microscope. It is probably a very minute spirochaete, which undergoes a slow evolution in the body of the mosquito told off for that purpose. The earlier experiments (1810–20) made on themselves by Chervin, Potter, Firth and others were truly heroic, but proved nothing. Finlay (1880–1900) experimented with mosquitoes on himself and other volunteers, and certainly proved the transmissibility of the fever through mosquitoes. Sanarelli (1898) prepared an immunizing serum which gave good results: but the germ which he took to be the specific cause of the fever, having found it in cases of the fever, is not now accepted by bacteriologists as specific. But the great work, which proved to the world the way of infection of yellow fever, was done by the Army Commission of the United States (1900). This Commission was sent to Havana, and the experiments were carried out by Drs Walter Reed, Carrol, Lazear and Agramonte in the Army Camp in Havana. A hut was constructed with two compartments, divided from each other by a wire mosquito-proof screen. In one compartment they placed infected mosquitoes, which had bitten a yellow fever patient within the first three days of the fever. More than twenty volunteers offered themselves for experiment. In one set of experiments, clothing and other material, soiled by the vomit or blood or excretions from cases of the fever, were placed in one of the rooms, and some of the experimenters slept for 21 consecutive nights in contact with these materials, and in some cases in the very sheets on which yellow fever patients had died. Not one of these experimenters took the fever. In another set of experiments, 22 of the experimenters submitted themselves to be bitten by the infected mosquitoes, and in each instance they took the disease. It was thus proved, past all reasonable doubt, that yellow fever cannot be conveyed by ordinary infection, but must be transmitted from man to man through the agency of the mosquito. It might be said, by the opponents of all experiments on animals, that the discovery of these facts has nothing to do with "vivisection." But, as Professor Osler said in his evidence before the Royal Commission (vol. iv. p. 158), these experiments would never have been thought of if it had not been for previous experiments on animals. "The men who made these investigations spent their lives in laboratories, and their whole work has been based on experimentation on animals. They could not otherwise, of course, have ventured to devise a series of experiments of this sort." Out of this work came the wiping out of yellow fever (*q.v.*) from Cuba after the Spanish-American War, and from the area of the Panama Canal.

15. *Sleeping-Sickness.*—Experiments on animals have proved that sleeping-sickness is due to specific germs carried by tse-tse flies from man to man. By measures taken to prevent this way of infection, legions of human lives have been saved or safeguarded.

16. *Infantile Paralysis.*—Flexner, of the Rockefeller Institute, has proved, by experiments on animals, the infective nature of this disease, and its transmissibility by inoculation: a discovery of the very utmost value and significance.

17. *Myxoedema.*—Our knowledge of myxoedema, like our knowledge of cerebral localization, began not in experimental science but in clinical observation (Gull, 1873; Ord, 1877). In 1882–1883 Reverdin and Kocher published cases where removal of the thyroid gland for disease (goitre) had been followed by symptoms such as Gull and Ord had described. In 1884 Horsley, by removal of the thyroid gland of monkeys, produced in them a chronic myxoedema, a cretinoid state, the exact image of the disease in man: the same symptoms, course, tissue-changes, mental and physical hebetude, the same alterations of the excretions, the temperature and the voice. In 1888 the Clinical Society of London

published an exhaustive report, of 215 pages, on 119 cases of the disease, giving all historical, clinical, pathological, chemical and experimental facts; but out of 215 pages there is but half a page about treatment, of the useless old-fashioned sort. In 1890 Horsley published the suggestion that a graft of thyroid gland from a newly killed animal should be transplanted beneath the skin in cases of myxoedema: "The justification of this procedure rested on the remarkable experiments of Schiff and von Eisselsberg. I only became aware in April 1890 that this proposal had been in fact forestalled in 1889 by Dr Bircher in Aarau. Kocher had tried to do the same thing in 1883, but the graft was soon absorbed; but early in 1889 he tried it again in five cases, and one greatly improved." In 1891 George Murray published his *Note on the Treatment of Myxoedema by Hypodermic Injections of an Extract of the Thyroid Gland of a Sheep*. Later, the gland was administered in food. At the present time tabloids of thyroid extract are given. We could not have a better example how experiments on animals are necessary for the advancement of medicine. Now, with little bottles of tabloids, men and women are restored to health who had become degenerate in body and mind, disfigured and debased. The same treatment has given back mental and bodily growth to countless cases of sporadic cretinism. Moreover, the action of the thyroid gland has been made known, and the facts of "internal secretion" have been in part elucidated. (Claude Bernard, speaking of the thyroid, the thymus and the suprarenal capsules, said: "We know absolutely nothing about the functions of these organs; we have not so much as an idea what use and importance they may possess, because experiments have told us nothing about them, and anatomy, left to itself, is absolutely silent on the subject.")

18. *The Action of Drugs.*—Even in the 18th century medicine was still tainted with magic and with gross superstition: the 1721 Pharmacopoeia contains substances that were the regular stock-in-trade of witchcraft. Long after 1721 neither clinical observation, nor anatomy, nor pathology brought about a reasonable understanding of the action of drugs: it was the physiologists, more than the physicians, who worked the thing out—Bichat, Magendie, Claude Bernard. Magendie's study of upas and strychnine, Bernard's study of curare and digitalis, revealed the *selective* action of drugs: the direct influence of strychnine on the central nerve-cells, of curare on the terminal filaments of motor nerves.

Two instances may be given how experiments on animals have elucidated the action of drugs. A long list might be made—aconite, belladonna, chloride of calcium, cocain, chloral, ergot, morphia, salicylic acid, strophanthus, the chief diuretics, the chief diaphoretics—all these and many more have been studied to good purpose by this method; but it must suffice to quote here (1) Sir Thomas Fraser's account of digitalis, and (2) Sir Thomas Lauder Brunton's account of nitrite of amyl:—

"1. Digitalis was introduced as a remedy for dropsy; and on the applications which were made of it for the treatment of that disease, a slowing action upon the cardiac movements was observed, which led to its acquiring the reputation of a cardiac sedative. . . . It was not until the experimental method was applied in its investigation, in the first instance by Claude Bernard, and subsequently by Dybkowsky, Pelikan, Meyer, Böhm and Schmiedeberg, that the true action of digitalis upon the circulation was discovered. It was shown that the effects upon the circulation were not in any exact sense sedative, but, on the contrary, stimulant and tonic, rendering the action of the heart more powerful, and increasing the tension of the blood vessels. The indications for its use in disease were thereby revolutionized, and at the same time rendered more exact; and the striking benefits which are now afforded by the use of this substance in most (cardiac) diseases were made available to humanity."

"2. In the spring of 1867 I had opportunities of constantly observing a patient who suffered from angina pectoris, and of obtaining from him numerous sphygmographic tracings, both during the attack and during the interval. These showed that during the attack the pulse became quicker, the blood-pressure rose and the arterioles contracted. . . . It occurred to me that if it was possible to diminish the tension by drugs instead of by bleeding, the pain would be removed. I knew from unpublished experiments on animals by Dr A. Gamgee that nitrite of amyl had this power, and therefore tried it on the patient. My expectations were perfectly answered."

19. *Snake Venom.*—Sewall (1887) showed that animals could be immunized, by repeated injection of small doses of rattlesnake's venom, against a sevenfold fatal dose. Kanthack (1891) immunized animals against cobra venom: afterward Fraser, Calmette and many others worked at the subject. Fraser's work on the antidotal properties of the bile of serpents is of the very highest interest and value, both in physiology and in sero-therapy. Calmette's work is an admirable [illegible] of the delicacy and accuracy of the experimental [illegible] The different venoms were measured in decim [illegible] by the body-w [illegible] his estimate of [illegible] ity of the ani [illegible] more sus- [illegible]

"The following table gives the relative toxicity, for 1 kilogramme of rabbit, of the different venoms that I have tested":—

1. Venom of *Naja*	0·25 milligramme per kilogramme of rabbit. One gramme of this venom kills 4000 kilogrammes of rabbit: activity =	4,000,000.
2. Venom of *Hoplocephalus* . .	0·29 .	3,450,000.
3. Venom of *Pseudechis* . . .	1·25 .	800,000.
4. Venom of *Pelias berus* . . .	4·00 :	250,000.

By experiments *in vitro* Calmette studied the influence of heat and chemical agents on these venoms; and, working by various methods, was able to immunize animals:—

"I have got to immunizing rabbits against doses of venom that are truly colossal. I have several, vaccinated more than a year ago, that take without the least discomfort so much as forty milligrammes of venom of *Naja tripudians* at once. Five drops of serum from these rabbits wholly neutralize *in vitro* the toxicity of one milligramme of *Naja* venom. . . . It is not even necessary that the serum should come from an animal vaccinated against the same sort of venom as that in the mixture. The serum of a rabbit immunized against the venom of the cobra or the viper acts indifferently on all the venoms that I have tested."

In 1895 he had prepared a curative serum: "If you first inoculate a rabbit with such a dose of venom as kills the control-animals in three hours; and then, an hour after injecting the venom, inject under the skin of the abdomen four to five cubic centimetres of serum, recovery is the rule. When you interfere later than this, the results are uncertain; and out of all my experiments the delay of an hour and a half is the most that I have been able to reach."

In 1896 four successful cases were reported in the *British Medical Journal*. In 1898 Calmette reports:—

"It is now nearly two years since the use of my antivenomous serum was introduced in India, in Algeria, in Egypt, on the West Coast of Africa, in America, in the West Indies, Antilles, &c. It has been very often used for men and domestic animals (dogs, horses, oxen), and up to now none of those that have received an injection of serum have succumbed. A great number of observations have been communicated to me, and not one of them refers to a case of failure" (*Brit. Med. Journ.*, May 14, 1898; see also *Boston Medical and Surgical Journal*, April 7, 1898).

It is of course impossible that "antivenene" should be always at hand, or that it should bring about any great decrease in the number of deaths from snake-bite, which in India alone are 30,000 annually; but at least something has been accomplished with it.

The account given above of the chief discoveries that have been made by the help of experiments on animals, in physiology, pathology, bacteriology and therapeutics, might easily have been lengthened if we added to it other methods of treatment that owe less, but yet owe something, to these experiments. Nevertheless the facts quoted in this article are sufficient to indicate the great debt that medicine owes to the employment of vivisection. (S. P.)

VIZAGAPATAM, a town and district of British India, in the Madras presidency. The town stretches 3 m. along the coast, and has a station on a short branch of the East Coast railway, 484 m. N.E. of Madras. Pop. (1901) 40,892. It lies on a small bay, the south extremity of which is bounded by a promontory known as the Dolphin's Nose, and its northern extremity by the suburb of Waltair. The town or fort, as it is called, is separated from the Dolphin's Nose by a small river, which forms a bar where it enters the sea, but is passable for vessels of 300 tons during spring tides. An English factory was established here early in the 17th century, which was captured by the French in 1757, but shortly afterwards recovered. The town owes much to the munificence of the neighbouring raja of Vizianagram. A water supply has been provided at a cost of £30,000. Waltair is the European quarter. There is a considerable Roman Catholic population and a branch of the London Mission. The exports by sea include manganese ore, rice and sugar. Some weaving is carried on, and there is a speciality of ornamental boxes, &c., carved out of sandalwood, horn, ivory, porcupine quills and silver.

The DISTRICT OF VIZAGAPATAM has an area of 17,222 sq. m., being one of the largest districts in India. It is a picturesque and hilly country, but for the most part unhealthy. The surface is generally undulating, rising towards the interior, and crossed by streams, which are dry except during the rainy season. The main portion is occupied by the Eastern Ghats. The slopes of these mountains are clothed with luxuriant vegetation, amid which rise many tall forest trees, while the bamboo grows profusely in the valleys. The drainage on the east is carried by numerous streams direct to the sea, and that to the west flows into the Godāvari through the Indravati or through the Sabari and Siller rivers. To the west of the range is situated the greater portion of the extensive zamindari of Jāipur, which is for the most part very hilly and jungly In the extreme north a remarkable mass of hills, called the Nimgiris, rise to a height of 5000 ft. The plain along the Bay of Bengal is a vast sheet of cultivation, green with rice fields and gardens of sugar-cane and tobacco. There are great varieties of climate in the district. Along the coast the air is soft and relaxing, the prevailing winds being south-easterly The average annual rainfall at Vizagapatam exceeds 40 in. Pop. (1901) 2,933,650, showing an increase of 4·7% in the decade. The principal crops are rice, millets, pulses and oil-seeds, with some sugar-cane, cotton and tobacco The coast portion of the district is traversed throughout by the East Coast railway, opened from Madras to Calcutta in 1904, and a line through the hills from Vizianagram to Raipur in the Central Provinces has been sanctioned The chief seaports are Bimlipatam and Vizagapatam.

On the dissolution of the Mogul empire Vizagapatam formed part of the territory known as the Northern Circars, which were ceded to the East India Company by treaties in 1765 and 1766 It was long before British anthority was established over the hilly tract inland, inhabited by aboriginal tribes, and still administered under a peculiar system, which vests in the collector the powers of a political agent. This tract, forming more than two-thirds of the whole district, is known as the Agency

See *The Vizagapatam District Gazetteer* (Madras, 1907)

VIZETELLY, HENRY (1820–1894), English publisher, was born in London on the 30th of July 1820, the son of a printer. He was early apprenticed as a wood engraver, and one of his first blocks was a portrait of "Old Parr." Encouraged by the success of the *Illustrated London News*, Vizetelly in 1843, with his brother James Thomas Vizetelly (1817–1897) and Andrew Spottiswoode (1787–1866), started the *Pictorial Times*, which was published successfully for several years. In 1855, in partnership with Boyne, he started a threepenny paper called the *Illustrated Times*, which four years later was merged in the *Penny Illustrated Paper*. In 1865 Vizetelly became Paris correspondent for the *Illustrated London News*. During the years he remained in Paris he published several books—*Paris in Peril* (1882), *The Story of the Diamond Necklace* (1867) and a free translation of Topin's *Man in the Iron Mask*. In 1872 he was transferred to Berlin, where he wrote *Berlin under the New Empire* (1879). In 1887 he established a publishing house in London, issuing numerous translations of French and Russian authors. In 1888 he was prosecuted for publishing a translation of Zola's *La Terre*, and was fined £100; and when he reissued Zola's works in 1889 he was again prosecuted, fined £200 and imprisoned for three months. In 1893 he wrote a volume of autobiographical reminiscence called *Glances Back through Seventy Years*, a graphic picture of literary Bohemia in Paris and London between 1840 and 1870. He died on the 1st of January 1894. His younger brother, Frank Vizetelly (1830–1883), was a clever artist and journalist; he went to Egypt as war correspondent for the *Illustrated London News* and was never heard of after the massacre of Hicks Pasha's army in Kordofan.

VIZEU, or Viseu, an episcopal city and the capital of the district of Vizeu, Portugal, at the terminus of a branch of the Figueira da Foz-Guarda railway, and on the Ribeira d'Asnos, a sub-tributary of the Mondego. Pop. (1900) 8057. The cathedral, which was founded in the 12th century, contains pictures by the native artist Grão Vasco (16th century). The city stands near the ruins of the ancient *Vacca*, or *Cava de Viriato*, a Roman military colony founded by Decius Brutus and captured by Viriathus (2nd century B.C.). The administrative district of Vizeu coincides with the central and northern parts of the ancient province of Beira (*q.v.*). Pop. (1900) 402,259; area, 1937 sq. m.

VIZIADRUG, Vijayadurg or Gheria, a port on the W coast of India in Ratnagiri district, Bombay, 170 m. S. of Bombay city. Pop (1901) 2339. It is one of the best harbours on the west coast, being without any bar, and may be entered in all weathers, even to large ships it affords safe shelter during the south-west monsoon. At the beginning of the 18th century the pirate chief Angria made Viziadrug the capital of a territory stretching for 150 m along the coast and from 30 to 60 m. inland. The fort was taken by Admiral Watson and Colonel Clive in 1756.

VIZIANAGRAM, a town of British India, in the Vizagapatam district of Madras, 17 m. from the seaport of Bimlipatam, on the East Coast railway, 522 m N.E. of Madras. Pop. (1901) 37,270. It has a small military cantonment. It contains the residence of a *zamindar* of the same name, who ranks as the first Hindu nobleman of Madras. His estate covers about 3000 sq m., with a population of 900,000. The estimated income is £180,000, paying a permanent land revenue of £34,000 The town possesses many fine buildings, entirely supported by the raja. It has a college and two high schools.

The ruling family, which claims descent from a high official at the court of Golconda, established itself in Vizagapatam in the 17th century. In 1754 Viziarama Raz made an alliance with the French, but his son, on succeeding, fell out with them, captured Vizagapatam from them and ceded it to the British in 1758 The next raja, another Viziarama, was entirely under the influence of his half-brother Sita Ram, whose power, however, became so great a menace that he was forced to retire in 1793 A period of decay now set in. The raja was incompetent, and, his estate having been sequestrated for debt, revolted and was defeated and killed in 1794. The next raja, Narayana Babu, was no more successful, and his estate had been long under the management of the British government when he died in 1845. Viziarama Gajapati Raz, who succeeded him and took over full powers in 1852, was a man of ability, and received the titles of maharaja and K.C.S.I.; as also was his son, the maharaja Ananda Raz, G.C.I.E. He died in 1897, and was succeeded by Raja Pusapati Viziarama Gajapati Raz, during whose minority (till 1904) the estate was again under government administration.

VIZIER, more correctly Vizir (Arabic *Wazir*), literally "burden-bearer" or "helper," originally the chief minister or representative of the Abbasid caliphs. The office of vizier, which spread from the Arabs to the Persians, Turks, Mongols, and other Oriental peoples, arose under the first Abbasid caliphs (see Mahommedan Institutions, and Caliphate, C § 1) and took shape during its tenure by the Barmecides (*q.v.*). The vizier stood between sovereign and subjects, representing the former in all matters touching the latter. This withdrawal of the head of the state from direct contact with his people was unknown to the Omayyads, and was certainly an imitation of Persian usage; it has even been plausibly conjectured that the name is but the Arabic adaptation of a Persian title. In modern usage the term is used in the East generally for any important official under the sovereign.

VIZZOLA TICINO, a village of Lombardy, Italy, in the province of Milan, 6 m. W. of Gallarate and 31 m. N.W. of Milan, 725 ft. above sea-level. Pop. (1901) 469. It is situated on the Ticino, and is remarkable as having one of the largest electric works in Europe, worked by water-power from the Ticino brought by a canal 4½ m. long, constructed in 1889–91 by the Società Lombarda per Distribuzione di Energia Elettrica. Gallarate, Sesto Calende, Saronno and other neighbouring places are supplied from here with electricity.

VLAARDINGEN, a river port of Holland, in the province of South Holland, on the Maas, 6 m. by rail W. of Rotterdam. Pop. 17,000. A very old town and the seat of a former margraviate belonging to the counts of Holland, Vlaardingen is now chiefly important as the centre of the great herring and cod fisheries of the North Sea. Its only ornaments are the old market-place and the gardens formed by the purchase in 1825 of a seat called the Hof. The chief industries are those connected with the large fishing trade.

Distribution of the Vlach race.

VLACHS. The Vlach (Vlakh, Wallach) or Ruman race constitutes a distinct division of the Latin family of peoples, widely disseminated throughout south-eastern Europe, both north and south of the Danube, and extending sporadically from the Russian river Bug to the Adriatic. The total numbers of the Vlachs may be estimated at 10,000,000 or 11,000,000 North of the Danube, 5,400,000 dwell in Rumania; 1,250,000 are settled in Transylvania, where they constitute a large majority of the population, and a still greater number are to be found in the Banat and other Hungarian districts west and north of Transylvania. Close upon 1,000,000 inhabit Bessarabia and the adjoining parts of South Russia, and about 230,000 are in the Austrian province of Bukovina. South of the Danube, about 500,000 are scattered over northern Greece and European Turkey, under the name of Kutzo-Vlachs, Tzintzars or Aromani In Servia this element is preponderant in the Timok valley, while in Istria it is represented by the Cici, at present largely Slavonized, as are now entirely the kindred Morlachs of Dalmatia. Since, however, it is quite impossible to obtain exact statistics over so wide an area, and in countries where politics and racial feeling are so closely connected, the figures given above can only be regarded as approximately accurate; and some writers place the total of the Vlachs as low as 9,000,000. It is noteworthy that the Rumans north of the Danube continually gain ground at the expense of their neighbours; and even the long successful Greek propaganda among the Kutzo-Vlachs were checked after 1860 by the labours of Apostolu Margaritis and other nationalists.

A detailed account of the physical, mental and moral characteristics of the Vlachs, their modern civilization and their historical development, will be found under the headings RUMANIA and MACEDONIA.

All divisions of the race prefer to style themselves *Romqni*, *Romeni*, *Rumeni* or *Aromani*; and it is from the native pronunciation of this name that we have the equivalent expression *Ruman*, a word which must by no means be confined to that part of the Vlach race inhabiting the present kingdom of Rumania.

Its name.

The name "Vlachs," applied to the Rumans by their neighbours but never adopted by themselves, appears under many allied forms, the Slavs saying *Volokh* or *Woloch*, the Greeks *Vlachoi*, the Magyars *Oláh*, and the Turks, at a later date, *Iflák*. In its origin identical with the English *Wealh* or *Welsh*, it represents a Slavonic adaptation of a generic term applied by the Teutonic races to all Roman provincials during the 4th and 5th centuries. The Slavs, at least in their principal extent, first knew the Roman empire through a Teutonic medium, and adopted their term *Volokh* from the Ostro-Gothic equivalent of the Anglo-Saxon Wealh. It thus finds its analogies in the German name for Italy—*Welschland* (*Wälischland*), in the *Walloons* of the Low Countries and the *Wallgau* of Tirol. An early instance of its application to the Roman population of the Eastern empire is found (*c.* 550–600) in the *Traveller's Song*, where, in a passage which in all probability connects itself with the early trade-route between the Baltic staple of Wollin and Byzantium, the gleeman speaks of Caesar's realm as *Walaric*, "Welshry." In verse 140 he speaks of the *Rum-walas*, and it is to be observed that *Rum* is one of the words by which the Vlachs of eastern Europe still know themselves.

Its Latin character.

The Vlachs claim to be a Latin [illegible] the Spaniards or Provençals—Latin [illegible] and, in a smaller degre[illegible] long predominance of [illegible] influence, there is no [illegible] which is now [illegible] The lang[illegible] extent [illegible] render [illegible] the [illegible] by the names "Vlach" and "Ruman" but also by popular and literary tradition. In their customs and folk-lore both Latin and Slavonic traditions assert themselves. Of their Roman traditions the Trajan saga, the celebration of the Latin festivals of the Rosalia and Kalendae, the belief in the *striga* (witch), the names of the months and days of the week, may be taken as typical examples. Some Roman words connected with the Christian religion, like *biserica* (*basilica*) = a church, *botez* = *baptiso*, *duminica* = Sunday, *preot* (*presbyter*) = priest, point to a continuous tradition of the Illyrian church, though most of their ecclesiastical terms, like their liturgy and alphabet, were derived from the Slavonic. In most that concerns political organization the Slavonic element is also preponderant, though there are words like *impărat* = *imperator*, and *domn* = *dominus*, which point to the old stock. Many words relating to kinship are also Latin, some, like *vitrig* (*vitricus*) = father-in-law, being alone preserved by this branch of the Romance family. But if the Latin descent of the Vlachs may be regarded as proven, it is far less easy to determine their place of origin and to trace their early migrations

Its original home.

The centre of gravity of the Vlach or Ruman race is at present unquestionably north of the Danube in the almost circular territory between the Danube, Theiss and Dniester; and corresponds roughly with the Roman province of Dacia, formed by Trajan in A.D. 106. From this circumstance the popular idea has arisen that the race itself represents the descendants of the Romanized population of Trajan's Dacia, which was assumed to have maintained an unbroken existence in Walachia, Transylvania and the neighbour provinces, beneath the dominion of a succession of invaders The Vlachs of Pindus, and the southern region generally, were, on this hypothesis, to be regarded as later immigrants from the lands north of the Danube. In 1871, E. R. Roesler published at Leipzig, in a collective form, a series of essays entitled *Romänische Studien*, in which he absolutely denied the claim of the Rumanian and Transylvanian Vlachs to be regarded as autochthonous Dacians. He laid stress on the statements of Vopiscus and others as implying the total withdrawal of the Roman provincials from Trajan's Dacia by Aurelian, in A.D. 272, and on the non-mention by historians of a Latin population in the lands on the left bank of the lower Danube, during their successive occupation by Goths, Huns, Gepidae, Avars, Slavs, Bulgars and other barbarian races. He found the first trace of a Roman settlement north of the Danube in a Transylvanian diploma of 1222. Roesler's thesis has been generally regarded as an entirely new departure in critical ethnography. As a matter of fact, his conclusions had to a great extent been already anticipated by F. J. Sulzer in his *Geschichte des Transalpinischen Daciens*, published at Vienna in 1781, and at a still earlier date by the Dalmatian historian G. Lucio (Lucius of Traü) in his work *De Regno Dalmatiae et Croatiae*, Amsterdam, 1666.

The theory of the later immigration of the Rumans into their present abodes north of the Danube, as stated in its most extreme form by Roesler, commanded wide acceptance, and in Hungary it was politically utilized as a plea for refusing parity of treatment to a race of comparatively recent intruders. In Rumania itself Roesler's views were resented as an attack on Ruman nationality. Outside Rumania they found a determined opponent in Dr J. Jung, of Innsbruck, who upheld the continuity of the Roman provincial stock in Trajan's Dacia, disputing from historic analogies the total withdrawal of the provincials by Aurelian, and the reaction against Roesler was carried still f[illegible] J. L. Pič, Professor A. D. Xenopol of Jassy, B. P. [illegible] Onciul and many other Rumanian writers, who [illegible] while their own race north of the Danube represe[illegible] original Daco-Roman population of this region, the [illegible] Turkey and Greece are similarly descended from [illegible] Roman and Illyro-Roman inhabitants of the pro[illegible] south of the river. On this theory the entire [illegible] occupies almost precisely the same territories to-day [illegible] century.

On the whole it may be said that the truth lies between the two extremes. Roesler is no doubt so far right that after 272, and throughout the early middle ages, the bulk of the Ruman people lay south of the Danube. Pič's view that the population of the Roman provinces of Moesia and Illyria were Hellenized rather than Romanized, and that it is to Trajan's Dacia alone that we must look for the Roman source of the Vlach race, conflicts with what we know of the Latinizing of the Balkan lands from inscriptions, martyrologies, Procopius's list of Justinian's Illyrian fortresses and other sources. This Roman element south of the Danube had further received a great increase at the expense of Trajan's colonial foundation to the north when Aurelian established his New Dacia on the Moesian side of the river. On the other hand, the analogy supplied by the withdrawal of the Roman provincials from Riparian Noricum tells against the assumption that the official withdrawal of the Roman colonists of Trajan's Dacia by Aurelian entailed the entire evacuation of the Carpathian regions by their Latin-speaking inhabitants. As on the upper Danube the continuity of the Roman population is attested by the *Vici Romanisci* of early medieval diplomas and by other traces of a Romanic race still represented by the Ladines of the Tirol, so it is reasonable to suppose a Latin-speaking population continued to exist in the formerly thickly colonized area embracing the present Transylvania and Little Walachia, with adjoining Carpathian regions. Even as late as Justinian's time (483–565), the official connexion with the old Dacian province was not wholly lost, as is shown by the erection or restoration of certain fortified posts on the left bank of the lower Danube

Early migrations.

We may therefore assume that the Latin race of eastern Europe never wholly lost touch of its former trans-Danubian strongholds. It was, however, on any showing greatly diminished there The open country, the broad plains of what is now the Rumanian kingdom, and the Banat of Hungary were in barbarian occupation The centre of gravity of the Roman or Romance element of Illyricum had now shifted south of the Danube By the 6th century a large part of Thrace, Macedonia and even of Epirus had become Latin-speaking

What had occurred in Trajan's Dacia in the 3rd century was consummated in the 6th and 7th throughout the greater part of the South-Illyrian provinces, and the Slavonic and Avar conquests severed the official connexion with eastern Rome. The Roman element was uprooted from its fixed seats, and swept hither and thither by the barbarian flood. Nomadism became an essential of independent existence, while large masses of homeless provincials were dragged as captives in the train of their conquerors, to be distributed in servile colonies. They were thus in many cases transported by barbarian chiefs—Slav, Avar and Bulgarian—to trans-Danubian and Pannonian regions. In the *Acts* of St Demetrius of Thessalonica (d. A.D. 306) we find an account of such a Roman colony, which, having been carried away from South-Illyrian cities by the Avar *khagan* (prince), and settled by him in the Sirmian district beyond the Save, revolted after seventy years of captivity, made their way once more across the Balkan passes, and finally settled as an independent community in the country inland from Salonica. Others, no doubt, thus transported northwards never returned The earliest Hungarian historians who describe the Magyar invasion of the 9th century speak of the old inhabitants of the country as Romans, and of the country they occupied as *Pascua Romanorum*, and the Russian Nestor, writing about 1100, makes the same invaders fight against Slavs and Vlachs in the Carpathian Mountains. So far from the first mention of the Vlachs north of the Danube occurring only in 1222, as Roesler asserts, it appears from a passage of Nicetas of Chonae that they were to be found already in 1164 as far afield as the borders of Galicia, and the date of a passage in the *Nibelungenlied*, which mentions the Vlachs, under their name Râmunc, in association with the Poles, cannot well be later than 1200.

Nevertheless, throughout the early middle ages the bulk of the Ruman population lay south of the Danube. It was in the Balkan lands that the Ruman race and language took their characteristic mould. It is here that this new Illyrian Romance first rises into historic prominence. Already in the 6th century, as we learn from the place-names, such as Sceptecasas, Burgualtu, Clisura, &c., given by Procopius, the Ruman language was assuming, so far as its Latin elements were concerned, its typical form. In the somewhat later campaigns of Commentiolus (587) and Priscus, against the Avars and Slavs, we find the Latin-speaking soldiery of the Eastern emperor making use of such Romance expressions as *torna fratel* (turn, brother!), or *sculca* (out of bed) applied to a watch (cf. Ruman *a se culca* = Italian *coricarsi* + *ex*-(*s*-) privative). Next we find this warlike Ruman population largely incorporated in the Bulgarian kingdom, and, if we are to judge from the names Paganus and Sabinus, already supplying it with rulers in the 8th century. The blending and close contact during this period of the surviving Latin population with the Slavonic settlers of the peninsula impregnated the language with its large Slavonic ingredient. The presence of an important Latin element in Albanian, the frequent occurrence of Albanian words in Rumanian, and the remarkable retention by both languages of a suffix article, may perhaps imply that both alike took their characteristic shapes in the same region. The fact that these peculiarities are common to the Rumans north of the Danube, whose language differs dialectically from that of their southern brothers, shows that it was this southern branch that throughout the early periods of Ruman history was exercising a dominating influence. Migrations, violent transplantation, the intercourse which was kept up between the most outlying members of the race, in its very origin nomadic, at a later period actual colonization and the political influence of the Bulgaro-Vlachian empire, no doubt contributed to propagate these southern linguistic acquisitions throughout that northern area to which the Ruman race was destined almost imperceptibly to shift its centre of gravity.

Byzantium, which had ceased to be Roman, and had become Romanic, renewed its acquaintance with the descendants of the Latin provincials of Illyricum through a Slavonic medium; and applied to them the name of Vlach, which the Slav himself had borrowed from the Goth. The first mention of Vlachs in a Byzantine source is about the year 976, when Cedrenus (ii. 439) relates the murder of the Bulgarian tsar Samuel's brother "by certain Vlach wayfarers," at a spot called the Fair Oaks, between Castoria and Prespa. From this period onwards the Ruman inhabitants of the Balkan peninsula are constantly mentioned by this name, and we find a series of political organizations and territorial divisions connected with the name of *Vlachia*. A short synopsis may be given of the most important of these, outside the limits of Rumania itself.

Political and territorial divisions.

1 *The Bulgaro-Vlach Empire.*—After the overthrow of the older Bulgarian tsardom by Basil Bulgaroktonos (976–1025), the Vlach population of Thrace, Haemus and the Moesian lands passed once more under Byzantine dominion; and in 1185 a heavy tax, levied in kind on the cattle of these warlike mountain shepherds, stirred the Vlachs to revolt against the emperor Isaac Angelus, and under the leadership of two brothers, Peter and Asen, to found a new Bulgaro-Vlachian empire, which ended with Kaliman II in 1257 The dominions of these half-Slavonic half-Ruman emperors extended north of the Danube over a great deal of what is now Rumania, and it was during this period that the Vlach population north of the river seems to have been most largely reinforced. The 13th-century French traveller Rubruquis speaks of all the country between Don and Danube as *Asen's land* or *Blakia*.

2. *Great Walachia* (Μεγάλη Βλαχία).—It is from Anna Comnena, in the second half of the 11th century, that we first hear of a Vlach settlement, the nucleus of which was the mountainous region of Thessaly Benjamin of Tudela, in the succeeding century, gives an interesting account of this Great Walachia, then completely independent. It embraced the southern and central ranges of Pindus, and extended over part of Macedonia, thus including the region in which the Roman settlers mentioned in the *Acts* of St Demetrius had fixed their abode. After the Latin conquest of Constantinople in 1204, Great Walachia was included in the enlarged despotate of Epirus, but it soon reappears as an independent principality under its old name, which, after passing under the yoke

of the Serb emperor Dushan, was finally conquered by the Turks in 1393. Many of their old privileges were accorded to the inhabitants, and their taxes were limited to an annual tribute. Since this period the Megalovlachites have been largely Hellenized, but they are still represented by the flourishing Tzintzar settlements of Pindus and its neighbourhood (see MACEDONIA).

3. *Little Walachia* (Μικρὰ Βλαχία) was a name applied by Byzantine writers to the Ruman settlements of Aetolia and Acarnania, and with it may be included "Upper Walachia," or Ἀνώβλαχα. Its inhabitants are still represented by the Tzintzars of the Aspropotamo and the Karaguni (Black Capes) of Acarnania.

4. *The Morlachs* (*Mavrovlachi*) *of the West.*—These are already mentioned as *Nigri Latini* by the presbyter of Dioclea (*c.* 1150) in the old Dalmatian littoral and the mountains of what is now Montenegro, Herzegovina and North Albania. Other colonies extended through a great part of the old Servian interior, where is a region still called Stara Vlaška or "Old Walachia." The great commercial staple of the east Adriatic shores, the republic of Ragusa, seems in its origin to have been a Ruman settlement, and many Vlach traces survived in its later dialect. Philippus de Diversis, who described the city as it existed in 1440, says that "the various officers of the republic do not make use either of Slav or Italian, with which they converse with strangers, but a certain other dialect only partially intelligible to us Latins," and cites words with strong Ruman affinities. In the mountains above Ragusa a number of Vlach tribes are mentioned in the archives of that city, and the original relationship of the Ragusans and the nomadic Alpine representatives of the Roman provincials, who preserved a traditional knowledge of the old lines of communication throughout the peninsula, explains the extraordinary development of the Ragusan commerce. In the 14th century the Mavrovlachi or Morlachs extended themselves towards the Croatian borders, and a large part of maritime Croatia and northern Dalmatia began to be known as *Morlacchia*. A *Major Vlachia* was formed about the triple frontier of Bosnia, Croatia and Dalmatia, and a "Little Walachia" as far north as Požega. The Morlachs have now become Slavonized (see DALMATIA).

5. *Cici of Istria.*—The extreme Ruman offshoot to the north-west is still represented by the Cici of the Val d'Arsa and adjoining Istrian districts. They represent a 15th-century Morlach colony from the Isles of Veglia, and had formerly a wider extension to Trieste and the counties of Gradisca and Gorz. The Cici have almost entirely abandoned their native tongue, which is the last remaining representative of the old Morlach, and forms a connecting link between the Daco-Roman (or Rumanian) and the Illyro- or Macedo-Roman dialects.

6. *Rumans of Transylvania and Hungary.*—As already stated, a large part of the Hungarian plains were, at the coming of the Magyars in the 9th century, known as *Pascua Romanorum*. At a later period privileged Ruman communities existed at Fogaras, where was a *Silva Vlachorum*, at Marmaros, Deva, Hatzeg, Hunyad and Lugos, and in the Banat were seven Ruman districts. Two of the greatest figures in Hungarian history, the 15th-century rulers John Corvinus of Hunyad and his son King Matthias, were due to this element. For its later history see TRANSYLVANIA.

See, in addition to the books already mentioned, J. L. Pič, *Über die Abstammung der Rumänen* (Leipzig, 1880); A. D. Xenopol, *Les Roumains au moyen âge* (Jassy, 1886); B. P. Hasdeu, "Stratŭ ši Substratŭ · Genealogia poporelorŭ balcanice," in *Annalele Academieĭ*, ser. II, vol. 14 (Bucharest, 1893); D. Onciul, "Românii in Dacia Traiana," &c., in *Enciclopedia Română*, vol. iii. (Bucharest, 1902).

VLADIKAVKAZ, a town and fortress of Russia in northern Caucasia, the capital of the province of Terek. Pop. (1900) 49,924. It stands on a plateau, at an altitude of 2345 ft., on both banks of the Terek, where that river issues from the Darial gorge. It is 434 m. by rail S.E. from Rostov-on-the-Don, and has regular communication with Tiflis (133 m.) by coach through the Darial Pass (Georgian military road) of the Caucasus. Moreover, a line of railway, running eastwards to the Caspian ports of Petrovsk and Baku, connects Vladikavkaz, or rather the station Beslan, 14 m. N. of it, with the Transcaucasian railway, *i.e.* with Tiflis, Poti and Batum. Russians, Armenians and Jews constitute the bulk of the population, which also contains Ossetes, Chechens, Ingushes and others. There are distilleries and a number of smaller factories. The fort, around which the town has grown up, was built in 1784. The town is an episcopal see of the Orthodox Greek Church.

VLADIMIR, ST (*c.* 956–1015), grand duke of Kiev and of all Russia, was the youngest son of Svyatoslav I. and his mistress Malushka. In 970 he received Great Novgorod as his apanage. On the death of Svyatoslav in 972, a long civil war took place between his sons Yaropolk and Oleg, in which Vladimir was to recover Novgorod, and on his return marched against Yaropolk. On his way to Kiev he sent ambassadors to Ragvald, prince of Polotsk, to sue for the hand of his daughter Ragnilda. The haughty princess refused to affiance herself to "the son of a bondswoman," but Vladimir attacked Polotsk, slew Ragvald, and took Ragnilda by force. Subsequently (980) he captured Kiev also, slew Yaropolk by treachery, and was proclaimed prince of all Russia. In 981 he conquered the Chervensk cities, the modern Galicia; in 983 he subdued the heathen Yatvyags, whose territories lay between Lithuania and Poland; in 985 he led a fleet along the central rivers of Russia to conquer the Bulgarians of the Kama, planting numerous fortresses and colonies on his way. At this time Vladimir was a thoroughgoing pagan. He increased the number of the *trebishcha*, or heathen temples; offered up Christians (Theodore and Ivan, the protomartyrs of the Russian Church) on his altars; had eight hundred concubines, besides numerous wives; and spent his whole leisure in feasting and hunting. He also formed a great council out of his boyars, and set his twelve sons over his subject principalities. In the year 987, as the result of a consultation with his boyars, Vladimir sent envoys to study the religions of the various neighbouring nations whose representatives had been urging him to embrace their respective faiths. The result is amusingly described by the chronicler Nestor. Of the Mussulman Bulgarians of the Volga the envoys reported "there is no gladness among them; only sorrow and a great stench; their religion is not a good one." In the temples of the Germans they saw "no beauty"; but at Constantinople, where the full festival ritual of the Orthodox Church was set in motion to impress them, they found their ideal. "We no longer knew whether we were in heaven or on earth, nor such beauty, and we know not how to tell of it." If Vladimir was impressed by this account of his envoys, he was yet more so by the offer of the emperor Basil II. to give him his sister Anna in marriage. In 988 he was baptized at Kherson in the Crimea, taking the Christian name of Basil out of compliment to his imperial brother-in-law; the sacrament was followed by his marriage with the Roman princess. Returning to Kiev in triumph, he converted his people to the new faith with no apparent difficulty. Crypto-Christians had been numerous in Kiev for some time before the public recognition of the Orthodox faith. The remainder of the reign of Vladimir was devoted to good works. He founded numerous churches, including the splendid *Desyatinnuy Sobor* or "Cathedral of the Tithes" (989), established schools, protected the poor and introduced ecclesiastical courts. With his neighbours he lived at peace, the incursions of the savage Petchenegs alone disturbing his tranquillity. His nephew Svyatpolk, son of his brother and victim Yaropolk, he married to the daughter of Boleslaus of Poland. He died at Berestova, near Kiev, while on his way to chastise the insolence of his son, Prince Yaroslav of Novgorod. The various parts of his dismembered body were distributed among his numerous sacred foundations and were venerated as relics. The university of Kiev has rightly been named after the man who both civilized and Christianized ancient Russia. His memory was also kept alive by innumerable folk ballads and legends. With him the Varangian period of Russian history ceases and the Christian period begins.

See *Memorials* (Rus.) published by the Commission for the examination of ancient documents (Kiev, 1881, &c.); I. Komanin and M. Istomin, *Collection of Historical Materials* (Rus.) (Kiev, [illegible] &c.); O. Partitsky, *Scandinavianism in Ancient Russia* (Rus.) (Lemberg, 1897), A. Lappo-Danilevsky, *Scythian Antiquities* (Rus.) (Petersburg, 1887); J. Macquart, *Osteuropäische u. [illegible]tische Streifzüge* (Leipzig, 1903), L. C. Goetz, *Das Kiewer Höhlenkloster als Kulturzentrum des vormongolischen* [illegible] 1904).

VLADIMIR, a government of mid[illegible] governments of Mosco[illegible] E. by Nizhniy-Novgo[illegible] area of [illegible]

300 ft. to 450 ft. below the general level, so that the country has a hilly appearance.

The lacustrine depression of the middle Volga and Oka extends into the east of the government. The Upper Carboniferous limestones, of which it is mostly built up, are overlain by Permian sandstones towards the east, and patches of Jurassic clays—denuded remnants of formerly extensive deposits—are scattered over its surface. The whole is covered with a thick sheet of boulder clay, considered to be the bottom moraine of the North-European ice-sheet, and overlaid, in its turn, in the depressions, by extensive lacustrine clays and sands. The geology, especially of the western parts, has been investigated by Professor Nikitin, who has ascertained that under the Glacial and post-Glacial deposits—the lower strata of which contain remains of the mammoth and rhinoceros and the upper fossils of extensive prehistoric forests—occur Lower Cretaceous deposits and deposits intermediate between the Cretaceous and the Jurassic ("Volga" deposits). Upper Jurassic (Kelaway and Oxford) and Upper Carboniferous deposits are also found, and at Gorbatov Permian marls.

The soil is for the most part unfertile, save in the district of Yuriev, where are patches of black earth, which have occasioned a good deal of discussion among Russian geologists. Iron ore is widely diffused, and china clay and gypsum are met with in several places. Peat is of common occurrence. Forests cover extensive tracts in the south-east. The climate resembles that of Moscow, but is a little colder, and still more continental: the average yearly temperature at the city of Vladimir is 38° F. (January, 16°; July, 66.5°).

The Oka flows through the government for 85 m., and is navigable throughout. Of its tributaries, the Klyazma is navigable to Kovrov, and even to Vladimir in summer; and timber is floated on the Teza. Small lakes are numerous; that of Pleshcheyevo or Pereyaslavl (5 m. in length) has historical associations, Peter the Great having there acquired in his boyhood his first experiences in navigation. The marshes extend to more than half a million acres.

The population was estimated in 1906 as 1,730,400. It is thoroughly Great Russian. The Finnish tribes, Muroma and Merya, which formerly inhabited the region, have been absorbed by the Slavs, as also have the Karelians, who are supposed to have formerly inhabited the territory. The descendants of the few hundred Karelian families, which were settled by Peter the Great on the shores of Lake Pereyaslavl, still, however, preserve their own language. The government is divided into thirteen districts, the chief towns of which are Vladimir, Alexandrov, Gorokhovets, Kovrov, Melenki, Murom, Pereyaslavl Zalyeskiy, Pokrov, Shuya, Sudogda, Suzdal, Vyazniki and Yuriev Polskiy. Ivanovo-Voznesensk, Gusevsk and Kholui are important industrial towns. The *zemstvos* (district councils) make considerable efforts to foster education and improve the sanitary arrangements.

The soil is not very fertile, and the standard of agriculture is low, the inhabitants being largely engaged in manufactures. In 1900 1,908,200 acres (15.8% of the entire area) were under cereals. Cherries and apples are exported in considerable quantities.

The cultivation of flax, both for local manufactures and for export—especially about Melenki—is important; so also is that of hemp. Natural pastures are numerous, and support large herds of cattle. The principal crops are rye, oats, wheat, barley and potatoes. The peasants hold 5,591,000 acres in communal ownership: of this 60% is arable land, 3,802,800 acres belong to private owners, 552,300 acres to the crown and 370,000 acres to the imperial family. The only important mineral is alabaster.

Vladimir ranks third among the governments of European Russia for manufactures. It has some 500 large factories, which employ over 100,000 persons (one-third women); the principal establishments are cotton, linen and silk mills, dye-works, and rope, paper, cardboard, oil, chemical, machinery, glass and iron works, tanneries and distilleries. Wood, coal, petroleum and peat are all used as fuel.

A distinctive feature of Vladimir is the great variety of petty trades carried on by peasants who still continue to cultivate their [illegible]. While in some villages almost all the male population leave their homes and travel all over Russia as carpenters, masons, or roof makers, or as pedlars or travelling merchants, other villages have their specialties in some branch of manufactured produce. [illegible] 30,000 carpenters leave Vladimir every year. Whole [illegible] are engaged in painting sacred pictures or ikons; and [illegible] the ikons are sold at a shilling the hundred, the aggregate [illegible] valued at [illegible] a year; and the Vladimir (or rather [illegible] are sold all over Russia and the Balkan peninsula. [illegible] are emplo[illegible] sickles, [illegible] (shoes [illegible] and are [illegible] woollen [illegible] toys, [illegible] other [illegible] ank in [illegible] out for [illegible] les and [illegible] The principal ports are Murom on the Volga and Kovrov and Vyazniki on the Klyazma. Timber, wood for fuel and manufactured goods are the chief exports.

Numbers of Palaeolithic stone implements, intermingled with bones of the mammoth and the rhinoceros, and still greater numbers of Neolithic stone implements, have been discovered. There are a great number of burial-mounds belonging to the Bronze and Iron periods, and containing decorations in amber and gold; nearly 2000 such burial-mounds are scattered round Lake Pleshcheyevo, some of them belonging to the pagan period and some to the early Christian. Coins from Arabia, Bokhara, Germany and Anglo-Saxon lands are found in great quantities. (P. A. K.; J. T. Be.)

VLADIMIR, a town of Russia, capital of the government of the same name known in history as Vladimir-on-the-Klyazma, to distinguish it from Vladimir in Volhynia. It is picturesquely situated on the Klyazma and Lybed, 118 m. by rail E.N.E. of Moscow. Pop. (1884) 18,420; (1900) 32,029. The city is an archiepiscopal see of the Orthodox Greek church. The Lybed divides it into two parts. Extensive cherry orchards occupy the surrounding slopes, and in each is a small watch-tower, with cords drawn in all directions to be shaken by the watcher when birds alight. The kreml stands on a hill and contains two very old cathedrals—the Uspenskiy (1150; restored in 1891), where all the princes of Vladimir have been buried, and the Dmitrievskiy (1197; restored in 1834–1835). Several churches date from the 12th century, including one dedicated to the Birth of Christ, in which St Alexander Nevski was buried. The "Golden Gate"—a triumphal gate surmounted by a church—was built by the grand duke Andrei Bogolyubskiy in 1158.

Vladimir was founded in the 12th century. It first comes into notice in 1151, when Andrei Bogolyubskiy secretly left Vyshgorod—the domain of his father in the principality of Kiev—and migrated to the newly settled land of Suzdal, where he became (1157) grand prince of the principalities of Vladimir, Suzdal and Rostov. In 1242 the principality was overrun by the Mongols under Batu Khan, and he and his successors asserted their suzerainty over it until 1328. During this period Vladimir became the chief town of the Russian settlements in the basin of the Oka, and it disputed the superiority with the new principality of Moscow, to which it finally succumbed in 1328. In the 14th century it began to decay.

VLADIMIR-VOLHYNSKIY, a town of Russia, in the government of Volhynia, 19 m. N.N.E. of the spot where the frontiers of Russia, Poland and Galicia meet and 300 m. W.N.W. of Kiev. Pop. (1885) 8752; (1897) 9695, three-fourths Jews. Though not mentioned in the annals before 988, Vladimir was probably in existence in the 9th century under the name of Ladomir. In the 10th century it was the capital of the principality of Volhynia. The Tatars and the Lithuanians destroyed it several times, but it always recovered, and only fell into decay in the 17th century. It was finally annexed to Russia after the first division of Poland (1772). The ruins in and near the town include remains of a church supposed to have been built by Vladimir, grand duke of Kiev, in the 10th–11th centuries, and of another built in 1160 by his descendant Mstislav. This latter was apparently very well built, and its length exceeded that of the temple of St Sophia at Kiev. The town contains a good archaeological museum.

VLADIVOSTOK, the chief Russian seaport and naval station on the Pacific Ocean, situated at the southern extremity (43° 7′ N. and 131° 55′ E.) of the Maritime Province, not far from the point where that government touches both Manchuria and Korea (Cho-sen). It is connected by rail with Khabarovsk (479 m. N.N.E.), the capital of the Amur region, and with Chita in Transbaikalia (1362 m.) via Ninguta, Kharbin, Tsitsikar and Khailar. Pop. (1900) 38,000. The town stands on Peter the Great Gulf, occupying the northern shore of one of its horn-like expansions, which the Russians have called the Golden Horn. The depth of the Eastern Bosporus ranges from 13 to 20 fathoms, and that of the Golden Horn from 5 to 13, the latter affording a spacious harbour. The hills are covered with forests of oak, lime, birch, maple, cork, walnut, acacia, ash, aspen, poplar, elm, apple, pear and wild cherry, with a rich undergrowth of the most varied shrubs. Excellent timber is supplied by oak and cedar forests not far off. The climate, however, is severe, as compared with that of corresponding latitudes in Europe. Though standing in almost the same parallel as Marseilles, Vladivostok has an average annual temperature of only 40° F., and, although the gulf itself never freezes, a thin ice-crust forms along the shores in December and remains until April. The town has several handsome buildings, a monument to Admiral Nevelskiy (1897), a cathedral, a museum, an observatory, an Oriental institute (opened in 1899), professional schools, a naval hospital, mechanical and naval works, steam saw-mills and flour-mills. The drawback of Vladivostok is that it has not, and cannot have, a well-developed hinterland, despite the great efforts which have been made by the Russian government to supply the Usuri region (to the north of Vladivostok) with Russian settlers. The town of Vladivostok was founded in 1860–1861, and from 1865 to 1900 was a free port.

VODENA (Turk. and Bulg. *Voden*, anc. *Edessa*, *q.v.*), a city of European Turkey, in the vilayet of Salonica, western Macedonia; at the source of the small river Bistritza, which flows east and south into Lake Yenije, and on the railway from Salonica to Monastir. Pop. (1905) about 25,000, consisting of Turks, Slavs and Greeks. The town stands on a rocky height commanding views of Pindus and Olympus; the approaching slopes are richly wooded, and traversed by picturesque waterfalls, from which the name of Vodena (Slav. *voda*, water) is probably derived. Vodena is the see of a Greek archbishop, and possesses numerous churches and mosques, besides unimportant remains of Roman and Byzantine buildings. It has manufactures of cotton, tobacco and leather, and a large trade in wine, silk cocoons and red pepper.

VODEYSHANKAR, GOWRISHANKAR (1805–1892), native minister of the state of Bhaunagar in Kathiawar, Bombay, was born on the 21st of August 1805, of a family of Nagar Brahmins. He rose from being a revenue officer to be state minister in 1847. His success in this capacity was such that on the death of the reigning chief, in 1870, he was appointed joint administrator in concert with a British official. The experiment was in every respect successful. Under the simple and economical forms used in native states, improvements suggested by British experience were introduced. The land revenue was based on a cash system, the fiscal and customs systems were remodelled and tree planting was encouraged. The town of Bhaunagar received the great boon of the Gowrishankar Waterworks, on which six lakhs of rupees were spent. The Bhaunagar state also warmly pressed for railway communication with the continent of India, and thus began a movement which has spread a network of railway lines over the peninsula of Kathiawar. The British government rewarded these many services of Gowrishankar with the distinction of C.S.I. in 1877. He helped to establish the Rajkumar College at Rajkot, for the education of native princes, and also the Rajasthanik Court, which, after settling innumerable disputes between the land-owning classes and the chiefs, has since been abolished. In 1879 Gowrishankar resigned office, and devoted himself to the study of the higher literature of that Vedanta philosophy which through his whole life had been to him a solace and a guide. In 1884 he wrote a work called *Swarupanusandhan*, on the union of the soul with Deity, which led to a letter of warm congratulation from Max Müller, who also published a short biography of him. In 1887 he put on the robe of the *Sanyasi* or ascetic, the fourth stage, according to the Hindu Shastras, in the life of the twice-born man, and in this manner passed the remainder of his life, giving above ten hours each day to Vedantic studies and holy contemplation. He died, revered by all classes, in December 1892.

See Javerital U. Yajnik, *Gowrishankar Udayashankar* (Bombay, 1889).

VODKA, VODKI or WODKY, the Russian national spirituous beverage. Originally vodka was made almost entirely from rye, barley malt to the extent of 15 to 20% being used to effect saccharification (see SPIRITS), but at the present day potatoes and maize are the staple raw materials from which this spirit is manufactured, and, as a rule, green rye malt is now used instead of barley. The distillation is conducted by means of live steam in a double still of the "patent" type. Vodka as manufactured contains from 90 to 96% of alcohol, but it is diluted, previous to retailing, to a strength of 60 to 40%. It is illegal to sell it with less than 40% of alcohol.

VOETIUS (VOET), **GYSBERTUS** (1588–1676), Dutch theologian, was born at Heusden, Holland. He studied at Leiden, and in 1611 became pastor of Blymen, whence in 1617 he returned to Heusden. In 1619 he played an influential part in the Synod of Dort, and in 1634 was made professor of theology and Oriental science at Utrecht. Three years later he became pastor of the Utrecht congregation. He was an advocate of the extremest form of Calvinism against the Arminians; but his personal influence was good, and the city of Utrecht perpetuated his memory by giving his name to the street in which he had lived.

VOGEL, EDUARD (1829–1856), German traveller in Central Africa, was born at Krefeld on the 7th of March 1829. He studied mathematics and astronomy at Leipzig and Berlin, and in 1851 engaged in astronomical work in London. In 1853 he was chosen by the British government to take supplies to Heinrich Barth, then in the western Sudan; and Vogel met Barth at Kuka in Bornu (1854). During 1854 and 1855 he explored the countries round Lake Chad and the upper course of the Benue. On the 1st of December 1855 he left Kuka for the Nile Valley, and nothing further was heard of him. Several search expeditions were organized to ascertain his fate and to recover his papers; it was not until 1873 that Gustav Nachtigal on reaching Wadai learnt that Vogel had been murdered in that country in February 1856.

See *Erinnerungen an einen Verschollenen* (Leipzig, 1863), by Vogel's sister, E. Polko, and *Der Afrikaforscher Eduard Vogel* (Hamburg, 1889).

VOGEL, SIR JULIUS (1835–1899), British colonial statesman, son of Albert Leopold Vogel, was born in London on the 24th of February 1835, was educated at University College school, London, and emigrated to Victoria during the exciting years which followed the discovery of goldfields there. He became editor of a newspaper at Maryborough, stood for the Legislative Assembly and was defeated, and in 1861 left Victoria, carried in the mining rush to Otago, New Zealand, where much gold had just been found. Settling in Dunedin, he bought a half-share in the *Otago Daily Times*, and was soon its editor and a member of the Otago Provincial Council. He made his paper the most influential in the colony, and was returned to the House of Representatives. In 1866 he was head of the Otago Provincial Executive; by 1869 he had made his mark in the New Zealand parliament, and was treasurer in the ministry of Sir William Fox. Without delay he brought forward a scheme for the construction of trunk railways and other public works, the purchase of land from the Maori tribes, and the introduction of immigrants, all to be done with money borrowed in London. At that time New Zealand hardly contained a quarter of a million of white settlers, was exhausted by the ten years' struggle with the Maori, not then ended, and was depressed by the low price of her staple product, wool, and the abatement of a gold-fever. Yet Vogel's sanguine, energetic appeals and remarkable gift of persuasion induced the House of Assembly to adopt a modified version of his scheme. For the next six years he was the most powerful man in the colony. Millions were borrowed, railways were pushed on, immigrants—state and voluntary—streamed in. Lasting peace was made with the Maori, a telegraph line laid to Australia, a steam mail service secured across the Pacific to San Francisco; a government life insurance office, and a public trust office, were established, both of which pro
were well-managed. De
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In 1874 Vogel, until that time a supporter of the Provincial system, decided to abolish it. In this, with the aid of Sir E. W. Stafford and Sir H. A. Atkinson, he succeeded. In the struggle, however, he broke with many of his old allies, and in 1876 suddenly quitted New Zealand to take the post of agent-general in London. This he held until 1880, and while holding it negotiated a loan for five millions. Having become connected with certain public companies, and the New Zealand government objecting thereto, he had to resign his position. An attempt, too, which he made in 1880 to enter the House of Commons as Conservative member for Penryn was unsuccessful. In 1884 he returned to New Zealand, was at once elected to parliament, and formed a coalition ministry with the Radical leader, Sir R. Stout. They held office for three years, but though Vogel showed some of his old financial skill, they were not years of prosperity for the colony, or triumph for the government. A deficit, a rejected scheme of taxation and a crushing defeat at the polls ended Vogel's career as a minister. After a few months of failure as leader of an outnumbered Opposition he gave up the contest, left New Zealand for the last time, and for the last eleven years of his life lived quietly near London. Throughout his life he had from time to time to struggle with deafness, lameness and acute bodily pain, while an impulsive, speculative nature led him once and again into financial difficulties. The persistency with which he faced trouble and embarrassment, the hopefulness he showed under stress of ill fortune, the sympathy and pleasantness of manner which won him friends at all times, were elements in his curious and interesting character no less remarkable than the fertility and imaginative power of his busy brain.

Vogel was among the pioneers of Imperial Federation; he would have extended Great Britain's influence in the Pacific Ocean had he been allowed. He was the first minister to secure the second reading of a Women's Franchise Bill in New Zealand. As long ago as 1874 he endeavoured to save the New Zealand forests from the reckless destruction by axe and fire which has since gone on. In 1889 a novel from his pen, *Anno Domini 2000*, was published, and reached a second edition. He died at East Molesey on the 13th of March 1899. His wife, who was the daughter of William Clayton, government architect, New Zealand, two sons and a daughter survived him. Another son had been killed in the Matabele War in South Africa. Vogel was a Jew of the Ashkenazi rite. (W. P. R.)

VOGHERA (anc. *Iria*), a town of Lombardy, Italy, in the province of Pavia, and 19 m. by rail S.S.W. of that city, 305 ft. above sea-level, on the Staffora (a tributary of the Po). Pop. (1901) 14,453 (town); 20,442 (commune). The fortifications erected by the Visconti in the middle ages have given place to shady promenades. The large church of San Lorenzo dates from the 11th century, but was remodelled in the baroque style about the beginning of the 17th. The suppressed church of S. Ilario (Chiesa Rossa), so called from the red colour of the brick of which it is built, dates from the 10th century. The neighbourhood produces much silk, in which, as well as in corn and wine, an active trade is carried on. The ancient Iria took its name from the river on which it was situated. It was on the road from Placentia to Dertona, and was made a colony by Augustus (*colonia Forum Iulium Iriensium*).

VOGLER, GEORG JOSEPH (1749–1814), usually known as Abbé or Abt (Abbot) Vogler, German organist and composer, was born at Pleichach in Würzburg on the 15th of June 1749. [illegible] maker, while educating him in the Jesuit [illegible] was so marked [illegible], but [illegible] other [illegible] the Golden Spur, and appointed protonotary and chamberlain to the pope.

On his return to Mannheim in 1755 Vogler was appointed court chaplain and second "maestro di cappella." He now established his first great music school. His pupils were devoted to him, but he made innumerable enemies, for the principles upon which he taught were opposed to those of all other teachers. He had invented a new system of fingering for the harpsichord, a new form of construction for the organ, and a new system of musical theory founded upon that of Valotti. Mozart condemned the fingering as "miserable," and many rumours to his discredit have survived to this day owing to Mozart's share in the prejudice felt against him. The proposed change in the construction of the organ consisted in simplifying the mechanism, introducing free-reeds in place of ordinary reed-stops, and substituting unisonous stops for the great "mixtures" then in vogue. The theoretical system, though professedly based upon Valotti's principles, was to a great extent empirical. Nevertheless, in virtue of a certain substratum of truth which seems to have underlain his new theories, Vogler undoubtedly exercised a powerful influence over the progress of musical science, and numbered among his disciples some of the greatest geniuses of the period.

In 1778 the elector removed his court to Munich. Vogler followed him thither in 1780, but, dissatisfied with the reception accorded to his dramatic compositions, soon quitted his post. He went to Paris, where after much hostility his new system was recognized as a continuation of that started by Rameau. His organ concerts in the church of St Sulpice attracted considerable attention. At the request of the queen, he composed the opera *Le Patriotisme*, which was produced before the court at Versailles. His travels were wide, and extended over Spain, Greece, Armenia, remote districts of Asia and Africa, and even Greenland, in search of uncorrupted forms of national melody. In 1786 he was appointed "kapellmeister" to the king of Sweden, founded his second music school at Stockholm, and attained extraordinary celebrity by his performances on an instrument called the "orchestrion"—a species of organ invented by himself.[1] In 1790 he brought this instrument to London, and performed upon it with great effect at the Pantheon, for the concert-room of which he also constructed an organ upon his own principles. The abbé's pedal-playing excited great attention. His most popular pieces were a fugue on themes from the "Hallelujah Chorus," composed after a visit to the Handel festival at Westminster Abbey, and *A Musical Picture for the Organ*, by Knecht, containing the imitation of a storm.

From London Vogler proceeded to Rotterdam and the chief towns on the Rhine. At Esslingen he was presented with the "wine of honour," reserved for the use of sovereigns. At Frankfort he attended the coronation of the emperor Leopold II. He then visited Stockholm, and after a long residence there, interrupted by endless wanderings, once more established himself in Germany, where his compositions, both sacred and dramatic, received at last full credit. We hear of him at Berlin in 1800, at Vienna in 1804 and at Munich in 1806. While at Frankfort in 1807 he received an invitation from Louis I., grand duke of Hesse-Darmstadt, offering him the appointment of "kapellmeister," with the order of merit, the title of privy councillor, a salary of 3000 florins, a house, a table supplied from the duke's own kitchen, and other privileges, which determined him to bring his wanderings at last to a close.

At Darmstadt he opened his third and most famous music school, the chief ornaments of which were Gänsbacher, Weber and Meyerbeer, whose affection for their old master was unbounded. One of Vogler's latest exploits was a journey to Frankfort in 1810, to witness the production of Weber's *Sylvana*. He continued to work hard to the last, and died suddenly of apoplexy at Darmstadt on the 6th of May 1814. He was a brilliant and accomplished performer, and an excellent if an eccentric teacher; but his own compositions have not survived.

VOGT, KARL CHRISTOPH (1817–1895), German naturalist and geologist, was born at Giessen on the 5th of July 1817. In 1847 he became professor of zoology at Giessen, and in 1852 professor of geology and afterwards also of zoology at Geneva, where he died on the 5th of May 1895. His earlier publications were on zoology; he dealt with the Amphibia (1839), Reptiles (1840), with Mollusca and Crustacea (1845) and more generally with the invertebrate fauna of the Mediterranean (1854)

His separate works include *Im Gebirg und auf den Gletschern* (1843); *Physiologische Briefe* (1845-46); *Grundriss der Geologie* (1860); and *Lehrbuch der Geologie und Petrefactenkunde* (2 vols., 1846–47; ed. 4, 1879). An English version of his *Lectures on Man: his Place in Creation and in the History of the Earth* was published by the Anthropological Society of London in 1864.

VOGTLAND, or VOIGTLAND, a district of Germany, forming the S.W. corner of the kingdom of Saxony, and also embracing parts of the principality of Reuss and of the duchies of Saxe-Altenburg and Saxe-Weimar. It is bounded on the N. by the principalities of Reuss, in the S.E. by Bohemia, and on the S.W. and W. by Bavaria. Its character is generally mountainous, and geologically it belongs to the Erzgebirge range. It is extremely rich in mineral ores—silver, copper, lead and bismuth. The name denoted the country governed for the emperor by a *Vogt* (bailiff or steward), and was, in the middle ages, known as *terra advocatorum*. The Vögte are first met with in the country in the 10th century, and the office shortly afterwards appears to have become hereditary in the princely line of Reuss. But this house was not in undivided possession, rival claims being raised from time to time; and after being during the middle ages a bone of contention between Bohemia, the burgraves of Nuremberg and the Saxon house of Wettin, it passed gradually to the Wettins, falling by the division of 1485 to the Ernestine branch of the family. The elector Augustus I. made it one of the circles of his dominions.

See Limmer, *Geschichte des Voglandes* (Gera, 1825–28, 4 vols.); Simon, *Das Vogtland* (Meissen, 1904); C. F. Collmann, *Das Vogtland im Mittelalter* (Greiz, 1892); and Metzner, *Vogtländische Wanderungen* (Annaberg, 1902).

VOGÜÉ, EUGÈNE MELCHIOR, COMTE DE (1848–), French author, was born at Nice on the 25th of February 1848. He served in the campaign of 1870, and on the conclusion of the war entered the diplomatic service, being appointed successively attaché to the legations at Constantinople and Cairo and secretary at St Petersburg. He resigned in 1882, and from 1893 to 1898 was deputy for Ardèche. His connexion with the *Revue des deux mondes* began in 1873 with his *Voyage en Syrie et en Palestine*, and subsequently he was a frequent contributor. He did much to awaken French interest in the intellectual life of other countries, especially of Russia, his sympathy with which was strengthened by his marriage in 1878 with a Russian lady, the sister of General Annenkov. De Vogüé was practically the first to draw French attention to Dostoievski and his successors. He became a member of the French Academy in 1888.

His works include: *Histoires orientales* (1879); *Portraits du siècle* (1883); *Le Fils de Pierre le Grand* (1884); *Histoires d'hiver* (1885); *Le Roman russe* (1886); *Regards historiques et littéraires* (1892); *Cœurs russes* (1894); *Devant le siècle* (1896); *Jean d'Agrève* (1898); *Le Rappel des ombres* (1900); *Le Maître de la mer* (1903); *Maxime Gorky* (1905).

VOICE (Fr. *voix*, from Lat. *vox*), the sound produced by the vibrations of the vocal cords, two ligaments or bands of fibrous elastic tissue situated in the larynx. It is to be distinguished from *speech*, which is the production of articulate sounds intended to express ideas. Many of the lower animals have voice, but none has the power of speech in the sense in which man possesses that faculty. There may be speech without voice, as in whispering, whilst in singing a scale of musical tones we have voice without speech. (See SONG; and for speech see PHONETICS; also the articles on the various letters of the alphabet.)

1. ***Physiological Anatomy.***—The organ of voice, the *larynx*, is situated in man in the upper and fore part of the neck, where it forms a well-known prominence in the middle line (see details under RESPIRATORY SYSTEM). It opens below into the trachea or windpipe, and above into the cavity of the pharynx, and it consists of a framework of cartilages, connected by elastic membranes or ligaments, two of which constitute the true vocal cords. These cartilages are movable on each other by the action of various muscles, which thus regulate the position and the tension of the vocal cords. The trachea conveys the blast of air from the lungs during expiration, and the whole apparatus may be compared to an acoustical contrivance in which the lungs represent the wind chest and the trachea the tube passing from the wind chest to the sounding body contained in the larynx. Suppose two tight bands of any elastic membrane, such as thin sheet india-rubber, stretched over the end of a wide glass tube so that the margins of the bands touched each other, and that a powerful blast of air is driven through the tube by a bellows. The pressure would so distend the margins of the membrane as to open the aperture and allow the air to escape; this would cause a fall of pressure, and the edges of the membrane would spring back by their elasticity to their former position; again the pressure would increase, and again the edges of the membrane would be distended, and those actions would be so quickly repeated as to cause the edges of the membrane to vibrate with sufficient rapidity to produce a musical tone, the pitch of which would depend on the number of vibrations executed in a second of time. In other words, there would be a rapid succession of puffs of air. The condensation and rarefaction of the air thus produced are the chief cause of the tone, as H. von Helmholtz has pointed out, and in this way the larynx resembles the siren in its mode of producing tone. It is evident also that the intensity or loudness of the tone would be determined by the amplitude of the vibrations of the margins of the membrane, and that its pitch would be affected by any arrangements effecting an increase or decrease of the tension of the margins of the membrane. The pitch might also be raised by the strength of the current of air, because the great amplitude of the vibrations would increase the mean tension of the elastic membrane. With tones of medium pitch, the pressure of the air in the trachea is equal to that of a column of mercury of 16 [illegible] with [illegible]

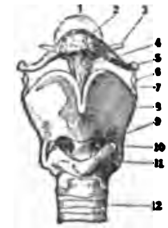


FIG. 1.

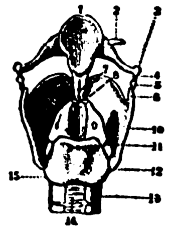


FIG. 2.

FIG. 1.—Cartilages and Ligaments of the Larynx, seen from the front; abt. half nat. size 1, epiglottis; 2, hyoid bone; 3, small cornu of hyoid bone; 4, middle thyro-hyoid ligament; 5, great cornu of hyoid bone; 6, small nodules of cartilage (*cartilago triticea*); 7, the lateral thyro-hyoid ligament; 8, left lamina or wing of thyroid cartilage; 9, cricoid cartilage; 10, lower cornu of thyroid cartilage; 11, part of cricoid united to the thyroid by the middle crico-thyroid ligament; 12, second [illegible] (From Krause.)

FIG. 2.—Cartilages and Ligament of Larynx, [illegible] abt. half nat. size. 1, epiglottis; 2, lesser cornu of hyoi[illegible] 3, greater cornu of hyoid; 4, lateral thyro-hyoid ligament; [illegible] tilago triticea; 6, upper cornu of thyroid; 7, thyro-epiglot[illegible] ment; 8, cartilages of Santorini; 9, arytenoid cartilage; [illegible] lamina of thyroid; 11, muscular process of arytenoid [illegible] 12, inferior cornu of thyroid; 13, first ring of trachea [illegible] membranous wall of trachea; 15, lamina of [illegible] (From Krause.)

as that represented by 30 mm. of water. Such is a general conception of the mechanism of voice.

The *cartilages* form the framework of the larynx. They consist of three single pieces (the thyroid, the cricoid and the cartilage of the epiglottis) and of three pairs (two arytenoids, two cornicula laryngis or cartilages of Santorini, and two cuneiform cartilages or cartilages of Wrisberg), see figs. 1 and 2. The epiglottis, the cornicula laryngis, the cuneiform cartilages and the apices of the arytenoids are composed of yellow or elastic fibro-cartilage, whilst the cartilage of all the others is of the hyaline variety, resembling that of the costal or rib cartilages. These cartilages are bound together by ligaments, some of which are seen in figs. 1 and 2, whilst the remainder are represented in fig. 3. The ligaments specially concerned in the production of voice are the *inferior thyro-arytenoid ligaments*, or true vocal cords. These are composed of fine elastic fibres attached behind to the anterior projection of the base of the arytenoid cartilages, *processus vocalis*, 3 in fig. 3, and in front to the middle of the angle between the wings or laminae of the thyroid cartilage. They are practically continuous with the lateral crico-thyroid ligaments, 6 in fig. 3.

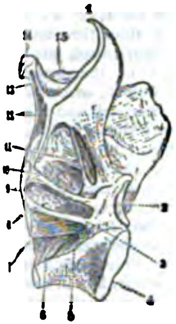


FIG. 3.—Right Half of the Larynx, from a vertical and slightly oblique section; abt. two-thirds nat. size. 1, epiglottis; 2, arytenoid cartilage; 3, processus vocalis of arytenoid; 4, cricoid cartilage; 5, capsular thyro-hyoid ligament; 6, lateral crico-thyroid ligament; 7, posterior crico-thyroid ligament; 8, inferior thyro-arytenoid ligament, or true vocal cord; 9, thyroid cartilage; 10, superior thyro-arytenoid ligament, or false vocal cord; 11, thyro-ary-epiglottideus muscle; 12, middle thyro-hyoid ligament; 13, hyo-epiglottic ligament; 14, body of hyoid bone; 15, smaller cornu of hyoid bone. (From Krause.)

The *cavity* of the larynx is divided into an upper and lower portion by the narrow aperture of the *glottis* or chink between the edges of the true vocal cords, the *rima glottidis*. Immediately above the true vocal cords, between these and the false vocal cords, there is on each side a recess or pouch termed the *ventricle* of Morgagni, and opening from each ventricle there is a still smaller recess, the *laryngeal pouch*, which passes for the space of half an inch between the superior vocal cords inside and the thyroid cartilage outside, reaching as high as the upper border of that cartilage at the side of the epiglottis. The ventricles no doubt permit a free vibration of the true vocal cords. The upper aperture of the glottis is triangular, wide in front and narrow behind; and, when seen from above by means of the laryngoscope, it presents the view represented in fig. 4. The aperture is bounded in front by the epiglottis, *e*, behind by the summits of the arytenoid cartilages, *ar*, and on the sides by two folds of mucous membrane, the aryteno-epiglottic folds, *ae*. The rounded elevations corresponding to the cornicula laryngis and cuneiform cartilages, *c*, and also the cushion of the epiglottis, *e*, are readily seen in the laryngoscopic picture. The glottis, *o*, is seen in the form of a long narrow fissure, bounded by the true vocal cords, *ti*, whilst above them we have the false vocal cords, *ts*, and between the true and false cords the opening of the ventricle, *v*. The *rima glottidis*, between the true vocal cords, in the adult male measures about 23 mm., or nearly an inch from before backwards, and from 6 to 12 mm. across its widest part, according to the degree of dilatation. In females and in males before puberty the antero-posterior diameter is about 17 mm. and its transverse diameter about 4 mm. The vocal cords of [illegible] male [illegible] length a[illegible] and [illegible] fe[illegible] m.

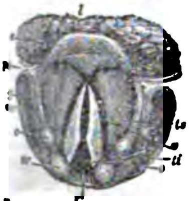


FIG. 4.—Laryngoscopic View of the Glottis. *l*, tongue; *e*, epiglottis; *pe*, pharyngo-epiglottic fold; *g*, pharyngo-laryngeal groove; *ae*, aryteno-epiglottic fold; *c*, cuneiform cartilage, or cartilage of Wrisberg; *ar*, arytenoid cartilage; *i*, inter-arytenoid fold; [illegible] *v*, ventricle; [illegible] inferior or true [illegible] cord; *ts*, superior [illegible] (Fr[illegible]

vocal cords the epithelium is squamous. Patches of squamous epithelium are also found in the ciliated tract above the glottis, on the under surface of the epiglottis, on the inner surface of the arytenoid cartilages, and on the free border of the upper or false cords. Numerous mucous glands exist in the lining membrane of the larynx, more especially in the epiglottis. In each laryngeal pouch there are sixty to seventy such glands, surrounded by fat.

We are now in a position to understand the action of the *muscles* of the larynx by which the vocal cords, forming the *rima glottidis*, can be tightened or relaxed, and by which they can be approximated or separated. Besides certain extrinsic muscles — sterno-hyoid, omohyoid, sterno-thyroid and thyro-hyoid—which move the larynx as a whole, there are *intrinsic* muscles which move the cartilages on each other. Some of these are seen in fig. 5. These muscles are (*a*) the crico-thyroid, (*b*) the posterior crico-arytenoid, (*c*) the lateral crico-arytenoid, (*d*) the thyro-arytenoid, (*e*) the arytenoid, and (*f*) the aryteno-epiglottidean. Their actions will be readily understood with the aid of the diagrams in fig. 6. (1) The *crico-thyroid* is a short thick triangular muscle, its fibres passing from the cricoid cartilage obliquely upwards and outwards to be inserted into the lower border of the thyroid cartilage and to the outer border of its lower horn. When the muscle contracts, the cricoid and thyroid cartilages are approximated. In this action, however, it is not the thyroid that is depressed on the cricoid, as is generally stated, but, the thyroid being fixed in position by the action of the extrinsic muscles, the anterior border of the cricoid is drawn upwards, whilst its posterior border, in consequence of a revolution around the axis uniting the articulations between the lower cornua of the cricoid and the thyroid, is depressed, carrying the arytenoid cartilages along with it. Thus the vocal cords are stretched. (2) The *thyro-arytenoid* has been divided by anatomists into two parts—one, the internal, lying close to the true vocal cord, and the other, external, immediately within the ala of the thyroid cartilage. Many of the fibres of the anterior portion pass from the thyroid cartilage with a slight curve (concavity inwards) to the processus vocalis at the base of the arytenoid cartilage. They are thus parallel with the true vocal cord, and when they contract the arytenoids are drawn forwards, carrying with them the posterior part of the cricoid and relaxing the vocal cords. Thus the thyro-arytenoids are the antagonists of the crico-thyroids. K. F. W. Ludwig has pointed out that certain fibres (*portio-ary-vocalis*) arise from the side of the cord itself and pass obliquely back to the processus vocalis. These will tighten the parts of the cord in front and relax the parts behind their points of attachment. Some of the fibres of the outer portion run obliquely upwards from the side of the crico-thyroid membrane, pass through the antero-posterior fibres of the inner portion of the muscle, and finally end in the tissue of the false cord. These fibres have been supposed to render the edge of the cord more prominent. Other fibres inserted into the processus vocalis will rotate slightly the arytenoid outwards, whilst a few passing up into the aryteno-epiglottidean folds may assist in depressing the epiglottis (Quain). (3) The *posterior* and *lateral crico-arytenoid* muscles have antagonistic actions, and may be considered together. The *posterior* arise from the posterior surface of the cricoid cartilage, and passing upwards and outwards are attached to the outer angle of the base of the arytenoid. On the other hand, the *lateral* arise from the upper border of the cricoid as far back as the articular surface for the arytenoid, pass backwards and upwards, and are also inserted into the outer angle of the base of the arytenoid before the attachment of the posterior crico-arytenoid. Imagine the pyramidal form of the arytenoid cartilages. To the inner angle of the triangular base are attached, as already described, the true vocal cords; and to the outer angle the two muscles in question. The posterior crico-arytenoids draw the outer angles backwards and inwards, thus rotating the inner angles, or processus vocalis, outwards, and, when the two muscles act, widening the rima glottidis. This action is opposed by the lateral crico-thyroids, which draw the outer angle forwards and outwards, rotate the inner angles inwards,

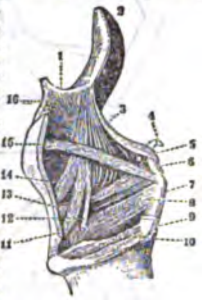


FIG. 5.—Muscles of the left side of the larynx, seen from within; abt. two-thirds nat. size. 1, hyo-epiglottic ligament, seen in profile; 2, epiglottis; 3, aryteno-epiglottic muscle; 4, Santorini's cartilage; 5, oblique arytenoid muscle; 6, transverse arytenoid muscle, seen in profile; 7, posterior crico-arytenoid; 8, lateral crico-arytenoid; 9, lower cornu of thyroid cartilage cut through; 10, insertion of posterior portion of crico-thyroid muscle; 11, left lamina of thyroid cartilage cut through; 12, long thyro-epiglottic muscle (a variety); 13, inferior thyro-arytenoid; 14, thyro-epiglottic; 15, superior thyro-arytenoid; 16, median thyro-hyoid ligament. (From Krause.)

and thus approximate the cords. (4) The *arytenoids* pass from the one arytenoid cartilage to the other, and in action these cartilages will be approximated and slightly depressed. (5) The *aryteno-epiglottidean* muscles arise near the outer angles of the arytenoid; their fibres pass obliquely upwards, decussate and are inserted partly into the outer and upper border of the opposite cartilage, partly into the aryteno-epiglottic fold, and partly join the fibres of the thyro-arytenoids. In action they assist in bringing the arytenoids together, whilst they also draw down the epiglottis, and constrict the upper aperture of the larynx. The vocal cords will be also relaxed by the elasticity of the parts.

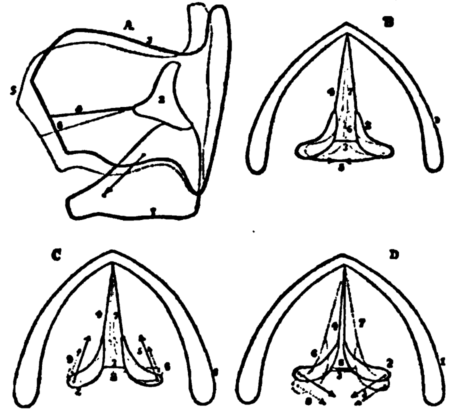


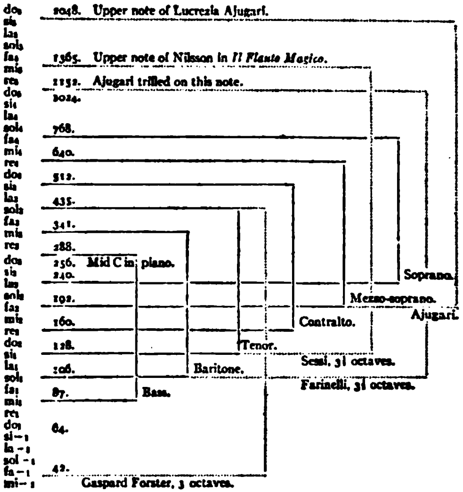
FIG. 6.—Diagrams explaining the action of the muscles of the larynx. The dotted lines show the positions taken by the cartilages and the true vocal cords by the action of the muscle, and the arrows show the general direction in which the muscular fibres act. A, Action of crico-thyroid: 1, cricoid cartilage; 2, arytenoid cartilage; 3, thyroid cartilage; 4, true vocal cord; 5, thyroid cartilage, new position; 6, true vocal cord, new position. B, Action of arytenoid: 1, section of thyroid; 2, arytenoid; 3, posterior border of epiglottis; 4, true vocal cord; 5, direction of muscular fibres; 6, arytenoid, new position; 7, true vocal cord, new position. C, Action of lateral crico-arytenoid; same description as for A and B; 8, posterior border of epiglottis, new position; 9, arytenoid in new position. D, Action of posterior crico-arytenoid; same description. (From Beaunis and Bouchard.)

Muscular mechanisms.

2. *Physiology of Voice Production.*—The vocal cords are tightened by the action of the crico-thyroid, or, as it might be more appropriately termed, the thyro-cricoid muscle. It stretches the thyro-arytenoid ligaments, the free edges of which, covered by mucous membrane, form the vocal cords. The adductors of the cords are the lateral crico-arytenoids, while the posterior crico-arytenoids are the abductors. The arytenoid muscle brings the cords together. Many of the fibres of the thyro-arytenoid are inserted obliquely into the sides of the cord, and in contraction they tighten the cord by pulling on the edge and making it curved instead of straight. Some such action is indicated by the elliptical shape of the rima glottidis in passing from the chest register to the middle register. Other fibres, however, running parallel with the cord may tend to relax it in certain circumstances. All the muscles except the thyro-cricoid (which is innervated by the superior laryngeal) receive nerve filaments from the inferior laryngeal branch of the vagus, the fibres being derived from the accessory roots. Both the abductor and adductor nerves come therefore from the inferior laryngeal. When an animal is deeply anaesthetized stimulation of the inferior laryngeal nerve causes abduction of the cord, but if the anaesthesia is slight, then we have adduction. The tonic contraction of the abductors is stronger than that of the adductors, so in a state of rest the glottis is slightly open. The centre of innervation is in the medulla oblongata, and this is dominated by a centre in the Rolandic region of the cerebral cortex.

The *intensity* or *loudness* of voice depends on the amplitude of the movement of the vocal cords. *Pitch* depends on the number of vibrations per second; and the length, size and degree of tension of the cords will determine the number of vibrations. The more tense the cords the higher the pitch, and the greater the length of the cords the lower will be the pitch. The *range* of the human voice is about three octaves—that is, from fa$_1$ (87 vibrations per second) to sol$_4$ (768 vibrations). In men, by the development of the larynx, the cords become more elongated than in women, in the ratio of 3 to 2, so that the male voice is of lower pitch and is usually stronger. At the age of puberty the larynx grows rapidly, and the voice of a boy "breaks" in consequence of the lengthening of the cords, generally falling an octave in pitch. A similar change, but very much less in amount, occurs at the same period in the female. At puberty in the female there is an increase of about one-third in the size of the glottis, but it is nearly doubled in the male, and the adult male larynx is about one-third greater than that of the female. In advanced life the upper notes of the register are gradually weakened and ultimately disappear, whilst the character of the voice also changes, owing to loss of elasticity caused by ossification, which first begins about middle life in the thyroid cartilage, then appears in the cricoid, and much later in the arytenoid. Eunuchs retain the voices of childhood; and by careful training it is possible in normal persons to arrest the development of the larynx so that an adult male can still sing the soprano parts sometimes used in cathedral choirs. The ranges of the different varieties of voice are shown in the following diagram, where the dotted lines give the range of certain remarkable voices, and the figures represent vibrations per second, taking the middle C of the piano as 256 vibrations per second.

General physiological characters.



A basso named Gaspard Forster passed from fa$_{-1}$ to la$_3$; the younger of the sisters Sessi had a contralto voice from do$_2$ to fa$_5$; the voice of Catalani ranged three and a half octaves; a eunuch singer, Farinelli, passed from la$_1$ to re$_5$; Nilsson, in *Il Flauto Magico*, could take fa$_5$; and Mozart states that he heard in Parma in 1770 a singer, Lucrezia Ajugari, range from sol$_2$ to do$_6$, which she gave purely, whilst she could execute trills on re$_5$. The latter is the most highly pitched voice referred to in musical literature, an octave and a half above the highest ordinary soprano. It will be observed that the lowest note of Gaspard Forster's voice is not much above the pitch at which the perception of musical tone begins, and that from this note to the upper note of Lucrezia Ajugari there is a range of nearly six octaves, whilst the extreme range of ordinary voices, from the lowest bass to the highest soprano, is a little over three octaves. It is also interesting to observe that the range of the human ear for the perception of musical tone is from do_{-1} to do_{10}, or from about 32 to 32,768 vibrations per second—eleven octaves.

3. *The Voice Registers.*—The voice has been divided by writers into three registers—the lower or chest, the middle and the small or head register. In singing, the voice changes in volume and in quality in passing from one register into another. There is remarkable diversity of opinion as to what happens in the larynx in passing through the various registers. There has also been much discussion as to the production of falsetto tones. Lehfeldt and Johannes Müller held that a weak blast of air caused only a portion of the cords, as regards length, to vibrate; M. J. Ortel noticed that when a falsetto tone is produced nodal lines are formed in the cords parallel to their edges, an observation supporting the first contention; M. Garcia was of opinion that as the voice rose in pitch into falsetto only the ligamentous edges of the cords vibrated; and W. R. E. Hodgkinson showed, by dusting finely powdered indigo into the larynx and observing the blue specks with the laryngoscope, that "in the deeper note of the lower register the vibrating margin extended from the thyroid cartilage in front to a point behind the junction of the ligamentous and cartilaginous portions of the cord." In singing falsetto tones these additional parts are not thrown into action. Some remarkable and instructive photographs obtained by French show that in proceeding from the lowest to the highest notes of the lower register the cords became lengthened by one-eighth of an inch in a contralto singer's larynx; the same singer, in passing into the middle register, showed a shortening of the cords by one-sixteenth of an inch, and another increase in length when the upper part of the middle register was reached.

4. *Condition of the Larynx in the Various Registers.*—In singing, one can readily observe that the tone may appear to come chiefly from the chest, from the throat or from the head, or it may show the peculiar quality of tone termed falsetto. Authorities differ much in the nomenclature applied to these varieties of the voice. Thus the old Italian music masters spoke of the voce di petto, voce di gola and voce di testa. Madame Seiler describes five conditions, viz. the first series of tones of the chest register, the second series of tones of the chest register, the first series of tones of the falsetto register, the second series of tones of the falsetto register, and the head register. French writers usually refer to two registers only, the chest and the head; whilst Behnke gives three registers for male voices (lower thick, upper thick and upper thin) and five for the voices of women and children (lower thick, upper thick, lower thin, upper thin and small). These distinctions are of more importance practically than as implying any marked physiological differences in the mechanism of the larynx during the production of the tones in the different registers. By means of the laryngoscope it is possible to see the condition of the rima glottidis and the cords in passing through all the range of the voice.

In 1807 Bozzini first showed that it was possible to see into the dark cavities of the body by illumining them with a mirror, and in 1829 W. Babington first saw the glottis in this way. In 1854 Garcia investigated his own larynx and that of other singers, and three years later Türck, and especially J. N. Czermak, perfected the construction of the laryngoscope. In 1883 Lennox Browne and Emil Behnke obtained photographs of the glottis in the living man. The laryngoscope is a small mirror, about the diameter of a shilling, fixed to the end of a long handle at an angle of 125° to 130°. This mirror is gently pushed towards the back of the throat, and if sufficient light be thrown into the mouth from a lamp, and if the eye of the observer be in the proper position, by angling the small mirror it is not difficult to get a view of the glottis. The light from the lamp is reflected by the mirror down on the glottis; from this it is reflected back to the mirror, and then by the mirror it is finally reflected to the eye of the observer. Usually the observer has in front of his eye a mirror by which a powerful beam of light can be thrown from a lamp into the mouth and throat. In the centre of the mirror there is a small hole through which the eye of the observer sees the image in the small mirror at the back of the throat. By placing a second plane mirror in front of the face, an observer can easily study the mechanism of his own larynx.

Suppose the picture of the larynx to be examined in the small mirror at the back of the throat, an image will be seen as in fig. 4. During calm breathing, the glottis is lance-shaped, between the yellowish white cords. A deep inspiration causes the glottis to open widely, and in favourable circumstances one may look into the trachea. When a sound is to be made, the vocal cords are brought close together, either along their whole length, as in fig. 7, or only along the ligamentous portion, the space between the arytenoids being still open, as in fig. 8. Then when the sound begins the glottis opens (fig. 4), the form of the opening influencing the kind of voice, whilst the degree of tension of the cords will determine the pitch.

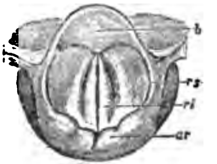


FIG. 7.

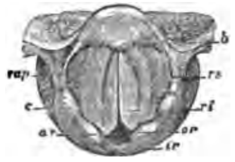


FIG. 8.

FIG. 7.—Arrangement of Glottis previous to Emission of a Sound. *b*, epiglottis; *rs*, false cord; *ri*, true vocal cord; *ar*, arytenoid cartilages. (From Mandl.)

FIG. 8.—Closure of the Ligamentous Portion of Glottis. *b*, epiglottis; *rs*, false cord; *ri*, true vocal cord; *or*, space between arytenoids; *ar*, arytenoid cartilages; *c*, cuneiform cartilages; *rap*, ary-epiglottic fold; *ir*, inter-arytenoid fold. (From Mandl.)

During inspiration the edges of the true vocal cords may occasionally be close together, as in sobbing, and during inspiration the false cords are easily separated, even when they touch, and during expiration, owing to dilatation of the ventricles, they come together and may readily close. Thus, from the plane of the cords, the true cords are most easily closed during inspiration and the false cords during expiration. J. Wyllie clearly showed in 1865 that the false vocal cords play the chief part in closure of the glottis during expiration. Lauder Brunton and Cash have confirmed J. Wyllie's results, and have shown further that the function of the false cords is to close the glottis and thus fix the thorax for muscular effort.

During the production of the *chest* voice, the space between the arytenoid cartilages is open, and between the vocal cords there is an ellipsoidal opening which gradually closes as the pitch of the sound rises (see figs. 9, 10, 11). During *head* voice, the opening between the arytenoids is completely closed; the portion between the vocal cords is open, but in place of being almost a narrow straight slit as in chest voice, it is wide open so as to allow an escape of more air (see fig. 12). Paralysis of the motor fibres causes aphonia, or loss of voice. If one cord is paralysed the voice may be lost or become falsetto in tone. Sometimes the cords may move in breathing or during coughing, but be motionless during an attempt at the production of voice. Rarely, incomplete unilateral paralysis of the recurrent nerve, or the existence of a tumour on each cord, thus making them unequal in length, may cause a double tone, or *diphthongia*. Hoarseness is caused by roughness or swelling of the cords.

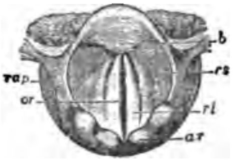


FIG. 9.

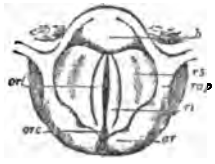


FIG. 10.

FIG 9.—Chest Voice, Deep Tone. *b*, epiglottis; *or*, glottis; *rs*, false vocal cord: *ri*, true vocal cord; *rap*, ary-epiglottidean fold; *ar*, arytenoid cartilages. (From Mandl.)

FIG. 10.—Chest Voice, Medium Tone. *orl*, ligamentous portion of glottis; *orc*, portion of glottis between arytenoids; remaining description as in fig. 7. (From Mandl.)

5. The *quality* of the human voice depends on the same laws that determine the quality, clang-tint or timbre of the tones produced by any musical instrument. Musical tones are formed by the vibrations of the true vocal cords. These tones may be either pure or mixed, and in both cases they are

strengthened by the resonance of the air in the air-passages and in the pharyngeal and oral cavities. If mixed—that is, if the tone is compounded of a number of partials—one or more of these will be strengthened by the cavities above the cords acting as a resonator; and so strongly may these partials be thus reinforced that the fundamental one may be obscured, and a certain quality or timbre will be communicated to the ear. Further, Helmholtz has shown that special forms of the oral cavity reinforce in particular certain partials, and thus give a character to vowel tones,—indeed to such an extent that each vowel tone may be said to have a fixed pitch. This may be proved by putting the mouth in a certain form, keeping the lips open, and bringing various tuning forks sounding feebly in front of the opening. When a fork is found to which the resonant cavity of the mouth corresponds, then the tone of the fork is intensified, and by thus altering the form and capacity of the oral cavity its pitch in various conditions may be determined. Thus, according to Helmholtz, the pitch corresponding to the vowels may be expressed:—

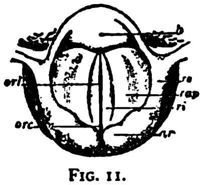


FIG. 11.

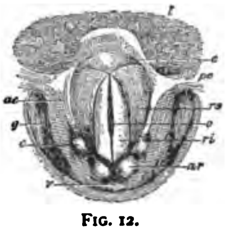


FIG. 12.

FIG. 11.—Chest Voice, High Tone. Description same as for figs. 7 and 8. (From Mandl.)

FIG. 12.—Head Voice, Deep Tones. *l*, tongue; *e*, epiglottis; *pe*, pharyngo-epiglottidean folds; *ae*, ary-epiglottic folds; *rs*, false cords; *ri*, true vocal cords; *g*, pharyngo-laryngeal groove; *ar*, arytenoid cartilages; *c*, cuneiform cartilages; *o*, glottis; *r*, inter-arytenoid folds. (From Mandl.)

Vowels . . .	OU	O	A	AI	E	I	EU	U
Tone . . .	fa$_2$	si♭$_3$	si♭$_4$	sol$_5$ or re$_4$	si♭$_5$ or fa$_3$	re$_6$ or fa$_2$	do$_5$ or fa$_3$	sol$_5$ or fa$_2$
No. of vibrations .	170	470	940	1536 or 576	1920 or 341	2304 or 170	1024 or 341	1536 or 170

R. Koenig has fixed the pitch of the vowels differently, thus:

Vowels . .	OU	O	A	E	I
Tone . .	si♭$_2$	si♭$_3$	si♭$_4$	si♭$_5$	si♭$_6$
No. of vibrations .	235	470	940	1880	3760

F. C. Donders has given a third result, differing from each of the above; and there is little doubt that much will depend on the quality of tone peculiar to different nationalities. By means of Koenig's manometric flames with revolving mirror the varying quality of tone may be illustrated: with a pure tone, the teeth in the flame-picture are equal, like the serrations of a saw, whilst usually the tone is mixed with partials which show themselves by the unequal serrations. Thus quality of voice depends, not merely on the size, degree of elasticity and general mobility of the vocal cords, but also on the form of the resonating cavities above, and very slight differences in these may produce striking results.

6. *Vowel Tones.*—A vowel is a musical tone produced by the vibrations of the vocal cords. The tone produced by the vocal cords is a mixed one, composed of a fundamental and partials, and certain of the partials are strengthened by the resonance of the air in the air-passages and in the pharyngeal and oral cavities. In this respect the quality of the human voice depends on the same laws as those determining the quality or timbre of the tones produced by any musical instrument. The pitch of the note of a musical instrument, however, depends on the pitch of the first or fundamental tone, while the partials are added with greater or less intensity so as to give a special character to the sound; and in the case of a vowel tone the pitch does not appear to depend on that of the fundamental tone but on the pitch of the resonance cavity, as adjusted for the sounding of any particular vowel. When we wish to pronounce or sing a vowel the oral cavity must be adjusted to a certain form, and it is only when it has that form that the vowel can be sounded. The nature of vowel tones has been investigated by means of the phonograph by Fleeming Jenkin and Ewing, L. Hermann, Pipping, Boeke, Lloyd, McKendrick and others. E. W. Scripture has worked with the gramophone. These observers may be ranged in two divisions—those who uphold the theory of relative as opposed to those who contend for the theory of fixed pitch. Assuming that a vowel is always a compound tone, composed of a fundamental and partials, those who uphold the relative pitch theory state that if the pitch of the fundamental is changed the pitch of the partials must undergo a relative change, while their opponents contend that whatever may be the pitch of the tone produced by the larynx, the pitch of the partials that gives quality or character to a vowel is always the same, or, in other words, vowel tones have a fixed pitch. Helmholtz held that all the partials in a vowel tone were harmonic to the fundamental tone, that is that their periods were simple multiples of the period of the fundamental tone. Hermann, however, has conclusively shown that many of the partials are inharmonic to the fundamental. This practically upsets the theory of Helmholtz. The methods by which this problem can be investigated are mainly two. The pitch of the oral cavity for a given vowel may be experimentally determined, or an analysis may be made of the curve-forms of vowels on the wax cylinder of the phonograph or the disk of the gramophone. By such an analysis, according to Fourier's theorem, the curve may be resolved into the partials that take part in its formation, and the intensity of those partials may be thus determined. The observations of Donders, Helmholtz, König and others as to the pitch of the resonating cavities gave different results. Greater success has followed the attempts made by Hermann, Boeke, McKendrick, Lloyd and Marichelle to analyse the curves imprinted on the phonograph. (Examples of such phonograms are given by McKendrick in the article on "Vocal Sounds" in Schäfer's *Physiology*, ii. 1228; see also PHONOGRAPH.)

The following is an instructive analysis by Boeke of the curves representing the tones of a cornet, and it illustrates the laws that govern the production of quality in such an instrument:—

Note . .	1	2	3	4	5	6	7	8	9	10	Partials.
f = 170 vibs. .	1	1·05	1·22	1·15	1·01	0·80	0·53	0·18	0·13	0·10	„
c′ = 256 „ .	1	0·92	0·81	0·53	0·39	0·20	0·07	0·04	0·06	0·04	„
g′ = 384 „ .	1	0·76	0·46	0·14	0·09	0·06	0·07	0·02	0·01	0·01	„
c″ = 512 „ .	1	0·92	0·30	0·14	0·15	0·09	0·07	0·06	0·03	0·02	„

These figures represent the relative intensities of the partials entering into the formation of the note, and it will be observed that the intensity gradually diminishes. This analysis may be contrasted with that of the vowel *āā* sung by Boeke (aet. 50) on the notes *f* and *c*′, and the same vowel sung on the notes *g*′ and *e*″ by his son (aet. 12).

Man, aet. 50, singing *āā*.

Pitch . .	1	2	3	4	5	6	7	8	9	10	Partials.
f = 170·6 vibs.	1	0·86	0·46	1·74	1·90	1·55	0·51	0·54	0·43	0·44	„
c′ = 256 „	1	0·49	1·96	1·25	0·60	0·56	0·23	0·05	0·06	0·10	„

Boy, aet. 12, singing *āā*.

Pitch . .	1	2	3	4	5	6	Partials.
g′ = 384 vibs. .	1	1·22	2·67	0·45	0·17	0·06	„
e″ = 640 „ .	1	8·09	1·45	0·53	–	–	„

It will be observed that in both these cases the intensity of the partials does not fade away gradually as we proceed from the lower to the higher partials, as with the cornet, but that certain partials are intensified more than others, namely, those printed in black. In other words, the *form* of the resonating cavity develops particular partials, and these modify the quality of the tone. If we multiply the vibrational number of the fundamental tone by the number of the partial we obtain the pitch of the resonance cavity; or if we take the mean of the partials reinforced we obtain the pitch of the mean resonance. Lloyd applies this method to the foregoing figures as follows:—

	Partials. Reinforced.	Mean Partial.	Pitch in Complete Vibration.
Man's dd.			
f, = 170·6 vibs. . . .	4–6	4·96	846
c′ = 256 „ . . .	3–4	3·39	868
Boy's dd.			
g′ = 384 vibs. . . .	2–4	2·82	1084
c′ = 640 „ . . .	1–3	2·04	1307

This analysis shows: (1) that the man's resonance rises slightly (half-semitone) in ascending seven semitones in the middle of his register; (2) that the boy's resonance rises three semitones in ascending nine semitones in the upper half of his register; and (3) in the mid-register the boy's resonance is to the man's as 5:4. Thus, as we sing a vowel in an ascending scale the pitch of the oral cavity slightly changes, or, in other words, the pitch of the resonating cavity for a given vowel may be slightly altered.

It would appear that both theories are partially true; they are not mutually exclusive. The view of Donders that each vowel has an oral cavity of unchangeable and fixed pitch is too exclusive, and, on the other hand, it cannot be denied that each vowel has a predominant partial or predominant partials which give it a definite character, and which must be produced by the oral cavity as a whole, or by the double resonance of portions of the cavity, as suggested by Lloyd. As we sing a vowel in an ascending scale the form of the resonance cavity may slightly change, but not sufficiently to alter the quality of the vowel. Thus we still detect the vowel tone. A singer almost instinctively chooses such vowels as best suit the resonating arrangements of his or her voice, and avoids vowels or words containing vowels that would lead to the production of notes of inferior quality.

AUTHORITIES.—Helmholtz, *Sensations of Tone*, trans. by Ellis (1875), p. 165. König, *Comptes Rendus* (1870), t. lxx. p. 931; also *Quelques expériences d'acoustique* (1882), p. 47. Donders, *De physiologie der spraakklanken* (1870), s. 9; also "Ueber de Vokell," *Archiv f. d. holländ Beitr. z. Nat. v. Heil.* (Utrecht, 1857), Bd. i. s. 354. Donkin, *Fourier's theorem, Acoustics*, p. 65; Fleeming Jenkin and Ewing, *Trans. Roy. Soc. Ed.* vol. xxviii. p. 750; Lloyd, *Proc. Roy. Soc. Ed.* (1898); *Phonetische Stud.* (1890–92); *Jl. of Anat. and Phys.* (London), vol. xxxi. p. 23; ibid. vol. xxxi. p. 240. Hermann, *Phonophotographische Untersuch.*, Bd. i.–v.; *Archiv f. d. ges. Physiol.* (Bonn), Bd. xlv. s. 582; Bd. xlvii. s. 44; Bd. xlvii. s. 347; Bd. liii. s. 1; Bd. lviii. s. 255. Pipping, *Zeitschr. f. Biol.* (Munich), Bd. xxvii. s. 1; also *Acta Societatis Scientiarum Fennicae*, Bd. xx. part ii. Boeke, "Mikroskopische Phonogrammstudien," *Archiv f. d. ges. Physiol.* (Bonn), Bd. i. s. 297; also *Proc. Roy. Soc. Ed.* (1896). McKendrick, *Trans. Roy. Soc. Ed.* vol. xxxviii. part ii.; *Proc. Roy. Soc. Ed.* (1896–97); *Sound and Speech Waves as revealed by the Phonograph* (London, 1897); Schäfer's *Text-book of Physiology*, vol. ii. art. "Vowel Sounds"; and *Nature* (Dec. 26, 1901). (In the latter there is an account of the important researches of Dr Marage.) Marichelle, *La Parole d'après la tracé du Phonographe* (Paris, 1897). Marage, *Théorie de la formation des voyelles*. E. W. Scripture, *Speech Curves* (1906). See also *Nature* (February 1907). (J. G. M.)

VOIRON, a town of France in the department of the Isère. Pop. (1901) 12,625. It stands at a height of 950 ft., on the Morge (a tributary of the Isère). It is a manufacturing town, and contains numerous factories which produce a sort of cloth named after the town, and also silk-weaving factories (2000 looms, with an annual output of eight to nine million yards). There are also paper-making factories in the town. The fine church of St Bruno was built 1864–73 at the expense of the monks of the Grande Chartreuse. Voiron is the starting-point of the steam tramways to St Laurent du Pont, 12 m. (for the Grande Chartreuse), and to Charavines, 10½ m. (for the Lac de Paladru). Voiron long formed part of Savoy, but in 1355 was exchanged (with the rest of the region between the Rhone and the Isère, watered by the Guiers Mort) by the count with France for Faucigny and Gex.

VOISENON, CLAUDE HENRI DE FUZÉE, ABBÉ DE (1708–75), French dramatist and man of letters, was born at the château of Voisenon near Melun, on the 8th of July 1708. At the age of ten he addressed an epistle in verse to Voltaire, who asked the boy to visit him. From this introduction dated a friendship that lasted for fifty years. Voisenon made his début as a dramatist with *L'Heureuse ressemblance* in 1728, followed in 1739 by a three-act comedy *L'École du monde* at the Théâtre français. This was preceded by a verse prologue, *L'Ombre de Molière*, and a month later Voisenon produced a criticism on his own piece in *Le Retour de l'ombre de Molière*. A duel in which he was the aggressor inspired him with remorse, and he entered the priesthood, becoming vicar-general to the bishop of Boulogne. He received the abbey of Jard, which made no demands on him. He became closely attached to Madame du Châtelet, the mistress of Voltaire (*q.v.*), and was intimate with the comte de Caylus and Mademoiselle Quinault Dufresne. He made witty but by no means edifying contributions to the *Étrennes de Saint-Jean*, the *Bals de Bois*, &c. In 1744 he produced the *Mariages assortis* and in 1746 his masterpiece, the *Coquette fixée*. He lived on terms of the closest intimacy with Charles Simon Favart and his wife. His pen was always at the service of any of his friends, and it was generally supposed, though on insufficient grounds, that he had a considerable share in Favart's most successful operas. Voisenon had, strange to say, scruples all his life about the incongruity between his way of living and his profession, but he continued to write indecent stories for private circulation, and wrote verses in honour of Madame du Barry, as he had done for Madame de Pompadour. He was elected to the Academy in 1762. On the disgrace of his patron, the duc de Choiseul, he lost his pensions and honours, but soon recovered his position. He was intimate with the chancellor Maupeou, and was suspected of writing on his behalf in defence of the abolition of the parlement. This and some other incidents brought him into general disgrace. Early in 1775 he retired to the château de Voisenon, where he died on the 22nd of November of the same year.

His *Œuvres complètes* were published by his executrix, Madame de Turpin, in 1781.

VOITURE, VINCENT (1598–1648), French poet, was the son of a rich merchant of Amiens. He was introduced by a school-fellow, the comte d'Avaux, to Gaston d'Orléans, and accompanied him to Brussels and Lorraine on diplomatic missions. Although a follower of Gaston, he won the favour of Richelieu, and was one of the earliest academicians. He also received appointments and pensions from Louis XIII. and Anne of Austria. He published nothing in book form, but his verses and his prose letters were the delight of the coteries, and were copied, handed about and admired more perhaps than the work of any contemporary. He had been early introduced to the Hôtel de Rambouillet, where he was the especial friend of Julie d'Angennes, who called him her "dwarf king." His ingenuity in providing amusement for the younger members of the circle ensured his popularity, which was never seriously threatened except by Antoine Godeau, and this rivalry ceased when Richelieu appointed Godeau bishop of Grasse. When at the desire of the duc de Montausier nineteen poets contributed to the *Guirlande de Julie*, which was to decide the much-fêted Julie in favour of his suit, Voiture refused to take part. The quarrel between the Uranistes and the Jobelins arose over the respective merits of a sonnet of Voiture addressed to a certain Uranie, and of another composed by Isaac de Benserade, till then unknown, on the subject of Job. Another famous piece of his of the same kind, *La Belle Matineuse*, is less exquisite, but still very admirable, and Voiture stands in the highest rank of writers of *vers de société*. His prose letters are full of lively wit, and, in some cases, as in the letter on Richelieu's policy (Letter LXXIV.), show considerable political penetration. He ranks with Jean de Balzac as the chief director of the reform in French prose which accompanied that of Malherbe in French verse. Voiture died at the outbreak of the Fronde, which killed the society to which he was accustomed, on the 26th of May 1648.

[1] See A. Roux, *Œuvres de M. de Voiture* (Paris, 1856); and C. A. Sainte-Beuve, *Causeries du lundi*, vol. xii.

VOIVODE (also *Vaivode*, *Vaywode*, *Waywode*, &c., Med. Gr. *βοεβόδος*), a title in use among certain Slavonic peoples, meaning literally "leader of an army" (Sl. *voi*, host, army; *voditi*, to lead), and so applied at various periods and in various eastern European countries to rulers, governors or officials of varying degree. It is best known as the title of the princes of Moldavia and Wallachia. In these states the title remained in use from the earliest times until 1658 in the case of the first state, and until 1716 in that of the second, when it gave way to Hospodar (*q.v.*). During the period of Hungarian domination of Transylvania (1004–1526) it was governed by a voivode as an Hungarian province, the last voivode raising himself to the position of an independent prince. In Poland the title was used of certain administrative officials; Polish historians latinized it by *palatinus*. At the present day voivode is used, in its original sense of a high military officer, in the Montenegrin army, where it corresponds to the general officer in other European armies.

VOKES, the name of a family of English actors. Frederick Mortimer Vokes (1846–1888), the son of a costumier, made his first appearance on the stage in 1854. In 1861 he, his sisters Jessie (1851–1884), Victoria (1853–1894) and Rosina (1858–1894), and Walter Fawdon (Vokes), first as the "Vokes Children" and then as the "Vokes Family," began to perform at music halls and at the pantomimes, and by their agility and humour made the name well known to English and American theatre-goers. Fred Vokes was a man of real inventiveness as well as rare acrobatic skill.

VOLAPÜK, the first artificial language (see Universal Languages) to attain any measure of practical success. First published in 1880, it was the work of J. M. Schleyer (b. 1839), a south-German priest. Volapük is not, like the earliest attempts of the kind, an a priori language, but is based mainly on English, the rest of the vocabulary being made up from Latin and the Romance languages. The borrowed words are reduced to a monosyllabic form and are often altered in a very arbitrary manner. Thus the name Volapük itself is made up of the two English words, *world* and *speak*, the first in the genitive, the three vowels, *a*, *e*, *i*, being used to express the three cases, genitive, dative and accusative respectively; the nominative is expressed by the bare root, and *s* is added to form the plural. The grammar of Volapük is therefore partly borrowed, like the vocabulary, partly original. Adjectives end in *-ik*. The persons of the verb are indicated by adding the pronouns *ob* "I," *ol* "thou," *om* "he," &c., plural *obs* "we," &c.; the tenses and the passive are indicated by prefixes, the moods by suffixes following the person-endings, many other inflections being used as well, so that the Volapük verb boasts of no less than 505,440 different forms.

Although founded on English, Volapük is mainly German in structure. It gets rid of the German word-order and the irregularities of German grammar, but it is often impossible to understand a Volapük text without thinking in German. The following is a specimen of the language:—

Löfob kemenis valik vola lölik, patiko etis pekulivöl, kels konfidoms Volapüke, as bale medas gletikün netasfetama.

"I love all my fellow-creatures of the whole world, especially those cultivated (ones) who believe in Volapük as (being) one of the greatest means of nation-binding."

Here *löfob* governs the dative just as its German equivalent does, and "cultivated" is used in the sense of the German *gebildeter*.

The history of Volapük has an interest greater than that of the language itself. It has proved (1) that people in general are ready to adopt an artificial language, and (2) that an artificial language is easier to learn than any national language, and supplies an efficient means of communication between those who have no other language in common. Volapük had no [illegible] merits to recommend it; yet, after a few [illegible] in south Germany, it spread, first to France [illegible] in a few years over the whole civilized [illegible] the third Volapük congress met at Paris, there were 283 Volapük societies all over the world, and the total number of Volapük students was estimated at over a million. At this congress every one—even the waiters—spoke Volapük, and the permanent triumph of the language seemed certain. But the year of its zenith was the beginning of a decline even more rapid than its rise. It fell to pieces through dissensions in its own camp, the first cause of which was the opposition of the inventor to those of his disciples who aimed at making the language mainly an instrument of commercial correspondence, and advocated the greatest possible simplification of grammar and vocabulary. The divergence of views between the inventor and his colleagues became more and more marked; and after the third congress the breach between M. Schleyer and the Volapük Academy (founded at the second congress in 1887) became a definite one: the director of the Academy proposed a totally new scheme of grammar, and other members proposed others, although one of the objects of the foundation of the Academy was the preservation of the integrity of the language. A new director, M. Rosenberger of St Petersburg, was elected in 1893; and from this moment the Academy dissociated itself from Volapük and began to construct a new international language, Idiom Neutral (see Universal Languages). (H. Sw.)

VOLCAE, a Celtic people in the province of Gallia Narbonensis, who occupied the district between the Garumna (Garonne), Cerbenna mons (Cévennes), and the Rhodanus (or even farther to the east in earlier times), corresponding roughly to the old province of Languedoc. They were divided into two tribes, the Arecomici on the east and the Tectosages (whose territory included that of the Tolosates) on the west, separated by the river Arauris (Hérault) or a line between the Arauris and Orbis (Orbe). The Volcae were free and independent, had their own laws, and possessed the *jus Latii*. The chief town of the Tectosages was Tolosa (Toulouse); of the Arecomici, Nemausus (Nîmes); the capital of the province and residence of the governor was Narbo Martius (Narbonne). It was said that there was an early settlement of Volcae Tectosages near the Hercynia Silva in Germany; Tectosages was also the name of one of the three great communities of Gauls who invaded and settled in Asia Minor in the country called after them Galatia.

See A. Holder, *Altceltischer Sprachschatz*, i. ii. (1896, 1904). *s.vv.* "Arecomici" and "Tectosagi"; T. R. Holmes, *Caesar's Conquest of Gaul* (1899) p. 513; A. Desjardins, *Géographie de la Gaule romaine*, i. (1876).

VOLCANO, an opening in the earth's crust, through which heated matter is brought, permanently or temporarily, from the interior of the earth to the surface, where it usually forms a hill, more or less conical in shape, and generally with a hollow or crater at the top. This hill, though not an essential part of the volcanic mechanism, is what is commonly called the volcano. The name seems to have been applied originally to Etna and some of the Lipari Islands, which were regarded as the seats of Hephaestus, a Greek divinity identified with Vulcan, the god of fire in Roman mythology. All the phenomena connected directly or indirectly with volcanic activity are comprised under the general designation of *vulcanism* or *vulcanicity*—words which are also written less familiarly as volcanism and volcanicity; whilst the study of the phenomena forms a department of natural knowledge known as *vulcanology*. Vulcanicity is the chief superficial expression of the earth's internal igneous activity.

It may happen that a volcano will remain for a long period in a state of moderate though variable activity, as illustrated by the normal condition of Stromboli, one of the Lipari Islands; but in most volcanoes the activity is more decidedly intermittent, paroxysms of greater or less violence occurring after intervals of comparative, or even complete, repose. If the period of quiescence has been very protracted, the renewed activity is apt to be exceptionally violent. Thus, Krakatoa before the great eruption of 1883 had been dormant for something like two centuries, and it is believed that the Japanese volcano Bandaisan previously to the gigantic outburst of 1888 had been silent for more than a thousand years. A volcano may indeed remain so long dormant as to be mistaken for one completely extinct. The volcanoes of central France are regarded as extinct, inasmuch as no authentic historical record of any eruption is known, but there are not wanting signs that in some parts of this volcanic region the subterranean forces may yet be slumbering rather than dead.

Premonitory Symptoms.—A volcanic eruption is usually preceded by certain symptoms, of which the most common are local earthquakes. The mountain, or other eruptive centre, may be thrown by internal activity into a state of tremor; the tremors perhaps continuing intermittently for months or even years, and becoming more frequent and violent as the crisis approaches. At first they are usually confined to the volcano and its immediate neighbourhood, but may subsequently extend to a considerable distance, though probably never developing into earthquakes of the first magnitude. The sudden opening of a subterranean crack, by rupture of a rock under strain, or the rapid injection of lava into such a fissure, will tend to produce a jar at the surface. For at least sixteen years before the first recorded eruption of Vesuvius in A.D. 79 earthquakes had been frequent in the Campania and had wrought havoc in the cities of Herculaneum and Pompeii. Again, the formation of Monte Nuovo, near Pozzuoli, in 1538, was heralded by local earthquakes beginning several years in advance of the eruption. So too in recent years many volcanic outbursts have been preceded by a succession of earthquakes; but as volcanoes are frequently situated in areas of marked seismic activity, the shocks antecedent to an eruption may not, unless exceptionally violent, receive much attention from local observers.

It commonly happens that a volcanic outburst is announced by subterranean roaring and rumbling, often compared to thunder or the discharge of artillery underground. Other precursory symptoms may be afforded by neighbouring springs, which not unusually flow with diminished volume, or even fail altogether. Possibly fissures open underground and drain off the water from the springs and wells in the immediate locality. Occasionally, however, an increased flow has been recorded. In some cases thermal springs make their appearance, whilst the temperature of any existing warm springs may be increased, and perhaps carbon dioxide be evolved. A disturbed state of the atmosphere is by no means a constant forerunner of an eruption, some of the greatest outbursts having occurred in a period of atmospheric stability: indeed the air is often felt to be close and still.

Immediately before a renewed outburst in an old volcano, the floor of the crater is generally upheaved to a greater or less extent, whilst the discharge of vapour from any fumaroles is increased. Where a crater has been occupied by water, forming a crater-lake, the water on the approach of an eruption becomes warm, evolves visible vapour, and may even boil. In the case of cones which are capped with snow, the internal heat of the rising lava usually causes a rapid melting of the snow-cap, resulting perhaps in a disastrous deluge.

It seems probable that by attention to the premonitory symptoms a careful local observer might in many cases foretell an eruption.

It generally happens that a great eruption is preceded by a preliminary phase of feeble activity. Thus, the gigantic catastrophe at Krakatoa on the 27th of August 1883, so far from having been a sudden outburst, was the culmination of a state of excitement, sometimes moderate and sometimes violent, which had been in progress for several months.

Emission of Vapour.—Of all volcanic phenomena the most constant is the emission of vapour. It is one of the earliest features of an eruption; it persists during the paroxysms, attaining often to prodigious volume; and it lingers as the last relic of an outburst, so that long after the ejection of ashes and lava has ceased an occasional puff of vapour may be the only memento of the disturbance.

By far the greatest proportion of the vapour is steam, which sometimes occurs almost to the exclusion of other gaseous products. Such, at least, is the usual and probably correct view, though it is opposed by A. Brun, who regards the volcanic vapours as chiefly composed of chlorides with steam in only subordinate amount. In the case of a mild eruption, like that occurring normally at Stromboli, the vapours may be discharged in periodical puffs, marking the explosion of bubbles rising more or less rhythmically from the seething lava in the volcanic cauldron. S. Wise observed at the volcano of Sangay, in Ecuador, no fewer than 267 explosions in the course of an hour, the vapour here being associated, as is so often the case, with ashes. During a violent eruption the vapour may be suddenly shot upwards as a vertical column of enormous height, penetrating the passing clouds. For a short distance above the vent the superheated steam sometimes exists as a transparent vapour, but it soon suffers partial condensation, forming clouds, which, if not dispersed by winds, accumulate over the mountain. When the vapour is free from ash it forms rolling balls of fleecy cloud, but usually it carries in mechanical association more or less finely divided lava as volcanic dust and ashes, whereby it becomes yellow, brown, or even black, sometimes as foul as the densest smoke. In a calm atmosphere the dust-laden vapour may rise in immense rings with a rotatory movement, like that of vortex-rings. Frequently the vapours, emitted in a rapid succession of jets, form cumulus clouds, or are massed together in cauliflower-like forms. The well-known "pine-tree appendage" of Vesuvius (*pino vulcanico*), noted by the younger Pliny in his first letter to Tacitus on the eruption in the year 79, is a vertical shaft of vapour terminating upwards in a canopy of cloud, and compared popularly with the trunk and spreading branches of the stone-pine. Whilst in some cases the cloud resembles a gigantic expanded umbrella, in others it is more mushroom-shaped. In a great eruption, the height of the mountain itself may appear dwarfed by comparison with that of the column of vapour. During the eruption of Vesuvius in April 1906, the steam and dust rose to a height of between 6 and 8 m. At Krakatoa in 1883 the column of vapour and ashes reached an altitude of nearly 20 m.; whilst it was estimated by some authorities that during the most violent explosions the finely divided matter must have been carried to an elevation of more than 30 m. The emission of vast volumes of vapour at high tension naturally produces much atmospheric disturbance, often felt at great distances from the centre of eruption.

Electrical Excitement.—It is probably to the uprushing current of vapour that much of the electrical excitement which invariably accompanies an eruption may be referred. The friction of the steam rushing in jets through the volcanic vent must produce electrical disturbance, and indeed an active volcano has been aptly compared to a hydroelectric machine of gigantic power. Another cause of excitement may be found in the mutual friction of the ejected cinders and ashes as they rise and fall in showers through the air. Much trituration of volcanic material may go on in the crater and elsewhere during the eruption, whereby the solid lava is reduced to a fine dust. Other means of generating electricity are found in the chemical reactions effected in the volcano and in the sudden condensation of the emitted vapour. L. Palmieri, in the course of his investigations at the observatory on Vesuvius, found that the vapours free from cinders carried a positive charge, whilst the cinders were negative.

The electrical phenomena attending an eruption are often of great intensity and splendour. The dark ash-laden clouds of vapour are shot through and through by volcanic lightning, sometimes in rapid horizontal flashes, then in oblique forked streaks, or again in tortuous lines compared to fiery serpents, whilst the borders of the cloud may be brilliant with electric scintillations, often forming balls and stars of fire. During the great eruption of Krakatoa remarkable phenomena were observed by ships in the Strait of Sunda, luminous balls like "St Elmo's fire" appearing at the mast-heads and the yard-arms, whilst the volcanic mud which fell upon rigging and deck was strongly phosphorescent.

Quite distinct from any electrical phenomena is that intermittent reddish glare which is often seen at night in clouds hanging over an active crater, and which is simply a glow due to reflection from the incandescent lava and stones in the volcanic cauldron below.

Volcanic Rain and Mud.—The condensation of the vast volumes of steam exhaled during an eruption produces torrents of rain, which, mingling to a greater or less extent with the volcanic ashes, forms a hot muddy stream known in Italy as *lava d'acqua* and *lava di fango*, and in South America as *moya*. Deluges of such mud-lava may rush violently down the mountain-side and spread over the neighbouring country with terribly destructive effect, whence they are greatly dreaded by those who dwell at the base of a volcano. The solidified volcanic mud, often mingled with larger fragments of lava, is known as *tuff* or *tufa*. Herculaneum was buried beneath a flood of mud swept down from Vesuvius during the Plinian eruption of 79, and the hard tufaceous crust which thus sealed up the ill-fated city came in turn to be covered by lava-flows from subsequent eruptions: hence the difficulty of excavating at Herculaneum compared with similar work at Pompeii, where there was probably much less mud, since the city, having been at a greater distance from the volcanic centre, was overwhelmed in great measure by loose ashes, capable of removal with comparative ease.

It sometimes happens that volcanic mud is formed by the mingling of hot ashes not directly with rain but with water from streams and lakes, or even, as in Iceland, with melted snow. A torrent of mud was one of the earliest symptoms of the violent eruption of Mont Pelé in Martinique in 1902. This mud had its source in the Étang Sec, a crater-basin high up on the S.W. side of the mountain. By the explosive discharge of ashes and vapours mingled with the water of the tarn there was produced a vast volume of hot muddy matter which on the 5th of May suddenly escaped from the basin, when a huge torrent of boiling black mud, charged with blocks of rock and moving with enormous rapidity, rolled like an avalanche down the gorge of the Rivière Blanche. If a stream of lava obstructs the drainage of a volcano, it may give rise to floods.

Ejected Blocks.—When a volcano after a long period of repose starts into fresh activity, the materials which have accumulated in the crater, including probably large blocks from the disintegration of the crater-walls, have to be ejected. If the lava from the last eruption has consolidated as a plug in the throat of the volcano, the conduit may be practically closed, and hence the first effort of the renewed activity is to expel this obstruction. The hard mass becomes shattered by the explosions, and the angular fragments so formed are hurled forth by the outrushing stream of vapour. When the discharge is violent, the vapour, as it rushes impetuously up the volcanic duct, may tear fragments of rock from its walls and project them to a considerable distance from the vent. Such ejected blocks, by no means uncommon in the early stages of an eruption, are often of large size and naturally vary according to the character of the rocks through which the duct has been opened. They may be irregular masses of igneous rocks, possibly lavas of earlier eruptions, or they may be stratified, sedimentary and fossiliferous rocks representing the platform on which the volcano has been built, or the yet more deeply seated fundamental rocks. By Dr H. J. Johnston-Lavis, who specially studied the ejected blocks of Vesuvius, the volcanic materials broken from the cone are termed "accessory" ejecta, whilst other fragmentary materials he conveniently calls "accidental" products, leaving the term "essential" ejecta for plastic lava, ashes, crystals, &c. Masses of Cretaceous or Apennine limestone ejected from Somma are scattered through the tuffs on the slopes of Vesuvius; and objects carved in such altered limestone are sold to tourists as "lava" ornaments. Under the influence of volcanic heat and vapours, the ejected blocks suffer more or less alteration, and may contain in their cavities many crystallized minerals. Certain blocks of sandstone ejected occasionally at Etna are composed of white granular quartz, permeated with vitreous matter and encased in a black scoriaceous crust of basic lava.

A rock consisting of an irregular aggregation of coarse ejected materials, including many large blocks, is known as a "volcanic agglomerate." Any fragmental matter discharged from a volcano may form rocks which are described as "pyroclastic."

Cinders, Ashes and Dust.—After the throat of a volcano has been cleared out and a free exit established, the copious discharge of vapour is generally accompanied by the ejection of fresh lava in a fragmentary condition. If the ejected masses bear obvious resemblance to the products of the hearth and the furnace, they are known as "cinders" or "scoriae," whilst the small cinders not larger than walnuts often pass under their Italian name of "lapilli" (*q.v.*). When of globular or ellipsoidal form, the ejected masses are known as "bombs" (*q.v.*) or "volcanic tears." Other names are given to the smaller fragments. If the lava has become granulated it is termed "volcanic sand"; when in a finer state of division it is called ash, or if yet more highly comminuted it is classed as dust; but the latter terms are sometimes used interchangeably. The pulverized material, consisting of lava which has been broken up by the explosion, or triturated in the crater, is often discharged in prodigious quantity, so that after an eruption the country for miles around the volcano may be covered with a coating of fine ash or dust, sometimes nearly white, like a fall of snow, but often of greyish colour, looking rather like Portland cement, and in many cases becoming reddish by oxidation of the ferruginous constituents. Even when first ejected the ash is sometimes cocoa-coloured. This finely divided lava insinuates itself into every crack and cranny, reaching the interior of houses even when windows and doors are closed. A heavy fall of ash or cinders may cause great structural damage, crushing the roofs of buildings by sheer weight, as was markedly the case at Ottajano and San Guiseppe during the eruption of Vesuvius in April 1906. On this occasion the dry ashes slipped down the sides of the volcanic cone like an avalanche, forming great ash-slides with ridges and furrows rather like barrancos, or ravines, caused by rain. The burial of Ottajano and San Ginseppe in 1906 by Vesuvian ejecta, mostly lapilli, has been compared with that of Pompeii in 79.

Deposits of volcanic sand and ashes retain their heat long after ejection, so that rain will cause them to evolve steam, and if the rain be heavy and sudden it may produce explosions with emission of great clouds of vapour. The fall of ash is at first prejudicial to vegetation, and is often accompanied or followed by acid rain; but ultimately the ash may prove beneficial to the soil, chiefly in consequence of the alkalis which it contains. The "May dust" of Barbados was a rain of volcanic ash which fell in May 1812 from the eruption of the Soufrière in St Vincent. It is estimated that the amount of dust which during this eruption fell on the surface of Barbados, 100 m. distant from the eruptive centre, was about 3,000,000 tons. The distance to which ash is carried depends greatly on the atmospheric conditions at the time of the eruption. Ashes from Vesuvius in an eruption in the year 472 were carried, it is said, as far as Constantinople. During an eruption of Cotopaxi, on the 3rd of July 1880, observed by E. Whymper, an enormous black column of dust-laden vapour was shot vertically upwards with such rapidity that in less than a minute it rose to a height estimated at 20,000 ft. above the crater-rim, or nearly 40,000 ft. above sea-level, when it was dispersed by the wind over a very wide area. It is believed that the amount of dust in this discharge must have been more than 2,000,000 tons. Enormous quantities of dust ejected from Krakatoa in 1883 were carried to prodigious distances, samples having been collected at more than a thousand miles from the volcano; whilst the very fine material in ultra-microscopic grains which remained suspended for months in the higher regions of the atmosphere seems to have enjoyed an almost world-wide distribution, and to have been responsible for the remarkable sunsets at that period.

The ash falling in the immediate vicinity of a volcanic vent will generally be coarser than that carried to a distance, since the particles as they are wafted through the air undergo a kind of sifting. Professor J. W. Judd, who made an exhaustive examination of the products of the eruption of Krakatoa, found that the dust near the volcano was comparatively coarse, dense and rather dark-coloured, in consequence of the presence of numerous fragments of heavy, dark, crystalline minerals, whilst the dust at a distance was excessively fine and perfectly white. According to this observer, the particles tended to fall in the following order: magnetite, pyroxenes, felspar, glass. The finely comminuted material, carried to a great height in the atmosphere, consisted largely of delicate threads and attenuated plates of vitreous matter, in many cases hollow and containing air-bubbles. The greater part of the dust was formed by the mutual attrition of fragments of brittle pumice as they rose and fell in the crater, which thus became a powerful "dust-making mill." By this trituration of the pumiceous lava, carried on for a space of three months during which the eruption lasted, the quantity of finely pulverized material must have been enormous; yet the amount of ejected matter was probably very much less than that extruded during some other historical eruptions, such as that of Tomboro in Sumbawa, in 1815. The explosions at Krakatoa were, however, exceptionally violent, having been sufficient to project some of the finely pulverized lava to an altitude estimated to have been at least 30 m. It is usually impossible during a great eruption to determine the height of the column of "smoke," since it hangs over the country as a pall of darkness.

The great black cloud, which was so characteristic a feature in the terrible eruptions in the West Indies in 1902, was formed of steam with sulphur dioxide and other gases, very heavily charged with incandescent sand or dust, forming a dense mixture that in some respects behaved like a liquid. Unlike the Krakatoa dust, which was derived from a vitreous pumice, the solid matter of the black cloud was largely composed of fragments of crystalline minerals. According to Drs Anderson and Flett it is not impossible that on the afternoon of the 17th of May 1902, the solid matter ejected from the Soufrière of St Vincent amounted to several billions of tons, and that some of the dust fell at distances more than 2000 m. east of the centre of eruption.

In Mexico and Central America, under the favourable influence of warmth and moisture, rich soils are rapidly formed by the decomposition of finely divided volcanic ejecta. Vast areas in North America, especially in Nebraska and Kansas, are covered with thick deposits of volcanic dust, partly from recent eruptions but principally from volcanic activity in geologic time. The dust is used in the arts as an abrasive agent.

Lava.—The volcanic cinders, sand, ashes and dust described above are but varied forms of solidified lava. Lava is indeed the most characteristic product of volcanic activity. It consists of mineral matter which is, or has been, in a molten state; but the liquidity is not due to simple dry fusion. The magma, or subterranean molten matter, may be regarded as composed essentially of various silicates, or their constituents, in a state of mutual solution, and heavily charged with certain vapours or gases, principally water-vapour, superheated and under pressure. In consequence of the peculiar constitution of the magma, the order in which minerals separate and solidify from it on cooling does not necessarily correspond with the inverse order of their relative fusibility. The lava differs from the magma before eruption, inasmuch as water and various volatile substances may be expelled on extrusion. The rapid escape of vapour from the lava contributes to the explosive phenomena of an eruption, whilst the rate at which the vapour is disengaged depends largely on the viscosity of the magma.

The lava on its immediate issue from the volcanic vent is probably at a white heat, but the temperature is difficult of determination since the molten matter is usually not easy of approach, by reason of the enshrouding vapour. Determinations of temperature are generally made at a short distance from the exit, when the lava has undergone more or less cooling, or on a small stream from a subordinate vent. A. Bartoli, using a platinum electric resistance pyrometer, found that a stream of lava near a *bocca*, or orifice of emission, on Etna, in the eruption of 1892, had at a depth of one foot a temperature of 1060° C. In the lavas of Vesuvius and Etna thin wires of silver and of copper have frequently been melted. Probably the lava at the surface of the stream has a temperature of something like 1100° C., but this must not be assumed to be its temperature at the volcanic focus. C. Doelter, in some experiments on the melting-point of lava by means of an electric furnace, found that a lava from Etna softened at from 962° to 970° C. and became fluid at 1010° to 1040°, whilst a Vesuvian lava softened at 1030° to 1060° and acquired fluidity at 1080° to 1090°. These results were obtained at ordinary atmospheric pressure, but it has been assumed that the melting-point of lava at a great depth would, through pressure alone, exceed that obtained in the laboratory. On the other hand the presence of water and of certain volatile fluxes in the magma lowers the fusing-point, and hence the extruded lava from which these have largely escaped may be much less fusible than the original magma.

Determinations of the melting-points of various glasses formed by the fusion of certain igneous rocks have been made by J. A. Douglas, with the meldometer of Professor J. Joly. The results give temperatures ranging from 1260° C. for rhyolite to 1070° for dolerite from the Clee Hills in Shropshire. The melting-points of the rocks in a glassy condition as here given are, however, lower than those of the corresponding rocks in a crystalline state.

It should be noted that all determinations of the melting-points of minerals and rocks involving ocular inspection of the physical state of the material are liable to considerable error, and the only accurate method seems to be that of determining the point at which absorption of heat abruptly occurs—the latent heat of fusion. This has been done in the refined investigations by Mr A. L. Day and his colleagues in the Geophysical Laboratory of the Carnegie Institution at Washington.

It is believed that the temperature of lava in the volcanic conduit may be in some cases sufficiently high to fuse the neighbouring rocks, and so melt out a passage through them in its ascent. The wall-rock thus dissolved in the magma will not be without influence on the composition of the lava with which it becomes assimilated.

Many interesting observations are on record with regard to the heating effect of lava on metals and other objects with which it may have come in contact. Thus, after the destruction of Torre del Greco by a current of lava from Vesuvius in 1794, it was found that brass in the houses under the lava had suffered decomposition, the copper having become crystallized; whilst silver had been not only fused but sublimed. This indicates a temperature of upwards of 1000° C. Panes of glass in the windows at Torre del Greco on the same occasion suffered devitrification.

Notwithstanding the high temperature of lava on emission, it cools so rapidly, and the consolidated lava conducts heat so slowly, that vegetable structures may be involved in a lava-flow without being entirely destroyed. A stream of lava on entering a wood, as in the sylvan region on Etna, may burn up the undergrowth but leave many of the larger trees with their trunks merely carbonized. On Vesuvius a lava-flow has been observed to surround trees while the foliage has been apparently uninjured. A vertical trunk of a coniferous tree partially enveloped in Tertiary basalt occurs at Gribon in the Isle of Mull, as described by Sir A. Geikie and others; plant-remains in basalt from the Bo'ness coalfield in Linlithgowshire have been noticed by H. M. Cadell; and attention has been called by B. Hobson to a specimen of scoriaceous basalt, from Mexico, which shows the impression of ears of maize and even relics of the actual grains. In consequence of the slow transmission of heat by solid lava, the crust on the surface of a stream may be crossed with impunity whilst the matter is still glowing at a short distance below. Lichens may indeed grow on lava which remains highly heated in the interior.

The solidified surface of a sheet of lava may be smooth and shining, sometimes quite satiny in sheen, though locally wrinkled and perhaps even ropy or hummocky, the irregularities being mainly due to superficial movement after partial solidification. The "corded lava" has a surface similar to that often seen on blast-furnace slag, and is suggestive of a tranquil flow. After a lava stream has become crusted over on cooling, the subjacent lava, still moving in a viscous condition, tends to tear the crust, forming irregular blocks, or clinkers, which are carried forward by the flow and ultimately left in the form of confused heaps, perhaps of considerable magnitude. The front of a stream may present a wall of scoriaceous fragments looking like a huge pile of coke. As the clinkers are carried along, on the surface of the lava, they produce by mutual friction a crunching noise; and the sluggish flow of the lava-stream laden with its burden has been compared with that of a glacier. Since the upper part of the stream moves more rapidly than the lower, which is retarded by cooling in contact with the bed-rock, the superficial clinkers are carried forward and, rolling over the end, may become embedded in the lava as it advances. Scoriae formed on the top of a stream may thus find their way to the base. Rock-fragments or other detrital matter occurring in the path of the lava will be caught up by the flow and become involved in the lower part of the molten mass; whilst the rocks over which the lava travels may suffer more or less alteration by the heat of the stream.

The rapidity of a lava flow is determined partly by the slope of the bed over which it moves and partly by the consistency of the lava, this being dependent on its chemical composition and on the conditions of cooling. In an eruption of Mauna Loa, in Hawaii, in 1855, the lava was estimated to flow at a rate of 40 m. an hour; and at an eruption of Vesuvius in 1805 a velocity of more than 50 m. an hour, at the moment of emission, was recorded. The rapidity of flow is, however, rapidly checked as the stream advances, the retardation being very marked in small flows. Where lava travels down a steep incline there is naturally a great tendency to form a rugged surface, whilst a quiet flow over a flat plane favours smoothness. If the lava meet a precipice it may form a cascade of great beauty, the clinkers rapidly rolling down with a clatter, as described by Sir W. Hamilton in the eruption of Vesuvius in 1771, when the fiery torrent had a perpendicular fall of 50 ft.

In Hawaii the smooth shining lava, often superficially waved and lobed, is known as *pahoehoe*, whilst the rugged clinker beds are termed *aa*. These terms are now used in general terminology, having been introduced by American geologists. The fields of aa often contain lava-balls and bombs. It may be said that the pahoehoe corresponds practically with the *Fladen lava* of German vulcanologists, and the aa with their *Schollen lava*. Rugged flows are known in Auvergne as *cheires*. The surface of a clinker-field has often a horribly jagged character, being covered with ragged blocks bristling with sharp points. In the case of an obsidian-flow a most dangerous surface is produced by the keen edges and points of the fragmentary volcanic glass.

If, after a stream of lava has become crusted over, the underlying magma should flow away, a long cavern or tunnel may be formed. Should the flow be rapid the roof may collapse and the fragments, falling on to the stream, may be carried forward or become absorbed in the fused mass. The walls and roof of a lava-cave are occasionally adorned with stalactites, whilst the floor may be covered with stalagmitic deposits of lava. The volcanic stalactites are slender, tubular bodies, extremely fragile, often knotted and rippled. Beautiful examples of lava stalactites from Hawaii have been described by Professor E. S. Dana. Caverns may also be formed in lava-flows by the presence of large bubbles, or by the union of several bubbles. It may happen, too, that certain monticules thrown up on the surface of the lava are hollow, of which a famous example is furnished by the Caverne de Rosemond, at the base of Piton Barry, in the Isle of Réunion.

It is of great interest to determine whether molten lava contracts or expands on solidification, but the experimental evidence on this subject is rather conflicting. According to some observers a piece of solid lava thrown on to the surface of the same lava in a liquid state will sink, while according to others it floats. It has often been observed that cakes formed by the natural fracture of the crust on the lava of Kilauea sink in the liquid mass, but it has been suggested that the fragments are drawn down by convection-currents. On the other hand a solid piece, though denser than the corresponding liquid, may be buoyed up for a time by the viscous condition of the molten lava. Moreover, the presence of minute vesicles may lighten the mass. Although the minerals of a rock-magma may separately contract on crystallization it does not follow that the magma itself, in which they probably exist in a state of solution, will undergo on crystallization a similar change of volume. On the whole, however, there seems reason to believe that lava on solidifying almost always diminishes in volume and consequently increases in density.

According to the experiments of C. Doelter the specific gravity of molten lava is invariably less than that of the same lava when solid, though in some cases the difference is but slight. In a vitreous or isotropic condition the lava has a lower density than when crystalline. The differences are illustrated by the following table, where the figures give the specific gravity:—

	Natural solid lava.	Liquid.	Rapidly cooled, glassy.	Slowly cooled, crystalline.
Lava of Etna .	2·83	2·58–2·74	2·71–2·75	2·81–2·83
„ Vesuvius	2·83–2·85	2·68–2·74	2·69–2·75	2·77–2·81

Experiments by Dr C. Barus showed that a diabase of specific gravity 3·017 formed a glass of sp. gr. 2·717, and melted to a liquid of sp. gr. 2·52. J. A. Douglas on examining various igneous rocks found that in all cases the rock in a vitreous state had a lower sp. gr. than in a crystalline condition, the difference being greatest in the acid plutonic rocks. A. Harker, however, has called attention to the fact that the glassy selvage of certain basic dykes in Scotland is denser than the same rock in a crystalline condition in the interior of the dykes.

Physical Structure of Lavas.—An amorphous vitreous mass may result from the rapid cooling of a lava on its extrusion from the volcanic vent. The common type of volcanic glass is known as obsidian (*q.v.*). Microscopic examination usually shows that even in this glass some of the molecules of the magma have assumed definite orientation, forming the incipient crystalline bodies known as microlites, &c. By the increase of these minute enclosures, in number and magnitude, the lava may become devitrified and assume a lithoidal or stony structure. If the molten magma consolidate slowly, the various silicates in solution tend to separate by crystallization as their respective points of saturation are reached. Should the process be arrested before the entire mass has crystallized, the crystals that have been developed will be embedded in the residual magma, which may, on consolidation, form a vitreous base. It is believed that in many cases the lava brings up, through its conduit, myriads of crystals that have been developed during slow solidification in the heart of the volcanic apparatus. Showers of crystals of leucite have occurred at Vesuvius, of labradorite at Etna, and of pyroxene at Vesuvius, Etna and Stromboli. These "intratelluric crystals" were probably floating in the molten magma, and had they remained in suspension, this magma might on consolidation have enveloped them as a ground-mass or base. A rock so formed is generally known as a "porphyry," and the structure as porphyritic. In such a lava the large crystals, or phenocrysts, evidently represent an early phase of consolidation, and the minerals of the matrix a later stage. It is notable that the intratelluric crysta[illegible]ess of outline, as though they had suffered corrosion by attack of the molten magma, whilst they may contain vitreous enclosures, suggesting that the surrounding mass was liquid during their consolidation. It is believed that the more slowly consolidation has occurred, the larger generally are the crystals; and the higher the temperature of the magma the greater the corrosion or resorption. Possibly under certain conditions the phenocrysts and the ground-mass may have solidified simultaneously.

In some cases the entire igneous mass assumes a crystalline structure, or becomes "holocrystalline." Such a structure is well displayed when the magma has consolidated at considerable depths, cooling slowly under great pressure, and forming rocks which are termed "plutonic" or "abyssal" to distinguish them from rocks truly volcanic, or those which, if not effusive, like lava-flows, have at least solidified very near to the surface as dykes and sills. Volcanic and plutonic rocks pass, however, into each other by gradual transition. The dyke-rocks, or intrusive masses, form an intermediate group sometimes distinguished under the name of "hypabyssal" rocks, as suggested by W. C. Brögger. Lavas extruded in submarine eruptions may have solidified under a great weight of sea-water, and therefore to that extent rather under plutonic conditions.

Chemical Composition of Lavas.—Lavas are usually classified roughly, from a chemical point of view, in broad groups according to the proportion of silica which they contain. Those in which the proportion of silica reaches 66% or upwards are said to be acid or acidic, whilst those in which it falls to 55% or below are called basic lavas. The two series are connected by a group of intermediate composition, whilst a small number of igneous rocks of exceptional type are recognized as ultrabasic. Professor F. W. Clarke has suggested a grouping of igneous rocks as per-silicic, medio-silicic and sub-silicic, in which the proportion of silica is respectively more than 60, between 50 and 60, or less than 50%.

By far the greater part of all lavas consists of various silicates, either crystallized as definite minerals or unindividualized as volcanic glass. In addition, however, to the mineral silicates, a volcanic rock may contain a limited amount of free acid and basic oxides, represented by such minerals as quartz and magnetite. Rhyolite may be cited as a typical example of an acid lava, andesite as an intermediate and basalt as a basic lava. The various volcanic rocks are described under their respective headings, so that it is needless to refer here to their chemical or mineralogical composition. It may, however, be useful to cite a few selected analyses of some recent lavas and ashes:—

	I.	II.	III.	IV.	V.	VI.
Silica . . .	48·28	49·73	50·00	68·99	61·88	49·20
Alumina . . .	18·39	18·46	13·99	16·07	18·30	14·90
Ferric oxide . .	1·12	6·95	5·13	2·63	1·97	4·51
Ferrous oxide . .	7·88	5·59	9·10	1·10	4·32	12·75
Manganous oxide .	..	..	..	0·28	..	0·28
Magnesia . . .	3·72	3·99	4·06	1·08	2·71	3·90
Lime . . .	9·20	10·71	10·81	3·16	6·32	9·20
Soda	2·84	3·50	3·02	4·04	3·17	1·96
Potash . . .	7·25	1·07	2·87	1·83	1·09	0·95
Titanium dioxide .	1·28	..	..	0·82	0·31	1·72
Phosphorus pentoxide	0·51	..	..	..	0·09	0·42
Loss on ignition .	0·62	..	0·24	..	0·19	0·10
	100·96	100·00	99·22	100·00	100·35	99·89

I. From Vesuvius, eruption of 1906; by M. Pisani.
II. „ Etna. Mean of several analyses by Silvestri and Fuchs (Mercalli).
III. „ Stromboli, 1891; by Ricciardi.
IV. „ Krakatoa eruption of 1883; by C. Winkler.
V. „ Mont Pelé, Martinique, eruption of 1902; by M. Pisani.
VI. „ Kilauea, Hawaii; by O. Silvestri.

In the course of the life of a volcano, the lava which it emits may undergo changes, within moderate limits, being at one time more acid, at another more basic. Such changes are sometimes connected with a shifting of the axis of eruption. Thus at Etna the lavas from the old axis of Trifoglietto in the Valle del Bove were andesites, with about 55% of silica, but those rising in the present conduit are doleritic, with a silica-content of only about 50%. It seems probable that, to a limited extent, changes in the character of a lava may sometimes be due to contact of the magma with different rocks underground: if these are rich in silica, the acidity of the lava will naturally increase; while if they are rich in calcareous and ferro-magnesian constituents, the basicity will increase: the variation is consequently apt to be only local, and probably always slight.

By von Richthofen and some others it has been held that during a long period of igneous activity a definite order in the succession of the erupted rocks is everywhere constant; but though some striking coincidences may be cited, it can hardly be said that this generalization has been satisfactorily established. It has, however, often been observed, as emphasized by Professor Iddings, that a volcanic centre will start with the emission of lavas of neutral or intermediate type, followed in the course of a geological period by acid and basic lavas, and ending with those of extreme composition, indicating progressive change in the magma.

The old idea of a universal magma, or continuous pyrosphere, has been generally abandoned. Whatever may have been the case in a primitive condition of the interior of the earth, it seems necessary to admit that the magma must now exist in separate reservoirs. The independent activity of neighbouring volcanoes strikingly illustrated in Kilauea and Mauna Loa in Hawaii, only 20 m. apart, suggests a want of communication between the conduits; and though the lavas are very similar at these two centres, it would seem that they can hardly be drawn from a common source. Again, the volcanoes of southern Italy and the neighbouring islands exhibit little or no sympathy in their action, and emit lavas of diverse type. The lavas of Vulcano, one of the Lipari Isles, are rhyolitic, whilst those of Stromboli, another of the group, are basaltic.

It is believed that the magma in a subterranean reservoir, though originally homogeneous, may slowly undergo certain changes, whereby the more basic constituents migrate to one quarter whilst the acid segregate in another, so that the canal, at successive periods, may bring up material of different types. The cause of this "magmatic differentiation," which has been the subject of much discussion, is of fundamental importance in any broad study of the genetic relations of igneous rocks.

It has often been observed that all the rocks from a definite igneous centre have a general similarity in chemical and mineralogical characters. This relationship is called, after Professor Iddings, "consanguinity," and appears to be due to the fact that the rocks are drawn from a common source. Professor Judd pointed out the existence of distinct "petrographical provinces," within which the eruptive rocks during a given geological period have a certain family likeness and have appeared in definite succession. Thus he recognized a Brito-Icelandic petrographical province of Tertiary and recent lavas. It has been shown by A. Harker that alkali igneous rocks are generally associated with the Atlantic type of coast-line and sub-alkali rocks with the Pacific type.

Although changes in the character of an erupted product from a given centre are usually brought about very slowly, it has often been supposed that even in the course of a single prolonged eruption, or series of eruptions, the character of the lava may vary to some extent. That this is not, however, usually the case has been repeatedly proved. M. H. Arsandaux, for instance, analysed the bombs of augite-andesite thrown out from Santorin at the beginning of the eruption of 1866, others ejected in 1867, and others again at the close of the eruption in 1868; and he found no important variation in the composition of the magma during these successive stages. Moreover, Professor A. Lacroix found that the material extruded from Vesuvius in 1906 remained practically of the same composition from the beginning to the end of the eruption, and further, that it presented great analogy to that of 1872 and even to that of 1631.

All the Vesuvian lavas are of the type of rock known as leucotephrite or leucitetephrite, or they pass, by the presence of a little olivine, into leucite-basanite. Leucite is characteristic of the lavas of Vesuvius, whilst it is excessively rare in those of Etna, where a normal doleritic type prevails. Nepheline, a felspathoid related to leucite, is characteristic of certain lavas, such as those of the Canary Islands, which comprise nepheline-tephrites and nepheline-basanites. Most of the lavas from the volcanoes of South America consist of hypersthene-andesite, and it is notable that the fragmental ejectamenta from the eruptions of St Vincent and Martinique in 1902 and from Krakatoa in 1883 were evidently derived from a magma of this Pacific type.

It commonly happens that acid lavas are paler in colour, less dense and less fusible than basic lavas, and they are probably drawn in some cases from shallower depths. As a consequence of the ready fusibility of many basic lavas, they flow freely on emission, running to great distances and forming far-spreading sheets, whilst the more acid lavas rapidly become viscid and tend to consolidate nearer to their origin, often in hummocky masses. The shape of a volcanic mountain is consequently determined to a large extent by the chemical character of the lavas which it emits. In the Hawaiian Islands, for instance, where the lavas are highly basic and fluent, they form mountains which, though lofty, are flat domes with very gently sloping sides. Such is the fluidity of the lava on emission that it flows freely on a slope of less than one degree. In consequence, too, of this mobility, it is readily thrown into spray and even projected by the expansive force of vapour into jets, which may rise to the height of hundreds of feet and fall back still incandescent, producing the appearance of "fire fountains." The emission is not usually accompanied, however, by violent explosions, such as are often associated with the eruption of magmas of less basic and more viscous nature. The viscosity of the lava at Kilauea was estimated by G. F. Becker to be about fifty times as great as that of water. It may be pointed out that the fusibility of a lava depends not on the mere fact that it is basic, but rather on the character of the bases. A lava from Etna or Vesuvius may be really as basic as one from Hawaii.

Capillary Lava.—A filamentous form of lava well known at Kilauea, in Hawaii, is termed *Pele's hair*, after Pele, the reputed goddess of the Hawaiian volcanoes. It resembles the capillary slag much used in the arts under the name of "mineral wool"—a material formed by injecting steam into molten slag from an iron blast-furnace. It is commonly supposed that Pele's hair has been formed from drops of lava splashed into the air and drawn out by the wind into fine threads. According, however, to Major C. E. Dutton, the filaments are formed on the eddying surface of the lava by the elongation of minute vesicles of water-vapour expelled from the magma. C. F. W. Krukenberg, who examined the hair microscopically, figured a large number of fibres, some of which showed the presence of minute vesicles and microscopic crystals, the former when drawn out rendering the thread tubular. In a spongy vitreous scoria from Hawaii, described as "thread-lace," a polygonal network of delicate fibres forms little skeleton cells. Capillary lava is not confined to the Hawaiian volcanoes: it is known, for example, in Réunion, and may be formed even at Vesuvius.

Pumiceous Lava.—The copious disengagement of vapour in a glassy lava gives rise to the light cellular or spongy substance, full of microscopic pores, known as pumice (*q.v.*). It is usually, though not invariably, produced from an acid lava, and may sometimes be regarded as the solidified foam of an obsidian. During the eruption of Krakatoa in 1883 enormous quantities of pumice were ejected, and were carried by the sea to vast distances, until they ultimately became water-logged and sank. Professor Judd found the pumice to consist of a vitreous lava greatly inflated by imprisoned vapours; the walls of the air-cells were formed of the lava drawn out into thin plates and threads, often with delicate fibres running across the cavities. Having been suddenly cooled, it was extremely brittle, and its ready pulverization gave rise to much of the ash ejected during this eruption. It has been shown by Dr Johnston-Lavis that a bed of pumiceous lava, especially if basic, is generally vitreous towards the base, becoming denser, darker and more crystalline upwards, until it may pass superficially into scoria. The change is explicable by reduction in the temperature of the magma consequent on the conversion of water into steam.

Water in Lavas.—Whether an eruption is of an explosive or a tranquil character must depend largely, though not wholly, on the chemical composition of the magma, especially on the extent to which it is aquiferous. By relief of pressure on the rise of the column in the volcanic channel, or otherwise, more or less steam will be disengaged, and if in large quantity this must become, with other vapours, a projectile agency of enormous power. The precise physical condition in which water exists in the magma is a matter of speculation, and hence Johnston-Lavis proposed to designate it simply as H_2O. Water above its critical point, which is about 370° C. or 698° F., cannot exist as a liquid, whatever be the pressure, neither is it an ordinary vapour. It has been estimated that the critical point would probably be reached at a depth of about 7 m. At very high temperatures the elements of water may exist in a state of dissociation.

Much discussion has arisen as to the origin of the volcanic water, but probably it is not all attributable to a single source. Some may be of superficial origin, derived from rain, river or sea; whilst the upward passage of lava through moist strata must generate large volumes of steam. It has often been remarked that wet weather increases the activity of a volcano, and that in certain mountains the eruptions are more frequent in winter. According, however, to Professor A. Riccò's prolonged study of Etna, rain has no apparent influence on the activity of this mountain, and indeed the number of eruptions in winter, when rains are abundant, seems rather less than in summer.

The popular belief that explosive action is due to the admission of water to the volcanic focus is founded mainly on the topographic relation of volcanoes to large natural bodies of water, many being situated near the shore of a continent or on islands or even on the sea-floor. Salt water gaining access to heated rocks, through fissures or by capillary absorption, would give rise not only to water-vapour but to the volatile chlorides so common in volcanic exhalations. Yet it is notable that comparatively little chlorine is found among the products exhaled by the volcanoes of Hawaii, though these are typically insular. L. Palmieri, however, described certain sublimates on lava at Vesuvius after the eruption of 1872 as deposits of "sea-salt," to show that they were not simply sodium chloride, but contained other constituents found in sea-water. Professor T. J. J. See believes that sea-water gains access to the heated rocks of the earth's interior by leakage through the floor of the ocean, the bottom never being water-tight, and Arrhenius supposes that it reaches the magma by capillarity through this floor.

It has been supposed that water on reaching the hot walls of a subterranean cavity would pass into the spheroidal state, and on subsequent reduction of temperature might come into direct contact with the heated surface, when it would flash with explosive violence into steam. Such catastrophes probably occur in certain cases. When, for example, a volcano becomes dormant, water commonly accumulates in the crater, and on a renewal of activity this crater-lake may be absorbed through fissures in the floor leading to the reopened duct, and thus become rapidly, even suddenly, converted into vapour But such incidents are accidental rather than normal, and seem incompetent to account for volcanic activity in general.

The effect of the contact of lava with water is often misunderstood.

When a stream of lava flows into the sea it no doubt immediately generates a prodigious volume of steam; but this is only a temporary phenomenon, for the lava rapidly becomes chilled by the cold water, with formation of a superficial solid layer, which by its low thermal conductivity allows the internal mass to cool slowly and quietly. In the great eruption of Krakatoa in 1883 the sea-water gained occasional access to the molten lava, and by its cooling effect checked the escape of vapour, thus temporarily diminishing the volcanic activity. But Judd compares this action to that of fastening down the safety-valve of a steam-boiler. The tension of the elastic fluids being increased by this repression would give rise subsequently to an explosion of greater violence; and hence the short violent paroxysms characteristic of the Krakatoa eruption were due to what he calls a "check and rally" of the subterranean forces. The action in the volcanic conduit has, indeed, been compared with that of a geyser.

The downward passage of water through fissures must be confined to the upper portion of the earth's crust known as the "zone of fracture," for it is there only that open channels can exist. Water might also percolate through the pores of the rocks, but even the pores are closed at great depths. It was shown many years ago by G. A. Daubrée that water could pass to a limited extent through a heated rock against the pressure of steam in the opposite direction. According to S. Arrhenius, water may pass inwards through the sea-bottom by osmotic pressure.

As the melting points of various silicates are lowered by admixture with water, it appears that the access of surface-waters to heated rocks must promote their fusibility. Judd has suggested that the proximity of large bodies of water may be favourable to volcanic manifestations, because the hydrated rocks become readily melted by internal heat and thus yield a supply of lava.

Whilst some of the water-vapour exhaled from a volcano is undoubtedly derived from superficial sources, notably in such insular volcanoes as Stromboli, the opinion has of late years been gaining ground, through the teaching of Professor E. Suess and others, that the volcanic water must be largely referred to a deep-seated subterranean origin—that it is, in a word, "hypogene" or magmatic rather than meteoric. It is held that the magma as it rises through the volcanic conduit brings up much water-vapour and other gaseous matters derived from original sources, perhaps a relic of what was present in the earth in its molten condition, having possibly been absorbed from a dense primordial atmosphere, or, as suggested by Professor T. C. Chamberlin, entrapped by the globe during its formation by accretion of planetesimal matter.

Water brought from magmatic depths to the surface, and appearing there for the first time, has been termed "juvenile," and it has been assumed that such water may be seen in hot springs like those at Carlsbad. Professor J. W. Gregory has suggested that certain springs in the interior of Australia may derive part of their supply from juvenile or plutonic waters.

According to A. Gautier, the origin of volcanic water may be found in the oxidation of hydrogen, developed from masses of crystalline rock, which by subsidence have been subjected to the action of subterranean heat.

Volcanic Vapours.—It seems not unlikely that the vapours and gases exist in the volcanic magma in much the same way that they can exist in molten metal. It is a familiar fact that certain metals when melted can absorb large volumes of gases without entering into chemical combination with them. Molten silver, for example, is capable of absorbing from the atmosphere more than twenty times its volume of oxygen, which it expels on solidification, thus producing what is called the "spitting of silver." Platinum again can absorb and retain when solid, or occlude, a large volume of hydrogen, that can be expelled by heating the metal in vacuo. In like manner molten rock under pressure can absorb much steam. It appears that many igneous rocks contain gases locked up in their pores, not set free by pulverization, yet capable of expulsion by strong heat. The gases in rocks have been the subject of elaborate study by R. T. Chamberlin, whose results appear in Publication No. 106 of the Carnegie Institution of Washington.

Sir W. A. Tilden has found that granite, gabbro, basalt and certain other igneous rocks enclose many times their volume of gases, chiefly hydrogen and carbon dioxide, with carbon monoxide, methane and nitrogen. Thus, the basalt of Antrim in Ireland, which is a Tertiary lava, yielded eight times its volume of gas having the following percentage composition: hydrogen 36·15, carbon dioxide 32·08, carbon monoxide 20·08, methane 10, nitrogen 1·61. No doubt some of the gases evolved on heating rocks may be generated by reactions during the experiment, as shown by M. W. Travers, and also by Armand Gautier. It has been pointed out by Gautier that the gas exhaled from Mont Pelé during the eruption of 1902 had practically the same composition as that which he obtained on heating granite and certain other rocks. According to this authority a cubic kilometre of granite heated to redness would yield not less than 26,000,000 tons of water-vapour, besides other gases. If then a mass of granite in the earth's crust were subject to a great local accession of heat it might evolve vast volumes of gaseous matter, capable of producing an eruption of explosive type. Judd found that the little balls of Siberian obsidian called marekanite threw off, when strongly heated, clouds of finely divided particles formed by rupture of the distended mass through the escape of vapour. Pitchstone when ignited loses in some cases as much as 10% of its weight, due to expulsion of water.

Much of the steam and other vapour brought up from below by the lava may be evolved on mere exposure to the air, and hence a stream freshly extruded is generally beclouded with more or less vapour. Gaseous bubbles in the body of the lava render it vesicular, especially in the upper part of a stream, where the pressure is relieved, and the vesicles by the onward flow of the lava tend to become elongated in the direction of movement. Vesiculation, being naturally resisted by cohesion, is not common in very viscid lavas of acid type, nor is it to be expected where the lava has been subject to great pressure, but it is seen to perfection in surface-flows of liquid lavas of basaltic character. A vesicular structure may sometimes be seen even in dykes, but the cavities are usually rounded rather than elongated, and are often arranged in bands parallel to the walls of the dyke. A very small proportion of water in a lava suffices to produce vesiculation. Secondary minerals developed in a cellular lava may be deposited in the steam-holes, thus producing an amygdaloidal rock.

After the surface of a lava-stream has become crusted over, vapour may still be evolved in the interior of the mass, and in seeking release may elevate or even pierce the crust. Small cones may thus be thrown up on a lava-flow, and when vapour escapes from terminal or lateral orifices they are known as "spiracles." The steam may issue with sufficient projectile force to toss up the lava in little fountains. When the lava is very liquid, as in the Hawaiian volcanoes, it may after projection from the blow-hole fall back in drops and plastic clots, which on consolidation form, by their union, small cones.

Vapour-vents on lava are often known as fumaroles (*q.v.*). The character of the gaseous exhalations varies with the temperature, and the following classification was suggested by C. Sainte-Claire Deville: (1) Dry or white fumaroles having a temperature above 500° C. and evolving compounds of chlorine, and perhaps fluorine. (2) Acid fumaroles, exhaling much steam, with hydrocholoric acid and sulphur dioxide. (3) Alkaline fumaroles, at a temperature of about 100°, with much steam and ammonium chloride and some sulphuretted hydrogen. (4) Cold fumaroles, below 100°, with aqueous vapour, carbon dioxide and sulphuretted hydrogen. (5) Mofettes, indicating the expiring phase of vulcanism. A similar sequence of emanations, following progressive cooling of the lava, has been noted by other observers. During an eruption, the gaseous products may vary considerably. Johnston-Lavis found at Vesuvius that the vapour which first escaped from the boiling lava contained much sulphurous acid, and that hydrochloric acid and other chlorides appeared later.

If the vapours exhaled from volcanoes were derived originally from superficial sources, the lava would, of course, merely return to the surface of the earth what it had directly or indirectly absorbed. But if, as is now rather generally believed, much if not most of the volcanic vapour is derived from original subterranean sources, it must form a direct contribution from the interior of the earth to the atmosphere and hydrosphere, and consequently becomes of extreme geological interest.

Description of Special Gases and Vapours.—Hydrochloric acid, HCl, escapes abundantly from many vents, often accompanied with the vapours of certain metallic chlorides, and is responsible for much of the acrid effects of volcanic exhalations. To avoid dangerous vapours an active volcano should be ascended on the windward side. Free hydrofluoric acid, HF, has sometimes been detected with the hydrochloric acid among Vesuvian vapours, and silicon fluoride, SiF_4, has also been reported. Sulphuretted hydrogen, H_2S, is a frequent emanation, and being combustible may contribute to the lambent flames seen in some eruptions. It readily suffers oxidation, giving rise to sulphur dioxide and water. By the interaction of hydrogen sulphide and carbon dioxide, water and carbon oxysulphide, COS, are formed; whilst by reaction with sulphur dioxide, water and free sulphur are produced, such being no doubt the origin of many deposits of volcanic sulphur. Hydrogen sulphide may be formed by the decomposition of certain metallic sulphides, like that of calcium, in the presence of moisture, as suggested by Anderson and Flett with regard to certain muds at the Soufrière of St Vincent. Sulphur dioxide, SO_2, is one of the commonest exhalations, especially at acid fumaroles. It may be detected by its characteristic smell, that of burning brimstone, even when present in very small proportion and in the presence of an excess of hydrochloric acid. By hydration it readily forms sulphurous acid, which may be further oxidized to sulphuric acid. J. B. Boussingault found free sulphuric acid (with hydrochloric acid) in the water of the Rio Vinagre which issues from the volcano of Puracé in the Andes of Colombia; and it occurs also in certain other volcanic waters. Carbon dioxide, CO_2, is generally a product of the later stages of an eruption, and is often evolved after all other gases have ceased to escape. Although it may sometimes be due to the decomposition of limestone, it seems to be mostly of true magmatic origin. At the well-known Grotta del Cane, at Lake Agnano, in the Phlegraean Fields near Naples, there has been for ages a copious discharge, and analyses of the air of the cave by T. Graham Young showed the presence of from 61·5 to 71% of carbon dioxide. Gautier, in 1907, found 96 to 97% of this gas in the vapours (excluding water-vapour) emitted from the Solfatara near Pozzuoli in the Bay of Naples. The gas by its density tends to accumulate in depressed areas, as in the Death Gulch in the Yellowstone Park and in the Upas Valley of Java. In the Eifel, in the Auvergne and in many other volcanic regions it is discharged at temperatures not above that of the atmosphere. This natural carbonic acid gas is now utilized industrially at many localities. In the gases of the fumaroles of Mont Pelé, carbon monoxide, CO, was detected by H. Moissan. Probably certain hydrocarbons, notably methane or marsh-gas, CH_4, often exist in volcanic gases. They might be formed by the action of water on natural carbides, such as that of magnesium, calcium, &c. Moissan found 5·46% of methane in vapour from a fumarole on Mont Pelé in 1902. Free hydrogen was detected by R. Bunsen as far back as 1846 in vapours from volcanoes in Iceland. In 1861 Deville and Fouqué found it, with hydrocarbons, at Torre del Greco near Naples; and in 1866 Fouqué discovered it at Santorin, where some of the vapour at the immediate focus of eruption contained as much as 30% of hydrogen. It is notable that at Santorin free oxygen was also found. The elements of water may possibly exist, at the high temperature of the magma, in a state of dissociation, and certain volcanic explosions have sometimes been attributed to the combination of these elements. Oxygen is not infrequently found among volcanic emanations, but may perhaps be derived in most cases from superficial air and ground-water; and in like manner the nitrogen, often detected, may be sometimes of atmospheric origin, though in other cases derived from nitrides in the lava. In the vapours emitted by Mont Pelé in 1902 argon was detected by H. Moissan, to the extent of 0·71%; and in those from Vesuvius in 1906 argon and neon were found by Gautier. The collection of volcanic vapours offers difficulty, and it is not easy to avoid admixture with the atmosphere. F. A. Perret has successfully collected gases on Vesuvius.

Volcanic Flames.—Although the incandescence of the lava and stones projected during an eruption, and the reflection from incandescent matter in the crater have often been mistaken for red flames, there can be no doubt that true combustion, though generally feeble, does occur during volcanic outbursts. Among the gases cited above, hydrogen, hydrogen sulphide and the hydrocarbons are inflammable. The flames seen in volcanoes are generally pale and of bluish, greenish or yellowish tint. They were first examined spectroscopically by J. Janssen, who in 1867 detected the lines of burning hydrogen at Santorin. Subsequently he proved the presence of hydrogen, sodium and hydrocarbons in the volcanic flames of Kilauea. During the eruption of Vulcano, in the Lipari Isles, in 1888, flames with a bluish or greenish tinge were seen by A. E. Narlian, an experienced observer resident in the island. These, however, were referred to the kindling of sulphur deposited around the fumaroles, the flames being coloured by the presence of boric acid and arsenic sulphide.

When a stream of lava flows over vegetation the combustion of the leaves and wood may be mistaken for flames issuing from the lava. In like manner brushwood may grow in the crater of a dormant volcano and be ignited by a fresh outburst of lava, thus producing flames which, from their position in the crater, may readily deceive an observer.

Volcanic Sublimates.—Certain mineral substances occur as sublimates in and around the volcanic vents, forming incrustations on the lava. They are either deposited directly from the effluent vapours, which carry them in a volatile condition, or are produced by interaction of the vapours among themselves; whilst some of the incrustations, rather loosely called sublimates, are due to reaction of the vapours on the constituents of the lava. Possibly at the temperature of the magma-reservoirs even silica and various silicates may be volatilized, and might thus yield sublimation products. Many of the volcanic sublimates occur at first as incandescent crusts on the lava. Being generally unstable they are difficult of preservation, and are not usually well represented in collections.

Among the commonest sublimates is halite, or sodium chloride, NaCl, occurring as a white crystalline incrustation, sometimes accompanied, as at Vesuvius, by sylvite, or potassium chloride, KCl, which forms a similar sublimate. The two chlorides may be intimately associated. Sal ammoniac, or ammonium chloride, NH_4Cl, is not uncommon, especially at Etna, as a white crystalline crust, probably formed in part by the reaction of hydrochloric acid with nitrogen and hydrogen in the vapours. Bunsen, on finding it in Iceland, regarded it as a product of the distillation of organic matter. At the Solfatara, near Pozzuoli, sal ammoniac was formerly collected as a sublimate on tiles placed round a bocca or vapour-vent. Ferric chloride, $FeCl_3$, not infrequently occurs as a reddish or brownish yellow deliquescent incrustation, and because it thus colours the lava it has received the name of molysite (from Gr. μόλυνσις, stain). The action of hydrochloric acid on the iron compounds in the lava may readily yield this chloride, which from its yellowish colour has sometimes been mistaken for sulphur. A crystalline sublimate from the fumaroles on Vesuvius, containing ferric and alkaline chlorides, $KCl{\cdot}NH_4Cl{\cdot}2FeCl_3+6H_2O$, is known as kremersite, after P. Kremers. From a scoriaceous lava found on Vesuvius after the eruption of 1906, Johnston-Lavis procured a yellow rhombohedral sublimate, which he proved to be a chloride of manganese and potassium, whence he proposed for it the name chlormanganokalite. It was studied by L. J. Spencer, and found to contain $4KCl{\cdot}MnCl_2$. Chlorocalcite, or native calcium chloride, $CaCl_2$, has been found in cubic crystals on Vesuvian lava. Fluorite, or calcium fluoride, CaF_2, is also known as a volcanic product. Lead chloride, $PbCl_2$, a rare Vesuvian mineral, was named cotunnite, after Dr Cotugno of Naples. The action of hydrogen sulphide on this chloride may give rise to galena, PbS, found by A. Lacroix on Vesuvius in 1906. Atacamite, or cupric oxychloride, $CuCl_2{\cdot}3Cu(OH)_2$, occurs as a green incrustation on certain Vesuvian lavas, notably those of 1631. Another green mineral from Vesuvius was found by A. Scacchi to be a sulphate containing copper, with potassium and sodium, which he named from its fine colour *euclorina*—a word which has been written in English as euchlorinite. The copper in the sublimates on Vesuvius will sometimes plate the iron nails of a traveller's boots when crossing the newly erupted lava. Cupric oxide, CuO, occurs in delicate crystalline scales termed tenorite, after Professor G. Tenore of Naples; whilst cupric sulphide, CuS, forms a delicately reticulated incrustation known as covellite, after N. Covelli, its discoverer at Vesuvius.

A sublimate not infrequently found in feathery crystalline deposits on lava at Vesuvius, and formerly called "Vesuvian salt," is a potassium and sodium sulphate, $(K{\cdot}Na)_2SO_4$, known as aphthitalite (from Gr. ἄφθιτος, imperishable, and ἅλς, salt). A sulphate with the composition $PbSO_4{\cdot}(K{\cdot}Na)_2SO_4$, found in the fumaroles at Vesuvius after the eruption of 1906, was named by A. Lacroix palmierite, after L. Palmieri, who was formerly director of the observatory on Vesuvius. Various sulphites are formed on lavas by the sulphurous acid of the vapours. Ferric oxide, Fe_2O_3, which occurs in beautiful metallic scales as specular iron-ore, or as an amorphous reddish incrustation on the lava, is probably formed in most cases by the interaction of vapour of ferric chloride and steam at a high temperature. Less frequently, magnetite, Fe_3O_4, and magnesioferrite, $MgFe_2O_4$, are found in octahedral crystals on lava. An iron nitride (Fe_5N_2) was detected thinly incrusting a lava erupted at Etna in 1874, and was named by O. Silvestri, who examined it, siderazote.

Boric acid, H_3BO_3, occurs in the crater of Vulcano so abundantly that it was at one time collected commercially. It has also led to the foundation of an industry in Tuscany, where it is obtained from the soffioni (*q.v.*) of the Maremma. From Sasso in Tuscany it has received the name of sassolin or sassolite. Realgar, or arsenic sulphide, As_2S_2, occurs in certain volcanic exhalations and is deposited as an orange-red incrustation, often associated with sulphur, as at the Solfatara, where orpiment, As_2S_3, has also been found.

Of all volcanic products, sulphur (*q.v.*) is in some respects the most important. It may occur in large quantity lining the walls of the crater, as at Popocatepetl in Mexico, where it was formerly worked by the Indian "volcaneros," or on the other hand it may be a rare product, as at Vesuvius. Sulphur appears generally to owe its origin in volcanic areas to the interaction of sulphur dioxide and sulphuretted hydrogen, or to the action of water on the latter. A volcanic vent where sulphur is deposited is truly a solfatara (*solfo terra*) or a soufrière, but all volcanoes which have passed into that stage in which they emit merely heated vapours now pass under this name (see SOLFATARA). The famous Solfatara, an old crater in the Phlegraean Fields, exhales sulphurous vapours, especially at the Bocca Grande, from which sulphur is deposited. In the orange-coloured sulphur of the Solfatara, realgar may be present to the extent of as much as 18%. A brown seleniferous sulphur occurring at Vulcano, one of the Lipari Islands, was termed by W. Haidinger volcanite, but it should be noted that Professor W. H. Hobbs has applied this name to an anorthoclase-augite rock ejected as bombs at Vulcano. Sulphur containing selenium is known as a volcanic product in Hawaii, whilst in Japan not only selenium but tellurium occurs in certain kinds of sulphur.

At the Solfatara, near Pozzuoli, the hot sulphurous vapours attack the trachytic rocks from which they issue, giving rise to such products as alum, kaolin and gypsum. To some of these products, including alunogen and mendozite (soda-alum), the name solfatarite was given by C. W. Sheppard in 1835. By prolonged action of the acid vapours on lava, the bases of the silicates may be removed, leaving the silica as a soft white chalk-like substance. The occurrence of kaolin and other white earthy alteration-products led to the hills around the Solfatara being known to the Romans as the *Colli leucogei*.

The Hot Dust Cloud and Avalanche of Pelé.—The terrific eruptions in the islands of Martinique and St Vincent in the West Indies in 1902, furnished examples of a type of activity not previously recognized by vulcanologists, though, as Professor A. Lacroix has pointed out, similar phenomena have no doubt occurred elsewhere, especially in the Azores. By Drs Tempest Anderson and J S. Flett, who were commissioned by the Royal Society to report on the phenomena, this type of explosive eruption is distinguished as the "Peléan type." Its distinctive character is found in the sudden emission of a dense black cloud of superheated and suffocating gases, heavily charged with incandescent dust, moving with great velocity and accompanied by the discharge of immense volumes of volcanic sand, which are not rained down in the normal manner, but descend like a hot avalanche. The cloud, with the avalanche, is called by Lacroix a *nuée Peléenne*, or *nuée ardente*, the latter term having been applied to the fatal cloud in the eruptions at San Jorge in the Azores in 1818. In its typical form, the cloud seen at Pelé appeared as a solid bank, opaque and impenetrable, but having the edge in places hanging like folds of a curtain, and apparently of brown or purplish colour. Rolling along like an inky torrent, it produced in its passage intense darkness, relieved by vivid lightning. So much solid matter was suspended in the cloud, that it became too dense to surmount obstacles and behaved rather like a liquid. It has, however, been suggested that its peculiar movement as it swept down the mountain was due not simply to its heavy charge of solids, but partly to the oblique direction of the initial explosion. After leaving the crater, it underwent enormous expansion, and Anderson and Flett were led to suggest that possibly at the moment of emission it might have been partly in the form of liquid drops, which on solidifying evolved large volumes of gas held previously in occlusion. The deadly effect of the blast seems to have been mostly due to the irritation of the mucous membrane of the respiratory passages by the fine hot dust, but suffocating gases, like sulphur dioxide and sulphuretted hydrogen, were associated with the water-vapour. Possibly the incandescent dust was even hotter than the surrounding vapour, since the latter might be cooled by expansion.

It is said that the black cloud as it swept along was accompanied by an indraught of air, not however sufficiently powerful to check its rapid advance. The current of air was likened by Anderson and Flett to the inrush of air at a railway station as an express train passes. An attempt was made to determine the temperature of the fatal blast which destroyed St Pierre, but without very definite results. Thus it was assumed that as the telephone wires were not melted the temperature was below the fusing-point of copper: possibly, however, the blast may have passed too rapidly to produce the effects which might normally be due to its temperature.

Shape of Volcanic Cones.—Those volcanic products which are solid when ejected, or which solidify after extrusion, tend to form by their accumulation around the eruptive vent a hill, which, though generally more or less conical, is subject to much variation in shape. It occasionally happens that the hill is composed wholly of ejected blocks, not themselves of volcanic origin. In this case an explosion has rent the ground, and the effluent vapours have hurled forth fragments of the shattered rock through which the vent was opened, but no ash or other fragmentary volcanic material has been ejected, nor has any lava been poured forth. This exceptional type is represented in the Eifel by certain monticules which consist mainly of fragments of Devonian slate, more or less altered. In some cases the area within a ring of such rocky materials is occupied by a sheet of water, forming a crater-lake, known in the Eifel as a *maar*. Piles of fragmentary matter of this character, though containing neither cinders nor lava, may be fairly regarded as volcanic, inasmuch as they are due to the explosive action of hot subterranean vapours.

In the ordinary paroxysmal type of eruption, however, cinders and ashes are shot upwards by the explosion and then descend in showers, forming around the orifice a mound, in shape rather like the diminutive cone of sand in the lower lobe of an hour-glass. Little cinder-cones of this character may be formed within the crater of a large volcano during a single eruption; whilst large cones are built up by many successive discharges, each sheet of fragmentary material mantling more or less regularly round the preceding layer. The symmetry of the hill is not infrequently affected by disturbing influences—a strong wind, for example, blowing the loose matter towards one side. The sides of a cinder cone have generally a steep slope, varying from 30° to 45°, depending on the angle of repose of the ejectamenta. Excellent examples of small scoria-cones are found among the puys of Auvergne in central France, whilst a magnificent illustration of this type of hill is furnished by Fusiyama, in Japan, which reaches an altitude of 12,000 ft. How such a cone may be rapidly built up was well shown by the formation of Monte Nuovo, near Pozzuoli—a hill 400 ft. high and a mile and a half in circumference, which is known from contemporary evidence to have been formed in the course of a few days in September 1538. The shape of a cinder cone may be retained for ages, since it is not liable to suffer greatly by denudation, as the rain soaks into the loose porous mass instead of running down the outside. If lava rises in the duct of a cinder cone, it may, on accumulation in the crater, break down the wall, and thus effect its escape as a stream. Cones breached in this way are not uncommon in Auvergne.

It often happens that the cinders and ashes ejected from a volcano become mixed with water, and so form a paste, which sets readily as a hard tufaceous mass. Such natural tuff is indeed similar to the hydraulic cement known as pozzolana, which is formed artificially from volcanic ashes, and is renowned for durability. Although streams of volcanic mud are commonly associated with the ashes of a cinder-cone they may also form independent structures or tuff-cones. These are generally broad-topped hills, having sides with an angle of slope as low in some cases as 15°.

Lava-cones are built up of streams of lava which have consolidated around the funnel of escape. Associated with the lava, however, there is usually more or less fragmentary matter, so that the cones are composite in structure and consequently more acute in shape than if they were composed wholly of lava. As the streams of lava in a volcano run at different times in different directions, they radiate from the centre, or flow from lateral or eccentric orifices, as irregular tongues, and do not generally form continuous sheets covering the mountain.

When lava is the sole or chief element in the cone, the shape of the hill is determined to a great extent by the chemical composition and viscosity of the lava, its copiousness and the rapidity of flow. If the lava be highly basic and very mobile, it may spread to a great distance before solidifying, and thus form a hill covering a large area and rising perhaps to a great height, but remarkably flat in profile. Were the lava perfectly liquid, it would indeed form a sheet without any perceptible slope of surface. As a matter of fact, some lavas are so fluent as to run down an incline of 1°, and flat cones of basalt have in some cases a slope of only 10° or even less. The colossal mass of Mauna Loa, in Hawaii, forms a remarkably flat broad cone, spreading over a base of enormous area and rising to a height of 13,900 ft. Major Dutton, writing in 1883, said that "a moderate eruption of Mauna Loa represents more material than Vesuvius has emitted since the days of Pompeii." Yet the lava is so mobile that it generally wells forth quietly, without explosive demonstration, and therefore unaccompanied by fragmentary ejectamenta. Fluent lavas like those of Hawaii are also poured forth from the volcanoes and volcanic fissures of Iceland.

If the lava be less basic and less fusible, the hill formed by its accumulation instead of being a low dome will take the shape of a cone with sides of higher gradient: in the case of andesite cones, for instance, the slope may vary from 25° to 35°. Acid rocks, or those rich in silica, such as rhyolites and trachytes, may be emitted as very viscous lavas tending to form dome-shaped or bulbous masses. Experiment shows that such lavas may persist for a considerable time in a semi-solid condition. It is possible for a dome to increase in size not by the lava running over the crater and down the sides but by injection of the pasty magma within the expanding bulb while still soft; or if solidified, the crust yields by cracking. Such a mode of growth, in which the dome consists of successive sheets that have been compared to the skins of an onion, has been illustrated by the experiments of Dr A. Reyer, and the structure is typically represented by the mamelons or steep-sided domes of the Isle of Bourbon. The Puy-de-Dôme in Auvergne is an example of a cone formed of the trachytic rock called from its locality domite, whilst the Grand Sarcoui in the same region illustrates the broad dome-shaped type of hill. Such domes may have no summit-crater, and it is then usually assumed that the top with the crater has been removed by denudation, but possibly in some cases such a feature never existed. The "dome volcano" of von Seebach is a dome of acid lava extruded as a homogeneous mass, without conspicuous chimney or crater. Although domes are usually composed of acid rocks, it seems possible that they may be formed also of basic lavas, if the magma be protruded slowly at a low temperature so as to be rapidly congealed.

The Spine of Pelé.—A peculiar volcanic structure appeared at Mont Pelé in the course of the eruption of 1902, and was the subject of careful study by Professor A. Lacroix, Dr E. A. Hovey, A. Heilprin and other observers. It appears that from fissures in the floor of the Étang Sec a viscous andesitic lava, partly quartziferous, was poured forth and rapidly solidified superficially, forming a dome-shaped mass invested by a crust or carapace. According to Lacroix, the crust soon became fractured, partly by shrinkage on consolidation and partly by internal tension, and the dome grew rapidly by injection of molten matter. Then there gradually rose from the dome a huge monolith or needle, forming a terminal spine, which in the course of its existence varied in shape and height, having been at its maximum in July 1903, when its absolute height was about

5276 ft. above sea-level. The walls of the spine, inclined at from 75° to 90° to the horizon, were apparently slickensided, or polished and scratched by friction: masses were occasionally detached and vapours were continually escaping. Several smaller needles were also formed. Some observers regarded the great spine as a solidified plug of lava from a previous outburst, expelled on a renewal of activity. Lacroix, however, believed that it was formed by the extrusion of an enormous mass of highly viscid magma, perhaps partly solidified before emission, and he compared the formation of the dome in the crater to the structure on Santorin in 1866, described by Fouqué as a "cumulo-volcano." Professor H. F. Cleland has suggested a comparison with the cone of andesite in the crater of the volcano of Toluca in Mexico, and it is said that similar formations have been observed in the volcanoes of the Andes. Dr Tempest Anderson, on visiting Pelé in 1907, found a stump of the spine, consisting of a kind of volcanic agglomerate, rising from a cone of talus formed of its ruins.

The Crater.—The eruptive orifice in normal volcano—the *bocca* of Italian vulcanologists—is usually situated at the bottom of a depression or cup, known as the crater. This hollow is formed and kept open by the explosive force of the elastic vapours, and when the volcano becomes dormant or extinct it may be closed, partly by rock falling from its crumbling walls and partly by the solidification of the lava which it may contain. If a renewed outburst occurs, the floor of the old crater may reopen or a new outlet may be formed at some weak point on the side of the mountain: hence a crater may, with regard to position, be either terminal or lateral. The position of the crater will evidently be also changed on any shifting of the general axis of eruption. In shape and size the crater varies from time to time, the walls being perhaps breached or even blown away during an outburst. Hence the height of a volcanic mountain in activity, measured to the rim of the crater or the terminal peak, is not constant. Vesuvius, for example, suffered a reduction of several hundred feet during the great eruption of 1906, the east side of the cone having lost, according to V. R. Matteucci, 120 metres.

Whilst in many cases the crater is a comparatively small circular hollow around the orifice of discharge, it forms in others a large bowl-like cavity, such as is termed in some localities a "caldera." In the Sandwich Islands the craters are wide pits bounded by nearly vertical walls, showing stratified and terraced lavas and floored by a great plain of black basalt, sometimes with lakes of molten lava. Professor W. H. Pickering compares the lava-pits of Hawaii to the crater-rings in the moon. Some of the pit-craters in the Sandwich Islands are of great size, but none comparable with the greatest of the lunar craters. Dr G. K. Gilbert, however, has suggested that the ring-shaped pits on the moon are not of volcanic origin, but are depressions formed by the impact of meteorites. Similarly the "crater" of Coon Butte, near Canyon Diablo, in Arizona, which is 4000 ft. in diameter and 500 ft. deep, has been regarded as a vast pit due to collision of a meteorite of prodigious size. Probably the largest terrestrial volcanic crater is that of Aso-san, in the isle of Kiushiu (Japan), which is a huge oval depression estimated by some observers to have an area of at least 100 sq. m. Some of the large pit-craters have probably been formed by subsidence, the cone of a volcano having been eviscerated by extravasation of lava, and the roof of the cavity having then subsided by loss of support The term caldera has sometimes been limited to craters formed by such collapse.

On the floor of the crater, ejected matter may accumulate as a conoidal pile; and if such action be repeated in the crater of the new cone, a succession of concentric cones will ultimately be formed. The walls of a perfect crater form a ring, giving the cone a truncated appearance, but the ring may suffer more or less destruction in the course of the history of the mountain. A familiar instance of such change is afforded by Vesuvius. The mountain now so called, using the term in a restricted sense, is a huge composite cone built up within an old crateral hollow, the walls of which still rise as an encircling rampart on the N. and N.E. sides, and are known as Monte Somma; but the S. and S.W. sides of the ancient crater have disappeared, having been blown away during some former outburst, probably the Plinian eruption of 79. In like manner the relics of an old crater form an amphitheatre partially engirdling the Soufrière in St Vincent, and other examples of "Somma rings" are known to vulcanologists.

Much of the fragmental matter ejected from a volcano rolls down the inside of the crater, forming beds of tuff which incline towards the central axis, or have a centroclinal dip. On the contrary, the sheets of cinder and lava which form the bulk of the cone slope away from the axis, or have a dip that is sometimes described as periclinal or qua-qua-versal. According to the old "crater-of-elevation theory," held especially by A. von Humboldt, L. von Buch and Élie de Beaumont, this inclination of the beds was regarded as mainly due to upheaval. It was contended that the volcanic cone owed its shape, for the most part, to local distension of the ground, and was indeed comparable to a huge blister of the earth's crust, burst at the summit to form the "elevation crater." Palma, in the Canary Islands, was cited as a typical example of such a formation. This view was opposed mainly by Poulett-Scrope, Sir Charles Lyell and Constant Prévost, who argued that the volcano, so far from being bladder-like, was practically a solid cone of erupted matter: hence this view came to be known as the "crater-of-eruption theory." Its general soundness has been demonstrated whenever an insight has been obtained into the internal structure of a volcano. Thus, after the eruption of Krakatoa in 1883 a magnificent natural section of the great cone of Rakata, at the S. end of the island, was exposed—the northern half having been blown away— and it was then evident that this mountain was practically a solid cone, built up of a great succession of irregular beds of tuff and lava, braced together by intersecting dykes. The internal architecture of a volcano is rarely so well displayed as in this case, but dissections of cones, more or less distinct, are often obtained by denudation. It should be mentioned that, in connexion with the structures called *laccoliths*, there may have been an elevation, or folding, and even faulting, of the superficial rocks by subterranean intrusion of lava; but this is different from the local expansion and rupture of the ground required by the old theory. It may be noted, however, that in recent years the view of elevation, in a modified form, has not been without supporters.

Where the growth of a volcanic mound takes place from within, as in certain steep-sided trachytic cones, there may be no perceptible crater or external outlet. Again, there are many volcanoes which have no crater at the summit, because the eruptions always take place from lateral outlets. Even when a terminal pit is present, the lava may issue from the body of the mountain, and in some cases it exudes from so many vents or cracks that the volcano has been described as "sweating fire."

Parasitic Cones.—In the case of a lofty volcano the column of lava may not have sufficient ascensional force to reach the crater at the summit, or at any rate it finds easier means of egress at some weak spot, often along radial cracks, on the flanks of the mountain. Thus at Etna, which rises to a height of more than 10,800 ft., the eruptions usually proceed from lateral fissures, sometimes at least half-way down the mountain-side. When fragmental materials are ejected from a lateral vent a cinder-cone is formed, and by frequent repetition of such ejections the flanks of Etna have become dotted over with hundreds of scoria-cones much like the puys of Auvergne, the largest (Monte Minardo) rising to a height of as much as 750 ft. Hills of this character, seated on the parent mountain, are known as parasitic cones, minor cones, lateral cones, &c.

Such subordinate cones often show a tendency to a linear arrangement, rising from vents or *bocche* along the floor of a line of fissure. Thus in 1892 a chain of five cones arose from a rift on the S. side of Etna, running in a N. and S. direction, and the hills became known as the Monti Silvestri, after Professor Orazio Silvestri of Catania. This rift, however, was but a continuation of a fissure from which there arose in 1886 the series of cones called the Monti Gemmellaro, while this in turn was a prolongation of a rent opened in 1883. The eruption on Etna in the spring of 1910 took place along the same general direction, but at a much higher elevation. The tendency for eruptions to be renewed along old lines of weakness, which can be readily opened afresh and extended, is a feature well known to vulcanologists.

The small cones which are frequently thrown up on lava streams were admirably exemplified on Vesuvius in the eruption of 1855 and figured by J. Schmidt. The name of "driblet cones" was given by J. D. Dana to the little cones and pillars formed by jets of lava projected from blowing holes at Kilauea, the drops of lava remaining plastic and cohering as they fell. Such clots may form columns and pyramids, with almost vertical sides. Steep-sided cones more or less of this character occur elsewhere, but are usually built up around spiracles. Small cones formed by mere dabs of lava are known trivially as "spatter cones."

Fissure Eruptions.—In certain parts of the world there are vast tracts of basaltic lava with little or no evidence of cones or of pyroclastic accompaniment. To explain their formation, Baron F. von Richthofen suggested that they represent great floods of lava which were poured forth not from ordinary volcanic craters with more or less explosive violence, but from great fissures in the earth's crust, whence they may have quietly welled forth and spread as a deluge over the surface of the country. The eruptions were thus effusive rather than explosive. Such phenomena, constituting a distinct type of vulcanism, are distinguished as fissure eruptions or massive eruptions—terms which suggest the mode of extrusion and the character of the extruded matter. As the lava in such outflows must be very fusible, it is generally of basaltic type, like that of Hawaii: indeed, the Hawaiian volcanoes, with their quiet emission of highly fluent lavas, connect the fissure eruptions with the "central eruptions," which are usually regarded as representing the normal type of activity. At the present day true fissure eruptions seem to be of rather limited occurrence, but excellent examples are furnished by Iceland. Here there are vast fields of black basalt, formed of sheets of lava which have issued from long chasms, studded in most cases with rows of small cones, but these generally so insignificant that they make no scenic features and might be readily obliterated by denudation. Dr T. Thoroddsen enumerates 87 great rifts and lines of cones in Iceland, and even the larger cones of Vesuvian type are situated on fissures.

It is believed that fissure eruptions must have played a far more important part in the history of the earth than eruptions of the familiar cone-and-crater type, the latter representing indeed only a declining phase of vulcanism. Sir Archibald Geikie, who has specially studied the subject of fissure eruptions, regards the Tertiary basaltic plateaus of N E. Ireland and the Inner Hebrides as outflows from fissures, which may be represented by the gigantic system of dykes that form so marked a feature in the geological structure of the northern part of Britain and Ireland. These dykes extend over an area of something like 40,000 sq. m., while the outflows form an aggregate of about 3000 ft. in thickness. In parts of Nevada, Idaho, Oregon and Washington, sheets of late Tertiary basalt from fissure eruptions occupy an area of about 200,000 sq. m., and constitute a pile at least 2000 ft. thick. In India the "Deccan traps" represent enormous masses of volcanic matter, probably of like origin but of Cretaceous date, whilst South Africa furnishes other examples of similar outflows. Professor J. W. Gregory recognized in the Kapte plains of East Africa evidence of a type of vulcanism, which he distinguished as that of "plateau eruptions." According to him a number of vents opened at the points of intersection of lines of weakness in a high plateau, giving rise to many small cones, and the simultaneous flows of lava from these cones united to form a far-spreading sheet.

Extrusive and Intrusive Magmas.—When the molten magma in the interior of the earth makes its way upwards and flows forth superficially as a stream of lava, the product is described as extrusive, effusive, effluent or eruptive; but if, failing to reach the surface, the magma solidifies in a fissure or other subterranean cavity, it is said to be intrusive or irruptive. Rocks of the former group only are sometimes recognized as strictly "volcanic," but the term is conveniently extended, at least in certain cases, to igneous rocks of the latter type, including therefore certain hypabyssal and even plutonic rocks.

When the intrusive magma has been forced into narrow irregular crevices it forms "veins," which may exhibit complex ramifications, especially marked in some acid rocks; but when injected into a regularly shaped fissure, more or less parallel-sided, and cutting across the planes of bedding, it forms a wall-like mass of rock termed a "dyke." Most dykes are approximately vertical, or at least highly inclined in position. The inclination of a dyke to a vertical plane is termed its "hade." In a cinder-cone, the lava as it rises may force its way into cracks, formed by pressure of the magma and tension of the vapours, and will thus form a system of veins and dykes, often radiating from the volcanic axis and strengthening the structure by binding the loose materials together. Thus, in the Valle del Bove, a huge cavity on the east side of Etna, the walls exhibit numerous vertical dykes, which by their hardness stand out as rocky ribs, forming a marked feature in the scenery of the valley. In a similar way dykes traverse the walls of the old crater of Monte Somma at Vesuvius. Exceptionally a dyke may be hollow, the lava having solidified as a crust at the margin of the fissure but having escaped from the interior while still liquid.

When molten matter is thrust between beds of tuff or between successive lava-flows or even ordinary sedimentary strata, it forms an intrusive sheet of volcanic rock known as a "sill." A sill may sometimes be traced to its connexion with a dyke, which represents the channel up which the lava rose, but instead of reaching the surface the fluid found an easier path between the strata or perhaps along a horizontal rent. Although a dyke may represent a conduit for the ascent of lava which has flowed out superficially, yet if the lava has been removed at the surface by denudation the dyke terminates abruptly, so that its function as the former feeder of a lava-current is not evident. In other cases a dyke may end bluntly because the crack which it occupies never reached the surface.

Lava which has insinuated itself between planes of stratification may, instead of spreading out as a sheet or sill, accumulate locally as a lenticular mass, known as a *laccolith* or *laccolite* (*q.v.*). Such a mass, in many cases rather mushroom-shaped, may force the superincumbent rocks upwards as a dome, and though at first concealed may be ultimately exposed by removal of the overlying burden by erosion. The term *phacolite* was introduced by A. Harker to denote a meniscus-shaped mass of lava intruded in folded strata, along a crest or a trough. The *bysmalith* of Professor Iddings is a *laccolith* of rather plug-like shape, with a faulted roof. An intrusive mass quite irregular in shape has been termed by R. A. Daly a *chonolith* (Gr. χώνη, a mould), whilst an intrusion of very great size and ill-defined form is sometimes described as a *bathylith* or *batholite*.

Structural Peculiarities in Lava.—Many of the structures exhibited by lava are due to the conditions under which solidification has been effected. A dyke, for example, may be vitreous at the margin where it has been rapidly chilled by contact with the walls of the fissure into which it was injected, whilst the main body may be lithoidal or crystalline: hence a basalt dyke will sometimes have a selvage formed of the basaltic glass known as tachylyte. A similar glass may form a thin crust on certain lava-flows. In a homogeneous vitreous lava, contraction on solidification may develop curved fissures, well seen in the delicate "perlitic" cracks of certain obsidians, indicating a tendency to assume a globular structure. This structure becomes very distinct by the development of "spherulites" or globular masses with a radiating fibrous structure, sometir vitrified glass. Occasionally the spherulitic br v, when they are known as lithophyses, of which excellent examples occur at Obsidian Cliff in the Yellowstone National Park, as described by Professor Iddings. Globular structure on a large scale is sometimes displayed by lavas, expecially those of basic type, such as the basalt of Aci Castello in Sicily, which was probably formed, according to Professor Gaetano Platania, by flow of the lava into submarine silt, relics of which still occur between the spheroids. Ellipsoidal or pillow-shaped masses are not infrequently developed in ancient lava-flows, and Sir A. Geikie has suggested the term "pillow-structure" for such formations. Dr T. Anderson has observed them in the recent lavas of Savaii.

Joints, or cracks formed by shrinkage on solidification, may divide a sheet of lava into columns, as familiarly seen in basalt, where the rock often consists of a close mass of regular polygonal prisms, mostly hexagonal. Each prism is divided at intervals by transverse joints, more or less curved, so that the portions are united by a slight ball-and-socket articulation. As the long axes of the columns lie at right angles to the cooling surface they are vertical in a horizontal sheet of lava, horizontal in a vertical dyke, and inclined or curved in other cases. It sometimes happens that in a basaltic dyke the formation of the prisms, having started from the opposite walls as chilling surfaces, has not been completed; and hence the prisms fail to meet in the middle. A spheroidal structure is often developed in basalt columns by weathering, the rock exfoliating in spherical shells, rather like the skins of an onion: such a structure is characteristically shown at the Käsekellar, known also as the Elfen Grotto, at Bertrich, near Alf on the Mosel. where the pillars of the lava are broken into short segments which suggest by their flattened globular shape a pile of Dutch cheeses. Although prismatic jointing, or columnar structure, is most common in basalt, it occurs also in other volcanic rocks. Fine columns of obsidian, for instance, are seen at Obsidian Cliff in the Yellowstone Park, where the pillars may be 50 ft. or more in height. Such an occurrence, however, is exceptional.

Vitreous lavas often show fluxion structure in the form of streaks, bands or trains of incipient crystals, indicating the flow of the mass when viscous. The character of this structure is related to the viscosity of the lava. Those structural peculiarities which depend mainly on the presence of vapour, such as vesiculation, have been already noticed, and the porphyritic structure has likewise been described.

Submarine Volcanoes.

Considering how large a proportion of the face of the earth is covered by the sea, it seems likely that volcanic eruptions must frequently occur on the ocean-floor. When, as occasionally though not often happens, the effects of a submarine eruption are observed during the disturbance, it is seen that the surface of the sea is violently agitated, with copious discharge of steam; the water passes into a state of ebullition, perhaps throwing up huge fountains; shoals of dead fishes, with volcanic cinders, bombs and fragments of pumice, float around the centre of eruption, and ultimately a little island may appear above sea-level. This new land is the peak of a volcanic cone which is based on the sea-floor, and if in deep water the submarine mountain must evidently be of great magnitude. Christmas Island in the Indian Ocean, described by Dr C. W. Andrews, appears to be a volcanic mountain, with Tertiary limestones, standing in water more than 14,000 ft. deep. Many volcanic islands, such as those abundantly scattered over the Pacific, must have started as submarine volcanoes which reached the surface either by continued upward growth or by upheaval of the sea-bottom. Etna began its long geological history by submarine eruptions in a bay of the Mediterranean, and Vesuvius in like manner represents what was originally a volcano on the sea-floor. As the ejectamenta from a submarine vent accumulate on the sea-bottom they become intermingled with relics of marine organisms, and thus form fossiliferous volcanic tuffs. By the distribution of the ashes over the sea-floor, through the agency of waves and currents, these tuffs may pass insensibly into submarine deposits of normal sedimentary type.

One of the best examples of a submarine eruption resulting in the formation of a temporary island occurred in 1831 in the Mediterranean between Sicily and the coast of Africa, where the water was known to have previously had a depth of 100 fathoms. After the usual manifestations of volcanic activity an accumulation of black cinders and ashes formed an island which reached at one point a height of 200 ft., so that the pile of erupted matter had a thickness of about 800 ft. The new island, which was studied by Constant Prévost, became known in England as Graham's Island, in France as Ile Julie and in Italy by various names as Isola Ferdinandea. Being merely a loose pile of scoriae, it rapidly suffered erosion by the sea, and in about three months was reduced to a shoal called Graham's

Reef. In 1891 a submarine eruption occurred near the isle of Pantellaria in the same waters, and the eruptive centre was termed by Professor H. S. Washington and Foerstner volcano, but it gave rise to no island. A well-known instance of a temporary volcanic island was furnished by Sabrina—an islet of cinders thrown up by submarine eruptions in 1811, off the coast of St Michael's, one of the Azores. The island of Bogosloff, or Castle Island, in Bering Sea, about 40 m. W. of Unalaska Island, is a volcanic mass which was first observed in 1796 after an eruption. In 1883 another eruption in the neighbouring water threw up a new volcanic cone of black sand and ashes, known as New Bogosloff or Fire Island, situated about half a mile to the N.W. of Old Bogosloff, with which it was connected by a low beach. Another island, called Perry Island, larger than either of the others, made its appearance in the neighbourhood about the time of the great earthquake in California in 1906. It is reported that some of these islands have since disappeared.

Mud Volcanoes.

Mud volcanoes are small conical hills of clay which discharge, more or less persistently, streams of fine mud, sometimes associated with naphtha or petroleum, and usually with bubbles of gas. As the mud is generally saline, the hills are known also as "salses." The gases are chiefly hydrocarbons, often with more or less sulphuretted hydrogen and carbon dioxide, and sometimes with nitrogen. Though generally less than a yard in height, the cones may in exceptional cases rise to an elevation of as much as 500 ft. The mud oozes from the top and spreads over the sides, or is spurted forth with the gases. Occasionally the discharge is vigorous, mud and stones being thrown up to a considerable height, sometimes accompanied by flames due to combustion of the hydrocarbons.

Mud volcanoes occur in groups, and have a wide distribution. They are known in Iceland; in Modena; at Taman and Kertch, in the Crimea; at Baku on the Caspian; in Java and in Trinidad: Humboldt described those near Turbaco, in Colombia. In Sicily they occur near Girgenti, and a group is known at Paterno on Etna. By the Sicilians they are termed, *maccalube*, a word of Arabic origin. The "paint-pots" of the Yellowstone National Park are small mud volcanoes.

Many so-called mud volcanoes appear to be due to the derangement of subterranean water-flow or to landslips in connexion with earthquakes, whilst others may be referable to certain chemical reactions going on underground; but there are others again which seem to be truly of volcanic origin. Hot water and steam escaping through clays, or crumbling tuffs reduced to a clayey condition, may form conical mounds of pasty material, through which mud oozes and water escapes.

Geysers are closely related to volcanoes, but in consequence of their special interest they are treated separately (see GEYSER). For natural steam-holes and other phenomena connected with declining volcanicity, see SOFFIONI, SOLFATARA and MOFETTA.

Geographical Distribution of Volcanoes.

It is matter of frequent observation that volcanoes are most abundant in regions marked by great seismic activity. Although the volcano and the earthquake are not usually connected in the direct relation of cause and effect, yet in many cases they seem referable to a common origin. Both volcanic extrusion and crustal movement may be the means of relieving local strains in the earth's crust, and both are found to occur, as might reasonably be expected, in many parts of the earth where folding and fracture of the rocks have frequently happened and where mountain-making appears to be still in progress. Thus, volcanoes may often be traced along zones of crustal deformation, or folded mountain-chains, especially where they run near the borders of the oceanic basins. They are frequently associated with the Pacific type of coast-line.

The most conspicuous example of linear distribution is furnished by the great belt of volcanoes, coinciding for the most part with a band of seismic disturbance, which engirdles intermittently the huge basin of the Pacific; though here, as elsewhere in studying volcanic topography, regard must be paid to dormant and extinct centres as well as to those that are active at the present time. As volcanoes are in many cases ranged along what are commonly regarded as lines of fracture, it is not surprising that the centres of most intense volcanicity are in many cases situated at the intersection of two or more fracture-lines. On the eastern side of the Pacific Ocean the great volcanic ring may be traced, though with many and extensive interruptions, from Cape Horn to Alaska. In South America the chain of the Andes between Corcovado in the south and Tolima in the north is studded at irregular intervals with volcanoes, some recent and many more extinct, including the loftiest volcanic mountains in the world. The grandest group of South American volcanoes, though mostly quiescent, is in Ecuador. Cotopaxi, seen in activity by E. Whymper in 1880, has, according to him, a height of 19,613 ft., whilst Sangay is said to be one of the most active volcanoes in the world. The linear arrangement, often a marked feature in the distribution of volcanoes, is well exemplified in the general north-and-south trend of the Andean ranges, the volcanoes being situated along the orographic axis. These folded mountains with their volcanoes also illustrate the close relationship to the sea so frequently observed in volcanic topography, a relationship, however, not without many exceptions. The volcanic rock called andesite was so named by L. von Buch from its characteristic occurrence in the Andes. It is notable that the volcanic rocks throughout the great Pacific belt present much similarity in composition. The volcanoes of Ecuador have been described in detail by A. Stübel and others (see ANDES).

Central America contains a large number of active volcanoes and solfataras, many of which are located in the mountains parallel to the western coast. Conseguina, on the south side of the Gulf of Fonseca, is remarkable for its eruption in 1835, when an enormous volume of ash was ejected and the summit of the mountain blown away. Izalco, in San Salvador, came into existence in 1770, and is habitually active. In the centre of Lake Ilopango in Salvador, which possibly occupies an ancient crater, a volcanic island arose in 1880, and attained a height of 160 ft. Guatemala is peculiarly rich in volcanoes, as described by Dr Tempest Anderson, who visited the country in 1907. The Cerro Quemado, or the Volcano of Quezaltenango, was the scene of a great eruption in 1785. At the Volcano of Santa Maria there was an outburst in 1902 more violent than the simultaneous éruptions in the Lesser Antilles. The cones of Guatemala include the Volcan de Fuego and the Volcan de Agua, the former often active in historic times, whilst the latter is notable for the flood which in 1541 swept down from the mountain and destroyed Old Guatemala, but this flood was probably not of volcanic origin.

The plateau of Mexico is the seat of several active volcanoes which occur in a band stretching across the country from Colima in the west to Tuxtla near Vera Cruz. The highest of these volcanic mountains is Orizaba, or Cithaltepetl, rising to an altitude of 18,200 feet, and known to have been active in the 16th century. Popocatepetl ("the smoking mountain") reaches a height of about 17,880 ft., and from its crater sulphur was at one time systematically collected. The famous volcano of Jorullo, near Toluca, at a distance of about 120 m. from the sea, has been the centre of much scientific discussion since it was regarded by Humboldt, who visited it in 1803, as a striking proof of the elevation theory. It came into existence rapidly during an eruption which began in September 1759, when it was said by unscientific observers that the ground became suddenly inflated from below. The cone, though not of exceptional magnitude, is situated in an elevated district, and its summit rises to about 4330 ft. above sea-level. In the neighbourhood of Jorullo there are three subordinate cones of similar character known as *volcancitos*, with great numbers of small mounds of cinder and ash formed around fumaroles on the lava, and locally called *hornitos*, or "little ovens." The streams of basaltic lava from Jorullo form rough barren surfaces, which pass under the name of *malpays*, or bad lands.

In the United States very few volcanoes are active at the present day, though many have become extinct only in times that are geologically recent. An eruption occurred in 1857 at Tres Virgines, in the south of California, and the cinder cone on Lassen's Peak (California) was also active in the middle of the 19th century. The Mono Valley craters and Mount Shasta, in California, are extinct. The Cascade Range contains numerous volcanic peaks, but only few show signs of activity. Mount Hood, in Oregon, exhales vapour, as also does Mount Rainier in Washington. Mount St Helens (Washington) was in eruption in 1841 and 1842; and Mount Baker (Washington), the most northern of the volcanoes connected with the Cascade Range, is said to have been active in 1843. Few volcanic peaks occur in the Rocky Mountains, but evidence of lingering activity is very marked in the geysers and hot springs of the Yellowstone National Park. The earth's internal heat is also manifested at many points elsewhere, as at Steamboat Springs on the Virginia Range, an offshoot of the Sierra Nevada, and in the Comstock Lode.

Volcanic activity is prominent in Alaska, along the Coast Range and in the neighbouring islands. The crater of Mount Edgecumbe, in Lazarus Island, is said to have been active in 1796, but this is doubtful. Mount Fairweather has probably been in recent activity, and the lofty cone of Mount Wrangell, on Copper river, is reported to have been in eruption in 1819. In the neighbourhood of Cook's Inlet there are several volcanoes, including the island of St Augustine. Unimak Island has two volcanoes, which have supplied the natives with sulphur and obsidian; one of these volcanoes being Mount Shishaldin, a cone rivalling Fusiyama in graceful contour. The

Aleutian volcanic belt is a narrow, curved chain of islands, extending from Cook's Inlet westwards for nearly 1600 m. It is notable that the convexity of the curve faces the great ocean, as has been observed in other cases, the arcs following the direction of the rock-folds. According to Professor I. C. Russell, an authority on the volcanoes of N. America, there are in the Aleutian Islands and in the peninsula no fewer than 57 craters, either active or recently extinct.

From the Aleutian Islands the volcanic band of the Pacific changes its direction, and passing to the peninsula of Kamschatka, where 14 volcanoes are said to be active, turns southwards and forms the festoon of the Kurile Islands. Here again the convexity of the insular arc is directed towards the ocean. This volcanic archipelago leads on to the great islands of Japan, where the volcanoes have been studied by Professor J. Milne, who also described those of the Kuriles. Of the 54 volcanoes recognized as now active or only recently extinct in Japan, the best known is the graceful cone of the sacred mountain Fusiyama, but others less pretentious are far more dangerous. The great eruption of Bandaisan, about 120 m. N. of Tokio, which occurred in 1888, blew off one side of the peak called Kobandai, removing, according to Professor Sekiya's estimate, about 2982 million tons of material. Aso-san in Kiushui, the southernmost large island of Japan, is notable for the enormous size of its crater. In the Bonin group of islands volcanic activity is indicated by such names as Volcano Island and Sulphur Island.

South of the Japanese archipelago the train of volcanoes passes through some small islands in or near the Loo Choo (Liu Kiu) group and thence onwards by Formosa to the Philippine Islands, where subterranean activity finds abundant expression in earthquakes and volcanoes. After leaving this region the linear arrangement of the eruptive centres becomes less distinctly marked, for almost every island in the Moluccas and the Sunda Archipelago teems with volcanoes, solfataras and hot springs. Possibly, however, a broken zone may be traced from the Moluccas through New Guinea and thence to New Zealand, perhaps through eastern Australia (for though no active volcanoes are known there, relics of comparatively recent activity are abundant); or again by way of the Bismarck Archipelago, the Solomon Islands, the New Hebrides, the Fiji Islands and Kermodoc Island.

The great volcanic district in New Zealand is situated in the northern part of North Island, memorable for the eruption of Tarawera in 1886. This three-peaked mountain on the south side of Lake Tarawera, not previously known to have been active, suddenly burst into action; a huge rift opened, and Lake Rotomahana subsided, with destruction of the famous sinter terraces. The crater of Tongariro is in the solfatara stage, whilst Mount Ruapehu is regarded as extinct. On White Island in the Bay of Plenty the cone of Wharkari is feebly active.

Far to the south, on Ross Island, off South Victoria Land, in Antarctica, are the volcanoes of Erebus and Terror, the former of which is active. These are often regarded as remotely related to the Pacific zone, but Dr G. T. Prior has shown that the Antarctic volcanic rocks which he examined belonged to the Atlantic and not the Pacific type.

Within the great basin of the Pacific, imperfectly surrounded by its broken girdle of volcanoes, there is a vast number of scattered islands and groups of islands of volcanic origin, rising from deep water, and having in many cases active craters. The most important group is the Hawaiian Archipelago, where there is a chain of at least fifteen large volcanic mountains—all extinct, however, with the exception of three in Hawaii, namely Mauna Loa, Kilauea and Hualalai; and of these Hualalai has been dormant since 1811. It is notable that the two present gigantic centres of activity, though within 20 m. of each other, appear to be independent in their eruptivity. Several of the Hawaiian Islands, as pointed out by J. D. Dana, who was a very high authority on this group, consist of two volcanoes united at the base, forming volcanic twins or doublets.

The volcanic regions of the Pacific are connected with those of the Indian Ocean by a grand train of islands rich in volcanoes, stretching from the west of New Guinea through the Moluccas and the Sunda Islands, where they form a band extending axially through Java and Sumatra. Here is situated the principal theatre of terrestrial vulcanicity, apparently representing an enormous fissure, or system of fissures, in the earth's crust, sweeping in a bold curve, with its convexity towards the Indian Ocean.

Numerous volcanic peaks occur in the string of small islands to the east of Java—notably in Flores, Sumbawa, Lombok and Bali; and one of the most terrific eruptions on record in any part of the world occurred in the province of Tomboro, in the island of Sumbawa, in the year 1815. Java contains within its small area as many as 49 great volcanic mountains—active, dormant and extinct. The largest is Smeru, about 12,000 ft. high, but the most regularly active is said to be Gownong Lamongang, which is in almost uninterrupted activity, emitting usually only ashes and vapour, though in 1883 lava streamed forth. Many of the Javanese volcanoes present marked regularity of contour, with the sides of the cones rather symmetrically furrowed by tropical rains and probably aided by [illegible]. The radial furrows on volcanic cones are [illegible] "barrancos."

[illegible] island of Krakatoa in the Strait of Sunda appears to be situated at a volcanic node, or the intersection of two curved fissures, and it is believed that the island itself represents part of the basal wreck of what was once a volcano of gigantic size. After two centuries of repose, a violent catastrophe occurred in 1883, whereby the greater part of the island was blown away. This eruption and its effects were made the subject of careful study by Verbeek, Bréon and Judd.

Through the great island of Sumatra, a chain of volcanoes runs longitudinally, and may possibly be continued northwards in the Bay of Bengal by Barren Island and Norcondam—the former an active and the latter an extinct volcano. On the western side of the Indian Ocean a small volcanic band may be traced in the islands of the Mascarene group, several craters in Réunion (Bourbon) being still active. Far south in the Indian Ocean are the volcanic islands of New Amsterdam and St Paul. The Comoro Islands in the channel of Mozambique exhibit volcanic activity, whilst in East and Central Africa there are several centres, mostly extinct but some partially active, associated with the Rift Valleys. The enormous cones of Kenia and Kilimanjaro are extinct, but on Kibo, one of the summits of the latter, a crater is still preserved. The Mfumbiro volcanoes, S. of Lake Edward, rise to a height of more than 14,700 feet. Kirunga, N. of Lake Kivu, is still partially active. Elgon is an old volcanic peak, but Ruwenzori is not of volcanic origin. On the west side of Africa, the Cameroon Peak is a volcano which was active in 1909, and the island of Fernando Po is also volcanic. Along the Red Sea there are not wanting several examples of volcanoes, such as Jebel Teir. Aden is situated in an old crater.

Passing to the Atlantic, a broken band of volcanoes, recent and extinct, may be traced longitudinally through certain islands, some of which rise from the great submarine ridge that divides the ocean, in part of its length, into an eastern and a western trough. The northern extremity of the series is found in Jan Mayen, an island in the Arctic Ocean, where an eruption occurred in 1818. Iceland, however, with its wealth of volcanoes and geysers, is the most important of all the Atlantic centres. According to Dr T. Thoroddsen there are in Iceland about 130 post-glacial volcanoes, and it is known that from 25 to 30 have been in eruption during the historic period. Many of the Icelandic lava-flows, such as the immense flood from Laki (Skapta Jökull) in 1783, are referable to fissure eruptions, which are the characteristic though not the exclusive form of activity in this island. Probably this type was also responsible for the sheets of old lava in the terraced hills of the Faroe Islands, to which may have been related the Tertiary volcanoes of the west of Scotland and the north of Ireland.

An immense gap separates the old volcanic area of Britain from the volcanic archipelagoes of the Azores, the Canaries and the Cape Verd Islands. Palma—a little island in the Canary group, with a caldera or large crater at its summit, from which fissures or barrancos radiate—is famous in the history of vulcanology, in that it furnished L. von Buch with evidence on which he founded the "crater-of-elevation" theory. The remaining volcanic islands of the Atlantic chain, all now cold and silent, include Ascension, St Helena and Tristan da Cunha, whilst in the western part of the South Atlantic are the small volcanic isles of Trinidad and Ferdinando do Noronha. St Paul's rocks appear also to be of volcanic origin.

One of the most important volcanic regions of the world is found in the West Indies, where the Lesser Antilles—the scene of the great catastrophes of 1902—form a string of islands, stretching in a regular arc that sweeps in a N. and S. direction across the eastern end of the Caribbean Sea. Subject to frequent seismic disturbance, and rich in volcanoes, solfataras and hot springs, these islands seem to form the summit of a great earth-fold which, rising as a curved ridge from deep water, separates the Caribbean Sea from the Atlantic. The volcanoes are situated on the inner border of the curve. It is notable that the Antilles and the Sunda Islands, two of the grandest theatres of vulcanicity on the face of the earth, are situated at the antipodes of each other—one being apparently an eastern and the other a western offshoot of the great Pacific girdle.

The European volcanoes, recent and extinct, may be regarded as representing rather ill-defined branches thrown off eastwards from the Atlantic band. Vesuvius is the only active volcano on the mainland, but in the Mediterranean there are Etna on the coast of Sicily; the Lipari Islands, with Stromboli and Vulcano in chronic activity; and farther to the east the archipelago of Santorin, where new islands have appeared in historic times. Submarine eruptions have occurred also between Sicily and the coast of Africa; one in 1831 having given rise temporarily to Graham's Island, and another in 1891 appearing near Pantellaria, itself a volcanic isle. Of the extinct European volcanoes, some of the best known are in Auvergne, in the Eifel, in Bohemia and in Catalonia, whilst the volcanic land of Italy includes the Euganean hills, the Alban hills, the Phlegraean Fields, &c. The great lakes of Bolsena and Bracciano occupy old craters, and many smaller sheets of water are on similar sites. The volcanic islands no longer active include Ischia, with the great cone of Epomeo which was in a state of eruption in 1301; the Ponza Islands, Nisida, Vivera and others near Naples; and several in the Greek archipelago, such as Milos, Kimolos and Polinos.

From the eastern end of the Mediterranean evidence of former volcanic activity may be traced into Asia Minor and thence to Armenia and the Caucasus. East of Smyrna there is a great desolate tract which the ancients recognized as volcanic and termed the Catacecaumene (burnt country). The volcanic districts of Lydia were studied by Professor H. S. Washington. In the plateau of Armenia there are several extinct volcanic mountains, more or less destroyed, of which the best known is Ararat. Nimrud Dagh on the shore of Lake Van is said to have been in eruption in the year 1441. Dr F. Oswald has described the volcanoes of Armenia. Of the volcanoes in Persian territory not now active, Demavend, south of the Caspian, is an important example. Elburz is also described as an old volcano. It has been said that in Central Asia there are certain vents still active, and recent volcanic rocks are known from the Przhevalsky chain and other localities.

The number of volcanoes known to be actually active on the earth is generally estimated at between 300 and 400, but there is reason to believe that this estimate is far too low. If account be taken of those volcanic cones which have not been active in historic time, the total will probably rise to several thousands. The distribution of volcanoes at various periods of the earth's history, as revealed by the local occurrence of volcanic rocks at different horizons in the crust of the earth, is discussed under GEOLOGY. Periods of great earth-movement have been marked by exceptional volcanic activity.

Causes of Vulcanicity.

In discussing the cause of vulcanicity two problems demand attention: first the origin of the heat necessary for the manifestation of volcanic phenomena, and secondly the nature of the force by which the heated matter is raised to the surface and ejected. According to the old view, which assumed that the earth was a spheroid of molten matter invested by a comparatively thin crust of solid rock, the explanation of the phenomena appeared fairly simple. The molten interior supplied the heated matter, while the shrinkage of the cooling crust produced fractures that formed the volcanic channels through which it was assumed the magma might be squeezed out in the process of contraction. When physicists urged the necessity of assuming that the globe was practically solid, vulcanologists were constrained to modify their views. Following a suggestion of W. Hopkins of Cambridge, they supposed that the magma, instead of existing in a general central cavity, was located in comparatively small subterranean lakes. Some authorities again, like the Rev. O. Fisher, regarded the magma as constituting a liquid zone, intermediate between a solid core and a solid shell.

If solidification of the primitive molten globe proceeded from the centre outwards, so as to form a sphere practically solid, it is conceivable that portions of the original magma might nevertheless be retained in cavities, and thus form "residual lakes." Although the mass might be for the most part solid, the outer portion, or "crust," could conceivably have a honeycombed structure, and any magma retained in the cells might serve indirectly to feed the volcanoes. Neighbouring volcanoes seem in some cases to draw their supply of lava from independent sources, favouring the idea of local cisterns or "intercrustal reservoirs." It is probable, however, that subterranean reservoirs of magma, if they exist, do not represent relics of an original fluid condition of the earth, but the molten material may be merely rock which has become fused locally by a temporary development of heat or more likely by a relief of pressure. It should be noted that the quantity of magma required to supply the most copious lava-flows is comparatively small, the greatest recorded outflow (that of Tomboro in Sumbawa, in 1815) not having exceeded, it is said, six cubic miles; and even this estimate is probably too high. Whilst in many cases the magma-cisterns may be comparatively small and temporary, it must be remembered that there are regions where the volcanic rocks are so similar throughout as to suggest a common origin, thus needing intercrustal reservoirs of great extent and capacity. It has been suggested that comparatively small basins, feeding individual volcanoes, may draw their supply from more extensive reservoirs at greater depths.

Much speculation has been rife as to the source of the heat required for the local melting of rock. Chemical action has naturally been suggested, especially that of superficial water, but its adequacy may be doubted. After Sir Humphry Davy's discovery of the metals of the alkalis, he thought that their remarkable behaviour with water might explain the origin of subterranean heat; and in more recent years others have seen a local source of heat in the oxidation of large deposits of iron, such as that brought up in the basalt of Disco Island in Greenland. It has been assumed by Moissan and by Gautier that water might attack certain metallic carbides, if they occur as subterranean deposits, and give rise to some of the products characteristic of volcanoes. But it seems that all such action must be very limited, and utterly inadequate to the general explanation of volcanic phenomena. At the same time it must be remembered that access of water to a rock already heated may have an important physical effect by reducing its melting point, and may thus greatly assist in the production of a supply of molten matter. The admission of surface-waters to heated rocks is naturally regarded as an important source of motive power in consequence of the sudden generation of vapour, but it is doubtful to what extent it may contribute, if at all, to the origin of volcanic heat.

According to Robert Mallet a competent source of subterranean heat for volcanic phenomena might be derived from the transformation of the mechanical work of compressing and crushing parts of the crust of the earth as a consequence of secular contraction. This view he worked out with much ingenuity, supporting it by mathematical reasoning and an appeal to experimental evidence. It was claimed for the theory that it explained the linear distribution of volcanoes, their relation to mountain chains, the shallow depth of the foci and the intermittence of eruptive activity. A grave objection, however, is the difficulty of conceiving that the heat, whether due to crushing or compression, could be concentrated locally so as to produce a sufficient elevation of temperature for melting the rocks. According to the calculations of Rev. O. Fisher, the crushing could not, under the most favourable circumstances, evolve heat enough to account for volcanic phenomena.

Since pressure raises the melting-point of any solid that expands on liquefaction, it has been conjectured that many deep-seated rocks, though actually solid, may be potentially liquid; that is, they are maintained in a solid state by pressure only. Any local relief of pressure, such as might occur in the folding and faulting of rocks, would tend, without further accession of heat, to induce fusion. But although moderate pressure raises the fusing-point of most solids, it is believed, from modern researches, that very great pressures may have a contrary effect.

It is held by Professor S. Arrhenius that at great depths in the earth the molten rock, being above its critical point, can exist only in the gaseous condition; but a gas under enormous pressure may behave, so far as compressibility is concerned, like a rigid solid. He concludes, from the high density of the earth as a whole and from other considerations, that the central part of our planet consists of gaseous iron (about 80% of the earth's diameter) followed by a zone of rock magma in a gaseous condition (about 15%), which passes insensibly outwards into liquid rock (4%), covered by a thin solid crust (less than 1% of diameter). If water from the crust penetrates by osmosis through the sea-floor to the molten interior, it acts, at the high temperature, as an acid, and decomposes the silicates of the magma. The liquid rock, expanded and rendered more mobile by this water, rises in fissures, but in its ascent suffers cooling, so that the water then loses its power as an acid and is displaced by silicic acid, when the escaping steam gives rise to the explosive phenomena of the volcano. The mechanism of the volcano is therefore much like that of a geyser, a comparison long ago suggested by Rev. O. Fisher and other geologists.

According to the "planetesimal theory" of Professor T. C. Chamberlin and Dr F. R. Moulton, which assumes that the earth was formed by the accretion of vast numbers of small cosmical bodies called planetesimals, the original heat of the earth's interior was due chiefly to the compression of the growing globe by its own gravity. The heat, proceeding from the centre outwards, caused local fusion of the rocks, though without forming distinct reservoirs of molten magma, and the fused matter charged with gases rose in liquid threads or tongues, which worked their way upwards, some reaching the superficial part of the earth and escaping through fissures in the zone of fracture, thus giving rise to volcanic phenomena. It is held that the explosive activity of a volcano is due to the presence of gases which have been brought up from the interior of the earth, whilst only a small and perhaps insignificant part is played by water of superficial origin.

Entirely new views of the origin of the earth's internal heat have resulted from the discovery of radioactivity. It has been shown by the Hon. R. J. Strutt, Professor J. Joly and others that radium is present in all igneous rocks, and it is estimated that the quantity in the crust of the earth is amply sufficient to maintain its temperature. An ingenious hypothesis was enunciated by Major C. E. Dutton, who found in the radioactivity of the rocks a sufficient source of heat for the explanation of all volcanic phenomena. He believes that the development of heat arising from radioactivity may gradually bring about the local melting of the rocks so as to form large subterranean pools of magma, from which the volcanoes may be supplied. The supply is usually drawn from shallow sources, probably, according to Dutton, from a depth of not more than three or rarely four miles, and in some cases at not more than a mile from the surface. If the water in the local magma should attain sufficient expansive power, it will rupture the overlying rocks and thus give rise to a volcanic eruption. When the reservoir becomes exhausted the eruption ceases, but if more heat be generated by continued radioactivity further fusion may ensue, and in time the eruption be repeated. According, however, to Professor Joly, it is improbable that sufficient heat for the manifestation of volcanic phenomena could be developed by the local radioactivity of the rocks in the upper part of the earth's crust.

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VOLCANO ISLANDS, three small islands in the western Pacific Ocean, S. of the Bonin Islands, forming part of the Japanese empire (annexed in 1891). They are also known as the Magellan Archipelago, and in Japan as Kwazan-retto (series of volcanic islands). They are situated between 24° and 26° N. and 141° and 142° E. Their names are Kita-iwo-jima (Santo Alessandro), Iwo-jima (Sulphur) and Minami-iwo-jima (Santo Agostino). Kita-iwo-jima—which, as its name (*kita*) implies, is the most northerly of the three—rises 2520 ft. above the water, and Minami-iwo-jima, the most southerly, to a height of 3021 ft. The islands are not inhabited. With this group is sometimes included another island, Arzobispo, nearer the Bonin group.

VOLCEI (mod. BUCCINO), an ancient town of Lucania, 2128 ft. above sea-level, the chief town of the independent tribe of the Volceiani, Vulcientes or Volcentani, whose territory was bounded N. by that of the Hirpini, W. and S. by Lucania and E. by the territory of Venusia. Some pre-Roman ruins still exist (*Not. Scav.*, 1884, 115). It became a *municipium*, and in A.D. 323 had an extensive territory attached to it, including the town of Numistro, the large Cyclopean walls of which may still be seen, 2½ m. below Muro Lucano. Below the town is a well-preserved Roman bridge over the Tanager (mod. Tanagro).

See G. Patroni in *Notizie degli scavi* (1897), 183.

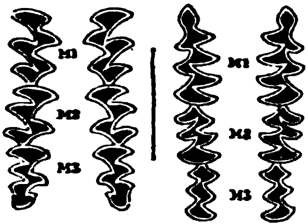
VOLCI, or VULCI, an ancient town of Etruria. The circuit of the walls measures about 4 m., and scanty traces of them and of Roman buildings within them still exist. The Ponte della Badia over the Fiora, a bridge with a main arch of 66 ft. span, 98 ft. above the stream, is also Roman. An aqueduct passes over it. The former wealth of the town is mainly proved by the discoveries made in its extensive necropolis from 1828 onwards—Greek vases, bronzes and other remains—many of which are now in the Vatican. By 1856 over 15,000 tombs had, it was calculated, been opened. These were entirely subterranean, and little is now to be seen on the site but a great tumulus, the Cucumella, and a few smaller ones. The frescoes from the François tomb, discovered in 1857, illustrating Greek and Etruscan myths, are now in the Museo Torlonia at Rome. Volci was one of the twelve towns of Etruria. Coruncanius triumphed over the people of Vulsinii and Volci in 280 B.C., and the colony of Cosa was founded in their territory. This seems to have led to the decline of the city, and it does not seem to have been of great importance in the Roman period, though it became an episcopal see.

See G. Dennis, *Cities and Cemeteries of Etruria* (London, 1883), i. 437, ii. 503; S. Gsell, *Fouilles dans la nécropole de Vulci* (Paris, 1891), for the excavations of 1889 (with copious references to earlier publications). (T. As.)

VOLE, a book-name (invented by Dr J. Fleming, author of a work on British animals) for the water-rat and those species of field-mice which have cheek-teeth of the same general type. Although the British representatives of this group should undoubtedly retain their vernacular designations of water-rat and short-tailed field-mouse, the term "vole" is one of great convenience in zoology as a general one for all the members of the group. Systematically voles are classed in the mammalian order RODENTIA, in which they constitute the typical section of the subfamily Microtinae in the Muridae, or mouse-group. As a group, voles are characterized by being more heavily built than rats and mice, and by their less brisk movements. They have very small eyes, blunt snouts, inconspicuous ears and short limbs and tails, in all of which points they are markedly contrasted with true rats and mice. In common with lemmings and other representatives of the Microtinae, voles are, however, broadly distinguished from typical rats and mice by the structure of their three pairs of molar teeth. These, as shown in the figure, are composed of a variable number of vertical triangular prisms, in contact with one another by two (or one) of their angles. On the number and relations of these prisms the voles, which form an exceedingly large group, ranging all over Europe and Asia north of (and inclusive of) the

Himalaya, and North America, are divided into genera and subgenera. Examples of some of these are afforded by the English representatives of the group.

The first of these is the common short-tailed field-mouse, or "field-vole," *Microtus agrestis*, which belongs to the typical section of the type genus, and is about the size of a mouse, with a short stumpy body, and a tail about one-third the length of the head and body. The hind feet have six pads on their inferior surfaces, and the colour is dull grizzled brown above and greyish white below. The molar teeth have respectively 5, 5 and 6 prisms above, and 9, 5 and 3 below. This rodent is one of the commonest of British mammals, and frequents fields, woods and gardens in numbers, often doing considerable damage owing to its fondness for garden produce. It is spread over the whole of Great Britain (exclusive of the Orkneys), while on the continent of Europe its range extends from Finland to North Italy and from France and Spain to Russia.



Upper and Lower Molars of the Water-Rat (or Water-Vole), *Microtus amphibius.*

The second and larger species is the water-rat, or "water-vole," which belongs to a second section of the genus, and is commonly known as *Microtus* (*Arvicola*) *amphibius*, although some writers employ the inappropriate specific name *terrestris*. It is about the size of a rat, and has long soft thick fur, of a uniform grizzled brown, except when (as is not uncommon) it is black. The tail is about half the length of the head and body, and the hind feet are long and powerful, although not webbed, and have five rounded pads on their lower surfaces. In the upper jaw the first molar has 5, the second 4 and the third 4 prisms, of which the last is irregular and sometimes divided into two, making 5. In the lower jaw the first molar has 7 prisms, of which the 3 anterior are generally not fully separated from one another, the second 5 and the third 3. The water-rat is perhaps the most often seen of all English mammals, owing to its diurnal habits. It frequents rivers and streams, burrowing in the banks, and often causing considerable damage. Its food consists almost wholly of water-weeds, rushes and other vegetable substances, but it will also eat animal food on occasion, in the shape of insects, mice or young birds. The female has during the summer three or four litters, each of from two to seven young. The range of the water-rat extends over Europe and North Asia from England to China, but the species is not found in Ireland, where no member of the group is native.

The red-backed field-mouse or "bank-vole" may be distinguished externally from the first species by its more or less rusty or rufous-coloured back, its larger ears and its comparatively longer tail, which attains to about half the length of the head and body. On account of an important difference in the structure of its molars, it is now very generally referred to a distinct genus, under the name of *Evotomys glareolus*; these teeth developing roots at a certain stage of existence, instead of growing permanently. Their prisms number respectively 5 and 4 and 5 above, and 7, 3 and 3 below. The habits of this species are in every way similar to those of the one first on the list. Its range in Great Britain extends northwards to Morayshire, but it is represented in an island off the Pembroke coast by a distinct form: on the continent of Europe it extends from France and Italy to southern Russia, while it is represented in northern Asia and North America by closely allied species. Fossil voles from the Pliocene of England and Italy with molars which are rooted as soon as developed form the genus *Mimomys*.

(R. L.*)

VOLGA (known to the Tatars as *Etil*, *Itil* or *Atel*; to the Finnish tribes as *Rau*, and to the ancients as *Rha* and *Oarus*), the longest and most important river of European Russia. It rises in the Valdai plateau of Tver and, after a winding course of 2325 m. (1070 in a straight line), falls into the Caspian at Astrakhan. It is by far the longest river of Europe, the Danube, which comes next to it, being only 1775 m., while the Rhine (760 m.) is shorter even than two of the chief tributaries of the Volga—the Oka and the Kama. Its drainage area, which includes the whole of middle and eastern as well as part of south-eastern Russia, amounts to 563,300 sq. m., thus exceeding the aggregate superficies of Germany, France and the United Kingdom, and containing a population of fifty millions. Its tributaries are navigable for an aggregate length of nearly 20,000 m. The "basin" of the Volga is not limited to its actual catchment area. By a system of canals which connect the upper Volga with the Neva, the commercial mouth of the Volga has been transferred, so to speak, from the Caspian to the Baltic, thus making St Petersburg, the capital and chief seaport of Russia, the chief port of the Volga basin as well. Other less important canals connect it with the Western Dvina (Riga) and the White Sea (Archangel); while a railway only 45 m. in length joins the Volga with the Don and the Sea of Azov, and three great trunk lines bring its lower parts into connexion with the Baltic and western Europe.

The upper river.

The Volga rises in extensive marshes on the Valdai plateau, where the W. Dvina also has its origin. Lake Seliger was formerly considered to be the principal source; but that distinction is now given to a small spring issuing beneath a chapel (57° 15′ N.; 32° 30′ E.) in the midst of a large marsh to the west of Seliger. The honour has also been claimed, not without plausibility, for the Runa rivulet. Recent exact surveys have shown these originating marshes to be no more than 665 ft. above sea-level. The stream first traverses several small lakes, all having the same level, and, after its confluence with the Runa, enters Lake Volga. A dam erected a few miles below that lake, with a storage of nearly 10,000 million cub. ft. of water, makes it possible to raise the level of the Volga as far down as the Sheksna, thus rendering it navigable, even at low water, from its 65th mile onwards.

From its confluence with the Sheksna the Volga flows with a very gentle descent towards the south-east, past Yaroslavl and Kostroma, along a broad valley hollowed to a depth of 150–200 ft. in the Permian and Jurassic deposits. In fact, its course lies through a string of depressions formerly filled with wide lakes, all linked together. When the Volga at length assumes a due south-east direction it is a large river (8250 cub. ft. per second, rising occasionally in high flood to as much as 178,360 cub. ft.); of its numerous tributaries, the Unzha (365 m., 330 navigable), from the north, is the most important.

Confluence with the Oka.

The next great tributary is the Oka, which comes from the south-west after having traversed, on its course of 950 m., all the Great Russian provinces of central Russia. It rises in the government of Orel, among hills which also send tributaries to the Dnieper and the Don, and receives on the left the Upa, the Zhizdra, the Ugra (300 m.), the Moskva, on which steamers ply up to Moscow, the Klyazma (395 m.), on whose banks arose the middle-Russian principality of Suzdal, and on the right the navigable Tsna (255 m.) and Moksha. Every one of these tributaries is connected with some important event in the history of Great Russia. The drainage area of the Oka is a territory of 97,000 sq. m. It has been maintained that, of the two rivers which unite at Nizhniy-Novgorod, the Oka, not the Volga, is the chief; the fact is that both in length (818 m.) and in drainage area above the confluence (89,500 sq. m.), as well as in the aggregate length of its tributaries, the Volga is the inferior stream.

Lacustrine depressions.

At its confluence with the Oka the Volga enters the broad lacustrine depression which must have communicated with the Caspian during the post-Pliocene period by means of at least a broad strait. Its level at low water is only 190 ft. above that of the ocean. Immediately below the confluence the breadth of the river ranges from 350 to 1750 yds. There are many islands which change their appearance and position after each inundation. On the right the Volga is joined by the Sura, which drains a large area and brings a volume of 2700 to 22,000 cub. ft. of water per second, the Vetluga (465 m. long, of which 365 are navigable), from the forest-tracts of Yaroslavl, and many smaller tributaries. Then the stream turns south-east and descends into another lacustrine depression, where it receives the Kama, below Kazañ. Remains of molluscs still extant in the Caspian occur extensively throughout this depression and up the lower Kama.

The Kama,[1] which brings to the Volga a contribution ranging from 52,500 to 144,400 cub. ft. and occasionally reaching 515,000 cub. ft. per second, might again be considered as the more important of the two rivers. It rises in Vyatka, takes a wide sweep towards the north and east, and then flows south and south-west to join the Volga after a course of no less than 1150 m.

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[1] To the Votyaks it is known as the Budzhim-Kam, to the Chuvashes as the Shoiga-adil and to the Tatars as the Cholman-idel or Ak-idel, all words signifying "White river."

The Samara bend.

Along the next 738 m. of its course the Volga—now 580 to 2600 yds. wide—flows south-south-west, with but one great bend at Samara. At this point, where it pierces a range of limestone hills, the course of the river is very picturesque, fringed as it is by cliffs which rise 1000 ft. above the level of the stream (which is only 54 ft. above the sea at Samara). Along the whole of the Samara bend the Volga is accompanied on its right bank by high cliffs, which it is constantly undermining, while broad lowland areas stretch along the left or eastern bank, and are intersected by several old beds of the Volga.

The lower river and delta.

At Tsaritsyn the great river reaches its extreme south-western limit, and is there separated from the Don by an isthmus only 45 m. in width. The isthmus is too high to be crossed by means of a canal, but a railway to Kalach brings the Volga into some sort of connexion with the Don and the Sea of Azov. At Tsaritsyn the river takes a sharp turn in a south-easterly direction towards the Caspian; it enters the Caspian steppes, and a few miles above Tsaritsyn sends off a branch—the Akhtuba—which accompanies it for 330 m. before falling into the Caspian. Here the Volga receives no tributaries; its right bank is skirted by low hills, but on the left it anastomoses freely with the Akhtuba when its waters are high, and floods the country for 15 to 35 m. The width of the main stream ranges from 520 to 3500 yds. and the depth exceeds 80 ft. The delta proper begins 40 m. above Astrakhan, and the branches subdivide so as to reach the sea by as many as 200 separate mouths. Below Astrakhan navigation is difficult, and on the sand-bars at the mouth the maximum depth is only 12 ft. in calm weather.

The figures given show how immensely the river varies in volume, and the greatness of the changes which are constantly going on in the channel and on its banks. Not only does its level occasionally rise in flood as much as 50 ft. and overflow its banks for a distance of 5 to 15 m.; even the level of the Caspian is considerably affected by the sudden influx of water brought by the Volga. The amount of suspended matter brought down is correspondingly great. All along its course the Volga is eroding and destroying its banks with great rapidity; towns and loading ports have constantly to be shifted farther back.

The question of the gradual desiccation of the Volga, and its causes, has often been discussed, and in 1838 a committee which included Karl Baer among its members was appointed by the Russian academy of sciences to investigate the subject. No positive result was, however, arrived at, principally on account of the want of regular measurements of the volume of the Volga and its tributaries—measurements which began to be made on scientific principles only in 1880. Still, if we go back two or three centuries, it is indisputable that rivers of the Volga basin which were easily navigable then are now hardly accessible to the smallest craft. The desiccation of the rivers of Russia has been often attributed to the steady destruction of its forests. But it is obvious that there are other general causes at work, which are of a much more important character—causes of which the larger phenomena of the general desiccation of Eastern and Western Turkestan are contemporaneous manifestations. The gradual elevation of the whole of northern Russia and Siberia, and the consequent draining of the marshes, is one of these deeper-seated, ampler causes; another is the desiccation of the lakes all over the northern hemisphere.

Fisheries.—The network of shallow and still *limans* or "cut-offs" in the delta of the Volga and the shallow waters of the northern Caspian, freshened as these are by the water of the Volga, the Ural, the Kura and the Terek, is exceedingly favourable to the breeding of fish, and as a whole constitutes one of the most productive fishing grounds in the world. As soon as the ice breaks up in the delta innumerable shoals of roach (*Leuciscus rutilus*) and trout (*Luciotrutta leucichthys*) rush up the river. They are followed by the great sturgeon (*Acipenser huso*), the pike, the bream and the pike perch (*Lucioperca sandra*). Later on appears the Caspian herring (*Clupea caspia*), which formerly was neglected, but has now become more important than sturgeon; the sturgeon *A. stellatus* and "wels" (*Silurus glanis*) follow, and finally the sturgeon *Acipenser güldenstadtii*, so much valued for its caviare. In search of a gravelly spawning-ground the sturgeon go up the river as far as Sarepta (250 m.). The lamprey, now extensively pickled, the sterlet (*A. ruthenus*), the tench, the gudgeon and other fluvial species also appear in immense numbers. It is estimated that 180,000 tons of fish of all kinds, of the value of considerably over £1,500,000, are taken annually in the four fishing districts of the Volga, Ural, Terek and Kura. Seal-hunting is carried on off the Volga mouth, and every year about 40,000 of *Phoca vitulina* are killed to the north of the Manghishlak peninsula on the east side of the Caspian.

Ice Covering.—In winter the numberless tributaries and sub-tributaries of the Volga become highways for sledges. The ice lasts 90 to 160 days, and breaks up earlier in its upper course than in some parts lower down. The average date of the break-up is April 11th at Tver, and 14 days later about Kostroma, from which point a regular acceleration is observed (April 16th at Kazan, April 7th at Tsaritsyn, and March 17th at Astrakhan).

Traffic.—The greater part of the traffic is up river, the amount of merchandise which reaches Astrakhan being nearly fifteen times less than that reaching St Petersburg by the Volga canals. The goods transmitted in largest quantity are fish, metals, manufactured wares, hides, flax, timber, cereals, petroleum, oils and salt. The down-river traffic consists chiefly of manufactured goods and timber, the latter mostly for the treeless governments of Samara, Saratov and Astrakhan, as well as for the region adjacent to the lower course of the Don. Dredging machines are kept constantly at work, while steamers are stationed near the most dangerous sandbanks to assist vessels that run aground. The following table shows the principal river ports, with the movement of shipping in an average year:—

Chief River Ports on the Volga.	Vessels.		Tons.			Approximate Value.
	Entered.	Cleared.	Imported.	Exported.	Total.	
						£
Astrakhan	2,724	3,228	938,000	3,734,000	4,672,000	7,812,000
Tsaritsyn.	6,412	1,482	1,152,000	462,000	1,614,000	5,000,000
Rybinsk.	3,760	6,295	590,000	172,000	762,000	3,573,000
Nizhniy-Novgorod	12,960	7,585	4,092,000	84,000	4,176,000	2,727,000
Saratov	1,639	1,738	923,000	128,000	1,051,000	1,882,000

Formerly tens of thousands of *burlaki*, or porters, were employed in dragging boats up the Volga and its tributaries, but this method of traction has disappeared unless from a few of the tributaries. Horse-power is still extensively resorted to along the three canal systems. The first large steamers of the American type were built in 1872. Thousands of steamers are now employed in the traffic, to say nothing of smaller boats and rafts. Many of the steamers use as fuel *masut* or petroleum refuse. Large numbers of the boats and rafts are broken up after a single voyage.

History.—The Volga was not improbably known to the early Greeks, though it is not mentioned by any writer previous to Ptolemy. According to him, the Rha is a tributary of an interior sea, formed from the confluence of two great rivers, the sources of which are separated by twenty degrees of longitude, but it is scarcely possible to judge from his statements how far the Slavs had by that time succeeded in penetrating into the basin of the Volga. The Arab geographers throw little light on the condition of the Volga during the great migrations of the 3rd century, or subsequently under the invasion of the Huns, the growth of the Khazar empire in the southern steppes and of that of Bulgaria on the middle Volga. But we know that in the 9th century the Volga basin was occupied by Finnish tribes in the north and by Khazars and various Turkish races in the south. The Slavs, driven perhaps to the west, had only the Volkhov and the Dnieper, while the (Mahommedan) Bulgarian empire, at the confluence of the Volga with the Kama, was so powerful that for some time it was an open question whether Islam or Christianity would gain the upper hand among the Slav idolaters. But, while the Russians were driven from the Black Sea by the Khazars, and later on by a tide of Ugrian migration from the north-east, a stream of Slavs moved slowly towards the north-east, down the upper Oka, into the borderland between the Finnish and Turkish regions. After two centuries of struggle the Russians succeeded in colonizing the fertile valleys of the Oka basin; in the 12th century they built a series of fortified towns on the Oka and Klyazma; and finally they reached the mouth of the Oka, there founding (in 1222) a new Novgorod—the Novgorod of the Lowlands, now Nizhniy-Novgorod. The great lacustrine depression of the middle Volga was thus reached; and when the Mongol invasion of 1239-42 came, it encountered in the Oka basin a dense agricultural population with many fortified and wealthy towns—a population which the Mongols found they could conquer, indeed, but were unable to drive before them as they had done so many of the Turkish tribes.

This invasion checked but did not stop the advance of the Russians down the Volga. Two centuries elapsed before the Russians covered the 300 m. which separate the mouths of the Oka and the Kama and took possession of Kazañ. But in the meantime a flow of Novgorodian colonization had moved eastward, along the upper portions of the left-bank tributaries of the Volga, and had reached the Urals.

With the capture of Kazañ (1552) the Russians found the lower Volga open to their boats, and eight years afterwards they were masters of the mouth of the river at Astrakhan. Two centuries more elapsed before the Russians secured a free passage to the Black Sea and became masters of the Sea of Azov and the Crimea; the Volga, however, was their route. During these two centuries they fortified the lower river, settled it, and penetrated farther eastward into the steppes towards the upper Ural and thence to the upper parts of the Tobol and other great Siberian rivers.

Bibliography.—P. P. Semenov's *Geographical and Statistical Dictionary* (5 vols., St Petersburg, 1863–85) contains a full bibliography of the Volga and tributaries. See also V. Ragozin's *Volga* (3 vols., St Petersburg, 1880–81, with atlas; in Russian); N. Bogolyubov, *The Volga from Tver to Astrakhan* (Russian, 1876); H. Roskoschny, *Die Wolga und ihre Zuflüsse* (Leipzig, 1887, vol. i.), history, ethnography, hydrography and biography, with rich bibliographical information; N. Boguslavskiy, *The Volga as a Means of Communication* (Russian, 1887), with detailed profile and maps; Peretyatkovich, *Volga Region in the 15th and 16th Centuries* (1877); and Lender, *Die Wolga* (1889). (P. A. K.; J. T. Be.)

VOLHYNIA, a government of south-western Russia, bounded by the Polish governments of Lublin and Siedlce on the W., Grodno and Minsk on the N., Kiev on the E. and Podolia and Galicia (Austria) on the S., with an area of 27,690 sq. m. A broad, flat spur of the Carpathians—the Avratynsk plateau—which enters from the west and stretches out eastward towards the Dnieper occupies its southern portion, reaching a maximum elevation of 1200 ft.; another branch of the Carpathians in the west of the government ranges between 700 and 900 ft. at its highest points. Both are deeply grooved in places, and the crags give a hilly aspect to the districts in which they occur. The remainder of the government, which is quite flat, with an imperceptible slope towards the marshes of Pinsk, is known as the Polyesie (see Minsk).

The population in 1906 was estimated at 3,547,500. Some three-fourths of the population are Little Russians; the other elements are White and Great Russians, Poles (5·2%), Jews (13·2%) and Germans (5·7 %). The government is divided into twelve districts, the chief towns of which are Zhitomir, the capital, Dubno, Kovel, Kremenets, Lutsk, Novograd Volhynskiy, Ostrog, Ovruch, Vladimir Volhynskiy, Rovno, Staro-Konstantinov and Zaslavl. The conditions of peasant ownership differ from those which prevail in other parts of Russia, and of the total area the peasants hold approximately one-half; 42% of the total is in the hands of private owners, a considerable number of Germans having settled and bought land in the government.

Forests cover nearly 50% of the area in the north (that is, in the Polyesie) and 15% elsewhere. Agriculture is well developed in the south, and in 1900 there were 4,222,400 acres (24%) under cereal crops alone. In the Polyesie the principal occupations are connected with the export of timber and firewood, the preparation of pitch, tar, potash and wooden wares, and boat-building. Lignite and coal, some graphite and kaolin, are mined, as also amber, which is often found in big lumps. Manufacturing industries are not very highly developed. The factories are confined to sugar works, distilleries, woollen mills, and candle, tobacco, glass, cloth and agricultural machinery works. Domestic industry in the villages is chiefly limited to the making of wooden goods, including parquetry. The exports of grain and timber, chiefly to Germany and Great Britain, and of wool and cattle, are considerable.

Volhynia has been inhabited by Slavs from a remote antiquity. In Nestor's *Annals* its people are mentioned under the name of Dulebs, and later in the 12th century they were known as Velhynians and Buzhans (dwellers on the Bug). From the 9th century the towns of Volhynia-Vladimir, Ovruch, Lutsk and Dubno were ruled by descendants of the Scandinavian or Varangian chief Rurik, and the land of Volhynia remained independent until the 14th century, when it fell under Lithuania. In 1569 it was annexed to Poland, and so remained until 1795, when it was taken possession of by Russia.

VOLK, LEONARD WELLS (1828–1895), American sculptor, was born at Wellstown (now Wells), Hamilton county, New York, on the 7th of November 1828. He first followed the trade of a marble cutter with his father at Pittsfield, Massachusetts. In 1848 he opened a studio at St Louis, Missouri, and in 1855 was sent by his wife's cousin, Stephen A. Douglas, to Rome to study. Returning to America in 1857, he settled in Chicago, where he helped to establish an Academy of Design and was for eight years its head. Among his principal works are the Douglas monument at Chicago and the Soldiers' and Sailors' monument at Rochester, New York, and statues of President Lincoln and Stephen A. Douglas (in the Illinois State Capitol at Springfield, Ill.), and of General James Shields (in Statuary Hall, Capitol, Washington), Elihu B. Washburn, Zachariah Chandler and David Davis. In 1860 he made a life-mask (now in the National Museum, Washington) of Lincoln, of whom only one other, by Clark Mills in 1865, was ever made. His son, Douglas Volk (b. 1856), figure and portrait painter, who studied under J. L. Gérôme in Paris, became a member of the Society of American Artists in 1880 and of the National Academy of Design in 1899.

VOLKSRUST, a town of the Transvaal, 175 m. S.E. of Johannesburg and 308 m. N.N.W. of Durban. Pop. (1904) 2382, of whom 1342 were whites. The town lies at an elevation of 5429 ft. just within the Transvaal frontier and 4 m. N. of the pass through the Drakensberg known as Laing's Nek. It is the centre of a rich agricultural district. It was founded by the Boer government in 1888. As a customs port of entry it was of some importance, and it maintains its position as a distributing depot. It was created a municipality in 1903. Sandstone is quarried in the district.

VOLLENDAM, a small fishing village of Holland in the province of North Holland, adjoining Edam on the shores of the Zuider Zee. It is remarkable for the quaintness of the buildings and the picturesque costume of the villagers, who are of a singularly dark and robust type. Many artists have been attracted to settle here. Vollendam has its origin in the building of the great sea-dam for the new waterway to Edam in the middle of the 14th century. On the seaward side of the dike are some houses built on piles in the style of lake dwellings.

VOLLMAR, GEORG HEINRICH VON (1850–), German Socialist, was born at Munich in 1850. He was educated in a school attached to a Benedictine monastery at Augsburg, and in 1865 entered the Bavarian army as a lieutenant in a cavalry regiment. He served in the campaign of 1866, and then entered the papal army as a volunteer. In 1869 he returned to Germany, and during the war with France served in the army railway department. He was severely wounded at Blois and pensioned. Permanently crippled by his wounds, he devoted himself to political and social studies. In 1872 he was converted to the principles of Social Democracy, and threw himself with great energy into political agitation. In 1877 he became editor of the party organ at Dresden, and under the Socialist law was repeatedly condemned to various terms of imprisonment, and was also expelled from that city. From 1879 to 1882 he lived at Zürich, then the headquarters of Social Democracy, when, besides attending the university, he took part in editing the *Social Demokrat*. In 1881 he was elected member of the Reichstag, and from 1883 to 1889 was a member of the Saxon diet. After 1885 he resided in Bavaria, and it was to him that was chiefly due the great success of the Socialists in the older Bavarian provinces. He identified himself with the more moderate and opportunist section of the Socialist party, decisively dissociating himself from the doctrine of a sudden and violent overthrow of society, and urging his associates to co-operate in bringing about a gradual development towards the Socialistic state. He refused to identify Social Democracy with the extreme views as to religion and the family advocated by Bebel, and successfully resisted attempts made in 1891 to expel hi the party in consequence of his opinions. He became a member of the Bavarian Diet in 1893.

In addition to a couple of books on the preservation of forests, he published *Der isolierte Soziale Staat* (Zürich, 1880).

VOLNEY, CONSTANTIN FRANÇOIS CHASSEBŒUF, Comte de (1757–1820), French *savant*, was born at Craon (Maine-et-Loire) on the 3rd of February 1757, of good family; he was at first surnamed Boisgirais from his father's estate, but afterwards assumed the name of Volney. He spent some four years in Egypt and Syria, and published his *Voyage en Egypte et en Syrie* in 1787, and *Considérations sur la guerre des Turcs et de la Russie* in 1788. He was a member both of the States-General and of the Constituent Assembly. In 1791 appeared *Les Ruines, ou méditations sur les révolutions des empires*, an essay on the philosophy of history, containing a vision which predicts the final union of all religions by the recognition of the common truth underlying them all. Volney tried to put his politico-economic theories into practice in Corsica, where in 1792 he bought an estate and made an attempt to cultivate colonial produce. He was thrown into prison during the Jacobin triumph, but escaped the guillotine. He was some time professor of history at the newly founded École Normale. In 1795 he undertook a journey to the United States, where he was accused in 1797 of being a French spy sent to prepare for the reoccupation of Louisiana by France. He was obliged to return to France in 1798. The results of his travels took form in his *Tableau du climat et du sol des États-Unis* (1803). He was not a partisan of Napoleon, but, being a moderate man, a *savant* and a Liberal, was impressed into service by the emperor, who made him a count and put him into the senate. At the restoration he was made a peer of France. He became a member of the Institute in 1795. He died in Paris on the 25th of April 1820.

VOLO, a town and seaport of Greece, on the east coast of Thessaly, at the head of the gulf to which it gives its name. Pop. (1907) 23,319. It is the chief seaport and second industrial town of Thessaly, connected by rail with the town of Larissa. The anchorage is safe, vessels loading and discharging by means of lighters. The port has a depth of 23 to 25 ft.

The *Kastro*, or citadel, of Volo stands on or close to the site of Pagasae, whence the gulf took the name of Sinus Pagasaeus or Pagasicus, and which was one of the oldest places of which mention occurs in the legendary history of Greece. From this port the Argonautic expedition was said to have sailed, and it was already a flourishing place under the tyrant Jason, who from the neighbouring Pherae ruled over all Thessaly. Two miles farther south stand the ruins of Demetrias, founded (290 B.C.) by Demetrius Poliorcetes, and for some time a favourite residence of the Macedonian kings. On the opposite side of the little inlet at the head of the gulf rises the hill of Episcopi, on which stood the ancient city of Iolcus. At Dimini, about 3 m. W. of Volo, several tombs have been found which yielded remains of the later Mycenean Age.

VOLOGAESES (Vologaesus, Vologases; on the coins *Ologases*; Armen. *Valarsh*; Mod. Pers. *Balash*), the name of five Parthian kings.

(1) Vologaeses I., son of Vonones II. by a Greek concubine (Tac. *Ann.* xii. 44), succeeded his father in A.D. 51 (Tac. *Ann.* xii. 14; cf. Joseph. *Ant.* xx. 3, 4). He gave the kingdom of Media Atropatene to his brother Pacorus, and occupied Armenia for another brother, Tiridates (Tac. *Ann.* xii. 50, xv. 2; Joseph. *Ant.* xx. 3, 4). This led to a long war with Rome (54–63), which was ably conducted by the Roman general Corbulo. The power of Vologaeses was weakened by an attack of the Dahan and Sacan nomads, a rebellion of the Hyrcanians, and the usurpation of Vardanes II. (Tac. *Ann.* xiii. 7, 37; xiv. 25; xv. 1; cf. Joseph. *Ant.* xx. 4, 2, where he is prevented from attacking the vassal king of Adiabene by an invasion of the eastern nomads). At last a peace was concluded, by which Tiridates was acknowledged as king of Armenia, but had to become a vassal of the Romans; he went to Rome, where Nero gave him back the diadem (Tac. *Ann.* xv. 1 ff.; Dio Cass. lxii. 19 ff., lxiii. 1 ff.); from that time an Arsacid dynasty ruled in Armenia under Roman supremacy. Vologaeses was satisfied with this result, and honoured the memory of Nero (Suet. *Nero*, 57), though he stood in good relations with Vespasian also, to whom he offered an army of 40,000 archers in the war against Vitellius (Tac. *Hist.* iv. 51; Suet, *Vespas.* 6; cf. Joseph. *Ant.* vii. 5, 2, 7, 3; Dio Cass. lxvi. 11). Soon afterwards the Alani, a great nomadic tribe beyond the Caucasus, invaded Media and Armenia (Joseph. *Bell.* vii. 7, 4); Vologaeses applied in vain for help to Vespasian (Dio Cass. lxvi. 11; Suet. *Domitian*, 2). It appears that the Persian losses in the east also could not be repaired; Hyrcania remained an independent kingdom (Joseph. *Bell.* vii. 7, 4; Aurel. Vict. *Epit.* 15, 4). Vologaeses I. died about A.D. 77. His reign is marked by a decided reaction against Hellenism; he built Vologesocerta (Balashkert) in the neighbourhood of Ctesiphon with the intention of drawing to this new town the inhabitants of the Greek city Seleucia (Plin. vi. 122). Another town founded by him is Vologesias on a canal of the Euphrates, south of Babylon (near Hira; cf. Nöldeke in *Zeitschrift der deutschen-morgenl. Gesellschaft*, xxviii. 93 ff.). On some of his coins the initials of his name appear in Aramaic letters.

(2) Vologaeses II., probably the son of Vologaeses I., appears on coins, which bear his proper name, in 77–79, and again 121–47. During this time the Parthian kingdom was torn by civil wars between different pretenders, which reached their height during the war of Trajan, 114–17. Besides Vologaeses II. we find on coins and in the authors Pacorus (78–*c.* 105), Artabanus III. (80–81), Osroes (106–29), Mithradates V. (*c.* 129–47) and some others; thus the Parthian empire seems during this whole time to have been divided into two or three different kingdoms. By classic authors Vologaeses II. is mentioned in the time of Hadrian (*c.* 131), when Cappadocia, Armenia and Media were invaded by the Alani (Dio Cass. lxix. 15).

(3) Vologaeses III., 147–91. Under him, the unity of the empire was restored. But he was attacked by the Romans under Marcus Aurelius and Verus (162–65). In this war Seleucia was destroyed and the palace of Ctesiphon burnt down by Avidius Cassius (164); the Romans even advanced into Media. In the peace, western Mesopotamia was ceded to the Romans (Dio Cass. lxxi. 1 ff.; Capitolin. *Marc. Aur.* 8 f.; Verus 8, &c.). Vologaeses III. is probably the king Volgash of the Parsee tradition, preserved in the *Dinkart*, who began the gathering of the writings of Zoroaster.

(4) Vologaeses IV., 191–209. He was attacked by Septimius Severus in 195, who advanced into Mesopotamia, occupied Nisibis and plundered Ctesiphon (199), but attempted in vain to conquer the Arabic fortress Atra; in 202 peace was restored.

(5) Vologaeses V., 209–*c.* 222, son of Vologaeses IV. Soon after his accession his brother Artabanus IV., the last Arsacid king, rebelled against him, and became master of the greater part of the empire (Dio Cass. lxxvii. 12). But Vologaeses V. maintained himself in a part of Babylonia; his dated coins reach down to A.D. 222. (Ed. M.)

VOLOGDA, a government of north-eastern Russia, having the government of Archangel on the N., Tobolsk on the E., Perm, Vyatka, Kostroma and Yaroslavl on the S., Novgorod, Olonetz and Archangel on the W. This immense government, which comprises an area of 155,218 sq. m., stretches in a north-easterly direction for 800 m., from Novgorod to the Urals, and includes the broad depression drained by the Sukhona from the S.W., and the Vychegda from the N.E., both head-waters of the N. Dvina. From the basin of the Volga it is separated by a flat, swampy, wooded swelling, where the heads of tributaries belonging to both Arctic and Caspian drainage-areas are closely intermingled. The eastern boundary of Vologda follows the main water-parting of the Urals, which has but few points over 3000 ft.; wide *parmas*, or woody plateaus, fill up the space between the main chain of the Urals and the southern spurs of the Timan Mountains, in the upper basin of the Pechora. It is above the *parmas*—especially over those which are nearest the Urals proper—that the highest summits of the Urals rise in the form of dome-shaped mountains (Töll-poz-iz, 5535 ft.; Kozhem-iz, 4225 ft.; Shadmaha, 4115 ft.). The Timan

Mountains are a swampy plateau, where the rivers flowing to the N. Dvina or to the Pechora take their rise in common marshes; so that on the Mylva portage boats have to be dragged a distance of only 3 m. to be transported from one system to the other.

Permian sandstones and cupriferous slates cover most of the territory; only a few patches of Jurassic clays overlie them; in the east, in the Ural *parmas*, coal-bearing Carboniferous, Devonian and Silurian slates and limestones appear, wrapping the crystalline slates of the main ridge. Vast layers of boulder clay and Lacustrine deposits overlie the whole. Rock-salt and salt springs, iron ore, millstones and grindstones are the chief mineral products; but mining is in its infancy.

The river Sukhona, which rises in the south-west and flows north-east, is navigable for 375 m. After its confluence with the Yug (390 m. long), which flows from the south, it becomes the N. Dvina, which proceeds north-west, and receives the Vychegda, 740 m. long and navigable for 570 m., though it passes through a nearly uninhabited region. The Luza, a tributary of the Yug, is also navigated for more than 250 m. The Pechora, which flows through eastern Vologda, is an artery for the export of corn and the import of fish. The Pinega, the Mezeñ and the Vaga, all belonging to the Arctic basin, rise in northern Vologda. In the south-west the Sukhona is connected by means of Lake Kubina and the canal of Alexander von Württemberg with the upper Volga. Numberless smaller lakes occur, and marshes cover a considerable part of the surface.

The climate is severe, the average yearly temperature being 36° F. at Vologda (Jan., 10°·7; July, 63°·5) and 32°·5 at Ust-Sysolsk (Jan., 4°·8; July, 61°·7).

The flora and the physical aspects vary greatly as the traveller moves north-east down the Sukhona and up the Vychegda, towards the *parmas* of the Pechora. In the south-west the forests are cleared, and the dry slopes of the hills have been converted into fields and meadows; the population is relatively dense, and nearly one-quarter of the area is under crops. There is a surplus of grain, which is used for distilleries, and apples are extensively cultivated. The flora is middle-Russian. Farther north-east the climate grows more severe; but still, until the Dvina is reached, corn succeeds well, and there is no lack of excellent meadows on the river-terraces. Flax is cultivated for export; but only 4% of the area is tilled, the remainder being covered with thick fir forests with occasional groups of deciduous trees (birch, aspen, elder). At about 46° E. the larch appears and soon supersedes the fir. Several plants unknown in western Russia make their appearance (*Silene tartarica*, *Anthyllis vulneraria*, *Euphorbia palustris*, *Filago arvensis*, *Lycopodium complanatum*, *Sanguisorba officinalis*). The *Veratrum* is especially characteristic; it sometimes encroaches on the meadows to such an extent as to compel their abandonment. The region of the upper Mezeñ (the Udora) again has a distinctive character. The winter is so protracted, and the snowfall so copious, that the Syryenians are sometimes compelled to clear away the snow from their barley-fields. But the summer is so hot (a mean of 54° for the three summer months) that barley ripens within forty days after being sown. The Timan plateaus are a marked boundary for the middle-Russian flora. Those to the east of them are uninhabitable; even on the banks of the rivers the climate is so severe, especially on account of the icy northern winds, that rye and barley are mostly grown only in orchards. The whole is covered with quite impenetrable forests, growing on a soil saturated with water. Mosquitoes swarm in the forests; birds are rare. The Siberian cedar begins and the lime tree disappears. Fir, cedar, pine and larch compose the forests, with birch and aspen on their outskirts. Hunting is the chief occupation of the Syryenian inhabitants.

The population was estimated in 1906 at 1,517,500, of whom 57,407 lived in towns; 90% were Great Russians and 8·4% Syryenians (*q.v.*). The government is divided into ten districts, the chief towns of which are Vologda, Gryazovets, Kadnikov, Nikolsk, Solvychegodsk, Totma or Totyma, Ustyug Velikiy, Ust-Sysolsk, Velsk and Yarensk. Agriculture thrives in the three south-western districts. Live-stock breeding occupies considerable numbers of people. A little salt is raised, and there are a few ironworks, but manufacturing industries are in their infancy; the chief branch is the weaving of linen in the villages. (P. A. K.; J. T. Be.)

VOLOGDA, a town of Russia, capital of the government of the same name, situated in its south-western corner on the river Vologda, above its confluence with the navigable Sukhona, 127 m. by rail N. of Yaroslavl. Pop. (1881) 17,025; (1897) 27,822. It is an old town, having many ancient churches, including one which dates from the 12th century, and the cathedral, founded in 1568. Vologda is a considerable commercial centre—flax, linseed, oats, hemp, butter and eggs being exported to both St Petersburg and Archangel. It has distilleries, tanneries, and oil, soap, tobacco, candle and fur-dressing works.

Vologda existed as a trading town as early as the 12th century. It was a colony of Novgorod, and was founded in 1147, and carried on a brisk trade in flax, tallow, furs, corn, leather and manufactured goods. In 1273 it was plundered by the prince of Tver in alliance with the Tatars, but soon recovered. Moscow disputed its possession with Novgorod until the 15th century; the Moscow princes intrigued to find support amidst the poorer inhabitants against the richer Novgorod merchants, and four successive times Vologda had to fight against its metropolis. It was definitely annexed to Moscow in 1447. When Archangel was founded, and opened for foreign trade in 1553, Vologda became the chief depot for goods exported through that channel Polish bands plundered it in 1613, and the plague of 1648 devastated it; but it maintained its commercial importance until the foundation of St Petersburg, when Russian foreign trade took another channel.

VOLSCI, an ancient Italian people, well known in the history of the first century of the Roman Republic. They then inhabited the partly hilly, partly marshy district of the S. of Latium, bounded by the Aurunci and Samnites on the S., the Hernici on the E., and stretching roughly from Norba and Cora in the N. to Antium in the S. They were among the most dangerous enemies of Rome, and frequently allied with the Aequi, whereas the Hernici from 486 B.C. onwards were the allies of Rome. In the Volscian territory lay the little town of Velitrae (Velletri), the birthplace of Augustus. From this town we have a very interesting though brief inscription dating probably from early in the 3rd century B.C.; it is cut upon a small bronze plate (now in the Naples Museum), which must have once been fixed to some votive object, dedicated to the god *Declunus* (or the goddess *Decluna*).

The language of this inscription is clear enough to show the very marked peculiarities which rank it close beside the language of the Iguvine Tables (see Iguvium). It shows on the one hand the labialization of the original velar *q* (Volscian *pis* = Latin *quis*), and on the other hand it palatalizes the guttural *c* before a following *i* (Volscian *façia* = Latin *faciat*). Like Umbrian also, but unlike Latin and Oscan, it has degraded all the diphthongs into simple vowels (Volscian *se* parallel to Oscan *svai*; Volscian *deue*, Old Latin and Oscan *deiuai* or *deiuoi*). This phenomenon of what might have been taken for a piece of Umbrian text appearing in a district remote from Umbria and hemmed in by Latins on the north and Oscan-speaking Samnites on the south is a most curious feature in the geographical distribution of the Italic dialects, and is clearly the result of some complex historical movements.

In seeking for an explanation we may perhaps trust, at least in part, the evidence of the Ethnicon itself. The name *Volsci* belongs to what may be called the -CO- group of tribal names in the centre, and mainly on the west coast, of Italy, all of whom were subdued by the Romani before the end of the 4th century B.C.; and many of whom were conquered by the Samnites about a century or more earlier. They are, from south to north, *Osci*, *Aurunci*, *Hernici*, *Marruci*, *Falisci*; with these were no doubt associated the original inhabitants of *Aricia* and of *Sidici-num*, of *Vescia* among the *Aurunci*, and of *Labici* close to Hernican territory. The same formative element appears in the adjective *Mons Massicus*, and the names *Glanica* and *Marica* belonging to the Auruncan district, with *Graviscae* in south Etruria, and a few other names in central Italy (see "I due strati nella popolazione Indo-Europea dell' Italia Antica," in the *Atti del Congresso Internazionale di Scienze Storiche*, Rome, 1903, p. 17). With these names must clearly be judged the forms *Tusci* and *Etrusci*, although these forms must not be regarded as anything but the names given to the Etruscans by the folk among whom they settled. Now the historical fortune of these tribes is reflected in several of their names (see Sabini). The Samnite and Roman conquerors tended to impose the form of their own Ethnicon, namely the suffix -NO-, upon the tribes they conquered; hence the *Marruci* became the *Marrucini*, the **Arici* became *Aricini*, and it seems at least probable that the forms *Sidicini*, *Carecini*, and others of this shape are the results of this same process. The conclusion suggested is that these -CO- tribes occupied the centre and west coast of Italy at the time of the Etruscan invasion (see Etruria: *Language*); whereas the -NO- tribes only reached this part of Italy, or at least only became dominant there, long after the Etruscans had settled in the Peninsula.

It remains, therefore, to ask whether any information can be had about the language of this primitive -CO- folk, and whether they can be identified as the authors of any of the various archaeological strata now recognized on Italian soil. If the conclusions suggested under Sabini may be accepted as sound we should expect to find the Volsci speaking a language similar to that of the Ligures, whose fondness for the suffix *-sco-* we have noticed (see Ligures), and identical with that spoken by the plebeians of Rome, and that this branch of Indo-European was among those which preserved the original Indo-European Velars from the labialization which befell them in the speech of the Samnites. The language of the inscription of Velitrae offers at first sight a difficulty from this point of view, in the conversion which it shows of *q* to *p*; but it is to be observed that the Ethnicon of Velitrae is *Veliternus*, and that the people are called on the inscription itself *Velestrom* (genitive plural); so that there is nothing to prevent our assuming that we have here a settlement of Sabines among the Volscian hills, with their language to some extent (*e.g.* in the matter of the diphthongs and palatals) corrupted by that of the people round about them; just as we have reason to suppose was the case with the Safine language of the *Iguvini*, whose very name was later converted into *Iguvinates*, the suffix *-ti-* being much more frequent among the -CO- tribes than among the Safines (see Sabini)

The name *Volsci* itself is significant not merely in its suffix; the older form *Volusci* clearly contains the word meaning "marsh" identical with Gr. ἕλος, since the change of **velos-* to **volus-* is phonetically regular in Latin. The name *Marica* ("goddess of the salt-marshes") among the Aurunci appears also both on the coast of Picenum and among the Ligurians; and Stephanus of Byzantium identified the Osci with the Siculi, whom there is reason to suspect were kinsmen of the Ligures. It is remarkable in how many marshy places this *-co-* or *-ca-* suffix is used. Besides the *Aurunci* and the *dea Marica* and the *intempestaeque Graviscae* (Virg. *Aen.* x. 184), we have the *Ustica cubans* of Horace (*Odes* i. 17, 11), the *Hernici* in the Trerus valley, *Satricum* and *Glanica* in the Pomptine marshes.

For the text and fuller account of the Volscian inscription, and for other records of the dialect, see R. S. Conway, *The Italic Dialects*, pp. 267 sqq. (R. S. C.)

VOLSINII, an ancient town of Etruria, Italy. The older Volsinii occupied in all probability the isolated tufa rock, so strongly defended by nature, upon which in Roman times stood the town which Procopius (*B.G.* ii. 11 seq.) calls Οὐρβιβεντός (*Urbs vetus*, the modern Orvieto). This conjecture, first made by O. Müller, has been generally accepted by modern archaeologists, and it is a strong point in its favour that the bishop of Orvieto in 595 signs himself *episcopus civitatis Bulsiniensis* (Gregor. Magn. *Registr.* v. 57*a*, cf. ii. 11, vi. 27). It had, and needed, no outer walls, being surrounded on all sides except the S.W. by abrupt tufa cliffs; but a massive wall found by excavation on the S.W. side of the town may have belonged to the acropolis. No remains of antiquity are to be seen within the city; but at the foot of the hill on the N. a large Etruscan necropolis was found in 1874, dating from the 5th century B.C. The tombs, constructed of blocks of stone and arranged in rows divided by passages (like houses in a town), often had the name of the deceased on the façade. Many painted vases, &c., were found; some of the best are in the Museo Civico at Orvieto. Tombs with paintings have also [illegible] the town on the way to Bolsena.

[illegible] the richest of the twelve cities of Etruria. Wars between Volsinii and Rome are mentioned in 392, 308 and 294 B.C., and in 265–64 B.C. the Romans assisted the inhabitants against their former slaves, who had successfully asserted themselves against their masters and took the town. Fulvius Flaccus gained a triumph for his victory, and it was probably then that the statue of Vertumnus which stood in the Vicus Tuscus at Rome was brought from Volsinii. Zonaras states that the city was destroyed and removed elsewhere, though the old site continued apparently to be inhabited, to judge from the inscriptions found there. The new city was certainly situated on the hills on the N.E. bank of the Lake of Bolsena (*Lacus Volsiniensis*), 12 m. W S.W of Orvieto, where many remains of antiquity have been found, on and above the site of the modern Bolsena (*q.v.*). These remains consist of Etruscan tombs, the sacred enclosure of the goddess Nortia, with votive objects and coins ranging from the beginning of the 3rd century B.C. to the middle of the 3rd century A.D., remains of Roman houses, &c, and an amphitheatre of the imperial period (E Gabrici in *Monumenti dei Lincei*, xvi., 1906, 169 sqq., and in *Notizie degli Scavi*, 1906, 59 sqq.)

The history of the new Volsinii is somewhat scanty Sejanus, the favourite of Tiberius, and Musonius Rufus the Stoic were natives of the place. The earliest dated inscription from the cemetery of S. Christina (discovered with its subterranean church in 1880–81) belongs to A.D. 376 and the first known bishop of Volsinii to A.D. 499. In the next century, however, the see was transferred to Orvieto. Etruscan tombs have been found on the Isola Bisentina, in the lake; and on the west bank was the town of Visentium, Roman inscriptions belonging to which have been found. The site is marked by a medieval castle bearing the name Bisenzo.

See E. Bormann in *Corp. Inscr. Latin.* xi., 1888, pp. 423 sqq.; *Notizie degli Scavi*, *passim*; G. Dennis, *op. cit.* (ii. 18 sqq.). (T. As.)

VOLTA, ALESSANDRO (1745–1827), Italian physicist, was born at Como on the 18th of February 1745. He is celebrated as a pioneer of electrical science, after whom the "volt" is named. In 1774 he was appointed professor of physics in the gymnasium of Como, and in 1777 he travelled through Switzerland, where he formed an intimate friendship with H. B. de Saussure. In 1779 a chair of physics was founded in Pavia, and Volta was chosen to occupy it. In 1782 he journeyed through France, Germany, Holland and England, and became acquainted with many scientific celebrities. In 1791 he received the Copley medal of the Royal Society. In 1801 Napoleon called him to Paris, to show his experiments on contact electricity, and a medal was struck in his honour. He was made a senator of the kingdom of Lombardy. In 1815 the emperor of Austria made him director of the philosophical faculty of Padua. In 1819 he retired and settled in his native town, where he died on the 5th of March 1827. For Volta's electrical work, and his place in the history of discovery (see Electricity; also Voltmeter).

VOLTA, the largest river of the coast of Upper Guinea, between the Gambia and the Niger, with a length of about 900 m. Its mouth and the greater part of its course are in British territory. Its lower course had been known since the discoveries of the Portuguese, from whom it received (15th century) its name on account of the winding nature of its stream. It was not, however, until the last fifteen years of the 19th century that the extent of its basin—extending far north within the bend of the Niger—was made known.

There are two main upper branches, the Black and the White Volta. Their sources lie on the grassy plateaus north of the forest belt of the Guinea coast, the Black Volta rising (as the Baule) in about 11° N. 4° 50′ W. Its course is at first E. and N.E., to 12° 25′ N., at which point, after receiving a tributary from nearly 14° N.—the most northerly point of the basin,—it turns sharply south. From the eleventh to the ninth parallel the river forms the boundary between the Northern Territories of the Gold Coast (British) and the French Ivory Coast colony. The southerly course of the stream ceases at 8° 15′ N. where it is deflected E., and even N., by a mountain range composed of sandstone and granite, which it finally breaks through by a narrow pass, in which its width is only some 60 yds. Elsewhere it has a general width of 150 to 200 yds. In 0° 50′ W. it receives the White Volta, which flows generally south from about 13° N. and likewise breaks through a narrow gap in the plateau escarpment. Both rivers shrink greatly in the dry season, reaching their lowest level at the end of January. Below the junction the Volta flows S.E. and S., turning, however, E. for 40 m. just north of 6°. In 7° 37′ N. it receives on the left bank a large tributary, the Oti, coming from 12° N. In its lower course, through the forest belt, the river has often a width of over half a mile, with a depth in places of 40 to 50 ft. in the rains, but in 6° 18′ N. it traverses a pass in which its width is narrowed to 30 yds. Its use as a waterway is limited by a number of rapids, the lowest of which occur in 6° 7′ N., above the trading port of Akuse. Its mouth is also obstructed during the greater part of the year by a bar. The river is usually navigable by small vessels from its mouth for about 60 m.

The lower Volta was explored by M. J. Bonnat in 1875, but the upper basin was first traversed by the German traveller G. A. Krause (1886–87) and the French captain L. G. Binger (1888). It has since been explored by a number of colonial officials—German, French and British. Between 6° 41′ and 8° 8′ N. the Volta forms the boundary between the Gold Coast and Togoland.

VOLTAIRE, FRANÇOIS MARIE AROUET DE (1694–1778), French philosopher, historian, dramatist and man of letters, whose real name was François Marie Arouet simply, was born on the 21st of November 1694 at Paris, and was baptized the next day. His father was François Arouet, a notary; his mother was Marie Marguerite Daumart or D'Aumard. Both father and mother were of Poitevin extraction, but the Arouets had been for two generations established in Paris, the grandfather being a prosperous tradesman. The family appear to have always belonged to the yeoman-tradesman class; their special home was the town of Saint-Loup. Voltaire was the fifth child of his parents—twin boys (of whom one survived), a girl, Marguerite Catherine, and another boy who died young, having preceded him. Not very much is known of the mother, who died when Voltaire was but seven years old. She pretty certainly was the chief cause of his early introduction to good society, the abbé de Châteauneuf (his sponsor in more ways than one) having been her friend. The father appears to have been somewhat peremptory in temper, but neither inhospitable nor tyrannical. Marguerite Arouet, of whom her younger brother was very fond, married early, her husband's name being Mignot; the elder brother, Armand, was a strong Jansenist, and there never was any kind of sympathy between him and François.

The abbé de Châteauneuf instructed him early in belles-lettres and deism, and he showed when a child the unsurpassed faculty for facile verse-making which always distinguished him. At the age of ten he was sent to the Collège Louis-le-Grand, which was under the management of the Jesuits, and remained there till 1711. It was his whim, as part of his general liberalism, to depreciate the education he received; but it seems to have been a very sound and good education, which formed the basis of his extraordinarily wide, though never extraordinarily accurate, collection of knowledge subsequently, and (a more important thing) disciplined and exercised his literary faculty and judgment. Nor can there be much doubt that the great attention bestowed on acting—the Jesuits kept up the Renaissance practice of turning schools into theatres for the performance of plays both in Latin and in the vernacular—had much to do with Voltaire's lifelong devotion to the stage. It must have been in his very earliest school years that the celebrated presentation of him by his godfather to Ninon de Lenclos took place, for Ninon died in 1705. She left him two thousand francs "to buy books with." He worked fairly, played fairly, lived comfortably, made good and lasting friends. Some curious traits are recorded of this life—one being that in the terrible famine year of Malplaquet a hundred francs a year were added to the usual boarding expenses, and yet the boys had to eat *pain bis*.

In August 1711, at the age of seventeen, he came home, and the usual battle followed between a son who desired no profession but literature and a father who refused to consider literature a profession at all. For a time Voltaire submitted, and read law at least nominally. The abbé de Châteauneuf died before his godson left school, but he had already introduced him to the famous and dissipated coterie of the Temple, of which the grand prior Vendôme was the head, and the poets Chaulieu and La Fare the chief literary stars. It does not appear that Voltaire got into any great scrapes; but his father tried to break him off from such society by sending him first to Caen and then, in the suite of the marquis de Châteauneuf, the abbé's brother, to the Hague. Here he met a certain Olympe Dunoyer ("Pimpette"), a girl apparently of respectable character and not bad connexions, but a Protestant, penniless, and daughter of a literary lady whose literary reputation was not spotless. The mother discouraged the affair, and, though Voltaire tried to avail himself of the mania for proselytizing which then distinguished France, his father stopped any idea of a match by procuring a *lettre de cachet*, which, however, he did not use. Voltaire, who had been sent home, submitted, and for a time pretended to work in a Parisian lawyer's office; but he again manifested a faculty for getting into trouble—this time in the still more dangerous way of writing libellous poems—so that his father was glad to send him to stay for nearly a year (1714–15) with Louis de Caumartin, marquis de Saint-Ange, in the country. Here he was still supposed to study law, but devoted himself in part to literary essays, in part to storing up his immense treasure of gossiping history. Almost exactly at the time of the death of Louis XIV. he returned to Paris, to fall once more into literary and Templar society, and to make the tragedy of *Œdipe*, which he had already written, privately known. He was now introduced to a less questionable and even more distinguished coterie than Vendôme's, to the famous "court of Sceaux," the circle of the beautiful and ambitious duchesse du Maine. It seems that Voltaire lent himself to the duchess's frantic hatred of the regent Orleans, and helped to compose lampoons on that prince. At any rate, in May 1716 he was exiled, first to Tulle, then to Sully. Allowed to return, he again fell under suspicion of having been concerned in the composition of two violent libels—one in Latin and one in French—called from their first words the *Puero Regnante* and the *J'ai vu*, was inveigled by a spy named Beauregard into a real or burlesque confession, and on the 16th of May 1717 was sent to the Bastille. He there recast *Œdipe*, began the *Henriade* and determined to alter his name. Ever after his exit from the Bastille in April 1718 he was known as Arouet de Voltaire, or simply Voltaire, though legally he never abandoned his patronymic. The origin of the famous name has been much debated, and attempts have been made to show that it actually existed in the Daumart pedigree or in some territorial designation. Some are said to maintain that it was an abbreviation of a childish nickname, "*le petit volontaire*." The balance of opinion has, however, always inclined to the hypothesis of an anagram on the name "Arouet le jeune," or "Arouet l. j.," *u* being changed to *v* and *j* to *i* according to the ordinary rules of the game.

A further "exile" at Châtenay and elsewhere succeeded the imprisonment, and though Voltaire was admitted to an audience by the regent and treated graciously he was not trusted. *Œdipe* was acted at the Théâtre Français on the 18th of November of the year of release, and was very well received, a rivalry between parties not dissimilar to that which not long before had helped Addison's *Cato* assisting its success. It had a run of forty-five nights, and brought the author not a little profit. With these gains Voltaire seems to have begun his long series of successful financial speculations. But in the spring of next year the production of Lagrange-Chancel's libels, entitled the *Philippiques*, again brought suspicion on him. He was informally exiled, and spent much time with Marshal Villars, again increasing his store of "reminiscences." He returned to Paris in the winter, and his second play, *Artémire*, was produced in February 1720. It was a failure, and though it was recast with some success Voltaire never published it as a whole, and used parts of it in other work. He again spent much of his time with Villars, listening to the marshal's stories and making harmless love to the duchess. In December 1721 his father died, leaving him property (rather more than four thousand livres a year), which was soon increased by a pension of half the amount from the regent. In return for this, or in hopes of more, he offered himself as a spy—or at any rate as a secret diplomatist—to Dubois. But meeting his old enemy Beauregard in one of the minister's rooms and making an offensive remark, he was waylaid by Beauregard some time after in a less privileged place and soundly beaten.

His visiting espionage, as unkind critics put it—his secret diplomatic mission, as he would have liked to have it put himself—began in the summer of 1722, and he set out for it in company with a certain Madame de Rupelmonde, to whom he as usual made love, taught deism and served as an amusing travelling companion. He stayed at Cambrai for some time, where European diplomatists were still in full session, journeyed to Brussels, where he met and quarrelled with Jean Baptiste Rousseau, went on to the Hague, and then returned. The *Henriade* had got on considerably during the journey, and, according to his lifelong habit, the poet, with the help of his friend Thiériot and others, had been "working the oracle" of puffery. During the late autumn and winter of 1722–23 he abode chiefly in Paris, taking a kind of lodging in the town house of M. de Bernières, a nobleman of Rouen, and endeavouring to procure a "privilege" for his poem. In this he was disappointed, but he had the work printed at Rouen nevertheless, and spent the summer of 1723 revising it. In November he caught smallpox and was very seriously ill, so that the book was not given to the world till the spring of 1724 (and then of course, as it had no privilege, appeared privately). Almost at the same time, the 4th of March, his third tragedy, *Mariamne* appeared, was well received at first, but underwent complete damnation before the curtain fell. The regent had died shortly before, not to Voltaire's advantage; for he had been a generous patron. Voltaire had made, however, a useful friend in another *grand seigneur*, as profligate and nearly as intelligent, the duke of Richelieu, and with him he passed 1724 and the next year chiefly, recasting *Mariamne* (which was now successful), writing the comedy of *L'Indiscret*, and courting the queen, the ministers, the favourites and everybody who seemed worth. The end of 1725 brought a disastrous close to this period of his life. He was insulted by the chevalier de Rohan, replied with his usual sharpness of tongue, and shortly afterwards, when dining with the duke of Sully, was called out and bastinadoed by the chavelier's hirelings, Rohan himself looking on. Nobody would take his part, and at last, nearly three months after the outrage, he challenged Rohan, who accepted the challenge, but on the morning appointed for the duel Voltaire was arrested and sent for the second time to the Bastille. He was kept in confinement a fortnight, and was then packed off to England in accordance with his own request. Voltaire revenged himself on the duke of Sully for his conduct towards his guest by cutting Maximilien de Béthune's name out of the *Henriade*.

No competent judges have ever mistaken the importance of Voltaire's visit to England, and the influence it exercised on his future career. In the first place, the ridiculous and discreditable incident of the beating had time to blow over; in the second, England was a very favourable place for Frenchmen of note to pick up guineas; in the third, and most important of all, his contact with a people then far more different in every conceivable way from their neighbours than any two peoples of Europe are different now, acted as a sovereign tonic and stimulant on his intellect and literary faculty. Before the English visit Voltaire had been an elegant trifler, an adept in the forms of literature popular in French society, a sort of superior Dorat or Boufflers of earlier growth. He returned from that visit one of the foremost literary men in Europe, with views, if not profound or accurate, yet wide and acute on all *les grands sujets*, and with a solid stock of money. The visit lasted about three years, from 1726 to 1729; and, as if to make the visitor's luck certain, George I. died and George II. succeeded soon after his arrival. The new king was not fond of "boetry," but Queen Caroline was, and international jealousy was pleased at the thought of welcoming a distinguished exile from French illiberality. The Walpoles, Bubb Dodington, Bolingbroke, Congreve, Sarah, duchess of Marlborough, Pope, were among his English friends. He made acquaintance with, and at least tried to appreciate, Shakespeare. He was much struck by English manners, was deeply penetrated by English toleration for personal freethought and eccentricity, and gained some thousands of pounds from an authorized English edition of the *Henriade*, dedicated to the queen. But he visited Paris now and then without permission, and his mind, like the mind of every exiled Frenchman, was always set thereon. He gained full licence to return in the spring of 1729.

He was full of literary projects, and immediately after his return he is said to have increased his fortune immensely by a lucky lottery speculation. The *Henriade* was at last licensed in France; *Brutus*, a play which he had printed in England, was accepted for performance, but kept back for a time by the author; and he began the celebrated poem of the *Pucelle*, the amusement and the torment of great part of his life. But he had great difficulties with two of his chief works which were ready to appear, *Charles XII.* and the *Lettres sur les Anglais*. With both he took all imaginable pains to avoid offending the censorship; for Voltaire had, more than any other man who ever lived, the ability and the willingness to stoop to conquer. At the end of 1730 *Brutus* did actually get acted. Then in the spring of the next year he went to Rouen to get *Charles XII.* surreptitiously printed, which he accomplished. In 1732 another tragedy, *Ériphile*, appeared, with the same kind of halting success which had distinguished the appearance of its elder sisters since *Œdipe*. But at last, on the 13th of August 1732, he produced *Zaïre*, the best (with *Mérope*) of all his plays, and one of the ten or twelve best plays of the whole French classical school. Its motive was borrowed to some extent from *Othello*, but that matters little. In the following winter the death of the comtesse de Fontaine-Martel, whose guest he had been, turned him out of a comfortable abode. He then took lodgings with an agent of his, one Demoulin, in an out-of-the-way part of Paris, and was, for some time at least, as much occupied with contracts, speculation and all sorts of means of gaining money as with literature.

In the middle of this period, however, in 1733, two important books, the *Lettres philosophiques sur les Anglais* and the *Temple du goût* appeared. Both were likely to make bad blood, for the latter was, under the mask of easy verse, a satire on contemporary French literature, especially on J. B. Rousseau, and the former was, in the guise of a criticism or rather panegyric of English ways, an attack on everything established in the church and state of France. It was published with certain "remarks" on Pascal, more offensive to orthodoxy than itself, and no mercy was shown to it. The book was condemned (June 10th, 1734), the copies seized and burnt, a warrant issued against the author and his dwelling searched. He himself was safe in the independent duchy of Lorraine with Émilie de Breteuil, marquise du Châtelet,[1] with whom he began to be intimate in 1733; he had now taken up his abode with her at the château of Cirey.

If the English visit may be regarded as having finished

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[1] Gabrielle Émilie Le Tonnelier de Breteuil, marquise du Châtelet (1706–1749), was the daughter of the baron de Breteuil, and married the marquis du Châtelet-Lomont in 1725. She was an accomplished linguist, musician and mathematician, and deeply interested in metaphysics. When she first became intimate with Voltaire she was practically separated from her husband, though he occasionally visited Cirey. She is only important from her connexion with Voltaire, though an attempt has been made to treat her as an original thinker; see F. Hamel, *An Eighteenth Century Marquise* (1910). She wrote *Institutions de physique* (1740), *Dissertation sur la nature et la propagation du feu* (1744), *Doutes sur les religions reculées* (1792), and in 1756 published a translation of Newton's *Principia*.

Voltaire's education, the Cirey residence may be justly said to be the first stage of his literary manhood. He had written important and characteristic work before; but he had always been in a kind of literary *Wanderjahre*. He now obtained a settled home for many years and, taught by his numerous brushes with the authorities, he began and successfully carried out that system of keeping out of personal harm's way, and of at once denying any awkard responsibility, which made him for nearly half a century at once the chief and the most prosperous of European heretics in regard to all established ideas. It was not till the summer of 1734 that Cirey, a half-dismantled country house on the borders of Champagne and Lorraine, was fitted up with Voltaire's money and became the headquarters of himself, of his hostess, and now and then of her accommodating husband. Many pictures of the life here, some of them not a little malicious, survive. It was not entirely a bed of roses, for the "respectable Emily's" temper was violent, and after a time she sought lovers who were not so much *des cérébraux* as Voltaire. But it provided him with a safe and comfortable retreat, and with every opportunity for literary work. In March 1735 the ban was formally taken off him, and he was at liberty to return to Paris, a liberty of which he availed himself sparingly.

At Cirey he wrote indefatigably and did not neglect business. The principal literary results of his early years here were the *Discours en vers sur l'homme*, the play of *Alzire* and *L'Enfant prodigue* (1736), and a long treatise on the Newtonian system which he and Madame du Châtelet wrote together. But, as usual, Voltaire's extraordinary literary industry was shown rather in a vast amount of fugitive writings than in substantive works, though for the whole space of his Cirey residence he was engaged in writing, adding to, and altering the *Pucelle*. In the very first days of his sojourn he had written a pamphlet with the imposing title of *Treatise on Metaphysics*. Of metaphysics proper Voltaire neither then nor at any other time understood anything, and the subject, like every other, merely served him as a pretext for laughing at religion with the usual reservation of a tolerably affirmative deism. In March 1736 he received his first letter from Frederick of Prussia, then crown prince only. He was soon again in trouble, this time for the poem of *Le Mondain*, and he at once crossed the frontier and then made for Brussels. He spent about three months in the Low Countries, and in March 1737 returned to Cirey, and continued writing, making experiments in physics (he had at this time a large laboratory), and busying himself with iron-founding, the chief industry of the district. The best-known accounts of Cirey life, those of Madame de Grafigny, date from the winter of 1738–39; they are somewhat spiteful but very amusing, depicting the frequent quarrels between Madame du Châtelet and Voltaire, his intense suffering under criticism, his constant dread of the surreptitious publication of the *Pucelle* (which nevertheless he could not keep his hands from writing or his tongue from reciting to his visitors), and so forth. The chief and most galling of his critics at this time was the Abbé Desfontaines, and the chief of Desfontaines's attacks was entitled *La Voltairomanie*, in reply to a libel of Voltaire's called *Le Préservatif*. Both combatants had, according to the absurd habit of the time, to disown their works, Desfontaines's disavowal being formal and procured by the exertion of all Voltaire's own influence both at home and abroad. For he had as little notion of tolerance towards others as of dignity in himself. In April 1739 a journey was made to Brussels, to Paris, and then again to Brussels, which was the headquarters for a considerable time, owing to some law affairs, of the Du Châtelets. Frederick, now king of Prussia, made not a few efforts to get Voltaire away from Madame du Châtelet, but unsuccessfully, and the king earned the lady's cordial hatred by persistently refusing or omitting to invite her. At last, in September 1740, master and pupil met for the first time at Cleves, an interview followed three months later by a longer visit. Brussels was again the headquarters in 1741, by which time Voltaire had finished the best and the second or third best of his plays, *Mérope* and *Mahomet*. *Mahomet* was played first at Lille in that year; it did not appear in Paris till August next year, and *Mérope* not till 1743. This last was, and deserved to be, the most successful of its author's whole theatre. It was in this same year that he received the singular diplomatic mission to Frederick which nobody seems to have taken seriously, and after his return the oscillation between Brussels, Cirey and Paris was resumed. During these years much of the *Essai sur les mœurs* and the *Siècle de Louis XIV*. was composed. He also returned, not too well-advisedly, to the business of courtiership, which he had given up since the death of the regent. He was much employed, owing to Richelieu's influence, in the fêtes of the dauphin's marriage, and was rewarded through the influence of Madame de Pompadour on New Year's Day 1745 by the appointment to the post of historiographer-royal, once jointly held by Racine and Boileau. The situation itself and its accompanying privileges were what Voltaire chiefly aimed at, but there was a salary of two thousand livres attached, and he had the year before come in for three times as much by the death of his brother. In the same year he wrote a poem on Fontenoy, he received medals from the pope and dedicated *Mahomet* to him, and he wrote court *divertissements* and other things to admiration. But he was not a thoroughly skilful courtier, and one of the best known of Voltairiana is the contempt or at least silence with which Louis XV.—a sensualist but no fool—received the maladroit and almost insolent inquiry *Trajan est-il content?* addressed in his hearing to Richelieu at the close of a piece in which the emperor had appeared with a transparent reference to the king. All this assentation had at least one effect. He, who had been for years admittedly the first writer in France, had been repeatedly passed over in elections to the Academy. He was at last elected in the spring of 1746, and received on the 9th of May. Then the tide began to turn. His favour at court had naturally exasperated his enemies; it had not secured him any real friends, and even a gentlemanship of the chamber was no solid benefit, except from the money point of view. He did not indeed hold it very long, but was permitted to sell it for a large sum, retaining the rank and privileges. He had various proofs of the instability of his hold on the king during 1747 and in 1748. He once lay in hiding for two months with the duchesse du Maine at Sceaux, where were produced the comedietta of *La Prude* and the tragedy of *Rome sauvée*, and afterwards for a time lived chiefly at Lunéville; here Madame du Châtelet had established herself at the court of King Stanislaus, and carried on a liaison with Saint-Lambert, an officer in the king's guard. In September 1749 she died after the birth of a child.

The death of Madame du Châtelet is another turning-point in the history of Voltaire. He was fifty-five, but he had nearly thirty years more to live, and he had learnt much during what may be called his Cirey cohabitation. For some time, however, after Madame du Châtelet's death he was in a state of pitiable unsettlement. At first, after removing his goods from Cirey, he hired the greater part of the Châtelet town house, and then the whole. He had some idea of settling down in Paris, and might perhaps have done so if mischief had not been the very breath of his nostrils. He went on writing satiric tales like *Zadig*. He engaged in a foolish and undignified struggle with Crébillon *père* (not *fils*), a rival set up against him by Madame de Pompadour, but a dramatist who, in part of one play, *Rhadamiste et Zénobie*, has struck a note of tragedy in the grand Cornelian strain, which Voltaire could never hope to echo. *Semiramis* (1748), *Oreste* (1750) and *Rome sauvée* itself were all products of this rivalry. He used the most extraordinary efforts to make himself more popular than he was, but he could not help being uncomfortable.

All this time Frederick of Prussia had been continuing his invitations. Voltaire left Paris on the 15th of June 1751, and reached Berlin on the 10th of July. This Berlin visit is more or less familiar to English readers from the two great essays of Macaulay and Carlyle as well as from the *Frederick* of the latter. But these two masters of English were not perhaps the best qualified to relate the story. Both were unjust to Voltaire, and Macaulay was unjust to Frederick as well. It is certain that at first the king behaved altogether like a king to his guest. He pressed him to remain; he gave him (the words are Voltaire's own) one of his orders, twenty thousand francs a year, and four thousand additional for his niece, Madame Denis, in case she would come and keep house for her uncle. But Voltaire's conduct was from the first Voltairian. He insisted on the consent of his own king, which was given without delay. But Frenchmen, always touchy on such a point, regarded Voltaire as something of a deserter; and it was not long before he bitterly repented his desertion, though his residence in Prussia lasted nearly three years. It was quite impossible that Voltaire and Frederick should get on together for long. Voltaire was not humble enough to be a mere butt, as many of Frederick's led poets were; he was not enough of a gentleman to hold his own place with dignity and discretion; he was constantly jealous both of his equals in age and reputation, such as Maupertuis, and of his juniors and inferiors, such as Baculard D'Arnaud. He was greedy, restless, and in a way Bohemian. Frederick, though his love of teasing for teasing's sake has been exaggerated by Macaulay, was a martinet of the first water, had a sharp though one-sided idea of justice, and had not the slightest intention of allowing Voltaire to insult or to tyrannize over his other guests and servants. If he is to be blamed in this particular matter, the blame must be chiefly confined to his imprudence in inviting Voltaire at the beginning and to the brutality of his conduct at the end. Within Voltaire there was always a mischievous and ill-behaved child; and he was never more mischievous, more ill-behaved and more childish than in these years. He tried to get D'Arnaud exiled, and succeeded. He got into a quite unnecessary quarrel with Lessing. He had not been in the country six months before he engaged in a discreditable piece of financial gambling with Hirsch, the Dresden Jew. He was accused of something like downright forgery—that is to say, of altering a paper signed by Hirsch after he had signed it. The king's disgust at this affair (which came to an open scandal before the tribunals) was so great that he was on the point of ordering Voltaire out of Prussia, and Darget the secretary had no small trouble in arranging the matter (February 1751). Then it was Voltaire's turn to be disgusted with an occupation he had undertaken himself—the occupation of "buckwashing" the king's French verses. However, he succeeded in finishing and printing the *Siècle de Louis XIV.*, while the *Dictionnaire philosophique* is said to have been devised and begun at Potsdam. But Voltaire's restless temper was brewing up for another storm. In the early autumn of 1751 La Mettrie, one of the king's parasites, and a man of much more talent than is generally allowed, horrified Voltaire by telling him that Frederick had in conversation applied to him (Voltaire) a proverb about "sucking the orange and flinging away its skin," and about the same time the dispute with Maupertuis, which had more than anything else to do with his exclusion from Prussia, came to a head. Maupertuis got into a dispute with one König. The king took his president's part; Voltaire took König's. But Maupertuis must needs write his *Letters*, and thereupon (1752) appeared one of Voltaire's most famous, though perhaps not one of his most read works, the *Diatribe du Docteur Akakia*. Even Voltaire did not venture to publish this lampoon on a great official of a prince so touchy as the king of Prussia without some permission, and if all tales are true he obtained this by another piece of something like forgery—getting the king to endorse a totally different pamphlet on its last leaf, and affixing that last leaf to *Akakia*. Of this Frederick was not aware; but he did get some wind of the *Diatribe* itself, sent for the author, heard it read to his own great amusement, and either actually burned the MS. or believed that it was burnt. In a few days printed copies appeared. Frederick did not like disobedience, but he still less liked being made a fool of, and he put Voltaire [illegible] again the affair blew over, the king believing that the edition of *Akakia* confiscated in Prussia was the only one. Alas! Voltaire had sent copies away; others had been printed abroad; and the thing was irrecoverable. It could not be proved that he had ordered the printing, and all Frederick could do was to have the pamphlet burnt by the hangman. Things were now drawing to a crisis. One day Voltaire sent his orders, &c., back; the next Frederick returned them, but Voltaire had quite made up his mind to fly. A kind of reconciliation occurred in March, and after some days of good-fellowship Voltaire at last obtained the long-sought leave of absence and left Potsdam on the 26th of the month (1753). It was nearly three months afterwards that the famous, ludicrous and brutal arrest was made at Frankfort, on the persons of himself and his niece, who had met him meanwhile. There was some faint excuse for Frederick's wrath. In the first place, the poet chose to linger at Leipzig. In the second place, in direct disregard of a promise given to Frederick, a supplement to *Akakia* appeared, more offensive than the main text. From Leipzig, after a month's stay, Voltaire moved to Gotha. Once more, on the 25th of May, he moved on to Frankfort. Frankfort, nominally a free city, but with a Prussian resident who did very much what he pleased, was not like Gotha and Leipzig. An excuse was provided in the fact that the poet had a copy of some unpublished poems of Frederick's, and as soon as Voltaire arrived hands were laid on him, at first with courtesy enough. The resident, Freytag, was not a very wise person (though he probably did not, as Voltaire would have it, spell "poésie" "poéshie"); constant references to Frederick were necessary; and the affair was prolonged so that Madame Denis had time to join her uncle. At last Voltaire tried to steal away. He was followed, arrested, his niece seized separately, and sent to join him in custody; and the two, with the secretary Collini, were kept close prisoners at an inn called the Goat. This situation was at last put an end to by the city authorities, who probably felt that they were not playing a very creditable part. Voltaire left Frankfort on the 7th of July, travelled safely to Mainz, and thence to Mannheim, Strassburg and Colmar. The last-named place he reached (after a leisurely journey and many honours at the little courts just mentioned) at the beginning of October, and here he proposed to stay the winter, finish his *Annals of the Empire* and look about him.

Voltaire's second stage was now over. Even now, however, in his sixtieth year, it required some more external pressure to induce him to make himself independent. He had been, in the first blush of his Frankfort disaster, refused, or at least not granted, permission even to enter France proper. At Colmar he was not safe, especially when in January 1754 a pirated edition of the *Essai sur les mœurs*, written long before, appeared. Permission to establish himself in France was now absolutely refused. Nor did an extremely offensive performance of Voltaire's—the solemn partaking of the Eucharist at Colmar after due confession—at all mollify his enemies. His exclusion from France, however, was chiefly metaphorical, and really meant exclusion from Paris and its neighbourhood. In the summer he went to Plombières, and after returning to Colmar for some time journeyed in the beginning of winter to Lyons, and thence in the middle of December to Geneva. Voltaire had no purpose of remaining in the city, and almost immediately bought a country house just outside the gates, to which he gave the name of Les Délices. He was here practically at the meeting-point of four distinct jurisdictions—Geneva, the canton Vaud, Sardinia and France, while other cantons were within easy reach; and he bought other houses dotted about these territories, so as never to be without a refuge close at hand in case of sudden storms. At Les Délices he set up a considerable establishment, which his great wealth made him able easily to afford. He kept open house for visitors; he had printers close at hand in Geneva; he fitted up a private theatre in which he could enjoy what was perhaps the greatest pleasure of his whole life—acting in a play of his own, stage-managed by himself. His residence at Geneva brought him into correspondence (at first quite amicable) with the most famous of her citizens, J. J. Rousseau. His *Orphelin de la Chine*, performed at Paris in 1755, was very well received; the notorious *La Pucelle* appeared in the same year. The earthquake at Lisbon, which appalled other people, gave Voltaire an excellent opportunity for ridiculing the beliefs of the orthodox, first in verse (1756) and later in the (from a literary point of view) unsurpassable tale of *Candide* (1759). All was, however, not yet quite smooth with him. Geneva had a law expressly forbidding theatrical performances in any circumstances whatever. Voltaire had infringed this law already as far as private performances went, and he had thought of building a regular theatre, not indeed at Geneva but at Lausanne. In July 1755 a very polite and, as far as Voltaire was concerned, indirect resolution of the Consistory declared that in consequence of these proceedings of the Sieur de Voltaire the pastors should notify their flocks to abstain, and that the chief syndic should be informed of the Consistory's perfect confidence that the edicts would be carried out. Voltaire obeyed this hint as far as Les Délices was concerned, and consoled himself by having the performances in his Lausanne house. But he never was the man to take opposition to his wishes either quietly or without retaliation. He undoubtedly instigated D'Alembert to include a censure of the prohibition in his *Encyclopédie* article on "Geneva," a proceeding which provoked Rousseau's celebrated *Lettre à D'Alembert sur les spectacles*. As for himself, he looked about for a place where he could combine the social liberty of France with the political liberty of Geneva, and he found one.

At the end of 1758 he bought the considerable property of Ferney, on the shore of the lake, about four miles from Geneva, and on French soil. At Les Délices (which he sold in 1765) he had become a householder on no small scale; at Ferney (which he increased by other purchases and leases) he became a complete country gentleman, and was henceforward known to all Europe as squire of Ferney. Many of the most celebrated men of Europe visited him there, and large parts of his usual biographies are composed of extracts from their accounts of Ferney. His new occupations by no means quenched his literary activity. He did not make himself a slave to his visitors, but reserved much time for work and for his immense correspondence, which had for a long time once more included Frederick, the two getting on very well when they were not in contact. Above all, he now, being comparatively secure in position, engaged much more strongly in public controversies, and resorted less to his old labyrinthine tricks of disavowal, garbled publication and private libel. The suppression of the *Encyclopédie*, to which he had been a considerable contributor, and whose conductors were his intimate friends, drew from him a shower of lampoons directed now at "l'infâme" (see *infra*) generally, now at literary victims, such as Le Franc de Pompignan (who had written one piece of verse so much better than anything serious of Voltaire's that he could not be forgiven), or Palissot (who in his play *Les Philosophes* had boldly gibbeted most of the persons so termed, but had not included Voltaire), now at Fréron, an excellent critic and a dangerous writer, who had attacked Voltaire from the conservative side, and at whom the patriarch of Ferney, as he now began to be called, levelled in return the very inferior farce-lampoon of *L'Écossaise*, of the first night of which Fréron himself did an admirably humorous criticism.

How he built a church and got into trouble in so doing at Ferney, how he put "Deo erexit Voltaire" on it (1760–61) and obtained a relic from the pope for his new building, how he entertained a grand-niece of Corneille, and for her benefit wrote his well-known "commentary" on that poet, are matters of interest, but to be passed over briefly. Here, too, he began that series of interferences on behalf of the oppressed and the ill-treated which, whatever mixture of motives may have prompted it, is an honour to his memory. Volumes and almost libraries have been written on the Calas affair, and we can but refer here to the only less famous cases of Sirven (very similar to that of Calas, though no judicial murder was actually committed), Espinasse (who had been sentenced to the galleys for harbouring a Protestant minister), Lally (the son of the unjustly treated but not blameless Irish-French commander in India), D'Étalonde (the companion of La Barre), Montbailli and others. In 1768 he entered into controversy with the bishop of the diocese; he had differences with the superior landlord of part of his estate, the president De Brosses; and he engaged in a long and tedious return match with the republic of Geneva. But the general events of this Ferney life are somewhat of that happy kind which are no events.

In this way Voltaire, who had been an old man when he established himself at Ferney, became a very old one almost without noticing it. The death of Louis XV. and the accession of Louis XVI. excited even in his aged breast the hope of re-entering Paris, but he did not at once receive any encouragement, despite the reforming ministry of Turgot. A much more solid gain to his happiness was the adoption, or practical adoption, in 1776 of Reine Philiberte de Varicourt, a young girl of noble but poor family, whom Voltaire rescued from the convent, installed in his house as an adopted daughter, and married to the marquis de Villette. Her pet name was "Belle et Bonne," and nobody had more to do with the happiness of the last years of the "patriarch" than she had. It is doubtful whether his last and fatal visit to Paris was due to his own wish or to the instigation of his niece, Madame Denis; but this lady—a woman of disagreeable temper, especially to her inferiors—appears to have been rather hardly treated by Voltaire's earlier, and sometimes by his later, biographers. The suggestion which has been made that the success of Beaumarchais piqued him has nothing impossible in it. At any rate he had, at the end of 1777 and the beginning of 1778, been carefully finishing a new tragedy—*Irène*—for production in the capital. He started on the 5th of February, and five days later arrived at the city which he had not seen for eight-and-twenty years.

He was received with immense rejoicings, not indeed directly by the court, but by the Academy, by society and by all the more important foreign visitors. About a fortnight after his arrival, age and fatigue made him seriously ill, and a confessor was sent for. But he recovered, scoffed at himself as usual, and prepared more eagerly than ever for the first performance of *Irène*, on the 16th of March. At the end of the month he was able to attend a performance of it, which was a kind of apotheosis. He was crowned with laurel in his box, amid the plaudits of the audience, and did not seem to be the worse for it. He even began or proceeded with another tragedy—*Agathocle*—and attended several Academic meetings. But such proceedings in the case of a man of eighty-four were impossible. To keep himself up, he exceeded even his usual excess in coffee, and about the middle of May he became very ill. On the 30th of May the priests were once more sent for—to wit, his nephew, the abbé Mignot, the abbé Gaultier, who had officiated on the former occasion, and the parish priest, the curé of St Sulpice. He was, however, in a state of half-insensibility, and petulantly motioned them away, dying in the course of the night. The legends about his death in a state of terror and despair are certainly false; but it must be regarded as singular and unfortunate that he, who had more than once gone out of his way to conform ostentatiously and with his tongue in his cheek, should have neglected or missed this last opportunity. The result was a difficulty as to burial, which was compromised by hurried interment at the abbey of Scellières in Champagne, anticipating the interdict of the bishop of the diocese by an hour or two. On the 10th of July 1791 the body was transferred to the Pantheon, but during the Hundred Days it was once more, it is said, disentombed, and stowed away in a piece of waste ground. His heart, taken from the body when it was embalmed, and given to Madame Denis and by her to Madame de Villette, was preserved in a silver case, and when it was proposed (in 1864) to restore it to the other remains, the sarcophagus at Sainte Geneviève (the Pantheon) was opened and found to be empty.

In person Voltaire was not engaging, even as a young man. His extraordinary thinness is commemorated, among other things, by the very poor but well-known epigram attributed to Young, and identifying him at once with "Satan, Death and Sin." In old age he was a mere skeleton, with a long nose and eyes of preternatural brilliancy peering out of his wig. He never seems to have been addicted to any manly sport, and took little exercise. He was sober enough (for his day and society) in eating and drinking generally; but drank coffee, as his contemporary, counterpart and enemy, Johnson, drank tea, in a hardened and inveterate manner. It may be presumed with some certainty that his attentions to women were for the most part platonic; indeed, both on the good and the bad side of him, he was all brain. He appears to have had no great sense of natural beauty, in which point he resembled his generation (though one remarkable story is told of his being deeply affected by Alpine scenery); and, except in his passion for the stage, he does not seem to have cared much for any of the arts. Conversation and literature were, again as in Johnson's case, the sole gods of his idolatry. As for his moral character, the wholly intellectual cast of mind just referred to makes it difficult to judge that. His beliefs or absence of beliefs emancipated him from conventional scruples; and he is not a good subject for those who maintain that a nice morality may exist independently of religion. He was good-natured when not crossed, generous to dependents who made themselves useful to him, and indefatigable in defending the cause of those who were oppressed by the systems with which he was at war. But he was inordinately vain, and totally unscrupulous in gaining money, in attacking an enemy, or in protecting himself when he was threatened with danger. His peculiar fashion of attacking the popular beliefs of his time has also failed to secure the approval of some who had very little sympathy with those beliefs. The only excuse made for the alternate cringing and insult, the alternate abuse and lying, which marked his course in this matter, has been the very weak plea that a man cannot fight with a system—a plea which is sufficiently answered by the retort that a great many men have so fought and have won. Voltaire's works, and especially his private letters, constantly contain the word "l'infâme" and the expression (in full or abbreviated) "écrasez l'infâme." This has been misunderstood in many ways—the mistake going so far as in some cases to suppose that Voltaire meant Christ by this opprobrious expression. No careful and competent student of his works has ever failed to correct this gross misapprehension. "L'infâme" is not God; it is not Christ; it is not Christianity; it is not even Catholicism. Its briefest equivalent may be given as "persecuting and privileged orthodoxy" in general, and, more particularly, it is the particular system which Voltaire saw around him, of which he had felt the effects in his own exiles and the confiscations of his books, and of which he saw the still worse effects in the hideous sufferings of Calas and La Barre.

Vast and various as the work of Voltaire is, its vastness and variety are of the essence of its writer's peculiar quality. The divisions of it have long been recognized, and may be treated regularly.

The first of these divisions in order, not the least in bulk, and, though not the first in merit, inferior to none in the amount of congenial labour spent on it, is the *theatre*. Between fifty and sixty different pieces (including a few which exist only in fragments or sketches) are included in his writings, and they cover his literary life. It is at first sight remarkable that Voltaire, whose comic power was undoubtedly far in excess of his tragic, should have written many tragedies of no small excellence in their way, but only one fair second-class comedy, *Nanine*. His other efforts in this latter direction are either slight and almost insignificant in scope, or, as in the case of the somewhat famous *Écossaise*, deriving all their interest from being personal libels. His tragedies, on the other hand, are works of extraordinary merit in their own way. Although Voltaire had neither the perfect versification of Racine nor the noble poetry of [illegible], he surpassed the latter certainly, and the former [illegible] of some not incompetent judges, in playing the difficult and artificial game of the French tragedy. *Zaïre*, among those where love is admitted as a principal motive, and *Mérope*, among those where this motive is excluded and kept in subordination, yield to no plays of their classe in such interest as is possible on the model, in stage effect and in uniform literary merit. Voltaire knew that the public opinion of his time reserved its highest prizes for a capable and successful dramatist, and he was determined to win those prizes. He therefore set all his wonderful cleverness to the task, going so far as to adopt a little even of that Romantic disobedience to the strict classical theory which he condemned, and no doubt sincerely, in Shakespeare.

As regards his *poems* proper, of which there are two long ones, the *Henriade* and the *Pucelle*, besides smaller pieces, of which a bare catalogue fills fourteen royal octavo columns, their value is very unequal. The *Henriade* has by universal consent been relegated to the position of a school reading book. Constructed and written in almost slavish imitation of Virgil, employing for medium a very unsuitable vehicle—the Alexandrine couplet (as reformed and rendered monotonous for dramatic purposes)—and animated neither by enthusiasm for the subject nor by real understanding thereof, it could not but be an unsatisfactory performance. The *Pucelle*, if morally inferior, is from a literary point of view of far more value. It is desultory to a degree; it is a base libel on religion and history; it differs from its model *Ariosto* in being, not, as *Ariosto* is, a mixture of romance and burlesque, but a sometimes tedious tissue of burlesque pure and simple; and it is exposed to the objection—often and justly urged—that much of its fun depends simply on the fact that there were and are many people who believe enough in Christianity to make its jokes give pain to them and to make their disgust at such jokes piquant to others. Nevertheless, with all the *Pucelle's* faults, it is amusing. The minor poems are as much above the *Pucelle* as the *Pucelle* is above the *Henriade*. It is true that there is nothing, or hardly anything, that properly deserves the name of poetry in them—no passion, no sense of the beauty of nature, only a narrow "criticism of life," only a conventional and restricted choice of language, a cramped and monotonous prosody, and none of that indefinite suggestion which has been rightly said to be of the poetic essence. But there is immense wit, a wonderful command of such metre and language as the taste of the time allowed to the poet, occasionally a singular if somewhat artificial grace, and a curious felicity of diction and manner.

The third division of Voltaire's works in a rational order consists of his *prose romances* or *tales*. These productions—incomparably the most remarkable and most absolutely good fruit of his genius—were usually composed as pamphlets, with a purpose of polemic in religion, politics, or what not. Thus *Candide* attacks religious and philosophical optimism, *L'Homme aux quarante écus* certain social and political ways of the time, *Zadig* and others the received forms of moral and metaphysical orthodoxy, while some are mere lampoons on the Bible, the unfailing source of Voltaire's wit. But (as always happens in the case of literary work where the form exactly suits the author's genius) the purpose in all the best of them disappears almost entirely. It is in these works more than in any others that the peculiar quality of Voltaire—ironic style without exaggeration—appears. That he learned it partly from Saint Evremond, still more from Anthony Hamilton, partly even from his own enemy Le Sage, is perfectly true, but he gave it perfection and completion. If one especial peculiarity can be singled out, it is the extreme restraint and simplicity of the verbal treatment. Voltaire never dwells too long on this point, stays to laugh at what he has said, elucidates or comments on his own jokes, guffaws over them or exaggerates their form. The famous "pour encourager les autres" (that the shooting of Byng did "encourage the others" very much is not to the point) is a typical example, and indeed the whole of *Candide* shows the style at its perfection.

The fourth division of Voltaire's work, the *historical*, is the bulkiest of all except his correspondence, and some parts of it are or have been among the most read, but it is far from being even among the best. The small treatises on Charles XII. and Peter the Great are indeed models of clear narrative and ingenious if somewhat superficial grasp and arrangement. The so-called *Siècle de Louis XIV.* and *Siècle de Louis XV.* (the latter inferior to the former but still valuable) contain a great miscellany of interesting matter, treated by a man of great acuteness and unsurpassed power of writing, who had also had access to much important private information. But even in these books defects are present, which appear much more strongly in the singular olla podrida entitled *Essai sur les mœurs*, in the *Annales de l'empire* and in the minor historical works. These defects are an almost total absence of any comprehension of what has since been called the philosophy of history, the constant presence of gross prejudice, frequent inaccuracy of detail, and, above all, a complete incapacity to look at anything except from the narrow standpoint of a half-pessimist and half self-satisfied *philosophe* of the 18th century.

His work in *physics* concerns us less than any other here; it is, however, not inconsiderable in bulk, and is said by experts to give proof of aptitude.

To his own age Voltaire was pre-eminently a poet and a philosopher; the unkindness of succeeding ages has sometimes questioned whether he had any title to either name, and especially to the latter. His largest *philosophical* work, at least so called, is the curious medley entitled *Dictionnaire philosophique*, which is compounded of the articles contributed by him to the great *Encyclopédie* and of several minor pieces. No one of Voltaire's works shows his anti-religious or at least anti-ecclesiastical animus more strongly. The various title-words of the several articles are often the merest stalking-horses, under cover of which to shoot at the Bible or the church, the target being now and then shifted to the political institutions of the writer's country, his personal foes, &c., and the whole being largely seasoned with that acute, rather superficial, common-sense, but also commonplace, ethical and social criticism which the 18th century called philosophy. The book ranks perhaps second only to the novels as showing the character, literary and personal, of Voltaire; and despite its form it is nearly as readable. The minor philosophical works are of no very different character. In the brief *Traité de métaphysique* the author makes his grand effort, but scarcely succeeds in doing more than show that he had no real conception of what metaphysic is.

In general *criticism* and *miscellaneous* writing Voltaire is not inferior to himself in any of his other functions. Almost all his more substantive works, whether in verse or prose, are preceded by prefaces of one sort or another, which are models of his own light pungent *causerie*; and in a vast variety of nondescript pamphlets and writings he shows himself a perfect journalist. In literary criticism pure and simple his principal work is the *Commentaire sur Corneille*, though he wrote a good deal more of the same kind—sometimes (as in his *Life* and notices of Molière) independently sometimes as part of his *Siècles*. Nowhere, perhaps, except when he is dealing with religion, are Voltaire's defects felt more than here. He was quite unacquainted with the history of his own language and literature, and more here than anywhere else he showed the extraordinarily limited and conventional spirit which accompanied the revolt of the French 18th century against limits and conventions in theological, ethical and political matters.

There remains only the huge division of his *correspondence*, which is constantly being augmented by fresh discoveries, and which, according to Georges Bengesco, has never been fully or correctly printed, even in some of the parts longest known. In this great mass Voltaire's personality is of course best shown, and perhaps his literary qualities not worst. His immense energy and versatility, his adroit and unhesitating flattery when he chose to flatter, his ruthless sarcasm when he chose to be sarcastic, his rather unscrupulous business faculty, his more than rather unscrupulous resolve to double and twist in any fashion so as to escape his enemies,—all these things appear throughout the whole mass of letters.

Most judgments of Voltaire have been unduly coloured by sympathy with or dislike of what may be briefly called his polemical side. When sympathy and dislike are both discarded or allowed for, he remains one of the most astonishing, if not exactly one of the most admirable, figures of letters. That he never, as Carlyle complains, gave utterance to one great thought is strictly true. That his characteristic is for the most part an almost superhuman cleverness rather than positive genius is also true. But that he was merely a mocker, which Carlyle and others have also said, is not strictly true or fair. In politics proper he seems indeed to have had few or no constructive ideas, and to have been entirely ignorant or quite reckless of the fact that his attacks were destroying a state of things for which as a whole he neither had nor apparently wished to have any substitute. In religion he protested stoutly, and no doubt sincerely, that his own attitude was not purely negative; but here also he seems to have failed altogether to distinguish between pruning and cutting down. Both here and elsewhere his great fault was an inveterate superficiality. But this superficiality was accompanied by such wonderful acuteness within a certain range, by such an absolutely unsurpassed literary aptitude and sense of style in all the lighter and some of the graver modes of literature, by such untiring energy and versatility in enterprise, that he has no parallel among ready writers anywhere. Not the most elaborate work of Voltaire is of much value for matter; but not the very slightest work of Voltaire is devoid of value in form. In literary craftsmanship, at once versatile and accomplished, he has no superior and scarcely a rival.

Bibliography.—The bibliography of Voltaire is a very large subject, and it has been the special occupation of a Rumanian diplomatist of much erudition and judgment, Georges Bengesco, *Bibliographie de Voltaire* (4 vols., Paris, 1882–90). The best edition of the works is that by Louis Moland in 52 volumes (Paris, Garnier); the handiest and most compact is that issued in 13 volumes royal octavo by Furne, and kept in print by the house of Didot. Of the earlier editions, though their bulk is an objection, several are interesting and valuable. Especially may be noticed the so-called edition of Kehl, in which Voltaire himself, and later Beaumarchais, were concerned (70 vols., 1785–89); those of Dalibon and Baudouin, each in 97 volumes (from which "the hundred volumes of Voltaire" have become a not infrequent figure of speech); and the excellent edition of Beuchot (1829) in 72 volumes. Editions of separate or selected works are innumerable, and so are books upon Voltaire. There is no really good detailed life of him, with complete examination of his work, in any language, though the works containing materials for such are numerous (the first of importance being that of T. J. Duvernet in 1797), and sometimes (especially in the case of M. Desnoiresterres, *Voltaire et la société française*, 1867 and others) excellent. In English the essays of Carlyle and Viscount Morley (1872) are both in their way invaluable, and to a great extent correct one another. The principal detailed life in English is that of an American writer, James Parton (1881), which gives the facts with very considerable detail and fair accuracy, but with little power of criticism. That of Mr S. G. Tallentyre (London, 1903, 2 vols.) is gossiping and popular. Francis Espinasse's *Voltaire* (1882), which contains a useful bibliography, J. Churton Collins's *Voltaire in England* (1886), and J. R. Lounsbury's *Shakespeare and Voltaire* (1902) may also be specified. (G. Sa.)

VOLTERRA (anc. *Volaterrae*), a town and episcopal see of Tuscany, Italy, in the province of Pisa, from which it is 51 m. by rail S.E., and 35 by road W.N.W. from Siena. Pop. (1901) 5522 (town); 14,207 (commune). It stands on a commanding olive-clad eminence 1785 ft. above sea-level, with a magnificent view over mountains and sea (the latter some 20 m. distant), and is surrounded by the massive remains of its ancient walls of large, roughly-rectangular blocks of stone, some 4½ m. in circuit, enclosing an area which must have been larger than was actually needed for habitation. Tombs of the pre-Etruscan or Villanova period have been found within its circuit, but only at the north-west extremity near S. Giusto. Here the clay of which the hill is formed is gradually giving way, causing landslips and the collapse of buildings, notably of the abbey church of S. Salvatore (1030). The medieval town occupies only the southern portion of this area. The most important relic of its Etruscan period is the Porta dell' Arco, an archway of dark greystone, about 20 ft. high, the corbels of which are adorned with almost obliterated heads, probably representing the guardian deities of the city. There are remains of baths and a cistern of Roman date. Volterra preserves its medieval character, having suffered little modification since the 16th century. The town contains many picturesque medieval towers and houses. The Palazzo dei Priori (1208–54), now the municipal palace, is especially fine, and the piazza in which it stands most picturesque. The museum contains a very valuable collection of Etruscan antiquities, especially cinerary urns from the ancient tombs N. and E. of the town. The urns themselves are of alabaster, with the figure of the deceased on the lid, and reliefs from Greek myths on the front. They belong to the 3rd–2nd centuries B.C. A tomb outside the town of the 6th century B.C., discovered in 1898, consisted of a round underground chamber, roofed with gradually projecting slabs of stone. The roof was supported in the centre by a massive square pillar (E. Petersen in *Römische Mitteilungen*, 1898, 409; cf. id. ibid., 1904, 244 for a similar one near Florence). There are also in the museum Romanesque sculptures from the old church of S. Giusto, &c. The cathedral, consecrated in 1120 (?), but enlarged and adorned by Niccolo Pisano (?) in 1254, has a fine pulpit of that period, and on the high altar are sculptures by Mino da Fiesole; it contains several good pictures—the best is an "Annunciation" by Luca Signorelli. The sacristy has fine carvings. The baptistery belongs to the 13th century; the font is by Andrea Sansovino, and the ciborium by Mino da Fiesole. Both these buildings are in black and white marble. S. Francesco has frescoes of 1410, and S. Girolamo terra-cottas and pictures. The citadel, now a house of correction, consists of two portions, the Rocca Vecchia, built in 1343 by Walter de Brienne, duke of Athens, and the Rocca Nuova, built by the Florentines (1472). The inhabitants are chiefly employed in the manufacture of vases and other ornaments from alabaster, of good quality, found in the vicinity. There are also in the neighbourhood rock-salt works and mines, as well as boracic acid works. This acid is exhaled in volcanic gas, which is passed through water tanks. The acid is deposited in the water and afterwards evaporated. It is sent to England, and used largely in the manufacture of pottery glaze.

Volaterrae (Etruscan *Velathri*) was one of the most powerful of the twelve confederate cities of Etruria. During the war between Marius and Sulla it withstood the latter's troops for two years in

82–80 B.C. As a result of its resistance Sulla carried a law for the confiscation of the land of those inhabitants of Volaterrae who had had the privileges of Roman citizenship. This, however, does not seem to have been carried out until Caesar as dictator divided some of the territory of Volaterrae among his veterans. Among its noble families the chief was that of the Caecinae, who took their name from the river which runs close to Volaterrae and still retains the name Cecina. Cicero defended one of its members in an extant speech. It is included by Pliny among the municipal towns of Etruria. In the 12th and 13th centuries it enjoyed free institutions; in 1361 it fell under the power of Florence. It rebelled, but was retaken and pillaged in 1472. Persius the satirist and the painter Daniele da Volterra were both natives of the town. Several works of the latter are preserved there.

See C. Ricci, *Volterra* (Bergamo, 1905); E. Bormann in *Corp. Inscr. Latin.* xi. (Berlin, 1888), p. 324; G. Dennis, *Cities and Cemeteries of Etruria* (London, 1883), ii. 136. (T. As.)

VOLTMETER, an instrument for measuring difference of electric potential (see ELECTROSTATICS) in terms of the unit called a volt. The volt (so called after A. Volta) is defined to be difference of potential which acting between the terminals of a resistance of one ohm sends through it a continuous current of one ampere. A voltmeter is therefore one form of electrometer (*q.v.*), but the term is generally employed to describe the instrument which indicates on a scale, not merely in arbitrary units but directly in volts, the potential difference of its terminals. Voltmeters may be divided into two classes, (*a*) electrostatic, (*b*) electrokinetic.

Electrostatic voltmeters are based on the principle that when two conductors are at different potentials they attract one another with a force which varies as the square of the potential difference (P. D.) between them. This mechanical stress may be made the measure of the P. D. between them, if one of the conductors is fixed while the other is movable, this last being subject to a constraint due to a spring or to gravity, means being also provided for measuring either the displacement of the movable conductor against the constraint or the force required to hold it in a fixed position relatively to the fixed conductor. One large class of electrostatic voltmeters consists of a fixed metal plate or plates and a movable plate or plates, the two sets of plates forming a condenser (see LEYDEN JAR). The movable system is suspended or pivoted, and when a P. D. is created between the fixed and movable plates, the latter are drawn into a new position which is resisted by the torque of a wire or by the force due to a weight. Utilizing this principle many inventors have devised forms of electrostatic voltmeter. One of the best known of these is Lord Kelvin's multicellular voltmeter. In this instrument (fig. 1) there are two sets of fixed metal plates, connected together and having a quadrantal shape, that is, approximately the shape of a quarter of a circular disk. In the space between them is suspended a "needle" which consists of a light aluminium axis, to [illegible] paddle-shaped aluminium blades. Th[illegible] silver wire, and its [illegible] paddle blades are [illegible] the needle is [illegible] or cells to the other member of the circuit, and a difference of potential is created between them, then the movable needle is drawn in so that the aluminium blades are more included between the fixed plates. This movement is resisted by the torsional elasticity of the suspending wire, and hence a fixed indicating needle attached to the movable system can be made to indicate directly on a scale the difference of potential between the terminals of the instrument in volts. Instruments of this kind have been constructed not only by Lord Kelvin, but also by W. E. Ayrton and others, for measuring voltages from 10,000 volts down to 1 volt. In other types of electrostatic instruments the movable system rotates round a horizontal axis or rests upon knife edges like a scale beam; in others again the movable system is suspended by a wire. In the former case the *control* is generally due to gravity, the plates being so balanced on the knife edge that they tend to take up a certain fixed position from which they are constrained when the electric forces come into play, their displacement relatively to the fixed plates being shown on a scale and thus indicating the P. D. between them. In the case of high tension voltmeters, the movable plate takes the form of a single plate of paddle shape, and for extra high tensions it may simply be suspended from the end of a balanced arm; or the movable system may take the form of a cylinder which is suspended within, but not touching, another fixed cylinder, the relative position being such that the electric forces draw the suspended cylinder more into the fixed one. Electrostatic voltmeters are now almost entirely used for the measurement of high voltages from 2000 to 50,000 volts employed in electrotechnics. For such purposes the whole of the working parts are contained in a metal case, the indicating needle moving over a divided scale which is calibrated to show directly the potential difference in volts of the terminals of the instrument. One much-used electrostatic voltmeter of this type is the Kelvin multicellular vertical pattern voltmeter (fig. 2). For use at the switch-boards of electric supply stations the instrument takes another form known as the "edge-wise" pattern.

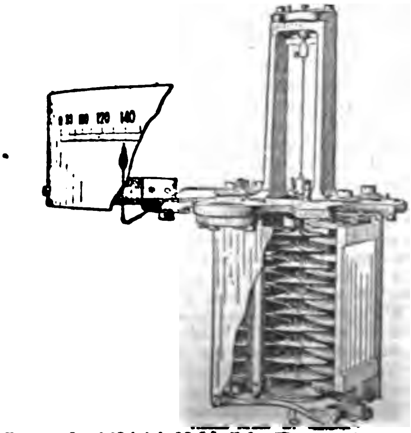

FIG. 1.—Lord Kelvin's Multicellular Electrostatic Voltmeter.

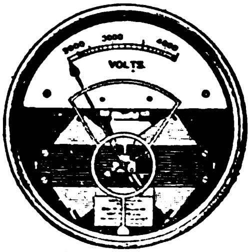

FIG. 2.—Round Dial Kelvin Multicellular Electrostatic Voltmeter, 5-in. scale. For high pressure.

Another class of voltmeters comprises the *electrokinetic voltmeters*. In these instruments the potential difference between two points is measured by the electric current produced in a wire connecting to two points. In any case of potential difference measurement it is essential not to disturb the potential difference being measured; hence it follows that in electrokinetic voltmeters the wire connecting the two points of which the potential difference is to be measured must be of very high resistance. The instrument then simply becomes an ammeter of high resistance, and may take any of the forms of practically used ammeters (see AMPEREMETER). Electromagnetic voltmeters may therefore be *thermal*, *electromagnetic* or *electrodynamic*.

As a rule, electromagnetic voltmeters are only suitable for the measurement of relatively small potentials—0 to 200 or 300 volts. Numerous forms of hot-wire or thermal voltmeter have been devised. In that known as the Cardew voltmeter, a fine platinum-silver wire, having a resistance of about 300 ohms, is stretched in a tube or upon a frame contained in a tube. This frame or tube is so constructed of iron and brass (one-third iron and two-thirds brass) that its temperature coefficient of linear expansion is the same as that of the platinum-silver alloy. The fine wire is fixed to one end of the tube or frame by an insulated support and the other end is attached to a motion-multiplying gear. As the frame has the same linear expansion as the wire, external changes of the temperature will not affect their relative length, but if the fine wire is heated by the passage of an electric current, its expansion will move the indicating needle over the scale, the motion being multiplied by the gear. In the Hartmann and Braun form of hot-wire voltmeter, the fine wire is fixed between two supports, and the expansion produced when a current is passed through it causes the wire to sag down, the sag being multiplied by a gear and made to move an indicating needle over a scale. In this case, the actual working wire, being short, must be placed in series with an additional high resistance. Hot wire voltmeters, like electrostatic voltmeters, are suitable for use with alternating currents of any frequency as well as with continuous currents, since their indications depend upon the heating power of the current, which is proportional to the square of the current and therefore to the square of the difference of potential between the terminals.

Electromagnetic voltmeters consist of a coil of fine wire connected to the terminals of the instrument, and the current produced in that wire by a difference of potential between the terminals creates a magnetic field proportional at any point to the strength of the current. This magnetic field may be made to cause a displacement in a small piece of soft iron, as in the case of the corresponding ammeters, and this in turn may be made to displace an indicating needle over a scale so that corresponding to every given potential difference between the terminals of the instrument there is a corresponding fixed position of the needle on the scale. One of the most useful forms of electromagnetic voltmeter is that generally known as a *movable coil* voltmeter (fig. 3). In this instrument there is a fixed permanent magnet, producing a constant magnetic field, and in the interspace between the poles is fixed a delicately pivoted coil of wire carried in jewelled bearings. The normal position of this coil is with its plane parallel to the lines of force of the field. The current is got in and out of the movable coil by means of fine flexible wires. The movable coil has attached to it an index needle moving over a scale, and a fixed coil of high-resistance wire is included in series with the movable coil between the terminals of the instrument. When a difference of potential is made between the terminals, a current passes through the movable coil, which then tends to place itself with its plane more at right angles to the lines of force of the field. This motion is resisted by the torsion of a spiral spring resembling the hair-spring of a watch having one end fixed to the coil axis, and there is therefore a definite position of the needle on the scale corresponding to each potential difference between the terminals, provided it is within the range of the control. These instruments are only adapted for the measurement of continuous potential difference, that is to say, unidirectional potential difference, but not for alternating voltages. Like the corresponding ammeters, they have the great advantage that the scales are equidivisional and that there is no dead part in the scale, whereas both the electrostatic and electrothermal voltmeters, above described, labour under the disadvantage that the scale divisions are not equal but increase with rise of voltages, hence there is generally a portion of the scale near the zero point where the divisions are so close as to be useless for reading purposes and are therefore omitted. For the measurement of voltages in continuous current generating stations, movable coil voltmeters are much employed, generally constructed then in the "edgewise" pattern (fig. 4).

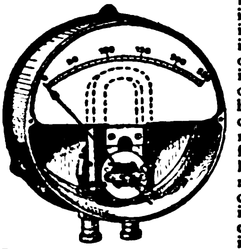

FIG. 3.—Round Dial Voltmeter of Kelvin Siphon Recorder, dead beat moving coil type, with front removed.

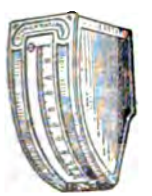

FIG. 4.—Edgewise Voltmeter. Stanley D'Arsonval type.

Electrodynamic Voltmeters.—A high-resistance electrodynamometer may be employed as a voltmeter. In this case both the fixed and movable circuits consist of fine wires, and the instrument is constructed and used in a manner similar to the Siemens dynamometer employed for measuring continuous alternating current (see AMPEREMETER). Another much-used method of measuring continuous current voltages or unidirectional potential difference employs the principle of potentiometer (*q.v.*). In this case a high-resistance wire is connected between the points of which the potential difference is required, and from some known fraction of this resistance wires are brought to an electrostatic voltmeter, or to a movable coil electromagnetic voltmeter, according as the voltage to be measured is alternating or continuous. This measurement is applicable to the measurement of high potentials, either alternating or continuous, provided that in the case of alternating currents the high resistance employed is wound non-inductively and an electrostatic voltmeter is used. The high-resistance wire should, moreover, be one having a negligible change of resistance with temperature. For this purpose it must be an alloy such as manganin or constantan. It is always an advantage, if possible, to employ an electrostatic voltmeter for measuring potential difference if it is necessary to keep the voltmeter permanently connected to the two points. Any form of electrokinetic voltmeter which involves the passage of a current through the wire necessitates the expenditure of energy to maintain this current and therefore involves cost of production. This amount may not by any means be an insignificant quantity. Consider, for instance, a hot-wire instrument, such as a Cardew's voltmeter. If the wire has a resistance of 300 ohms and is connected to two points differing in potential by 100 volts, the instrument passes a current of one-third of an ampere and takes up 33 watts in power. Since there are 8760 hours in a year, if such an instrument were connected continuously to the circuit it would take up energy equal to 263,000 watt-hours, or 260 Board of Trade units per annum. If the cost of production of this energy was only one penny per unit, the working expenses of keeping such a voltmeter in connexion with a circuit would therefore be more than £1 per annum, representing a capitalized value of, say, £10. Electrostatic instruments, however, take up no power and hence cost nothing for maintenance other than wear and tear of the instrument.

The qualities required in a good voltmeter are:—(i.) It should be quick in action, that is to say, the needle should come quickly to a position giving immediately the P.D. of the terminals of the instrument. (ii.) The instrument should give the same reading for the same P.D. whether this has been arrived at by increasing from a lower value or decreasing from a larger value; in other words, there should be no instrumental hysteresis. (iii.) The instrument should have no temperature correction; this is a good quality of electrostatic instruments, but in all voltmeters of the electrokinetic type which are wound with copper wire an increase of one degree centigrade in the average temperature of that wire alters the resistance by 0·4%, and therefore to the same extent alters the correctness of the indications. (iv.) It should, if possible, be available both for alternating and continuous currents. (v.) It should be portable and work in any position. (vi.) It should not be disturbed easily by external electric or magnetic fields. This last point is important in connexion with voltmeters used on the switchboards of electric generating stations, where relatively strong electric or magnetic fields may be present, due to strong currents passing through conductors near or on the board. It is therefore always necessary to check the readings of such an instrument *in situ*. Electrostatic voltmeters are also liable to have their indications disturbed by electrification of the glass cover of the instrument; this can be avoided by varnishing the glass with a semi-conducting varnish so as to prevent the location of electrostatic charges on the glass.

See J. A. Fleming, *Handbook for the Electrical Laboratory and Testing-Room* (London, 1903); G. Aspinall Parr, *Electrical Engineering Measuring Instruments* (London, 1903); K. Edgecumbe and F. Punga, "On Direct Reading Measuring Instruments for Switchboard Use," *Journ. Inst. Elec. Eng.* (London, 1904), 33, 620.
(J. A. F.)

VOLTURNO (anc. *Volturnus*, from *volvere*, to roll), a river of central Italy, which rises in the neighbourhood of Alfedena in the central Apennines of Samnium, runs S. as far as Venafro, and then S.E. After a course of some 75 m. it receives, about 5 m. E. of Caiazzo, the Calore, only 3 m. less in length, which runs first N. and then W., and after 37 m. reaches Benevento, near which it receives several tributaries; then curves round the mountain mass to the N. of the Caudine Forks, and so beyond Telese joins the Volturno. The united stream now flows W.S.W. past Capua (anc. *Casilinum*), where the Via Appia and Latina joined just to the N. of the bridge over it, and so through the Campanian plain, with many windings, into the sea. The direct length of the lower course is about 31 m., so that the whole is slightly longer than that of the Liri, and its basin far larger. The river has always had considerable military importance, and the colony of Volturnum (no doubt preceded by an older port of Capua) was founded in 194 B.C. at its mouth on the S. bank by the Romans; it is now about one mile inland. A fort had already been placed there during the Roman siege of Capua, in order, with Puteoli, to serve for the provisioning of the army. Augustus placed a colony of veterans here. The Via Domitiana from Sinuessa to Puteoli crossed the river at this point, and some remains of the bridge are visible. The river was navigable as far as Capua.

On the 1st of October 1860 the Neapolitan forces were defeated on the S. bank of the Volturno, near S. Maria di Capua Vetere, by the Piedmontese and Garibaldi's troops, a defeat which led to the fall of Capua. (T. As.)

VOLUINSKY, ARTEMY PETROVICH (1689–1740), Russian general and statesman, son of Peter Voluinsky, one of the dignitaries at the court of Theodore III., came of an ancient family. He entered a dragoon regiment in 1704 and rose to the rank of captain; then, exchanging the military service for diplomacy, he was attached to the suite of Vice-Chancellor Shafirov. He was present during the campaign of the Pruth, shared Shafirov's captivity in the Seven Towers and in 1715 was sent by Peter the Great to Persia to promote Russian influence there, and if possible to find an outlet to India. In 1718 Peter made him one of his six adjutant-generals, and governor of Astrakhan. In this post Voluinsky displayed distinguished administrative and financial talents. In 1723 he married Alexandra Naruishkina, Peter's cousin. The same year he was accused of peculation and other offences to the emperor, who caned him severely and deprived him of his plenipotentiary powers, despite his undeniable services in Persia, but for which Peter could never have emerged so triumphantly from the difficult Persian war of 1722–23. Catherine I. made Voluinsky governor of Kazan for a short time, and he held the same post for two years (1728–30) under Peter II. But his incurable corruption and unbridled temper so discredited the government that he was deprived of the post shortly after the accession of Anne. From 1730 to 1736 Voluinsky served in the army under Münnich. In 1737 he was appointed the second Russian plenipotentiary at the abortive congress of Nemirov held for the conclusion of peace with the Porte. In 1738 he was introduced into the Russian cabinet by Biren as a counterpoise against Andrei Osterman. Voluinsky, however, now thought himself strong enough to attempt to supersede Biren himself, and openly opposed the favourite in the Council of State in the debates as to the indemnity due to Poland for the violations of her territory during the war of the Polish Succession, Biren advising that a liberal indemnity should be given, whereas Voluinsky objected to any indemnity at all. Biren thereupon forced Anne to order an inquiry into Voluinsky's past career, with the result that he was tried before a tribunal of Biren's creatures and condemned to be broken on the wheel and then beheaded. On the scaffold, "by the clemency of the empress," his punishment was mitigated to the severing of his right hand followed by decapitation. The whole business seems to have been purely a piece of vindictiveness on the part of Biren.

See R. N. Bain, *The Pupils of Peter the Great* (London, 1897); D. A. Korsakov, *From the Lives of Russian Statesmen of the XVIIIth Century* (Rus.) (Kazan, 1891). (R. N. B.)

VOLUNTEERS, a general term for soldiers who are not professionals nor permanently embodied under arms in peace. Although it would be difficult to say when the principle of volunteer organization for national defence was first adopted in England, it is certain that voluntary military societies existed in various parts of the country in the reign of Henry VIII., who in fact granted a charter in 1537 to the "Fraternity or Guylde of Saint George: Maisters and Rulars of the said Science of Artillary as aforesaid rehearsed for long-bowes Cros-bowes and Hand-Gonnes." This ancient corps is now the Honourable Artillery Company of London. Although the Honourable Artillery Company has always been a distinct association, it was at one time (notably during the Great Rebellion) a centre of instruction for the City-trained bands, and in later times the H.A.C., divided into artillery and infantry units, has been assimilated as regards training and obligations to the Volunteer or Territorial Forces. Charters of a similar kind were granted to a Colchester society in 1619 and to one at Bury St Edmunds in 1628. In the 16th and 17th centuries also various temporary corps outside the militia or trained-band organization were called volunteers. At Boston, Massachusetts, there is established a corps bearing the name of the "Antient and Honorable Artillery Company of Massachusetts." This company was formed in 1638 after its London prototype.

The notion of a large organized Volunteer Force, however, seems to have originated in England at the time of the Militia Bill of 1757, which was amended in 1758 so as to allow the militia captains to accept volunteers instead of the ordinary militiamen who were compulsorily furnished *pro rata* by each parish. In 1778 the volunteers were still voluntary substitutes for militiamen, though formed in separate companies of the militia unit, but volunteer corps soon began to form themselves independently of the militia. In the meantime a large volunteer force had sprung up in Ireland. In 1779, Ireland being threatened with foreign invasion, a levy of [illegible] Protestants was made by the gentry in the north [illegible] Protestants had grown in 1782 to 100,000 [illegible] and their strength [illegible] ment of the [illegible] 1783, attempts [illegible] and the moderate men in parliament therefore hastened to disband it. But this military *coup d'état* was not forgotten in England. Ireland indeed supplied 70,000 volunteers during the Napoleonic wars, practically in place of her militia quota. But the rebellion of 1798 kept alive the memory of 1782, and about 1804 the government disarmed and disbanded them.

The English and Scottish volunteers, disbanded in 1783, were promptly revived when the French Revolutionary Wars produced a new and more formidable enemy. Volunteer corps, some dependent as companies upon the militia, others independent units, were raised in 1794, volunteer service counting as militia service for the purposes of raising the county, town or parish quota. This was followed in 1798 by the formation, for purely local defence, of the Armed Associations, the equivalent of the modern "rifle clubs." At the peace of Amiens the 340,000 volunteers then serving were nearly all disbanded, but one or two crops passed into the regular army as entire regiments, and some others managed to avoid disbandment until the renewal of the war revived the whole force. The danger of invasion was then at its height, and in a few months the force numbered 380,000 men, or 3½% of a population which already kept up a regular army and a militia. But the training of this mass was very unequal; the numbers fell off as the likelihood of invasion decreased, and in the reaction from the first enthusiasm it began to be questioned whether the volunteers could be of much value under the easy conditions of service prevailing. In 1808, therefore, the Local Militia was formed, in which the terms of enlistment and training liabilities were both stricter and better defined. The greater part of the volunteers transferred themselves to the Local Militia, which by 1812 (aided by the ballot) had reached a strength of 215,000 as against the 70,000 of the remaining volunteers. With the general peace of 1814 all these forces except the H.A.C. and the Yeomanry (*q.v.*) disappeared.

After an interval of nearly half a century the warlike attitude of France caused British citizens once more to arm for the protection of their country. The British army and navy had declined in strength and efficiency; France, on the other hand, by the energetic development of her military and naval power and the early application of steam to ships of war, brought the possibilities of the invasion of England in 1846 within measurable distance. England at this time was awakened to the gravity of the situation by the publication of a letter from Wellington to Sir John Burgoyne,[1] followed by a well-timed pamphlet by Sir Charles Napier, entitled *The Defence of England by Volunteer Corps and Militia.* The French danger, in abeyance during the Crimean War, was revived in 1857, when the tone of the French press became more and more menacing. The war in China, the Indian Mutiny and difficulties with the United States taxed the regular army to the utmost; while at home, besides the actual garrisons, there were barely 36,000 militia. This threatening condition of affairs tended to aggravate, if not to produce, a serious commercial panic. It was then that the volunteer movement began, and the Orsini episode and the openly expressed threats of French officers were all that was necessary to free the pent-up enthusiasm.

A few rifle clubs were already in existence, and two of these, working as military bodies from the outset (1852–53), became the two senior volunteer battalions—1st V.B. (now 4th Bn.) Devonshire Regt., and Victoria Rifles (now 9th Bn. London Regt.). But it was not until the situation became acute that the War Office took the step of raising the "Volunteer Force." A circular letter, dated 12th May 1859, from the secretary for war to the lords-lieutenant of counties in Great Britain authorized the formation of volunteer corps. The general enrolment took place at first under the old statute (44 Geo. III.). The main provisions of that act, however, were found inapplicable to the altered conditions under which invasion was now possible, and they failed also to provide for the maintenance of the volunteer force on a permanent footing in peace. A new act (Volunteer Act 1863) was therefore passed, the most important provision of which was that apprehended invasion should constitute a sufficient reason for the sovereign to call out the volunteers, in lieu of the old condition which required the actual appearance of the enemy. The volunteers were, when called out, bound to serve in Great Britain until released by a proclamation declaring the occasion to have passed. This was modified in 1900 during the South African War, a new enactment allowing the authorities to call them out at times of "imminent national danger and great emergency." In 1871 the volunteers were removed from the control of the lords-lieutenant and placed under the War Office. In 1881 the infantry battalions were affiliated to the various line regiments.

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[1] See *Life and Letters of Field-Marshal Sir John Burgoyne.*

The force thus brought into existence was composed of corps of light horse, mounted rifles, garrison and heavy artillery, engineers and rifle volunteers.[1] Later there existed also in connexion with the admiralty a corps of "Royal Naval Artillery Volunteers" for the coast defences. The terms of service and training liabilities underwent no alteration of principle during the forty-eight years of the force's existence. The property belonging to the corps was vested in the commanding officer and administered by a committee of officers under the rules of the corps. These rules were in the first instance agreed on at a general meeting of officers and men, and, having received the queen's approval, became legal, and could be enforced. The commanding officer could dismiss a man from the corps, and a volunteer not on actual service could terminate his engagement at fourteen days' notice. But, as it became the almost universal practice for the government or the regimental commander to issue clothing and equipment free, the volunteers contracted in return to serve for three, four or five years, and, if they exercised their statutory rights, were obliged to refund part of the cost. Further, when capitation grants were given for the maintenance of the corps, the volunteer had either to earn this by continued service or repay the sum lost to the corps by his resignation. These conditions materially modified the statute law in practice, and in fact the term of four years exacted from the Territorial to-day differs in little more than name from the requirements of the former "corps rules." Military law was applicable to officers and men when training with regulars.

The formation of volunteer corps was so rapid that in the course of a few months in 1859–60 a force of 119,000 was created. More, however, remained to be done to put an end to the ever-recurring commercial panics. The government, which in the beginning had tolerated rather than encouraged the movement, and had required the volunteer to serve and to equip himself entirely at his own expense, now followed the lead of public opinion, and decided on maintaining the volunteer force as a part of the regular defensive system. The *personnel* of the volunteer corps (with a few exceptions) thereupon underwent a change. The wealthy and professional classes, who had at first joined the ranks in anticipation of war, cared no longer to bear arms. Their places were taken by the artisan class, which added materially to the number and permanence of the force. But, as contributions and subscriptions now flagged, it became evident that public grants would have to be voted for its maintenance, and a scale of capitation allowances, subject to regulation, was fixed, on the recommendation of a Royal Commission. This capitation allowance per efficient volunteer was thenceforward the basis of all regimental finance and administration.

The turning-point in the history of the volunteers was the South African War. In January 1900, and on several subsequent occasions, the volunteers were invited to supply service companies for South Africa, to be incorporated in the regular battalions to which the volunteer battalions were affiliated. About one-third of the whole force volunteered for service in South Africa, and some 20,000 served in the volunteer companies with the line and in the "City Imperial Volunteers," besides a great number of volunteers whom the higher pay, easier conditions and better prospects of active employment in the mounted guerrilla warfare tempted into the ranks of the yeomanry. The return of these companies infused into the force a leaven of officers and men who had been through an experience of constant small skirmishes and prolonged marching and bivouacking. Meantime the force as a whole had been subjected to a more earnest and vigorous training than it had ever had before. The establishment was greatly increased, and 24 battalions were selected for special training and included with the regular home army in the field force. Various partial reorganizations followed in 1902–5, and at last, in 1907–8, the whole force was re-cast, re-enlisted upon somewhat different terms, and organized along with the yeomanry into the new Territorial Force (see UNITED KINGDOM: *Army*).

STRENGTH OF THE VOLUNTEER FORCE
(*From the Territorial Year Book 1909*).

Year.	Establishment.	Strength.	Classed as Efficient.
1861	211,961	161,239	140,100
1870	244,966	193,893	170,671
1880	243,546	206,537	196,938
1885	250,967	224,012	218,207
1890	260,310	221,048	212,293
1895	260,968	231,704	224,962
1899	263,416	229,854	223,921
1900	339,511	277,628	270,369
1901	342,003	288,476	281,062
1902	345,547	268,550	256,451
1903	346,171	253,281	242,104
1904	343,246	253,909	244,537
1905	341,283	249,611	241,549
1906	338,452	255,854	246,654
1907	335,849	252,791	244,212

VOLUSENUS, FLORENTIUS [FLORENCE WOLSON, or WOLSEY, in later writers WILSON, though in letters in the vernacular he writes himself VOLUSENE] (*c.* 1504–*c.* 1547), Scottish humanist, was born near Elgin about 1504. He studied philosophy at Aberdeen, and in the dialogue *De Animi Tranquillitate* says that the description of the abode of tranquillity was based on a dream that came to him after a conversation with a fellow-student on the banks of his native Lossie. He was then a student of philosophy of four years' standing. Proceeding to Paris, he became tutor to Thomas Wynter, reputed son of Cardinal Wolsey. He paid repeated visits to England, where he was well received by the king, and, after Wolsey's fall, he acted as one of Cromwell's agents in Paris. He was in England as late as 1534, and appears to have been rector of Speldhurst in Kent. In Paris he knew George Buchanan, and found patrons in the cardinal Jean de Lorraine and Jean du Bellay. He was to have gone with du Bellay on his mission to Italy in 1535, but illness kept him in Paris. As soon as he recovered he set out on his journey, but at Avignon, by the advice of his friend Antonio Bonvisi (d. 1558), he sought the patronage of the bishop of the diocese, the learned and pious Paul Sadolet, who made him master in the school at Carpentras, with a salary of seventy crowns. Volusenus paid frequent visits to Lyons (where Conrad Gesner saw him, still a young man, in 1540), probably also to Italy, where he had many friends, perhaps even to Spain. A letter addressed to him by Sadolet from Rome in 1546 shows that he had then resolved to return to Scotland, and had asked advice on the attitude he should adopt in the religious dissensions of the time. He died on the journey, however, at Vienne in Dauphiné, in 1546, or early in the next year.

Volusenus's linguistic studies embraced Hebrew as well as Greek and Latin. His reputation, however, rests on the beautiful dialogue, *De Animi Tranquillitate*, first printed by S. Gryphius at Lyons in 1543. From internal evidence it appears to have been composed about that time, but the subject had exercised the writer for many years. The dialogue shows us Christian humanism at its best. Volusenus is a great admirer of Erasmus, but he criticizes the purity of his Latin and also his philosophy. His own philosophy is Christian and Biblical rather than classical or scholastic. He takes a fresh and independent view of Christian ethics, and he ultimately reaches a doctrine as to the witness of the Spirit and the assurance of grace which breaks with the traditional Christianity of his time and is based on ethical motives akin to those of the German Reformers. The verses which occur in the dialogue, and the poem which concludes it, give Volusenus a place among Scottish Latin poets, but it is as a Christian philosopher that he attains distinction.

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[1] The light horse and mounted rifles disappeared in the end, or else were converted into yeomanry. The "rifles" title was maintained even after the infantry had been assimilated in drill, uniform and other respects to the line battalions. For this reason even scarlet-clothed battalions had no colours, pouch-belts instead of sashes, &c.

The dialogue was reissued at Leiden in 1637 by the Scots writer David Echlin, whose poems, with a selection of three poems from the dialogue of Volusenus, appear, with others, in the famous Amsterdam collection *Delitiae Poetarum Scotorum hujus aevi*, printed by Blaev in 2 vols. in 1637. Later editions of the dialogue appeared at Edinburgh in 1707 and 1751 (the latter edited by G. Wishart). All the reissues contain a short life of the author by Thomas Wilson, advocate, son-in-law and biographer of Archbishop Patrick Adamson. Supplementary facts are found in the letters and state papers of the period, and in Sadolet's *Letters*.

VOLUTE (Lat. *volutum*, *volvere*, to roll up), in architecture, the spiral scroll of the capital of the Ionic order. As in the earliest example known, that of the archaic temple of Diana at Ephesus, the width of the abacus is twice that of the depth, constituting therefore a bracket-capital; it is probable that at first it consisted of an oblong block of timber, which, raised on a vertical post or column, lessened the bearing of the architrave or beam, and the first volutes or scrolls were painted on. In votive columns carrying a sphinx, as at Delphi, or statues, the oblong form of capital with largely developed volutes was long retained, but in the porticoes of the Greek temples the abacus was made square and the volute diminished in projection on each side. In the side elevation the portion of the capital which joins the two volutes is known as the cushion, and when the Ionic column was used in porticoes in the capitals of the angle columns the volute was brought out on the diagonal, so as to present the same design on front and side; this, however, at the back led to a very awkward arrangement with two half volutes at right angles to one another, which was not of much importance under the portico, but when, in the open peristyle of the Pompeian house, it faced the open court, another design was necessary, and the angle volute was employed on all four sides. A similar arrangement was devised by Ictinus for the capitals in the interior of the temple at Bassae (430 B.C.), and was employed in the semi-detached columns of the raised stage at Epidaurus. The Romans adopted the angle volute in the temple of Fortuna Virilis at Rome, but, except in their porticoes and as semi-detached between arches, the Ionic order was rarely employed by them, and few Roman examples are known.

The architects of the Revival in the 16th century entirely misunderstood the origin and meaning of the volutes (the upper fillet of which was always carried horizontally across under the abacus in Greek and Roman work), and mistook them for horns, which they turned down into the echinus moulding.

VONDEL, JOOST VAN DEN (1587–1679), Dutch poet, was born at Cologne on the 17th of November 1587. His father, a hatter, was an exile from Antwerp on account of his Anabaptist opinions; but he returned to Holland when Joost was about ten years old, and settled in Amsterdam, where he carried on a hosiery business. Joost was the eldest son, and was expected to succeed to his father's shop. He was early introduced to the chamber of the Eglantine, however, and devoted most of his time to poetry and study. When the elder Vondel died he married Maria de Wolff, and seems to have left the management of his affairs in her capable hands. He read the French contemporary poets, and was especially influenced by the *Divine Sepmaine* of Du Bartas; he made some translations from the German; he was soon introduced to the circle gathered in the house of Roemer Visscher, and with these friends began to make a close study of classical writers. His first play, *Het Pascha*, was printed [illegible] to be the beginning of a long and [illegible] LITERATURE). After the pr[illegible] *Palamedes, or Murdered* [illegible] indignation at the [illegible] Vondel had to [illegible] eventually sat[illegible] the follow-in[illegible] the [illegible]ship with Hugo Grotius, another sufferer for his liberal opinions. Vondel had long been attracted by the aesthetic side of the Roman Catholic Church, and this inclination was perhaps strengthened by his friendship with Marie Tesselschade Visscher, for the Visscher household had been Catholic and liberal. Tesselschade's husband died in 1634; Vondel's wife died in 1635; and the ties between the two were strengthened by time. Vondel eventually showed his revolt against the Calvinist tyranny by formally embracing the Roman Catholic faith in 1640. The step was ill-received by many of his friends, and Hooft forbade him the hospitality of his castle at Muiden. In 1657 his only surviving son, who was entrusted with the hosiery business, mismanaged affairs to such an extent that he had to take ship for the East Indies, leaving his father to face the creditors. Vondel had to sacrifice the whole of his small fortune, and became a government clerk. He was pensioned after ten years' service, and died on the 5th of February 1679.

The more important of his thirty-two dramas are: *Hierusalem Verwoest* ("Jerusalem laid desolate") (1620); *Palamedes, of Vermoorde onnooselheyd* ("Palamedes, or Murdered Innocence") (1625); *Gijsbreght van Aemstel* (1637); *De Gebroeders* (1640), the subject of which is the ruin of the sons of Saul; *Joseph in Egypten* (1640); *Maria Stuart, of gemartelde majesteit* (1646); the pastoral of *De Leeuwendalers* (1648); *Lucifer* (1654); *Salmoneus* (Solomon) (1657); *Jephtha* (1659); *Koning David in ballingschap* ("King David in banishment"), *Koning David hersteld* ("King David restored") and *Samson* (1660); *Batavische Gebroeders*, the subject of which is the story of Claudius Civilis (1663); *Adam in ballingschap* ("Adam in exile") (1664), after the Latin tragedy of Hugo Grotius. He also wrote translations from the tragedies of Seneca, Euripides and Sophocles; didactic poems, and much lyrical poetry beside what is to be found in the choruses of his dramas.

His complete works were edited by van Lennep (12 vols., 1850–1869). A bibliography (1888) was published by J. H. W. Unger, who revised van Lennep's edition in 1888–94. *Lucifer* was translated into English verse by L. C. van Noppen (New York, 1898). See also E. Gosse, *Studies in Northern Literature* (1879); G. Edmundson, *Milton and Vondel* (1885), where Milton's supposed indebtedness to Vondel is discussed; and critical studies by A. Baumgartner, S. J. (Freiburg, 1882); C. Looten (Lille, 1889), by J. A. Alberdingk Thijm (*Portretten van Joost van den Vondel*, 1876); and especially the chapters on Vondel (pp. 133–325) in W. J. A. Jonckbloet's *Geschiedenis der nederlandsche letterkunde* (vol. iv. 1890).

VON HOLST, HERMANN EDUARD (1841–1904), German-American historian, was born at Fellin in the province of Livonia, on the 19th of June 1841. He was educated at the universities of Dorpat and Heidelberg, receiving his doctor's degree from the latter in 1865. He emigrated to America in 1867, remaining there until 1872. He was professor of history in the newly reorganized university of Strassburg from 1872 to 1874, and at Freiburg in Baden from 1874 to 1892, and for ten years he was a member of the Baden *Herrenhaus*, and vice-president for four. He revisited the United States in 1878–79 and in 1884, and in 1892 he became head of the department of history at the university of Chicago. Retiring on account of ill-health in 1900, he returned to Germany and died at Freiburg on the 20th of January 1904. Both through his books and through his lectures at the university of Chicago, Von Holst exerted a powerful influence in encouraging American students to follow more closely the German methods of historical research. His principal work is his *Constitutional and Political History of the United States* (German ed., 5 vols., 1873–91; English trans. by Lalor and Mason, 8 vols., 1877–92), which covers the period from 1783 to 1861, though more than half of it is devoted to the decade 1850–60; it is written from a strongly anti-slavery point of view. Among his other writings are *The Constitutional Law of the United States of America* (German ed., 1885; English trans., 1887); *John C. Calhoun* (1882), in the American Statesmen Series; *John Brown* (1888), and *The French Revolution Tested by Mirabeau's Career* (1894).

See the *Political Science Quarterly*, v. 677–78; the *Nation*, lxxviii. 65–67.

VONNOH, ROBERT WILLIAM (1858–), American portrait and landscape painter, was born in Hartford, Connecticut, on the 17th of September 1858. He was a pupil of Boulanger and Lefebvre in Paris; became an instructor at the Cowles Art School, Boston (1884–85), at the Boston

Museum of Fine Art Schools (1885–87), and in the schools of the Pennsylvania Academy of the Fine Arts, Philadelphia (1891–96), and a member of the National Academy of Design, New York (1906), and of the Secessionists, Munich. His wife, Bessie Potter Vonnoh (b. 1872), a sculptor, was a pupil of the Art Institute, Chicago, and became a member of the National Sculpture Society.

VONONES (on coins ONONES), the name of two Parthian kings.

(1) VONONES I., eldest son of Phraates IV. After the assassination of Orodes II. (*c.* A.D. 7), the Parthians applied to Augustus for a new king from the house of Arsaces. Augustus sent them Vonones (*Mon. Anc.* 5, 9; Tac. *Ann.* ii. 1 f.; Joseph. *Ant.* xviii. 2, 4), who was living as a hostage in Rome. But Vonones could not maintain himself; he had been educated as a Roman, and was despised as a slave of the Romans. Another member of the Arsacid house, Artabanus II., who was living among the Dahan nomads, was invited to the throne, and defeated and expelled Vonones. The coins of Vonones (who always uses his proper name) date from A.D. 8–12, those of Artabanus II. begin in A.D. 10. Vonones fled into Armenia and became king here. But Artabanus demanded his deposition, and as Augustus did not wish to begin a war with the Parthians he removed Vonones into Syria, where he was kept in custody (Tac. *Ann.* ii. 4). When he tried to escape, A.D. 19, he was killed by his guards (Tac. *Ann.* ii 58, 68).

(2) VONONES II., governor of Media, was raised to the throne after the death of Gotarzes in A.D. 51 (perhaps he was his brother, cf. Joseph. *Ant.* xx. 3, 4). But he died after a few months, and was succeeded by his son Vologaeses I. (Tac. *Ann.* xii. 14). (ED. M.)

VOODOO or VAUDOUX (Creole Fr. *vaudoux*, a negro sorcerer, probably originally a dialectic form of Fr. *Vaudois*, a Waldensian), the name given to certain magical practices, superstitions and secret rites prevalent among the negroes of the West Indies, and more particularly in the Republic of Haiti.

VOORHEES, DANIEL WOLSEY (1827–1897), American lawyer and political leader, was born in Butler county, Ohio, on the 26th of September 1827, of Dutch and Irish descent. During his infancy his parents removed to Fountain county, Indiana, near Veedersburg. He graduated at Indiana Asbury (now De Pauw) University, Greencastle, Indiana, in 1849; was admitted to the bar in 1850, and began to practise in Covington, Indiana, whence in 1857 he removed to Terre Haute. In 1858–60 he was U.S. district-attorney for Indiana; in 1861–66 and in 1869–73 he was a Democratic representative in Congress; and in 1877–97 he was a member of the U.S. Senate. During the Civil War he seems to have been affiliated with the Knights of the Golden Circle, but he was not so radical as Vallandigham and others. He was a member of the committee on finance throughout his service in the Senate, and his first speech in that body was a defence of the free coinage of silver and a plea for the preservation of the full legal tender value of greenback currency, though in 1893 he voted to repeal the silver purchase clause of the Sherman Act. He had an active part in bringing about the building of the new Congressional Library. He was widely known as an effective advocate, especially in jury trials. In allusion to his unusual stature he was called "the Tall Sycamore of the Wabash." He died in Washington, D.C., on the 10th of April 1897.

Some of his speeches were published under the title, *Forty Years of Oratory* (2 vols., Indianapolis, Indiana, 1898), edited by his three sons and his daughter, Harriet C. Voorhees, and with a biographical sketch by T. B. Long.

VORARLBERG, the most westerly province of the Austrian empire, extending S. of the Lake of Constance along the right bank of the Rhine valley. It consists of three districts, Bregenz, Bludenz and Feldkirch, which are under the administrative authority of the *Statthalter* (or prefect) at Innsbruck, but possess a governor and a diet of their own (twenty-one members), and send four members to the imperial parliament. Vorarlberg is composed of the hilly region of the Bregenzerwald, and, to its south, of the mountain valley of Montafon or of the upper Ill, through which an easy pass, the Zeinisjoch (6076 ft.), leads to the Tirolese valley of Paznaun, and so to Landeck. Near Bludenz the Kloster glen parts from the Ill valley; through the latter runs the Arlberg railway (1884)—beneath the pass of that name (5912 ft.)—to Landeck and Innsbruck. The Ill valley is bounded south by the snowy chain of the Rhätikon (highest point, the Scesaplana, 9741 ft., a famous view-point), and of the Silvretta (highest point, Gross Piz Buin, 10,880 ft.), both dividing Vorarlberg from Switzerland; slightly to the north-east of Piz Buin is the Dreiländerspitze (10,539 ft.), where the Vorarlberg, Tirolese and Swiss frontiers unite.

The total area of Vorarlberg is 1004·3 sq. m. Of this 88¼%, or about 886 sq. m., is reckoned "productive," 30% of this limited area being occupied by forests, while 118 sq. m. rank as "unproductive." In 1900 the total population was 129,237, all but wholly German-speaking and Romanist. The largest town is Dornbirn (pop. 13,052), but Bregenz (pop. 7595) is the political capital; Feldkirch has about 4000 inhabitants, while Bludenz has rather more (see the separate articles on the three former). In the hilly districts the inhabitants mainly follow pastoral pursuits, possessing much cattle of all kinds. In the towns the spinning and weaving of cotton (introduced towards the end of the 18th century) is very flourishing. Forests cover about one-sixth of the district, and form one of the principal sources of its riches. But the Vorarlberg is predominantly an Alpine region, though its mountains rarely surpass the snow-level. Ecclesiastically it is in the diocese of Brixen, whose vicar-general (a suffragan bishop) resides at Feldkirch.

The name of the district means the "land that is beyond the Arlberg Pass," that is, as it seems to one looking at it from the Tirol. This name is modern and is a collective appellation for the various counties or lordships in the region which the Habsburgs (after they secured Tirol in 1363) succeeded in purchasing or acquiring—Feldkirch (1375, but Hohenems in 1765 only), Bludenz with the Montafon valley (1394), Bregenz (in two parts, 1451 and 1523) and Sonnenberg (1455). After the annexation of Hohenems (its lords having become extinct in 1759), Maria Theresa united all these lordships into an administrative district of Hither Austria, under the name Vorarlberg, the governor residing at Bregenz. In 1782 Joseph II. transferred the region to the province of Tirol. The lordship of Blumenegg was added in 1804, but in 1805 all these lands were handed over, by virtue of the peace of Pressburg, to Bavaria, which in 1814 gave them all back, save Hoheneck. In 1815 the present administrative arrangements were made.

See A. Achleitner and E. Ubl, *Tirol und Vorarlberg* (Leipzig, 1895); J. R. von Bergmann, *Landeskunde v. Vorarlberg* (Innsbruck, 1868); Max Haushofer, *Tirol und Vorarlberg* (Bielefeld and Leipzig, 1899); J. C. Heer, *Vorarlberg und Liechtenstein—Land und Leute* (Feldkirch, 1906); O. von Pfister, *Das Montavon* (Augsburg, 1884); J. Staffler, *Tirol und Vorarlberg* (5 vols., Innsbruck, 1839–46); A. Steinitzer, *Geschichtliche und Kulturgeschichtliche Wanderungen durch Tirol und Vorarlberg* (Innsbruck, 1905); A. Waltenberger, *Algäu, Vorarlberg und Westtirol* (10th edition, Innsbruck, 1906). See also the list of books at the end of TIROL, and especially vol. xiii. ("Tirol u. Vorarlberg") (Vienna, 1893) of the great official work entitled *Die oesterreichisch-ungarische Monarchie in Wort und Bild.* (W. A. B. C.)

VORONEZH, a government of southern Russia, bounded N. by the government of Tambov, E. by Saratov and the Don Cossacks, S. by Kharkov and W. by Kursk and Orel; area, 25,435 sq. m. It occupies the southern slopes of the middle-Russian plateau, and its average elevation is from 450 to 700 ft. The surface is hilly, and intersected by ravines in the west (where two ranges of chalk hills separated by a broad valley run north and south), but flat and low east of the Don. Devonian sandstones crop out in the north; further south these are covered with Cretaceous deposits. Glacial clays with northern erratic boulders extend as far south as Voronezh, and extensive areas are covered with Lacustrine clays and sands. The soil is very fertile, owing to the prevalence of black earth; it becomes, however, sandy towards the east.

Voronezh lies on the border between the forest and meadow region of middle Russia and the southern steppes; the forests disappear rapidly towards the south, and those which in the time of Peter the Great stood on the upper tributaries of the Don, and were used for shipbuilding, have now been almost entirely destroyed. Less than one-tenth of the entire area is under wood.

The Don traverses Voronezh from N. to S.E., draining it for more than 400 m.; it is an important channel for the export of corn, tallow and other raw produce, as well as for the import of wood, floated down from the north. Its tributary the Voronezh is also navigated, and the Bityug and Khoper, both left-hand affluents of the Don, flow in part through the government. Many other small streams flowing into the Don intersect the territory, but the influence of the dry steppes begins to make itself felt; there are no lakes, and marshes persist only in the valleys. The climate is continental, and although the mean temperature at the town of Voronezh is 42·7° F., that of January is as low as 8·3°, and that of July as high as 74·2°.

The estimated pop. in 1906 was 3,097,700. The inhabitants consist in nearly equal parts of Great Russians in the north and Little Russians in the south, but there are a few Poles, Germans and Jews, both Orthodox and Karaites. The government is divided into twelve districts, the chief towns of which are Voronezh, Biryuch, Bobrov, Boguchar, Korotoyak, Nizhne-Dyevitsk, Novo-Khopersk, Ostrogozhsk, Pavlovsk, Valuiki, Zadonsk and Zemlyansk. Agriculture is the chief occupation, and grain is exported to a considerable amount. The peasants own 67% of the land, the crown and the imperial domains 3% and private owners 30%.

The principal crops are rye, wheat, oats, barley and potatoes. Aniseed, sunflowers, tobacco and beetroot are extensively cultivated, and much attention is paid to the growth of the pineapple. There are large tracts of excellent pasture land, on which cattle are bred; good breeds of cart-horses and trotting-horses are obtained. There are nearly two hundred breeding establishments, those at Hrenovoye and Chesmenka being the most important. In many villages the inhabitants are engaged in the making of wooden wares. There are flour-mills, distilleries, oil, sugar and woollen mills, iron works and tobacco factories.

VORONEZH, a town of Russia, capital of the government of the same name, on the river Voronezh, 5 m. above its confluence with the Don and 367 m. by rail S.S.E. of Moscow. Pop. (1901) 84,146. It is one of the best-built and most picturesque provincial towns of Russia, and is situated on the steep bank of the river, surrounded by three large suburbs —Troitskaya, Yamskaya and Chizhovka. It has a military school of cadets, two museums, a monument (1860) to Peter the Great, a railway college, a pilgrimage church, and a theatre which figures in the history of the Russian stage. It was the birthplace of two peasant poets, who wrote some of the finest examples of Russian poetry—A. V. Koltsov (1809–1842) and I. S. Nikitin (1824–1861). A memorial to the former was erected in 1868. There are factories for cleansing wool and for the preparation of linens, woollens, bells, tallow and oil, as well as some distilleries. Voronezh is an important entrepôt for corn, flax, tallow, hides, sugar, wood and coal from the Don.

The city was founded in 1586, as a fort against Tatar raids, on a site which had been occupied from the 11th century by a Khazar town, but had been deserted during the 14th and 15th centuries. Four years afterwards it was burned by the Tatars, but again rebuilt, and soon became an important trading place. Peter the Great recognized its importance, and in 1695 built here a flotilla of boats for the conquest of Azov. The town was [illegible] destroyed by fire in 1703, 1748 and 1773, [illegible]

[illegible] the name of a Russian family, [illegible] in Russian history. [illegible] (1714–1767), Russian [illegible] become prominent. At [illegible] a Kammer junker at [illegible] Petrovna, whom he materially assisted during the famous *coup d'état* of the 6th of December 1741, when she mounted the Russian throne on the shoulders of the Preobrazhensky Grenadiers. On the 3rd of January 1742 he married Anna Skavronskaya, the empress's cousin; and in 1744 was created a count and vice-chancellor. His jealousy of Alexis Bestuzhev induced him to participate in Lestocq's conspiracy against that statesman. The empress's affection for him (she owed much to his skilful pen and still more to the liberality of his rich kinsfolk) saved him from the fate of his accomplices, but he lived in a state of semi-eclipse during the domination of Bestuzhev (1744–1758). On the disgrace of Bestuzhev, Vorontsov was made imperial chancellor in his stead. Though well-meaning and perfectly honest, Vorontsov as a politician was singularly timorous and irresolute, and always took his cue from the court. Thus, under Elizabeth he was an avowed enemy of Prussia and a warm friend of Austria and France; yet he made no effort to prevent Peter III. from reversing the policy of his predecessor. Yet he did not lack personal courage, and endured torture after the Revolution of the 9th of July 1762 rather than betray his late master. He greatly disliked Catherine II., and at first refused to serve under her, though she reinstated him in the dignity of chancellor. When he found that the real control of foreign affairs was in the hands of Nikita Panin, he resigned his office (1763). Vorontsov was a generous protector of the nascent Russian literature, and, to judge from his letters, was a highly cultivated man.

ALEXANDER ROMANOVICH VORONTSOV (1741–1805), Russian imperial chancellor, nephew of the preceding and son of Count Roman Vorontsov, began his career at the age of fifteen in the Izmailovsky regiment of the Guards. In 1759, his kinsman, the grand chancellor Mikhail Illarionovich, sent him to Strassburg, Paris and Madrid to train him in diplomacy. Under Peter III. he represented Russia for a short time at the court of St James's. Catherine II. created him a senator and president of the Board of Trade; but she never liked him, and ultimately (1791) compelled him to retire from public life. In 1802 Alexander I. summoned him back to office and appointed him imperial chancellor. This was the period of the triumph of the Vorontsovs, who had always insisted on the necessity of a close union with Austria and Great Britain, in opposition to Panin and his followers, who had leaned on France or Prussia till the outbreak of the Revolution made friendship with France impossible. Vorontsov was also an implacable opponent of Napoleon, whose "topsy-turvyness" he was never weary of denouncing. The rupture with Napoleon in 1803 is mainly attributable to him. He also took a leading part in the internal administration and was in favour of a thorough reform of the senate and the ministries. He retired in 1804. He possessed an extraordinary memory and a firm and wide grasp of history.

His "Memoirs of my Own times" (Rus.) is printed in vol. vii. of the *Vorontsov Archives*.

SEMEN ROMANOVICH VORONTSOV (1744–1832), Russian diplomatist, brother of Alexander Romanovich, distinguished himself during the first Turkish War of Catherine II. at Larga and Kagula in 1770. In 1783 he was appointed Russian minister at Vienna, but in 1785 was transferred to London, where he lived for the rest of his life. Vorontsov enjoyed great influence and authority in Great Britain. Quickly acquainting himself with the genius of English institutions, their ways and methods, he was able to render important services to his country. Thus during Catherine's second Turkish War he contributed to bring about the disarmament of the auxiliary British fleet which had been fitted out to assist the Turks, and in 1793 obtained a renewal of the commercial treaty between Great Britain and Russia. Subsequently, his extreme advocacy of the exiled Bourbons, his sharp criticism of the Armed Neutrality of the North, which he considered disadvantageous to Russia, and his denunciation of the partitions of Poland as contrary to the first principles of equity and a shock to the conscience of western Europe, profoundly irritated the empress. On the accession of Paul he was raised to the rank of ambassador extraordinary and minister plenipotentiary, and received immense estates in Finland. Neither Vorontsov's detention of the Russian squadron under Makarov in British ports nor his refusal, after the death of Bezborodko, to accept the dignity of imperial chancellor could alienate the favour of Paul. It was only when the emperor himself began to draw nearer to France that he began to consider Vorontsov as incompetent to serve Russia in England, and in February 1800 all the count's estates were confiscated. Alexander I. on his accession at once reinstated him, but ill-health and family affairs induced him to resign his post in 1806. From that time till his death in 1832 he continued to live in London.

Besides his valuable *Note on the Russian War* (Rus.) and numerous letters, Vorontsov was the author of an autobiography (in *Russky Arkhiv*, Petersburg, 1881) and "Notes on the Internal Government of Russia" (Rus.) (in *Russky Arkhiv*, 1881).

MIKHAIL SEMENOVICH VORONTSOV (1782–1856), Russian prince and field-marshal, son of the preceding, spent his childhood and youth with his father in London, where he received a brilliant education. During 1803–4 he served in the Caucasus under Tsitsianov and Gulyakov, and was nearly killed in the Zakatahko disaster (January 15, 1804). From 1805 to 1807 he served in the Napoleonic wars, and was present at the battles of Pultusk and Friedland. From 1809 to 1811 he participated in the Turkish War and distinguished himself in nearly every important action. He was attached to Bagration's army during the war of 1812, was seriously wounded at Borodino, sufficiently recovering, however, to rejoin the army in 1813. In 1814, at Craonne, he brilliantly withstood Napoleon in person. He was the commander of the corps of occupation in France from 1815 to 1818. On the 7th of May 1823 he was appointed governor-general of New Russia, as the southern provinces of the empire were then called, which under his administration developed marvellously. He may be said to have been the creator of Odessa and the benefactor of the Crimea. He was the first to start steamboats on the Black Sea (1828). The same year he succeeded the wounded Menshikov as commander of the forces besieging Varna, which he captured on the 28th of September. In the campaign of 1829 it was through his energetic efforts that the plague, which had broken out in Turkey, did not penetrate into Russia. In 1844 Vorontsov was appointed commander-in-chief and governor of the Caucasus with plenipotentiary powers. For his brilliant campaign against Shamyl, and especially for his difficult march through the dangerous forests of Ichkerinia, he was raised to the dignity of prince, with the title of Serene Highness. By 1848 he had captured two-thirds of Daghestan, and the situation of the Russians in the Caucasus, so long almost desperate, was steadily improving. In the beginning of 1853 Vorontsov was allowed to retire because of his increasing infirmities. He was made a field-marshal in 1856, and died the same year at Odessa. Statues have been erected to him both there and at Tiflis.

See V. V. Ogarkov, *The Vorontsovs* (Rus.) (Petersburg, 1892); *Vorontsov Archives* (Rus. and Fr.) (Moscow, 1870, &c.); M. P. Shelverbinin, *Biography of Prince M. S. Vorontsov* (Rus.) (Petersburg, 1858). (R. N. B.)

VÖRÖSMARTY, MIHÁLY (1800–1855), Hungarian poet, was born at Puszta-Nyék on the 1st of December 1800, of a noble Roman Catholic family. His father was a steward of the Nadasdys. Mihály was educated at Székesfejérvár by the Cistercians and at Pest by the Piarists. The death of the elder Vörösmarty in 1811 left his widow and numerous family extremely poor. As tutor to the Perczel family, however, Vörösmarty contrived to pay his own way and go through his academical course at Pest. The doings of the diet of 1825 first enkindled his patriotism and gave a new direction to his poetical genius (he had already begun a drama entitled *Salomon*), and he flung himself the more recklessly into public life as he was consumed by a hopeless passion for Etelka Perczel, who socially was far above him. To his unrequited love we owe a whole host of exquisite lyrics, while his patriotism found expression in the heroic epos *Zalán futása* (1824), gorgeous in colouring, exquisite in style, one of the gems of Magyar literature. This new epic marked a transition from the classical to the romantic school. Henceforth Vörösmarty was hailed by Kisfaludy and the Hungarian romanticists as one of themselves. All this time he was living from hand to mouth. He had forsaken the law for literature, but his contributions to newspapers and reviews were miserably paid. Between 1823 and 1831 he composed four dramas and eight smaller epics, partly historical, partly fanciful. Of these epics he always regarded *Cserhalom* (1825) as the best, but modern criticism has given the preference to *Két szomszéd vár* (1831), a terrible story of hatred and revenge. When the Hungarian Academy was finally established (November 17, 1830) he was elected a member of the philological section, and ultimately succeeded Karóly Kisfaludy as director with an annual pension of 500 florins. He was one of the founders of the Kisfaludy Society, and in 1837 started the *Athenaeum* and the *Figyelmező*, the first the chief bellettristic, the second the best critical periodical of Hungary. From 1830 to 1843 he devoted himself mainly to the drama, the best of his plays, perhaps, being *Vérnász* (1833), which won the Academy's 100-gulden prize. He also published several volumes of poetry, containing some of his best work. *Szózat* (1836), which became a national hymn, *Az elhagyott anya* (1837) and *Az úri hölgyhöz* (1841) are all inspired by a burning patriotism. His marriage in 1843 to Laura Csajághy inspired him to compose a new cycle of erotics. In 1848, in conjunction with Arany and Petőfi, he set on foot an excellent translation of Shakespeare's works. He himself was responsible for *Julius Caesar* and *King Lear*. He represented Jankovics at the diet of 1848, and in 1849 was made one of the judges of the high court. The national catastrophe profoundly affected him. For a short time he was an exile, and when he returned to Hungary in 1850 he was already an old man. A profound melancholy crippled him for the rest of his life. In 1854 he wrote his last great poem, the touching *A vén cigány*. He died at Pest in 1855 in the same house where Karóly Kisfaludy had died twenty-five years before. His funeral, on the 21st of November, was a day of national mourning. His penniless children were provided for by a national subscription collected by Ferencz Deák, who acted as their guardian.

The best edition of Vörösmarty's collected works is by Pál Gyulai (Budapest, 1884). Some of them have been translated into German, *e.g. Gedichte* (Pest, 1857); *Ban Marot*, by Mihály Ring (Pest, 1879); *Ausgewählte Dichte*, by Paul Hoffmann (Leipzig, 1895). See Pál Gyulai, *The Life of Vörösmarty* (Hung.) (3rd ed., Budapest, 1890), one of the noblest biographies in the language; Brajjer, *Vörösmarty, sein Leben und seine Werke* (Nagy-Becskerek, 1882). (R. N. B)

VORTICELLA, the Bell-Animalcule, a genus of Peritrichous Infusoria (*q.v.*) characterized by the bell-shaped body, with short oral disk and collar, attached by a hollow stalk, inside and around which passes, attached spirally a contractile bundle of myonemes. By their contraction the stalk is brought into the form of a corkscrew, the thread being now on the shorter, *i.e.* the inner, side of the turns; and the animal is jerked back near to the base of the stalk. As soon as the contraction of the thread ceases, the elasticity of the stalk extends the animal to its previous position. On fission, one of the two animals swims off by the development of the temporary posterior girdle of membranelles, the disk being retracted and closed over by the collar, so that the cell is ovoid: on its attachment the posterior girdle of cilia disappears and a stalk forms. The other cell remains attached to the old stalk. In the allied genera *Carchesium* and *Zoothamnium* the two produced by fission remain united, so that a branching colony is ultimately produced. The genus is a large one, and many species are epizoic on various water animals.

VORTIGERN (GUORTHIGIRNUS, WYRTGEORN), king of the Britons at the time of the arrival of the Saxons under Hengest and Horsa. The records do not agree as to the date of the arrival of these chieftains or the motives which led them to come to Britain. It seems clear, however, that Vortigern made use of them to protect his kingdom against the Picts and Scots, and rewarded them for their services with a grant of land. Later we find the Britons at war with the new-comers, now established in Kent, and four battles are fought, in the last of which, according to the *Historia Brittonum*, the king's son Vortemir, their leading opponent, is slain. The *Historia Brittonum* is our only authority for the marriage of Vortigern with the daughter of Hengest before the war. It also records the massacre of the British nobles after the death of Vortemir and the subsequent grant of Essex and Sussex to the invaders by Vortigern.

See *Historia Brittonum*, ed. Th. Mommsen in *Mon. Hist. Germ.* xiii.; *Anglo-Saxon Chronicle*, ed. Earle and Plummer (Oxford, 1899); Bede, *Hist. Eccl.*, ed. C. Plummer (Oxford, 1896).

VOSGES, a frontier department of eastern France, formed in 1790 chiefly of territory previously belonging to Lorraine, together with portions of Franche-Comté and Champagne, and bounded N. by the department of Meurthe-et-Moselle, E. by Alsace, S.E. by the territory of Belfort, S. by the department of Haute-Saône, W. by Haute-Marne and N.W. by Meuse. Pop. (1906) 429,812; area, 2279 sq. m. The Vosges mountains (see below) form a natural boundary on the east, their highest French eminence, the Hohneck, attaining 4482 ft. The Monts Faucilles traverse the south of the department in a broad curve declining on the north into elevated plateaus, on the south encircling the upper basin of the Saône. This chain, dividing the basins of the Rhone and the Rhine, forms part of the European watershed between the basins of the Mediterranean and Atlantic. The Moselle and the Meuse, tributaries of the Rhine, have the largest drainage areas in the department; a small district in the N.W. sends its waters to the Seine, the rest belongs to the basin of the Rhone. The Moselle rises in the Col de Bussang in the extreme south-east, and in a N.N.W. course of about 70 m. in the department receives the Moselotte and the Vologne on the right; the Mortagne and Meurthe on the right and the Madon on the left bank also belong to this department though they join the Moselle outside its borders. The source of the Saône is on the southern slope of the Faucilles. On the shore of Lake Gérardmer lies the beautifully situated town of Gérardmer, a well-known centre for mountain excursions.

The elevation and the northward exposure of the valleys make the climate severe, and a constant dampness prevails, owing both to the abundance of the rainfall and to the impermeability of the subsoil. The average temperature at Épinal (1070 ft.) is 49° F. The annual rainfall at Épinal is 28 in., at St Dié 32 in. and in the mountains more. Arable farming flourishes in the western districts where wheat, oats and potatoes are largely grown. The vine is cultivated on the river banks, to best advantage on those of the Moselle. Pasture is abundant in the mountainous region, where cheese-making is carried on to some extent, but the best grazing is in the central valleys. Forests, which occupy large tracts on the flanks of the Vosges, cover about one-third of the department, and are a principal source of its wealth. Sawmills are numerous in the Vosges and the manufacture of furniture, sabots, brushes and wood-working in general are prominent industries. The department has mines of lignite and stone quarries of various kinds. There are numerous mineral springs, of which those of Contrexéville, Plombières, Vittel, Bains-les-Bains, Martigny-les-Bains and Bussang may be named. The manufacture of textiles is the chief industry, comprising the spinning and weaving of cotton, wool, silk, hemp and flax, and the manufacture of hosiery and of embroidery and lace, Mirecourt (pop. 5092) being an important centre for the two last. The department forms the [illegible] of St Dié (province of Besançon), has its court of [illegible] centre at Nancy, and belongs to the [illegible] is divided into the arrondisse- [illegible], Remiremont and [illegible] Wasgau or Vogesen), [illegible] along the west side of the Rhine valley in a N.N.E. direction, from Basel to Mainz, for a distance of 150 m. Since 1871 the southern portion, from the Ballon d'Alsace to Mont Donon, has been the frontier between France and Germany. There is a remarkable similarity between the Vosges and the corresponding range of the Black Forest on the other side of the Rhine: both lie within the same degrees of latitude and have the same geological formation; both are characterized by fine forests on their lower slopes, above which are open pasturages and rounded summits of a uniform altitude; both have a steep fall to the Rhine and a gradual descent on the other side. The Vosges in their southern portion are mainly of granite, with some porphyritic masses, and of a kind of red sandstone (occasionally 1640 ft. in thickness) which on the western versant bears the name of "grès Vosgien."

Orographically the range is divided south to north into four sections: the Grandes Vosges (62 m.), extending from Belfort to the valley of the Bruche; the Central Vosges (31 m.), between the Bruche and the Col de Saverne; the Lower Vosges (30 m.), between the Col de Saverne and the source of the Lauter; and the Hardt (*q.v.*). The rounded summits of the Grandes Vosges are called "ballons." The departments of Vosges and Haute Saône are divided from Alsace and the territory of Belfort by the Ballon d'Alsace or St Maurice (4100 ft.). Thence northwards the average height of the range is 3000 ft., the highest point, the Ballon de Guebwiller (Gebweiler), or Soultz, rising to the east of the main chain to 4680 ft. The Col de Saales, between the Grandes Vosges and the central section, is nearly 1900 ft. high; the latter is both lower and narrower than the Grandes Vosges, the Mont Donon (3307 ft.) being the highest summit. The railway from Paris to Strassburg and the Rhine and Marne Canal traverse the Col de Saverne. No railway crosses the Vosges between Saverne and Belfort, but there are carriage roads over the passes of Bussang from Remiremont to Thann, the Schlucht (3766 ft.) from Gérardmer to Munster, the Bonhomme from St Dié to Colmar, and the pass from St Dié to Ste Marie-aux-Mines. The Lower Vosges are a sandstone plateau ranging from 1000 to 1850 ft. high, and are crossed by the railway from Hagenau to Sarreguemines, defended by the fort of Bitche.

Meteorologically the difference between the eastern and western versants of the range is very marked, the annual rainfall being much higher and the mean temperature being much lower in the latter than in the former. On the eastern slope the vine ripens to a height of 1300 ft.; on the other hand, its only rivers are the Ill and other shorter streams. The Moselle, Meurthe and Sarre all rise on the Lorraine side. Moraines, boulders and polished rocks testify the existence of the glaciers which formerly covered the Vosges. The lakes, surrounded by pines, beeches and maples, the green meadows which provide pasture for large herds of cows, and the fine views of the Rhine valley, Black Forest and snow-covered Swiss mountains combine to make the district picturesque. On the lower heights and buttresses of the main chain on the Alsatian side are numerous castles, generally in ruins. At several points on the main ridge, especially at St Odile above Ribeauville (Rappoltsweiler), are the remains of a wall of unmortared stone with tenons of wood, 6 to 7 ft. thick and 4 to 5 ft. high, called the pagan wall (Mur Payen). It was used for defence in the middle ages, and archaeologists are divided as to whether it was built for this purpose by the Romans, or before their arrival.

VOSMAER, CAREL (1826–1888), Dutch poet and art-critic, was born at the Hague on the 20th of March 1826. He was trained to the law, and held various judiciary posts, but in 1873 withdrew entirely from legal practice. His first volume of poems, 1860, did not contain much that was remarkable. His temperament was starved in the very thin air of the intellectual Holland of those days, and it was not until after the sensational appearance of Multatuli (Edward Douwes-Dekker) that Vosmaer, at the age of forty, woke up to a consciousness of his own talent. In 1869 he produced an exhaustive monograph on Rembrandt, which was issued in French. Vosmaer became a contributor to, and then the leading spirit and editor of, a journal which played an immense part in the awakening of Dutch literature; this was the *Nederlandsche Spectator*, in which a great many of his own works, in prose and verse, originally appeared. The remarkable miscellanies of Vosmaer, called *Birds of Diverse Plumage*, appeared in three volumes, in 1872, 1874 and 1876. In 1870 he selected from these all the pieces in verse, and added other poems to them. In 1881 he published an archaeological novel called *Amazone*, the scene of which was laid in Naples and Rome, and which described the raptures of a Dutch antiquary in love. Vosmaer undertook the gigantic task of translating Homer into Dutch hexameters, and he lived just long enough to see this completed and revised. In 1873 he came to London to visit his lifelong friend, Sir (then Mr) Lawrence Alma-Tadema, and on his return published *Londinias*, an exceedingly brilliant mock-heroic poem in hexameters. His last poem was *Nanno*, an idyll on the Greek model. Vosmaer died, while travelling in Switzerland, on the 12th of June 1888. He was unique in his fine sense of plastic expression; he was eminently tasteful, lettered, refined. Without being a genius, he possessed immense talent, just of the order to be useful in combating the worn-out rhetoric of Dutch poetry. His verse was modelled on Heine and still more on the Greeks; it is sober, without colour, stately and a little cold. He was a curious student in versification, and it is due to him that hexameters were introduced and the sonnet reintroduced into Holland. He was the first to repudiate the traditional, wooden alexandrine. In prose he was greatly influenced by Multatuli, in praise of whom he wrote an eloquent treatise, *Een Zaaier* (*A Sower*). He was also somewhat under the influence of English prose models. (E. G.)

VOSS, JOHANN HEINRICH (1751–1826), German poet and translator, was born at Sommersdorf in Mecklenburg-Strelitz on the 20th of February 1751, the son of a farmer. After attending (1766–69) the gymnasium at Neubrandenburg, he was obliged to accept a private tutorship in order to earn money to enable him to study at a university. At the invitation of H. C. Boie, whose attention he had attracted by poems contributed to the Göttingen *Musenalmanach*, he went to Göttingen in 1772. Here he studied philology and became one of the leading spirits in the famous *Hain* or *Dichterbund*. In 1775 Boie made over to him the editorship of the *Musenalmanach*, which he continued to issue for several years. He married Boie's sister Ernestine in 1777 and in 1778 was appointed rector of the school at Otterndorf in Hanover. In 1782 he accepted the rectorship of the gymnasium at Eutin, where he remained until 1802. Retiring in this year with a pension of 600 thalers he settled at Jena, and in 1805, although Goethe used his utmost endeavours to persuade him to stay, accepted a call to a professorship at Heidelberg. Here, in the enjoyment of a considerable salary, he devoted himself entirely to his literary labours, translations and antiquarian research until his death on the 29th of March 1826.

Voss was a man of a remarkably independent and vigorous character. In 1785–95 he published in two volumes a collection of original poems, to which he afterwards made many additions. The best of these works is his idyllic poem *Luise* (1795), in which he sought, with much success, to apply the style and methods of classical poetry to the expression of modern German thought and sentiment. In his *Mythologische Briefe* (2 vols., 1794), in which he attacked the ideas of Christian Gottlob Heyne, in his *Antisymbolik* (2 vols., 1824–26), written in opposition to Georg Friedrich Creuzer (1771–1858), and in other writings he made important contributions to the study of mythology. He was also prominent as an advocate of the right of free judgment in religion, and at the time when some members of the Romantic school were being converted to the Roman Catholic church he produced a strong impression by a powerful article, in *Sophronison*, on his friend Friedrich von Stolberg's repudiation of Protestantism (1819). It is, however, as a translator that Voss chiefly owes his place in German literature. His translations indicate not only sound scholarship but a thorough mastery of the laws of German diction and rhythm. The most famous of his translations are those of Homer. Of these the best is the translation of the *Odyssey*, as originally issued in 1781. He also translated Hesiod, Theocritus, Bion and Moschus, Virgil, Horace, Tibullus, Propertius and other classical poets, and he prepared a critical edition of Tibullus. In 1818–29 was published, in 9 vols., a translation of Shakespeare's plays, which he completed with the help of his sons Heinrich and Abraham, both of whom were scholars and writers of considerable ability.

J. H. Voss's *Sämtliche poetische Werke* were published by his son Abraham in 1835; new ed. 1850. A good selection is in A. Sauer, *Der Göttinger Dichterbund*, vol. i. (Kürschner's *Deutsche Nationalliteratur*, vol. 49, 1887). His Letters were also published by his son in 4 vols. (1829–33). Voss left a short autobiography, *Abriss meines Lebens* (1818). See also W. Herbst, *J. H. Voss* (3 vols., 1872–76); A. Heussner, *J. H. Voss als Schulmann in Eutin* (1882).

VOSS, RICHARD (1851–), German dramatist and novelist, was born at Neugrape, in Pomerania, on the 2nd of September 1851, the son of a country squire. Though intended for the life of a country gentleman, he showed no inclination for outdoor life, and on his return from the war of 1870–71, in which he was wounded, he studied philosophy at Jena and Munich, and then settled at Berchtesgaden. In 1884 Voss was appointed by the grand duke of Weimar librarian of the Wartburg, but, in consequence of illness, he resigned the post.

Chief among his dramas are *Savonarola* (1878); *Magda* (1879); *Die Patricierin* (1880); *Der Mohr des Zaren* (1883); *Unehrlich Volk* (1885); *Alexandra* (1888); *Eva* (1889); *Wehe dem Besiegten* (1889); *Die neue Zeit* (1891); *Schuldig* (1892). Among his novels may be mentioned *San Sebastian* (1883); *Der Sohn der Volskerin* (1885); *Die Sabinerin* (1888); *Der Mönch von Berchtesgaden* (1891); *Der neue Gott* (1898); *Die Rächerin* (1899); *Allerlei Erlebtes* (1902); and *Die Leute von Valdaré* (1902).

See M. Goldmann, *Richard Voss, ein literarisches Charakterbild* (1900).

VOSSEVANGEN, or Voss, a village and favourite tourist-centre of Norway, in South Bergenhus *amt* (county), 67 m. N.W. of Bergen by rail. It was the terminus of the finely engineered Bergen & Vossevangen railway, which, however, forms part of the projected trunk line between Christiania and Bergen. Vossevangen is pleasantly situated on the Vangsvand, in fertile upland, and has a stone church of the 13th century, and a *finneloft* or two-storeyed timber house of the 14th century, with an outside stair. Driving roads run N.E. and S.E. from Vossevangen. The former, passing Stalheim, descends into the sombre Naerödal, a precipitous valley terminating in the Naerö Fjord, a head-branch of the Sogne Fjord. The latter route follows the deep but gentler valley of the Skjerve, whence from Övre Vasenden roads continue to Eide (18 m.) and to Ulvik (32 m.), both on branches of the Hardanger Fjord.

VOSSIUS [Voss], **GERHARD JOHANN** (1577–1649), German classical scholar and theologian, was the son of Johannes Voss, a Protestant of the Netherlands, who fled from persecution into the Palatinate and became pastor in the village near Heidelberg where Gerhard was born. Johannes was a Calvinist, however, and the strict Lutherans of the Palatinate caused him once more to become a wanderer; in 1578 he settled at Leiden as student of theology, and finally became pastor at Dort, where he died in 1585. Here the son received his education, until in 1595 he entered the university of Leiden, where he became the lifelong friend of Hugo Grotius, and studied classics, Hebrew, church history and theology. In 1600 he was made rector of the high school at Dort, and devoted himself to philology and historical theology. From 1614 to 1619 he was director of the theological college at Leiden. Meantime he was gaining a great reputation as a scholar, not only in the Netherlands, but also in France and England. But in spite of the moderation of his views and his abstention from controversy, he came under suspicion of heresy, and escaped expulsion from his office only by resignation (1619). The year before he had published his valuable history of Pelagian controversies, which his enemies considered favoured the views of the Arminians or Remonstrants. In 1622, however, he was appointed professor of rhetoric and chronology, and subsequently of Greek, in the university. He declined invitations from Cambridge, but accepted from Archbishop Laud a prebend in Canterbury cathedral without residence, and went to England to be installed in 1629, when he was made LL.D. at Oxford. In 1632 he left Leiden to take the post of professor of history in the newly founded Athenaeum at Amsterdam, which he held till his death on the 19th of March 1649.

His son Isaak (1618–1689), after a brilliant career of scholarship in Sweden, became residentiary canon at Windsor in 1673. He was the author of *De septuaginta interpretibus* (1661), *De poematum cantu et viribus rhythmi* (1673), and *Variarum observationum liber* (1685).

Vossius was amongst the first to treat theological dogmas and the heathen religions from the historical point of view. His principal works are *Historia Pelagiana sive Historiae de controversiis quas Pelagius ejusque reliquiae moverunt* (1618); *Aristarchus, sive de arte grammatica* (1635 and 1695; new ed. in 2 vols., 1833–35); *Etymologicum linguae Latinae* (1662; new ed. in two vols., 1762–63);

Commentariorum Rhetoricorum oratoriarum institutionum Libri VI. (1606 and often); *De Historicis Graecis Libri III.* (1624); *De Historicis Latinis Libri III.* (1627); *De Theologia Gentili* (1642); *Dissertationes Tres de Tribus Symbolis, Apostolico, Athanasiano et Constantinopolitano* (1642). Collected works published at Amsterdam (6 vols., 1695–1701).

See P. Niceron, *Mémoires pour servir à l'histoire des hommes illustres*, vol. xiii. (Paris, 1730); Herzog's *Realencyklopädie*, art. "Vossius"; and the article in the *Allgemeine Deutsche Biographie*.

VOTE and VOTING. The Latin *votum*, derived from *vovere*, to vow, meant a solemn promise, hence a wish, desire or prayer, in which senses the doublet "vow," derived through French, is used now chiefly. "Vote" is specially employed in the sense of a registering of one's choice in elections or on matters of debate, and the political meaning is the only one which requires comment.

Ancient.—In ancient Greece and Italy the institution of suffrage already existed in a rudimentary form at the outset of the historical period. In the primitive monarchies it was customary for the king to invite pronouncements of his folk on matters in which it was prudent to secure its assent beforehand. In these assemblies the people recorded their opinion by clamouring (a method which survived in Sparta as late as the 4th century B.C.), or by the clashing of spears on shields. This latter practice may be inferred to have obtained originally in Rome, the word *suffragium* meaning literally a responsive crash. Owing to the lack of routine in the early monarchies and aristocracies of Greece and Italy the vote as yet lacked importance as an instrument of government. But in the days of their full political development the communities of these countries had firmly established the principle of government according to the will of majorities, and their constitutions required almost every important act to be directed by a formal vote. This rule applied equally to the decisions of general assemblies, administrative councils and law courts, and obtained alike in states where suffrage was universal and where it was restricted.

In every case the taking of votes was effected in the form of a poll. The practice of the Athenians, which is shown by inscriptions to have been widely followed in the other states of Greece, was to hold a show of hands (*χειροτονία*), except on questions affecting the status of individuals: these latter, which included all lawsuits and proposals of ostracism (*q.v.*), were determined by secret ballot (*ψήφισμα*, so called from the *ψῆφοι* or pebbles with which the votes were cast). At Rome the method which prevailed up to the 2nd century B.C. was that of division (*discessio*). But the economic and social dependence of many voters on the nobility caused the system of open suffrage to be vitiated by intimidation and corruption. Hence a series of laws enacted between 139 and 107 B.C. prescribed the use of the ballot ("tabella," a slip of wood coated with wax) for all business done in the assemblies of the people.

For the purpose of carrying resolutions a simple majority of votes was deemed sufficient. Regulations about a *quorum* seem to have been unusual, though a notable exception occurs in the case of motions for ostracism at Athens. As a general rule equal value was made to attach to each vote; but in the popular assemblies at Rome a system of voting by groups was in force until the middle of the 3rd century B.C. by which the richer classes secured a decisive preponderance (see COMITIA).

As compared with modern practice the function of voting was restricted in some notable ways. (1) In the democracies of Greece the use of the lot largely supplanted polling for the election of magistrates: at Athens voting was limited to the choice of officers with special technical qualifications. (2) In accordance with the theory which required residence at the seat of government as a condition of franchise, the suffrage could as a rule only be exercised in the capital town. The only known exception under a centralized government was a short-lived experiment under the emperor Augustus, who arranged for polling stations to be opened at election-time in the country towns of Italy. In federal governments the election of deputies to a central legislature seems to be attested by the practice of the Achaean League, where the federal Council was probably elected in the several constituent towns. But little is known as to [illegible] ting delegates to representa[illegible] be said that the function of suffrage in Greece and Italy throws no light upon contemporary problems, such as the use of single-area constituencies and proportional representation.

Modern.—The modern method of obtaining a collective expression of opinion of any body of persons may be either "open" or secret. An open expression of opinion may be by some word of assent or negation, or by some visible sign, as the holding up of a hand. Indeed any method of voting which does not expressly make provision for concealing the identity of the person registering the vote is "open." Some methods of voting still employed (as in the case of parliamentary elections for some of the English universities, where votes may be sent by post) must necessarily reveal the manner in which the elector has recorded his vote. It is in connexion with the election of members of representative bodies—especially legislative bodies—that the qualifications for and methods of voting become especially important. Practically every civilized country has accepted and put in force some form of representation, which may be defined as the theory and principles on which the obtaining of a vote is founded. These are dealt with in the article REPRESENTATION, and it will be sufficient to give here the various qualifications which are considered by different countries as sufficient to give effect to the principle of representation and the methods of recording votes. In detail these are given for the United Kingdom and the United States in the articles REGISTRATION of Voters and ELECTIONS, and for other countries under their respective titles in the sections dealing with the Constitution.

The first consideration is the age at which a person should be qualified for a vote. This in a large number of countries is fixed at the age of manhood, namely, twenty-one years of age, but in Hungary the age is fixed at twenty years, in Austria twenty-four years, while in Belgium, Baden, Bavaria, Hesse, Prussia, Saxony, Japan, the Netherlands and Norway the age is twenty-five years, and in Denmark thirty years. Some countries (*e.g.* Austria, Germany, France) have adopted the principle of what is often termed "manhood or universal suffrage," *i.e.* every male adult, not a criminal or a lunatic, being entitled to a vote, but in all cases some further qualifications than mere manhood are required, as in Austria a year's residence in the place of election, or in France a six months' residence. A common qualification is that the elector should be able to read and write. This is required in Italy and Portugal and some of the smaller European states, in some states of the United States (see ELECTIONS) and in many of the South American republics. But the most universal qualification of all is some outward visible sign of a substantial interest in the state. The word "substantial" is used here in a comparative sense, as opposed to that form of suffrage which requires nothing more for its exercise than attainment of manhood and perhaps a certain qualifying period of residence. This tangible sign of interest in the state may take the form of possession of property, however small in amount, or the payment of some amount of direct taxation, indeed in some cases, as will be seen, this is rewarded by the conferring of extra votes.

In the United Kingdom possession of freehold or leasehold property of a certain value or occupation of premises of a certain annual value gives a vote. This qualification of property may be said to be included in what is termed the "lodger" vote, given to the occupier of lodgings of the yearly value unfurnished of not less than £10. In Hungary, the payment of a small direct tax on house property or land or on an income varying with occupation is necessary. So in Prussia, Saxony, Bavaria, Hesse, Italy (unless a certain standard in elementary education has been reached), Japan, the Netherlands, Portugal (unless the elector is able to read and write) and Russia. Some of the states in the United States also require the payment of a poll tax. On the other hand, in Russia, students, soldiers, governors of provinces and police officers are disqualified from voting; in Portugal, bankrupts, beggars, domestic servants, workmen in government service and non-commissioned officers are not electors; it must be noted, however, that the government of the new Portuguese republic promised in 1910 a drastic revision of the existing franchise. Italy disfranchises non-commissioned officers and men in the army while under arms, as do France and Brazil. The United Kingdom and Denmark disqualify those in actual receipt of parish relief, while in Norway, apparently, receipt of parish relief at any time is a disqualification, which, however, may be removed by the recipient paying back the sums so received. In some countries, *e.g.* Brazil, the suffrage is refused to members of monastic orders, &c., under vows of obedience. Apart from those countries where a modicum of education is necessary as a test of right to the franchise, there are others where education is specially favoured in granting the franchise. In the United Kingdom the members of eight universities (Oxford, Cambridge, London, Dublin University, Glasgow, Edinburgh, Aberdeen and St Andrews) send nine members to parliament; in Hungary members of the professional, scientific, learned and other classes (over 80,000) are entitled to vote without any other qualification; in Brunswick the scientific classes elect three members to the legislative chamber; in Saxony, members of scientific or artistic professions have extra votes; in Italy, members of academies and professors are qualified to vote by their position; while in the Netherlands legal qualifications for any profession or employment give a vote.

Many objections have been urged of late years to the principle of according a plurality of votes to one individual on account of superior qualifications over others which he may be considered to possess. In the United Kingdom, where, roughly speaking, the principle of representation is that of taxation, the possession of qualifying property in any number of electoral districts will give a vote in each of those districts. Whether those votes can be actually registered will of course depend on certain circumstances, such as the distance of the districts apart and whether the elections are held on the same day or not. The Radical party in the United Kingdom have of late years been hostile to any system of plurality of votes (whether gained by educational, property or other qualifications), though it may be said that the tendency of some recent electoral systems has been to introduce a steadying principle of this nature. In 1906 a bill was introduced for reducing the system of plural voting in the United Kingdom; it passed through the House of Commons, but was rejected by the House of Lords. The most remarkable system of plural voting was that introduced in Belgium by the electoral law of 1894. Under it, every citizen over thirty-five years of age with legitimate issue, and paying at least 5 francs a year in house tax, has a supplemental vote, as has every citizen over twenty-five owning immovable property to the value of 2000 francs, or having a corresponding income from such property, or who for two years has derived at least 100 francs a year from Belgian funds either directly or through the savings bank. Two supplementary votes are given to citizens over twenty-five who have received a diploma of higher instruction, or a certificate of higher secondary instruction, or who fill or have filled offices, or engaged in private professional instruction, implying at least average higher instruction. Three votes is the highest number allowed, while failure to vote is punishable as a misdemeanour. In 1908–9 the number of electors in Belgium was 1,651,647, of whom 981,866 had one vote, 378,264 two votes and 291,517 three votes. In some other countries weight is given to special qualifications. In the town of Bremen the government is in the hands of a senate of 16 members and a Convent of Burgesses (Bürgerschaft) of 150 members. These latter are elected by the votes of all the citizens divided into classes. University men return 14 members, merchants 40 members, mechanics and manufacturers 20 members, and the other inhabitants the remainder. So in Brunswick and in Hamburg legislators are returned by voters representing various interests. In Prussia, representatives are chosen by direct electors who in their turn are elected by indirect electors. One direct elector is elected from every complete number of 250 souls. The indirect electors are divided into three classes, the first class comprising those who pay the highest taxes to the amount of one-third of the whole; the second, of those who pay the next highest amount down to the limits of the second third; the third, of all the lowest taxed. In Italy electors must either have attained a certain standard of elementary education, or pay a certain amount of direct taxation, or if peasant farmers pay a certain amount of rent, or if occupants of lodgings, shops, &c., in towns, pay an annual rent according to the population of the commune. In Japan, voters must pay either land tax of a certain amount for not less than a year or direct taxes other than land tax for more than two years. In the Netherlands, householders, or those who have paid the rent of houses or lodgings for a certain period, are qualified for the franchise, as are owners or tenants of boats of not less than 24 tons capacity, as well as those who have been for a certain period in employment with an annual wage of not less than £22, 18s. 4d., have a certificate of state interest of not less than 100 florins or a savings bank deposit of not less than 50 florins.

The method now adopted in most countries of recording votes is that of secret voting or ballot (*q.v.*). This is carried out sometimes by a machine (see VOTING MACHINES). The method of determining the successful candidate varies greatly in different countries. In the United Kingdom the candidate who obtains a relative majority is elected, *i.e.* it is necessary only to obtain more votes than any other candidate (see REPRESENTATION).

VOTING MACHINES. The complications in the voting at American elections have resulted in the invention of various machines for registering and counting the ballots. These machines are in fact mechanical Australian ballots. The necessity for them has been emphasized by election practice in many parts of the United States, where in a single election there have been from five to ten parties on the ballot, with an aggregate of four hundred or five hundred candidates, making the paper ballots large and difficult to handle. The objections to the paper ballot are further emphasized in the results obtained. The number of void and blank ballots is seldom less than 5% of the number of voters voting, and is often as high as 40%. This lost vote is often greater than the majority of the successful candidate. In close elections there is an endless dispute as to whether the disputed ballots do or do not comply with the law. The election contest and recount expenses frequently exceed the cost of holding the election, and the title of the candidates to the office is frequently held in abeyance by a protracted contest until after the term of office has expired. A number of ways have been devised for marking the Australian ballot for identification without destroying its legality. The X is a very simple and well-known mark, yet in the case of *Coulchan* v. *White*, before the Supreme Court of Maryland, twenty-seven different ways of making the mark "X" were shown in the ballots in controversy, and all of them were a subject for judicial consideration, on which the judges of even the highest court could find room for disagreement. Wigmore in his book on the Australian ballot system points out thirteen ways of wrongly placing the mark, and forty-four errors in the style of the mark, besides many other errors tending to invalidate the ballot, all of them having frequently occurred in actual practice. These errors are not confined to the illiterates, but are just as common among the best-educated people. The ballots can and have frequently been altered or miscounted by unscrupulous election officers, and the detection of the fraud is frequently difficult and always expensive.

Voting machines were devised first by English, and later with more success by American inventors. The earlier machines of Vassie, Chamberlain, Sydserff (1869) and Davie (1870) were practically all directed toward voting for the candidates of a single office by a ball, the ball going into one compartment or the other according to the choice of the voter. The use of the ball is in accordance with the original idea of ballot, which means "a little ball"; and because of the requirement of many of the constitutions of the states of the United States, that "elections shall be by ballot," many American inventors follow this idea of using balls to indicate their votes. Others, however, maintaining that secrecy was the essential idea of voting by ballot, and that the form of the ballot was immaterial, worked on the idea of using a key and a counter for each candidate, the counter registering the successive impulses given to it by the key, the machine preventing the voter from giving the key more than one impulse, and preventing the voter from operating more keys than he is entitled to vote. The highest courts of four different American states have ruled that any form of voting machine that secured secrecy would be constitutional.

The first voting machine used in an election was the Myers Ballot Machine used at Lockport, New York, in 1892. This machine had a vertical keyboard with columns of push keys thereon, each column representing a party, and each key belonging to a candidate of that party, the keys of each horizontal line belonging to the candidates of the various parties for a particular office. The voter pushed one of the knobs in each office line, which knob operated its counter and locked all other possible votes for the same office until the voter left the booth. The operated keys were released by the operation of the second booth door as the voter left the machine, and they were then reset by springs. The doors were so arranged that the voter must first pass through one and lock it behind him before he could open the second one to get out. This both preserved secrecy and prevented repeating. Some sixty-five or more of these machines were used in the election in the city of Rochester, N.Y., in November 1896, and with marked success.

The McTammany Machine, operated by keys which punched holes in a web of paper. On this web the votes of each candidate were all punched in a single column, each separate column representing a separate candidate. The voter does not see the web, which is removed from the machine by the election officers after the election is over, and the vote thereon is canvassed by passing the web through a pneumatic counting machine. The paper web makes a separate record of each man's ballot that can be identified by a person skilled in the use of the machine. The machine is also slow in giving returns, due to the fact that the vote has to be counted after the election.

In other types of machines each candidate had a separate receptacle, into which the machine dropped a ball for each vote that was cast for the candidate. These machines have so far not been successful. The whole development of practical voting machines has been limited to those machines in which a separate counter is provided for each candidate, the counter being operated either directly or indirectly by the voter. Of this type is the Myers machine, as well as the other machines mentioned here.

The Bardwell Votometer had a separate counter for each candidate, with a single key for operating all the counters on the machine. A keyhole was provided in each counter, in which the key could be inserted, and by turning it 180° the counter was operated and the key could be removed for use in another counter. The voter could operate but one counter at a time, and could not operate the counters in very rapid succession. The limited use of this machine can be attributed principally to the slowness with which it can be worked. The voter enters this machine by raising a bar at one end, which unlocks the counters for voting operation. Raising a similar bar at the other end as the voter passes out resets the machine for the next voter and locks it.

The Abbott Machine has attained considerable use in the state of Michigan. In this machine the counters for each office are carried on a separate slide, and the voter moves these slides for the various offices from left to right, until the counter carrying the name of the candidate of his choice in each office row is lined up with the operating bar. The vertical movement of the operating bar counts the vote on each of these slides, rings a bell, which notifies the election officer that a vote has been cast, and locks the machine against further voting. The election officer then moves a slide which resets the machine for the next voter. The machine is limited in its application because two or more candidates on the same office line cannot be voted for by the same voter, although the voter may be entitled to vote for more than one candidate.

The U.S. Standard Voting Machine has had the most extensive use of any. A separate key is provided for each candidate, which keys are arranged on the keyboard of the machine in horizontal party rows and vertical office lines. Each key is shaped like a small pointer, which extends to the right from its pivot, and passes through the keyboard. The key swings downward from horizontal position and points to the name of the candidate below it. The keys are lettered consecutively by party rows, and numbered by office rows, so that each key bears a number and a letter distinguishing it from all [illegible] lever, by the [illegible] are [illegible] have [illegible] party [illegible] outward [illegible] a [illegible] which extends outwardly and has a loose connexion with a curtain. The operation of the lever by a convenient handle enables the voter to close the curtain and unlock the machine for voting, after which the voter cannot retire from the machine until he has voted on the machine to a certain extent. The operation of any one of the party levers rings a bell to show that he has voted, and permits the reverse movement of the curtain lever, which counts the vote, resets the machine for the next voter and opens the curtain. Before opening the curtain the vote is not counted, and the voter can take back or change his vote. Repeating is prevented by a knob on the end of the machine, which locks the curtain lever against a second movement until it is released by the election officer. At the top of the machine is a paper roll on which the voter can write the names of candidates whose names do not appear on the machine in connexion with keys. This roll is concealed by slides, one for each office line of keys, which slides must be lifted to expose the paper. An interlocking mechanism controls all the voting devices so that the voter cannot vote more than he is entitled to vote. These machines have been built large enough to provide for seven parties of sixty candidates each, and for thirty questions and amendments, a machine of such size carrying 480 counters, besides the total vote and protective counters.

The Dean Machine has its keyboard placed horizontally, the keys being push buttons, which are arranged in party columns and transverse office rows. Party levers are provided by which the keys of the party are moved to voted position. Considerable stress is laid on the small keyboard of this machine, the peculiar type of counter used on it, and the separate card ballot for voting for unnominated candidates.

Each state that adopts voting machines first enacts a law specifying the requirements that must be met in the construction of the machines. These requirements are substantially the same in all the states, the laws being copied largely from the New York Voting Machine Law. The laws require in general that the machine shall give the voter all the facilities for expressing his choice which the Australian ballot gives him, and further require that the machine shall prevent those mistakes or frauds, which if made on an Australian ballot would invalidate it.

Many of the states have special requirements, to meet which many ingenious features have been provided on the various machines. Among these is the group of 18 supervisors in San Francisco, for which office as many as 108 candidates have appeared upon one ballot, out of which the machine must permit the voter to vote any 18 and no more, regardless of the sequence in which they are selected, or the position in which they occur.

Another of these local features is the primary election feature required by Minnesota, in which state the various parties must hold their primary election at the same time and on the same machine. The voter announcing the party of his preference finds the voting devices on the machine of all other parties locked against him, but the voting devices of his own party are open to his use.

Still another is the lockout, by which the voter of limited voting franchises is prevented from voting for the candidates of certain offices. Another is the endorsed candidate in a group. Here the same candidate's name is provided with two or more voting devices in a group wherein the voter is allowed to vote for two or more candidates. Special provision must then be made to keep voters from voting twice for the same candidate.

As to the important benefits attending the use of machines, there can be mentioned accuracy both in the casting and the counting of the vote, speed in getting in returns, and economy in holding elections. The improvement in accuracy is shown by the fact that the vote for each office usually runs 99% or more of the highest possible vote that could be registered by the number of voters that have voted. Speed is shown by the fact that in the city of Buffalo, with 60,000 voters voting on election day, the complete returns, including the vote on over 100 candidates for the whole city, have been collected, tabulated and announced within 75 minutes from the closing of the polls. Economy is shown by the fact that although these machines are used but one or two days in each year, election expenses are reduced to such an extent that the machines pay for themselves in five or six elections. This is partly due to the smaller number of precincts necessary and the smaller number of election officers in each precinct and the shorter hours that they must work. The city of Buffalo has a dozen or more precincts, in each of which 800 voters or more are voted in an election day of ten hours, and in that city as many as 1041 voters have voted in one election day on one machine (F. Ke.)

VOTKINSK, a town and iron-works, in the Russian government of Vyatka, 40 m. N. of Sarapul and 8 m. W. from the Kama, founded in 1756. Pop. 21,000. Votkinsk was formerly one of the chief government establishments for the construction of steamers for the Caspian, as well as of locomotives for the Siberian railway, and it has long been renowned for its excellent tarantasses (driving vehicles) and other smaller iron-wares, as well as for its knitted goods. Its agricultural machinery is known throughout Russia.

VOUCHER (from "to vouch," to warrant, answer for, O. Fr. *voucher*, to cite, call in aid, Lat. *vocare*, to call, summon), any document in writing which confirms the truth of accounts or establishes other facts, more particularly a receipt or other evidence in writing which establishes the fact of the payment of money.

VOUET, SIMON (1590–1649), French painter, was born at Paris on the 9th of January 1590. He passed many years in Italy, where he married, and established himself at Rome, enjoying there a high reputation as a portrait painter. Louis XIII. recalled him to France and lodged him in the Louvre with the title of First Painter to the Crown. All royal work for the palaces of the Louvre and the Luxembourg was placed in his hands; the king became his pupil; he formed a large school, and renewed the traditions of that of Fontainebleau. Among his scholars was the famous Le Brun. Vouet was an exceedingly skilful painter, especially in decoration, and executed important works of this class for Cardinal Richelieu (Rueil and Palais Royal) and other great nobles. His better easel pictures bear a curious resemblance to those of Sassoferrato. Almost everything he did was engraved by his sons-in-law Tortebat and Dorigny.

VOUSSOIR (Ger. *Wölbestein*), the French term used by architects for the wedge-shaped stones or other material with which the arch (*q.v.*) is constructed; the lowest stone on each side is termed the springer (Fr. *coussinet sommier*) and the upper one at the crown of the arch the keystone (Fr. *claveau*).

VOW (Lat. *votum*, vow, *promise*: cf. VOTE), a transaction between a man and a god, whereby the former undertakes in the future to render some service or gift to the god or devotes something valuable now and here to his use. The god on his part is reckoned to be going to grant or to have granted already some special favour to his votary in return for the promise made or service declared. Different formalities and ceremonies may in different religions attend the taking of a vow, but in all the wrath of heaven or of hell is visited upon one who breaks it. A vow has to be distinguished, firstly, from other and lower ways of persuading or constraining supernatural powers to give what man desires and to help him in time of need; and secondly, from the ordered ritual and regularly recurring ceremonies of religion. These two distinctions must be examined a little more at length.

It would be an abuse of language to apply the term vow to the uses of imitative magic, *e.g.* to the action of a barren woman among the Battas of Sumatra, who in order to become a mother makes a wooden image of a child and holds it in her lap. For in such rites no prominence is given to the idea—even if it exists—of a personal relation between the petitioner and the supernatural power. The latter is, so to speak, mechanically constrained to act by the spell or magical rite; the forces liberated in fulfilment, not of a petition, but of *a wish* are not those of a conscious will, and therefore no thanks are due from the wisher in case he is successful. The deities, however, to whom vows are made or discharged are already personal beings, capable of entering into contracts or covenants with man, of understanding the claims which his vow establishes on their benevolence, and of valuing his gratitude; conversely, in the taking of a vow the petitioner's piety and spiritual attitude have begun to outweigh those merely ritual details of the ceremony which in magical rites are all-important.

Sometimes the old magical usage survives side by side with the more developed idea of a personal power to be approached in prayer. For example, in the Maghrib (in North Africa), in time of drought the maidens of Mazouna carry every evening in procession through the streets a doll called *ghònja*, really a dressed-up wooden spoon, symbolizing a pre-Islamic rain-spirit. Often one of the girls carries on her shoulders a sheep, and her companions sing the following words:—

> "Rain, fall, and I will give you my kid.
> He has a black head; he neither bleats
> Nor complains; he says not, 'I am cold.'
> Rain, who fillest the skins,
> Wet our raiment.
> Rain, who feedest the rivers,
> Overturn the doors of our houses."

Here we have a sympathetic rain charm, combined with a prayer to the rain viewed as a personal goddess and with a promise or vow to give her the animal. The point of the promise lies of course in the fact that water is in that country stored and carried in sheep-skins.[1]

Secondly, the vow is quite apart from established cults, and is not provided for in the religious calendar. The Roman vow (*votum*), as W. W. Fowler observes in his work *The Roman Festivals* (London, 1899), p. 346, "was the exception, not the rule; it was a promise made by an individual at some critical moment, not the ordered and recurring ritual of the family or the State." The vow, however, contained so large an element of ordinary prayer that in the Greek language one and the same word (εὐχή) expressed both. The characteristic mark of the vow, as Suidas in his lexicon and the Greek Church fathers remark, was that it was a promise either of things to be offered to God in the future and at once consecrated to Him in view of their being so offered, or of austerities to be undergone. For offering and austerity, sacrifice and suffering, are equally calculated to appease an offended deity's wrath or win his goodwill.

The Bible affords many examples of vows. Thus in Judges xi. Jephthah "vowed a vow unto the Lord, and said, If thou wilt indeed deliver the children of Ammon into my hand, then it shall be that whosoever cometh forth out of the doors of my house to meet me, when I return in peace from the children of Ammon, it shall be the Lord's, and I will offer it up for a burnt-offering." In the sequel it is his own daughter who so meets him, and he sacrifices her after a respite of two months granted her in order to "bewail her virginity upon the mountains." A thing or person thus vowed to the deity became holy or *taboo*; and for it, as the above story indicates, nothing could be substituted. It belonged to once to the sanctuary or to the priests who represented the god. In the Jewish religion, the latter, under certain conditions, defined in Leviticus xxvii., could permit it to be redeemed. But to substitute an unclean for a clean beast which had been vowed, or an imperfect victim for a flawless one, was to court with certainty the divine displeasure.

It is often difficult to distinguish a vow from an oath. Thus in Acts xxiii. 21, over forty Jews, enemies of Paul, bound themselves, under a curse, neither to eat nor to drink till they had slain him. In the Christian Fathers we hear of vows to abstain from flesh diet and wine. But of the abstentions observed by votaries, those which had relation to the barber's art were the commonest. Wherever individuals were concerned to create or confirm a tie connecting them with a god, a shrine or a particular religious circle, a hair-offering was in some form or other imperative. They began by polling their locks at the shrine and left them as a soul-token in charge of the god, and never polled them afresh until the vow was fulfilled. So Achilles consecrated his hair to the river Spercheus and vowed not to cut it till he should return safe from Troy; and the Hebrew Nazarite, whose strength resided in his flowing locks, only cut them off and burned them on the altar when the days of his vow were ended, and he could return to ordinary life, having achieved his mission. So in Acts xviii. 18 Paul "had shorn his head in Cenchreae, for he had a vow." In Acts xxi. 23 we hear of four Jews who, having a vow on them, had their heads shaved at Paul's expense. Among the ancient Chatti, as Tacitus relates (*Germania*, 31), young men allowed their hair and beards to grow, and vowed to court danger in that guise until they each had slain an enemy. Robertson Smith (*Religion of the Semites*, ed. 1901, p. 483) with much probability explains such usages from the widespread primitive belief that a man's life lurks in his hair, so that the devotee being consecrated or *taboo* to a god, his hair must be retained during the period of *taboo* or purification (as it is called in Acts xxi. 26) lest it be dissipated and profaned. The hair being part and parcel of the votary, its profanation would profane him and break the *taboo*. The same author remarks that this is why, when the hair of a Maori chief was cut, it was, being like the rest of his person sacred or *taboo*, collected and buried in a sacred place or hung on a tree. And we meet with the same scruple in the initiation rite, called σχῆμα, of Eastern monks. First, the novice is carefully denuded of the clothes, shoes and headgear, which he wore in the world, and which, being profane or unclean, would violate the *taboo* about to be set on him. His hair is then polled crosswise by way of consecrating it; and in some forms of the rite the presiding monk, called "the father of the hair," collects the shorn locks and deposits them under the altar or in some other safe and sacred place. Greek nuns used to keep the hair thus shorn off, weave it into girdles, and wear it for the rest of their lives round their waists, where close to their holy persons there was no risk of its being defiled by alien contact. The rest of this rite of σχῆμα, especially as it is preserved in the old Armenian versions, smacks no less of the most primitive *taboo*. For the novice, after being thus tonsured, advances to the altar holding a taper in either hand, just as tapers were tied to the horns of an animal victim; the new and sacred garb which is to demarcate him henceforth from the unclean world is put upon him, and the presiding father laying his right hand upon him devotes him with a prayer which begins thus:—

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[1] Professor A. Bel in paper *Quelque rites pour obtenir la pluie*, in *xiv*$^{\text{me}}$ *Congrès des Orientalistes* (Alger, 1905).

> "To thee, O Lord, as a rational whole burnt-offering, as mystic frankincense, as voluntary homage and worship. we offer up this thy servant N. or M."

From the same point of view is to be explained the prohibition to one under a vow of flesh diet and fermented drinks; for it was believed that by partaking of these a man might introduce into his body the unclean spirits which inhabited them—the brute soul which infested meat, especially when the animal was strangled, and the cardiac demon, as the Rabbis called it, which harboured in wine.

The same considerations help to explain the custom of votive offerings. Any popular shrine in Latin countries is hung with wax models of limbs that have been healed, of ships saved from wreck, or with pictures representing the votary's escape from perils by land and sea. So Cicero (*de Deorum Natura*, iii. 37) relates how a friend remarked to Diagoras the Atheist when they reached Samothrace: "You who say that the gods neglect men's affairs, do you not perceive from the many pictures how many have escaped the force of the tempest and reached harbour safely." Diagoras's answer, that the many more who had suffered shipwreck and perished had no pictures to record their fate does not concern us here. It is only pertinent to remark that these *votivae tabellae* and offerings may have had originally another significance than that of merely recording the votary's salvation and of marking his gratitude. The model ship may be a substitute for the entire ship which is become sacred to the god, but cannot be deposited in the shrine; the miniature limbs of wax are substitutes for the real limbs which now belong to the god. In other cases the very objects which are *taboo* are given to the god as when a sailor deposits his salt-stained suit before the idol.

The general idea, then, involved in vows, whether ancient or modern, is that to express which the modern anthropologist borrows the Polynesian word *taboo*. The votary desirous to "antedate his future act of service and make its efficacy begin at once,"[1] formally dedicates through spoken formula and ritual act a lifeless object such as a ring, an animal, his hair [illegible] entire person to the god. He so either makes sure [illegible] blessings, or shows gratitude for those already [illegible] of the ritual prescriptions that accompany [illegible] to guard inviolate the sanctity or *taboo*, the atmosphere of holiness or ritual purity, which envelops the persons or objects vowed or reserved to the god, and thereby separated from ordinary secular use.

The consideration of the moral effect of vows upon those who take them belongs rather to the history of Christian asceticism. It may, however, be remarked here that monkish vows, while they may lend to a man's life a certain fixity of aim and moral intensity, nevertheless tend to narrow his interests, and paralyse his wider activities and sympathies. In particular a monk binds himself to a lifelong and often morbid struggle against the order of nature; and motives become for him not good or bad according to the place they occupy in the living context of social life, but according as they bear upon an abstract and useless ideal. (F. C. C.)

VOZNESENSK, a town of Russia, in the government of Kherson, on the left bank of the river Bug, at the head of navigation, 55 m. N.W. from Nikolayev, to which steamers ply regularly. Pop. 14,178. It is a river port of some importance, and holds four large fairs annually. It contains a cathedral, a public garden and distilleries and breweries.

VRANCX, SEBASTIAN, born about 1572, was a painter of the Antwerp school, of very moderate ability. Most of his pictures represent scenes of war, such as the sack of towns, cavalry combats and the like. Though occasionally vigorous in drawing, his paintings are dull and heavy in tone. The date of his death is uncertain.

VRANYA, or Vranyé, the most southerly town of the kingdom of Servia, 7½ m. from the Macedonian frontier, on a slope descending from Mount Placevitza to the plain of the Upper Morava, in a picturesque and fertile country. Pop. (1900) 11,921. In the Russo-Turkish War of 1877 it was captured by the Servian army from the Turks, and subsequently was incorporated in the kingdom. It is the capital of a department of the same name, and is an important station on the railway from Nish to Salonica, with a custom house, principally for merchandise imported into Servia via Salonica. Its inhabitants are employed chiefly in the cultivation of flax and hemp, and in the making of ropes. There is a much frequented summer resort 4½ m. E., called Vranyska Banya, with baths of hot sulphurous mineral water.

VRATZA, the capital of the department of Vratza, Bulgaria, on the northern slope of the Stara Planina and on a small subtributary of the Danube. Pop. (1906) 14,832. Vratza is an archiepiscopal see and the headquarters of a military division. Wine, leather and gold and silver filigree are manufactured, and there is a school of sericulture.

VRIENDT, JULIAEN JOSEPH DE (1842–), and **ALBRECHT FRANÇOIS LIEVEN DE** (1843–1900), Belgian painters, both born at Ghent, sons of a decorative painter. The two brothers were close friends, and their works show marked signs of resemblance. Having received their early training from their father at Ghent, they removed to Antwerp, where they soon yielded to the influence of the painter Baron Henri Leys. Albrecht became director of the Academy of Fine Arts at Antwerp and was succeeded by his brother. Albrecht's principal works are "Jacqueline of Bavaria imploring Philip the Good to pardon her Husband" (1871, Liége Gallery), "The Excommunication of Bouchard d'Avesnes" (1877, Brussels Gallery), "The Angelus" (1877, acquired by Leopold II., king of the Belgians), "Pope Paul III. before Luther's Portrait" (1883, Antwerp Gallery), "The Citizens of Ghent paying homage to the child Charles V." ([illegible] Gallery), "Philip the Handsome swearing [illegible] privileges of the Town of Furnes" ([illegible] (1894, tri[illegible] the [illegible] and

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[1] *Religion of the Semites*, [illegible]

VRYHEID, a town of northern Natal, 291 m. by rail N. by W. of Durban. Pop. (1904) 2287, of whom 1344 were whites. It is the chief town of a district, of the same name, rich in mineral wealth, including copper, coal and gold. The coal-fields of Hlobane are S.E. of the town. Originally part of Zululand the district of Vryheid was ceded by Dinizulu to a party of Boers under Lucas Meyer, who aided him to crush his opponents, and was proclaimed an independent state under the title of the New Republic in 1884. In 1888 it was incorporated with the Transvaal and in 1903 annexed to Natal (see TRANSVAAL, § *History*; and ZULULAND, § *History*).

V-SHAPED DEPRESSION, in meteorology, a narrow area of low pressure usually occurring between two adjacent anticyclones, and taking the form of a V or tongue, as do the isobars representing it on a weather-chart. Such a depression may be regarded as a projection from a cyclonic system lying to one side of the two anticyclones. A similar depression, however, is frequently formed within a larger area of depression, *i.e.* an ordinary cyclone, and sometimes develops so far as to have a complete circulation of its own; it is then known as a "secondary." The line of lowest depression following the axis of the V brings with it heavy squalls and a sudden change of wind from one direction almost to the opposite. It is preceded by signs of break in the weather such as usually herald the approach of an ordinary cyclone, and is followed by the usual signs of clearance. The occurrence of a V-depression or secondary within an ordinary cyclonic system intensifies, often to a dangerous degree, the usual disturbances in the weather accompanying that system. Conditions exactly opposite to those accompanying a V-shaped depression are provided by a "wedge" (*q.v.*).

VULCAN (*Volcanus*), the Roman god of fire, and more especially of devouring flame (Virg. *Aen.* 5. 662). Whether he was also, like Hephaestus, the deity of smiths, is very doubtful; his surname *Mulciber* may rather be referred to his power to allay conflagrations. In the Comitium was an "area Volcani," also called "Volcanal"; and here on the 23rd of August (Volcanalia) the Flamen Volcanalis sacrificed, and the heads of Roman families threw into the fire small fish, which the Tiber fishermen sold on the spot. This flamen also sacrificed on the 1st of May to Maia, who in an old prayer formula (Gellius 13. 23) was coupled with Volcanus as Maia Volcani. It is not easy to explain these survivals of an old cult. But in historical times the association of this god with conflagrations becomes very apparent; when Augustus organized the city in *regiones* and *vici* to check the constant danger from fires, the *magistri vicorum* (officers of administrative districts) worshipped him as *Volcanus quietus augustus* (*C.I.L.* vi. 801 and 802) and on the 23rd of August there was a sacrifice to him together with Ops Opifera and the Nymphae, which suggests the need of water in quenching the flames. At Ostia, where much of the corn was stored which fed the Roman population, the cult of this god became famous; and it is probable that the fixing of his festival in August by the early Romans had some reference to the danger to the newly harvested corn from fire in that month.

(W. W. F.*)

VULGATE (from Lat. *vulgus*, the common people), a Latin version of the Bible prepared in the 4th century by St Jerome, and so called from its common use in the Roman Catholic Church (see BIBLE: *Texts and Versions*). Pius X. in 1908 entrusted to the Benedictine Order the task of revising the text, beginning with the Old Testament.

VULPECULA ET ANSER ("THE FOX AND GOOSE"), in astronomy, a modern constellation of the northern hemisphere, introduced by Hevelius, who catalogued twenty-seven stars. Interest is attached to *Nova Vulpeculae*, a "new" star dis[illegible] by Anthelm in 1670; *T Vulpeculae*, a short period [illegible] the famous "Dumb-bell" nebula.

[illegible] **CHRISTIAN AUGUST** (1762–1827), German author, [illegible] Weimar on the 23rd of January 1762, and was [illegible] and Erlangen. In 1790 he returned to Weimar, [illegible] who had entered into relations with Vulpius's sister Christine (1765–1816), whom he afterwards married, obtained employment for him. Here Vulpius began, in imitation of Christian Heinrich Spiess, to write a series of romantic narratives. Of these (about sixty in number) his *Rinaldo Rinaldini* (1797), the scene of which is laid in Italy during the middle ages, is the best. In 1797 Vulpius was given an appointment on the Weimar library, of which he became chief librarian in 1806. He died at Weimar on the 25th of June 1827.

VULTURE, the name of certain birds whose best-known characteristic is that of feeding upon carcases. The genus *Vultur*, as instituted by Linnaeus, is now restricted by ornithologists to a single species, *V. monachus*. The other species included therein by him, or thereto referred by succeeding systematists, being elsewhere relegated (see LÄMMERGEYER). A most important taxonomic change was introduced by T. H. Huxley (*Proc. Zool. Society*, 1867, pp. 462–64), who pointed out the complete structural difference between the vultures of the New World and those of the Old, regarding the former as constituting a distinct family, Cathartidae (which, however, would be more properly named Sarcorhamphidae), while he united the latter with the ordinary diurnal birds of prey as Gypaetidae.

The American vulture may be said to include four genera: (1) *Sarcorhamphus*, the gigantic condor, the male distinguished by a large fleshy comb and wattle; (2) *Gypagus*, the king-vulture, with its gaudily coloured head and nasal caruncle; (3) *Catharista*, containing the so-called turkey-buzzard with its allies; and (4) *Pseudogryphus*, the great Californian vulture —of very limited range on the western slopes of North America. Though all these birds are structurally different from the true vultures of the Old World, in habits the Vulturidae and Sarcorhamphidae are much alike.

King-Vulture (*Gypagus papa*).

The true vultures of the Old World, Vulturidae in the restricted sense, are generally divided into five or six genera, of which *Neophron* has been separated as forming a distinct subfamily, Neophroninae—its members, of comparatively small size, differing both in structure and habit considerably from the rest. One of them is the so-called Egyptian vulture or Pharaoh's hen, *N. percnopterus*, a remarkably foul-feeding species, living much on ordure. It is a well-known species in some parts of India,[1] and thence westward to Africa, where it has an extensive range. It also occurs on the northern shores of the Mediterranean, and has strayed to such a distance as to have suffered capture in England and even in Norway. Of the genera composing the other subfamily, Vulturinae, *Gyps* numbers seven or eight local species and races, on more than one of which the English name griffon has been fastened. The best known is *G. fulvus*, which by some authors is accounted "British" from an example having been taken in Ireland, though under circumstances which suggest its appearance so far from its nearest home in Spain to be due to man's intervention. The species, however, has a wider distribution on the European continent (especially towards the north-east) than the Egyptian vulture, and in Africa nearly reaches the Equator, extending also in Asia to the Himalaya; but both in the Ethiopian and Indian regions its range inosculates with that of several allied forms or species. *Pseudogyps* with two forms—one Indian, the other African—differs from *Gyps* by having 12 instead of 14 rectrices. Of the genera *Otogyps* and *Lophogyps* nothing here need be said; and then we have *Vultur*, with, as mentioned before, its sole representative, *V. monachus*, commonly known as the cinereous vulture, a bird which is found from the Straits of Gibraltar to the sea-coast of China. Almost all these birds inhabit rocky cliffs, on the ledges of which they build their nests.

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[1] In the eastern part of the Indian peninsula it is replaced by a smaller race or (according to some authorities) species, *N. ginginianus*, which has a yellow instead of a black bill.

The question whether vultures in their search for food are guided by sight of the object or by its scent has excited much interest. It seems to be now generally admitted that the sense of sight is in almost every case sufficient to account for the observed facts. (A. N.)

VURJEEVANDAS MADHOWDAS (1817–1896), Hindu merchant of Bombay, of the Kapole Bania caste, was born on the 28th of January 1817 at Gogla, in Kathiawar, whence his father came to Bombay with Sheth Manoredas for trading purposes. Vurjeevandas was educated in Bombay, started a new firm under the name of Vurjeevandas & Sons, and soon became one of the wealthiest merchants in Bombay. He was appointed a justice of the peace and a member of the Bombay Port Trust. He took a keen interest in the Royal Asiatic Society and the Bombay university, where a prize has been established to commemorate his name. He constructed the Madhow Bang in memory of his father, and gave it to the use of poor Hindus, endowing it with nearly five lakhs of rupees. He built a rest-house in Bombay in memory of his brother Mooljibhoy, and another one at Nasik. The sanatorium which he built in memory of his youngest son Rumhoredas at Sion Hill is a great boon to the poor people of his community. He also established a dispensary at Matoonga and a fund for the relief of indigent Hindus. He died on the 12th of January 1896.

VYATKA, or Viatka, a government of N.E. Russia, with the government of Vologda on the N., Perm on the E., Ufa and Kazan on the S. and Nizhniy-Novgorod and Kostroma on the W., having an area of 59,100 sq. m. It has on its northern boundary the flat water-parting which separates the basins of the Northern Dvina and the Volga, and its surface is an undulating plateau 800 to 1400 ft. above sea-level, deeply grooved by rivers and assuming a hilly aspect on their banks. The Kama rises in the N.E., and, after making a wide sweep through Perm, flows along its S.E. boundary, while the rest of the government is drained by the Vyatka and its numerous tributaries. Both the Kama and the Vyatka are navigable, as also are several tributaries; the Izh and Votka, which flow into the Vyatka, have important ironworks on their banks. The only railway is one from Perm to Archangel, through the town of Vyatka; the government is traversed by the great highway to Siberia, and by two other roads by which goods from the south are transported to loading-places on the Vychegda and the Yug to be shipped to Archangel. Lakes are numerous, and vast marshes exist everywhere, especially in the north. The climate is very severe, the average yearly temperature being 36° F. at Vyatka (January, 8·2°; July, 67·0°) and 35° at Slobodsk (January, 3·5°; July, 65·3°).

The estimated pop. in 1906 was 3,532,600. The bulk of the inhabitants (78 %) are Russians; Votyaks make 12·2 %, Cheremisses 5 %, and Tatars 3¾ %, the remainder being Bashkirs, Teptyars and Permyaks. The Votyaks (Otyaks), a Finnish tribe, call themselves Ot, Ut or Ud, and the Tatars call them Ar, so that they may possibly be akin to the Ars of the Yenisei. They are middle-sized, with fair hair and eyes, often red-haired; and the general structure of the face and skull is Finnish. By their dialect they belong to the same branch as the Permyaks.

The government is divided into eleven districts, the chief towns of which are Vyatka, Elabuga, Glazov, Kotelnich, Malmyzh, Nolinsk, Orlov, Sarapul, Slobodsk, Urzhum and Yaransk. Izhevsk and Votkinsk, or Kamsko-Votkinsk, have important ironworks. Some 55% of the surface is covered with forests, two-thirds of which belong to the crown, and hunting (especially squirrel-hunting) and fishing are of commercial importance. The peasants, who form 89% of the population, own 44% of the whole government, the crown 53% and private persons 2%. The soil is fertile, especially in the valleys of the south. Vyatka is one of the chief grain-producing governments of Russia. The principal crops are rye, wheat, oats, barley and potatoes. Flax and hemp are extensively cultivated, and large numbers of cattle are kept, but they are mostly of inferior breed. The government has a race of good ponies that are widely exported. Domestic industries occupy large numbers of the inhabitants. The principal manufacturing establishments are tanneries, distilleries, ironworks, chemical works, glass factories, cotton and steam flour-mills, and hardware, machinery, paper and fur-dressing works. (P. A. K.; J. T. Be.)

VYATKA, a town of Russia, capital of the government of the same name, on the Vyatka river, 304 m. by rail W.N.W. of Perm. Pop. 24,782. It is built on the steep hills which rise above the river and at their base. Its old walls have been demolished, and its old churches built anew. It is an episcopal see and has a fine cathedral. Its manufactures include silver and copper wares, and ecclesiastical ornaments, and it has an important trade in corn, leather, tallow, candles, soap, wax, paper and furs (exported), and in manufactured and grocery wares (imported). Vyatka was founded in 1181 by the Novgorodians, as Khlynov. In 1391 it was plundered by the Tatars, and again in 1477. Moscow annexed Khlynov in 1489. It received the name of Vyatka in 1780.

VYAZMA, a town of Russia, in the government of Smolensk, 109 m. by rail E.N.E. of the town of Smolensk. Pop. 15,676. It was a populous place as early as the 11th century, and carried on a lively trade with Narva on the Gulf of Finland. In the 15th century it fell under the dominion of Lithuania, but was retaken by the Russians. The Poles took it again in 1611, and kept it till the peace of 1634. It is now an important centre for trade. It has a cathedral, dating from 1596.

VYERNYI (formerly Almaty), a town and fort of Asiatic Russia, capital of the province of Semiryechensk, 50 m. N. of Lake Issyk-kul, at the northern foot of the Trans-Ili Ala-tau Mountains, at an altitude of 2440 ft. Pop. 24,798. Founded in 1854, it is well-built, provided with boulevards and surrounded by luxuriant gardens. It has a cathedral, being an archiepiscopal see of the Orthodox Greek Church, a school of gardening and sericulture, a public library, and a few distilleries, tanneries and oil works. Situated at the intersection of two roads—from Kulja to Tashkent, and from Semipalatinsk to Kashgar—Vyernyi carries on an active trade in wheat, rice, corn, tea, oil and tobacco. It was the centre of a remarkable earthquake on the 9th of June 1887.

VYRNWY (*Fyrnwy*), an artificial lake or reservoir in the north-west of Montgomeryshire, N. Wales, constructed for the Liverpool water-supply. It was formed by damming the river Vyrnwy, which runs through Montgomeryshire and joins the Severn above Shrewsbury (see Water-Supply).

VYSHNIY-VOLOCHOK, a town of Russia, in the [illegible] of Tver, 74 m. by rail N.W. of the city [illegible] The place owes its importance to its [illegible] Vyshne-Volotsk navigation; [illegible] Peter the Great in 17[illegible] the Neva. The [illegible] Tvertsa, a [illegible] the Msta [illegible] the [illegible]

W the twenty-third letter of the English alphabet, shows its origin in its name; it is but VV, and, as the name shows, V had the vowel value of *u*, while the "double *u*" was employed for the consonant value. In German the same symbol *w* is called *Vey*, because in that language it has the value of the English *v*, while the German *v* (*Vau*, *fow* in pronunciation) is used with the same value as *f*. In the English of the 9th century the *uu* of the old texts (and the *u* of the Northern) was found not to represent the English *w* satisfactorily, and a symbol *ƿ* was adopted from the Runic alphabet. This survived sporadically as late as the end of the 13th century, but long before that had been generally again replaced by *uu* (*vv* only in Early Middle English) and by *w*. For *w* the earliest English printers had a type, but French printers had not; hence a book like the Roman Catholic version of the New Testament printed at Rheims in 1582 prints *w* with two *v*'s set side by side. Throughout the history of English the sound seems to have remained the same—the consonantal *u*. For this value as well as for *u* Latin always used only V; in Greek, except in a few dialects, the consonant value was early lost (see under F). *W* is produced by leaving a very small opening between the slightly protruded lips while the back of the tongue is raised towards the soft palate and the nasal passage closed. The ordinary *w* is voiced, but according to some authorities the *w* in the combination *wh* (really *hw*) is not, in *when*, *what*, &c., even when the *h* is no longer audible. The combination WH (*hw*) represents the Indo-European q^w when changed according to Grimm's law from a stop to a spirant. Thus *what* corresponds philologically to the Latin *quod* and the first syllable of the Greek *πό-τερος*. In Southern English the *h* sound has now been generally dropped. In Scotland, along the line of former contact with Gaelic, it changes into *f*: *fite*=*white*, *forl*=*whorl*; but before *i* (*ee*) it remains in *wheel*. In Early English *w* appeared not only before *r* as in *write*, but also before *l* in *wlisp* (*lisp*). In *write*, *wring*, &c., the *w* is now silent, though dialectically, *e.g.* in Aberdeenshire, it has changed to *v* and is still pronounced, *vreet*, *vring*, &c. In English and in other languages there is considerable difficulty in pronouncing *w* before long *u* sounds: hence it has disappeared in pronunciation in *two* (*tū*), but survives in Scotch *twa*, though otherwise the difficulty is more noticeable in Scottish dialects than in literary English, as in "*oo*"=*wool* and in the Scottish pronunciation of English words like *wood* as *'ood*. (P. Gi.)

WA, a wild tribe inhabiting the north-east frontier of Upper Burma. Their country lies to the east of the Northern Shan States, between the Salween river and the state of Kēng-Tūng, extending for about 100 m. along the Salween and for considerably less than half that distance inland to the watershed between that river and the Mekong. The boundaries may be roughly said to be the Salween on the W., the ridge over the Namting valley on the N., the hills E. of the Nam Hka on the eastern and southern sides, while the country ends in a point formed by the junction of the Nam Hka with the Salween. The Was claim to have inhabited the country where they now are since the beginning of time; but it appears more probable that they were the aborigines of the greater part of northern Siam at least, if not of Indo-China, [illegible] travellers (*e.g.* Captain McLeod in 1837) speak of their having been the original inhabitants with small communities left behind from Kēng Tūng down to Chiengmai; [illegible] the state of Kē[illegible] just S.E. of the [illegible] country, has [illegible] called [illegible] tradition [illegible] were once [illegible] sites too [illegible] ple are [illegible] believe [illegible] biting [illegible] back, [illegible] it; but their language proves them to belong to the Môn-Khmer family. They are popularly divided into Wild Was and Tame Was. The Wild Was are remarkable as the best authenticated instance of head-hunters in the British Empire. They were formerly supposed to be also cannibals; but it is now known that they are not habitual cannibals, though it is possible that human flesh may be eaten as a religious function at the annual harvest feast. Their head-hunting habits have an animistic basis. In the opinion of the Wa the ghost of a dead man goes with his skull and hangs about its neighbourhood, and so many skulls posted up outside his village gate mean so many watch-dog *umbrae* attached to the village, jealous of their own preserves and intolerant of interlopers from the invisible world. Thus every addition to the collection of skulls is an additional safeguard against ill-affected demons, and a head-hunting expedition is not undertaken, as was once thought, from motives of cannibalism or revenge, but solely to secure the very latest thing in charms as a protection against the powers of darkness. Outside every village is an avenue of human skulls, amid groves conspicuous from long distances. These consist of strips of the primeval jungle, huge forest trees left standing where all the remaining country is cleared for cultivation. The undergrowth is usually cut away, and these avenues are commonly but not always in deep shade. Along one side (which side apparently does not matter) is a line of posts with skulls fitted into niches facing towards the path. The niche is cut sometimes in front, sometimes in the back of the post. In the latter case there is a round hole in front, through which sometimes only the teeth and empty eye-sockets, sometimes the whole skull, grins a ghastly smile. Most villages count their heads by tens or twenties, but some of them have hundreds, especially when the grove lies between several large villages, who combine or run their collections into one another. The largest known avenue is that between Hsūng Ramang and Hsan Htung. Here there must be a couple of hundred or more skulls; but it is not certain that even this is the largest. It is thought necessary to add some skulls to this pathway every year if the crops are to be good. The heads of distinguished and pious men and of strangers are the most efficacious. The head-hunting season lasts through March and April, and it is when the Wa hill fields are being got ready for planting that the roads in the vicinity become dangerous to the neighbouring Shans. The little that is known of the practice seems to hint at the fact that the victim selected was primarily a harvest victim. A Wild Wa village is a very formidable place to attack, except for civilized weapons of offence. All the villages are perched high up on the slope of the hills, usually on a knoll or spine-like spur, or on a narrow ravine near the crest of the ridge. The only entrance is through a long tunnel. There is sometimes only one, though usually there are two, at opposite sides of the village. This tunnelled way is a few inches over 5 ft. high and not quite so wide, so that two persons cannot pass freely in it, and it sometimes winds slightly, so that a gun cannot be fired up it; moreover, the path is frequently studded with pegs in a sort of dice arrangement, to prevent a rush. None of the tunnels is less than 30 yds. long, and some are as much as 100 yds. Round each village is carried an earthen rampart, 6 to 8 ft. high and as many thick, and this is overgrown with a dense covering of shrubs, thin bushes and cactuses, so as to be quite impenetrable. Outside this is a deep ditch which would effectually stop a rush. These preparations indicate the character of the inhabitants, which is so savage and suspicious that the Wa country is still unadministered and naturally does not appear in the 1901 census returns. The total number of the Wa race is estimated at more than 50,000. (J. G. Sc.)

WAAGEN, GUSTAV FRIEDRICH (1794–1868), German art historian, was born in Hamburg, the son of a painter and nephew of the poet Ludwig Tieck. Having passed through the college of Hirschberg, he volunteered for service in the Napoleonic campaign of 1813–1814, and on his return attended the lectures at Breslau University. He devoted himself to the study of art, which he pursued in the great European galleries, first in Germany, then in Holland and Italy. A pamphlet on the brothers Van Eyck led to his appointment to the directorship of the newly founded Berlin Museum in 1832. The result of a journey to London and Paris was an important publication in three volumes, *Kunstwerke und Künstler in England und Paris* (Berlin, 1837–1839), which became the basis for his more important *The Treasures of Art in Great Britain* (London, 1854 and 1857). In 1844 he was appointed professor of art history at the Berlin University, and in 1861 he was called to St Petersburg as adviser in the arranging and naming of the pictures in the imperial collection. On his return he published a book on the Hermitage collection (Munich, 1864). Among his other publications are some essays on Rubens, Mantegna and Signorelli; *Kunstwerke und Künstler in Deutschland* and *Die vornehmsten Kunstdenkmäler in Wien*. He died on a visit to Copenhagen in 1868. In the light of more recent research his writings are not of much value as regards trustworthy criticism, though they are useful as catalogues of art treasures in private collections at the time when they were compiled. His opinions were greatly respected in England, where he was invited to give evidence before the royal commission inquiring into the condition and future of the National Gallery.

WAAGEN, WILHELM HEINRICH (1841–1900), German palaeontologist, was born at Munich on the 23rd of June 1841. He was educated at Munich and Zurich, and through the influence of A. Oppel he commenced to study the rocks and fossils of the Jurassic system, and published an essay in 1865, *Versuch einer Allgemeinen Classification der Schichten des oberen Jura*. In 1870 he joined the staff of the Geological Survey of India, and was appointed palaeontologist in 1874, but was obliged to retire through ill-health in 1875. He published important monographs in the *Palaeontologia Indica* on the palaeontology of Cutch (1873–1876) and the Salt Range (1879–1883), dealing in the last-named work with fossils from the Lower Cambrian to the Trias. In 1879 he was appointed professor of mineralogy and geology in the German technical high school at Prague, and he became a contributor to the continuation of Barrande's great work on the *Système Silurien de Bohême*. In 1890 he became professor of palaeontology at the university of Vienna, and in 1898 the Lyell medal was awarded to him by the Geological Society of London. He died in Vienna on the 24th of March 1900.

WABASH, a city and the county-seat of Wabash county, Indiana, U.S.A., about 42 m. S.W. of Fort Wayne. Pop. (1890) 5105, (1900) 8618, of whom 498 were foreign-born and 134 negroes; (1910 U.S. census) 8687. It is served by the Cleveland, Cincinnati, Chicago & St Louis railway (which has extensive shops here), by the Wabash railway, and by interurban electric lines. It has a public library, a Memorial Hall (1897), erected to the memory of Federal soldiers in the Civil War and occupied by the local "camp" of the Grand Army of the Republic, a Masonic temple, a county hospital and two parks. The city is in a fertile agricultural region, and has a considerable trade in grain and produce. Among its manufactures are furniture, agricultural implements and foundry and machine-shop products. In 1905 the factory products were valued at $2,202,932 (31·2 % more than in 1900). Wabash was settled about 1834, incorporated as a village in 1854, and first chartered as a city in 1866. It was one of the first cities in the world to be lighted with electricity, a lighting plant being established in February 1880.

WACE, HENRY (1836–   ), English divine, was born in London on the 10th of December 1836, and educated at Marlborough, Rugby, King's College, London, and Brasenose College, Oxford. He was ordained in the Church of England in 1861, and held various curacies in London, being chaplain at Lincoln's Inn, was professor of ecclesiastical history, and subsequently (1883) principal. Both as preacher and writer Dr Wace, who took his D.D. degree in 1883, became conspicuous in the theological world. He was Boyle lecturer in 1874 and 1875, and Bampton lecturer in 1879; and besides publishing several volumes of sermons, he was co-editor of the *Dictionary of Christian Biography* (1877–1887), and editor of *The Speaker's Commentary on the Apocrypha*. He took a leading part as the champion of historic orthodoxy in the controversies with contemporary Rationalism in all its forms, and firmly upheld the importance of denominational education and of the religious test at King's College; and when the test was abolished in 1902 he resigned his seat on the council. In 1881 he was given a prebendal stall at St Paul's, and in 1889 was appointed a chaplain-in-ordinary to Queen Victoria. When he resigned the principalship of King's College in 1896 he was made rector of St Michael's, Cornhill; and in 1903 he became dean of Canterbury, in succession to Dr Farrar.

WACE, (?) ROBERT (1100?–1175?), Anglo-Norman chronicler, was born in Jersey. He studied at Caen; he became personally known to Henry I., Henry II., and the latter's eldest son, Prince Henry; from Henry II. he received a prebend at Bayeux and other gifts. Except for these facts he is known to us only as the author of two metrical chronicles in the Norman-French language. Of these the earlier in date is the *Roman de Brut*, completed in 1155, which is said to have been dedicated to Eleanor of Aquitaine (ed. A. J. V. Le Roux de Lincy, 2 vols., Rouen, 1836–1838). This is a free version of the Latin *Historia Britonum* by Geoffrey of Monmouth, in rhyming octosyllables; it was rendered into English, shortly after 1200, by Layamon, a mass-priest of Worcestershire, and is also largely used in the rhymed English chronicle of Robert Mannyng. Wace's second work, the *Roman de Rou*, written between 1160 and 1174, has a less fabulous character than the *Brut*, being a chronicle of the Norman dukes from Rollo to Robert Curthose. It has been ably dissected by Gustav Körting (*Über die Quellen des Roman de Rou*, Leipzig, 1867), who shows that it is mainly based upon Dudo and William of Jumièges. There is also reason for thinking that Wace used the *Gesta regum* of William of Malmesbury. Where Wace follows no ascertainable source he must be used with caution. Undoubtedly he used oral tradition; but he also seems to have given free play to his imagination.

The *Roman de Rou* is written in rhyming octosyllables, varied by assonanced alexandrines. It has been edited by F. Pluquet (2 vols. and supplement, Rouen, 1827–1829) and more completely by H. Andresen (2 vols., Heilbronn, 1877–1879). (H. W. C. D.)

WACHSMUTH, CHARLES (1829–1896), American palaeontologist, was born in Hanover, Germany, on the 13th of September 1829. Educated as a lawyer in his native city, he abandoned the profession on account of ill-health, and in 1852 went to New York as agent for a Hamburg shipping house. Two years later, for reasons of health, he removed to Burlington, Iowa, U.S.A., where he settled. Here he was attracted by the fossils, and especially the crinoids, of the Burlington Limestone, and in a few years possessed a fine collection. In 1864 he made acquaintance with L. Agassiz, and in the following year paid a visit to Europe, where he studied the crinoids in the British Museum and other famous collections. He now decided to devote all his energies to the elucidation of the crinoidea, and with signal success. He made further extensive collections, and supplied specimens to the Agassiz museum at Cambridge, U.S.A., and the British Museum. Becoming acquainted with Frank Springer (1848–   ), a lawyer at Burlington, he stirred up his enthusiasm in the subject, and together they continued the study of crinoids and published a series of important papers. These include "D[illegible] Ventral Structure of [illegible] quent Modifi[illegible] *Acad. Nat*[illegible] the Crino[illegible] America[illegible] review and analysis was published by F. A. Bather, of the British Museum, in the *Geol. Mag.* for 1898–1899. Wachsmuth died on the 7th of February 1896.

Obituary (with portrait) by F. A. Bather, *Geol. Mag.* (April 1896).

WACO, a city and the county-seat of McLennan county, Texas, nearly in the centre of the state, on both sides of the Brazos river, about 100 m. S. by W. of Dallas. Pop. (1890) 14,445; (1900) 20,686, of whom 5826 were negroes; (1910 census) 26,425. Waco is served by the Missouri, Kansas & Texas, and by other railways. Waco is the seat of Baylor University (co-educational) and of the Texas Christian University (Christian; co-educational). Baylor University was founded at Independence, Texas, by the Texas Union Baptist Association, in 1845, and was consolidated in 1886 with Waco University (Baptist, 1861, founded by Dr Rufus C. Burleson, a former president of Baylor University). It was named in honour of Robert E. B. Baylor (1793–1874), a representative in Congress from Alabama in 1830–1831, and one of its founders. In 1908–1909 it had 40 instructors and 1296 students (664 women), of whom 647 were in the college. The Texas Christian University was founded in 1873 at Thorp's Springs as a private school, chartered as Add Ran College, transferred to the Christian Churches of Texas in 1889, and removed to Waco in 1895. Its present name was adopted in 1902, the name Add Ran College being retained for the college of arts and sciences. In 1908–1909 the university had 26 instructors and 379 students (279 in the college of arts and sciences). Waco is situated in a fertile farming region. In 1905 the factory products were valued at $2,979,800. The city was named after the Waco (or Hueco) Indians (Caddoan stock), who had a large village here until 1830, when they were nearly exterminated by the Cherokees; in 1855 they removed to a reservation, and after 1859 became incorporated with the Wichita. The first white settlement was made in 1849. Waco was incorporated as a town in 1856; in 1909 the administration was entrusted to a mayor and four commissioners.

WAD, a black, earthy mineral consisting mainly of hydrated manganese dioxide; of importance as an ore. Being an amorphous substance, it varies considerably in chemical composition, and contains different impurities often in large amount. A variety containing much cobalt oxide is called "asbolite," while "lampadite" is a cupriferous variety. It is very soft, readily soiling the fingers, and may be considered as an earthy form of psilomelane (*q.v.*). It results from the decomposition of other manganese minerals, and is often deposited in marshes ("bog manganese") or by springs. The name wad is of uncertain origin, and has been applied also to graphite. (L. J. S.)

WADAI, a country of north central Africa, bounded N. by Borku and Enndi, S. by the Ubangi sultanates, W. and S.W. by Kanem and Bagirmi, and E. by Darfur. Formerly an independent Mahommedan sultanate, it was in 1909 annexed to French Equatorial Africa (French Congo). Wadai has an area estimated at 150,000 sq. m., and a population of 3,000,000 to 4,000,000.

The general level of the country is about 1500 ft. North, north-east, south-west and in the centre are ranges of hills rising another 1000 ft. West and north-west the fall to the Sahara is gradual. Here occur remarkable sand-ridges of fantastic shape—hollow mounds, pyramids, crosses, &c.—which are characteristic of the Libyan desert. There are also sandstone rocks of varying colours—red, blue, white, black, &c.—presenting the aspect of ruined castles, ramparts and churches. North-west is a wide district of dreary plain—part of the clay zone which stretches from the middle Niger to the Nile—covered with thorn bush and dum palms. The central and eastern regions are the most fertile, and contain large forest areas. The country belongs to the Chad drainage area, though it is possible that the Bahr-el-Ghazal (of the Chad system) may afford a connexion with the Nile (see SHARI). The streams which rise in the north-eastern districts, of which the Batha (over 300 m. long) is the largest, [illegible] ending in a depression, some 200 m. [illegible] Another [illegible] Wadi Rime, [illegible] e direction [illegible] rivers are [illegible] etely dry. [illegible] ft. deep. [illegible] but, save [illegible] ter in the [illegible] onfluence [illegible] he forests are large herds of elephants, and hippopotami abound along the river-beds. In the north are the camel and the ostrich. Among the trees is a species of wild coffee which reaches 50 to 60 ft. and yields berries of excellent quality. The cotton plant is indigenous.

Inhabitants and Trade.—The inhabitants consist of negroid and negro tribes, Arabs, Fula, Tibbu and half-castes. The Maba, the dominant race, are said to be of Nubian origin; they are believed not to number more than 750,000, and live chiefly in the north-eastern district. They are in political alliance with the Arab tribes, known in Wadai as Zoruk (dark) and Homr (red). The Maba have a reputation for pride, valour, cruelty, drunkenness and barbaric splendour.

The capital, Abeshr, is in the N.E., in about 21° E., 13° 50′ N. Thence a caravan route crosses the Sahara via the Kufra oases to Benghazi in Barca. Another trade route goes east through Darfur to Khartum. The people possess large numbers of horses, cattle, sheep and goats. Maize, durra, cotton and indigo are cultivated, and cloth is woven. Ivory and ostrich feathers, the chief articles of export, are taken to Tripoli by the desert route, together with small quantities of coffee and other produce. There is a trade in cattle, horses and coffee with the countries to the south. Until the French conquest Wadai was a great centre of the slave trade. Slaves were obtained by raiding and in the form of tribute from Bagirmi, Kanem and other countries once dependent on Wadai. The slaves were sent chiefly to Barca. Wadai was also notorious for its traffic in eunuchs.

History.—Situated between the Sahara and the dense forest lands of equatorial Africa, Wadai early became a meeting ground of negro and Arab culture. Eastern influences and the Mahommedan religion ultimately obtained predominance, though the sovereignty of the country reverted to the negro race. It was sometimes tributary to and sometimes the overlord of the neighbouring countries, such as Bagirmi and Kanem. It was made known to Europe by the writings of the Arab geographers, but it was not until Nachtigal's visit in 1873 that accurate knowledge of the land and people was obtained. About 1640 a Maba chieftain named Abd-el-Kerim conquered the country, driving out the Tunjur, a dynasty of Arabian origin. Thereafter Wadai, notorious as a great slave-raiding state, suffered from many civil and foreign wars. Mahommed Sherif, sultan from 1838 to 1858, introduced Senussiism into the country.

In the last decade of the 19th century the French advancing from the Congo and from the Niger made their influence felt in Wadai, and by the Anglo-French declaration of the 21st of March 1899 Wadai was recognized as within the French sphere. That state was then torn by civil wars. The Sultan Ibrahim (see SENUSSI) was murdered in 1900, and Ahmed Ghazili became sultan. He was warned by the Sheikh Senussi el Mahdi of the danger arising from the approach of the Christians (*i.e.* the French), but he had to meet the opposition of the princes Doud Murra (a brother of Ibrahim) and Acyl. Ahmed Ghazili and Doud Murra, though of the royal family, had non-Maba mothers; Acyl, a grandson of the Sultan Mahommed Sherif, was of pure Maba descent. Acyl, ordered to be blinded by Ahmed Ghazili, fled to Kelkélé, west of Lake Fittri, and entered into friendly relations with the French. A few months later (Dec. 1901) Ahmed was dethroned. With Doud Murra, who then became sultan, the French endeavoured to come to an understanding, and in November 1903 the Wadaians agreed to recognize the possession of Bagirmi, Kanem, &c., by France. However, in the spring of 1904, acting, it is believed, at the instigation of the Senussites, the Wadaians attacked French posts in the Shari region and carried off many slaves. At Tomba (13th of May 1904) they suffered a severe defeat, but they renewed their raids, and there was continual fighting on the west and south-west borders of Wadai during 1905–1907. The fighting resulted in strengthening the position of the French and of their ally Acyl, and in 1908 Doud Murra, again, it is stated, at the instigation of the Senussites, proclaimed the *jihad*. His army was split up under *aguids* (feudal lords), and was beaten in detail by the French. At Joue in the Batha valley (June 16, 1908) Commandant Julien inflicted enormous losses on the enemy. In May

1909 Captain Fiegenschuh, with a small force of tirailleurs, and Acyl's contingents, advanced up the Batha to a place within 15 m. of Abeshr, where, on the 1st of June, the enemy were defeated. The next day another fight took place close to Abeshr. The Wadaians were again put to flight and the town bombarded with cannon. Doud Murra with a small following fled north, and Abeshr was occupied by the French. The prince Acyl was subsequently placed on the throne, and, under French guidance, governed Wadai proper. Dar Sila, Dar Runga and other tributary states being directly governed by French residents.

The war was not, however, ended by the occupation of Abeshr. Captain Fiegenschub's column, operating south-east of Abeshr, was cut off by the Massalit Arabs near the Darfur frontier, but a punitive force retrieved this disaster in April following. While these operations were in progress, Lieut. Boyd Alexander (b. 1873), who had previously crossed from the Niger to the Nile, the first British explorer to enter Wadai, passed through Abeshr on his way to Darfur. At the station of Nyeri, in Dar Tama, on the Darfur border, he was murdered on the 2nd of April 1910.

In November 1910 a French column, 300 strong, under Colonel Moll, while operating in the Massalit country was attacked by 5000 men under Doud Murra and the sultan of the Massalit. The enemy was beaten off, but the French had over 100 casualties, including Colonel Moll killed.

See G. Nachtigal, *Sahara und Sudan* (3 vols., Berlin, 1879–1889); Captain Julien, "Le Dar Ouadai," *Renseign. colon. comité de l'Afrique française* (1904); J. van Vollenhoven, "Le Voyage de Nachtigal au Ouadai," *Renseign. colon.* (1903); Captain Repoux, "Le Ouadai," *B.S.G. Com. Bordeaux* (1909); Commandant Bordeaux, "Deux Contre-rezzous dans l'Ouaddai," *La Géog. B.S.G. Paris* (1908); A. Ferrier, "La Prise d'Abecher," *L'Afrique française* (1909); A. H. Keane, "Wadai," *Travel and Exploration* (July 1910); Sir H. H. Johnston, "Lieutenant Boyd Alexander," *Geog. Jour.* (July 1910); *The Times*, July 21st, 1910 (details of Boyd Alexander's murder). See also SENUSSI.

WADDING, LUKE (1588–1657), Irish Franciscan friar and historian, was born in Waterford in 1588 and went to study at Lisbon. He became a Franciscan in 1607, and in 1617 he was made president of the Irish College at Salamanca. The next year he went to Rome and stayed there till his death. He collected the funds for the establishment of the Irish College of St Isidore in Rome, for the education of Irish priests, opened 1625, and for fifteen years he was the rector. A voluminous writer, his chief work was the *Annales Minorum* in 8 folio vols. (1625–1654), re-edited in the 18th century and continued up to the year 1622; it is the classical work on Franciscan history. He published also a *Bibliotheca* of Franciscan writers, an edition of the works of Duns Scotus, and the first collection of the writings of St Francis of Assisi. (E. C. B.)

WADDINGTON, WILLIAM HENRY (1826–1894), French statesman, was born at St Remi-sur-l'Avre (Eure-et-Loir) on the 11th of December 1826. He was the son of a wealthy Englishman who had established a large spinning factory in France and had been naturalized as a French subject. After receiving his early education in Paris, he was sent to Rugby, and thence proceeded to Trinity College, Cambridge, where he was second classic and chancellor's medallist, and rowed for the university in the winning boat against Oxford. Returning to France, he devoted himself for some years to archaeological research. He undertook travels in Asia Minor, Greece and Syria, the fruits of which were published in two *Mémoires*, crowned by the Institute, and in his *Mélanges de numismatique et de philologie* (1861). Except his essay on "The Protestant Church in France," published in 1856 in *Cambridge Essays*, his remaining works are likewise archaeological. They include the *Fastes de l'empire romain*, and editions of Diocletian's edict and of Philippe Lebas's *Voyage archéologique* (1868–1877). He was elected in 1865 a member of the Académie des Inscriptions et Belles-Lettres.

After standing unsuccessfully for the department of the Aisne in 1865 and 1869, Waddington was returned by that constituency at the election of 1871. He was minister of public instruction in the short-lived cabinet of the 19th of May 1873, and in 1876, having been elected senator for the Aisne, he was again entrusted by Dufaure with the ministry of public instruction, with which, as a Protestant, he was not permitted to combine the ministry of public worship. His most important project, a bill transferring the conferment of degrees to the state, passed the Chamber, but was thrown out by the Senate. He continued to hold his office under Jules Simon, with whom he was overthrown on the famous *seize mai* 1877. The triumph of the republicans at the general election brought him back to power in the following December as minister of foreign affairs under Dufaure. He was one of the French plenipotentiaries at the Berlin Congress. The cession of Cyprus to Great Britain was at first denounced by the French newspapers as a great blow to his diplomacy, but he obtained, in a conversation with Lord Salisbury, a promise that Great Britain in return would allow France a free hand in Tunis.

Early in 1879 Waddington succeeded Dufaure as prime minister. Holding office by sufferance of Gambetta, he halted in an undetermined attitude between the radicals and the reactionaries till the delay of urgent reforms lost him the support of all parties. He was forced on the 27th of December to retire from office. He refused the offer of the London embassy, and in 1880 was reporter of the committee on the adoption of the *scrutin de liste* at elections, on which he delivered an adverse judgment. In 1883 he accepted the London embassy, which he continued to hold till 1893, showing an exceptional tenacity in defence of his country's interests. He died on the 13th of January 1894. His wife, an American lady, whose maiden name was Mary A. King, wrote some interesting recollections of their diplomatic experiences—*Letters of a Diplomatist's Wife, 1883–1900* (New York, 1903), and *Italian Letters* (London, 1905).

WADE, BENJAMIN FRANKLIN (1800–1878), American statesman, was born near Springfield, Massachusetts, on the 27th of October 1800, of Puritan ancestry. He was reared on a farm, receiving little systematic education, and in 1821 he removed with his family to Andover, in the Western Reserve of Ohio. Here he spent two more years on a farm, and then, securing employment as a drover, worked his way to Philadelphia and finally to Albany, New York, where for two years he taught school, studied medicine, and was a labourer on the Erie Canal. Returning to Ohio in 1825, he studied law at Canfield, was admitted to the bar in 1827, and began practice at Jefferson, Ashtabula county, where from 1831 to 1837 he was a law partner of Joshua R. Giddings, the anti-slavery leader. During 1837–1839 and 1841–1843 he was a Whig member of the Ohio State Senate. From 1847 until 1851 he was a state district judge, and from 1851 until 1869 was a member of the United States Senate, first as an anti-slavery Whig and later as a Republican. In the Senate Wade was from the first an uncompromising opponent of slavery, his bitter denunciations of that institution and of the slaveholders receiving added force from his rugged honesty and sincerity. His blunt, direct style of oratory and his somewhat rough manners were characteristic. After the outbreak of the Civil War he was one of the most vigorous critics of the Lincoln administration, whose Ohio member, Salmon P. Chase, had long been a political rival. He advocated the immediate emancipation and arming of the slaves, the execution of prominent Southern leaders, and the wholesale confiscation of Confederate property. During 1861–1862 he was chairman of the important joint-committee on the conduct of th[illegible], and in 1862, as chairman of the Senate Committee [illegible] was instrumental in abolishing slavery in the Federal Territories. In 1864, with H. W. Davis (*q.v.*), he secured the passage of the Wade-Davis Bill (for the reconstruction of the Southern States), the fundamental principle of which was that reconstruction was a legislative, not an executive, problem. This bill was p[illegible] both houses of Congress, just before their [illegible] President Lincoln withheld his signature [illegible] issued a proclamation explain[illegible] position. Soon af[illegible] in the N[illegible] a [illegible] purpose and attacking his leadership. As long as President Johnson promised severe treatment of the conquered South, Wade supported him, but when the President definitively adopted the more lenient policy of his predecessor, Wade became one of his most bitter and uncompromising opponents. In 1867 he was elected president *pro tem.* of the Senate, thus becoming acting vice-president. He voted for Johnson's conviction on his trial for impeachment, and for this was severely criticized, since, in the event of conviction, he would have become president; but Wade's whole course before and after the trial would seem to belie the charge that he was actuated by any such motive. After leaving the Senate he resumed his law practice, becoming attorney for the Northern Pacific railway, and in 1871 he was a member of President Grant's Santo Domingo Commission. He died at Jefferson, Ohio, on the 2nd of March 1878. His son, James Franklin Wade (b. 1843), was colonel of the 6th United States (coloured) cavalry during the Civil War, and attained the rank of major-general in the regular army in 1903, commanding the army in the Philippines in 1903-1904.

See A. G. Riddle, *Life of Benjamin F. Wade* (Cleveland, Ohio, 1886).

WADE, GEORGE (1673-1748), British field marshal, was the son of Jerome Wade of Kilavally, Westmeath, and entered the British army in 1690. He was present at Steinkirk in 1692, and in 1695 he became captain. In 1702 he served in Marlborough's army, earning particular distinction at the assault on the citadel of Liége, and in 1703 he became successively major and lieutenant-colonel in his regiment (later the 10th Foot). In 1704, with the temporary rank of colonel, he served on Lord Galway's staff in Portugal. Wade distinguished himself at the siege of Alcantara in 1706, in a rearguard action at Villa Nova in the same autumn (in which, according to Galway, his two battalions repulsed twenty-two allied squadrons), and at the disastrous battle of Almanza on the 25th of April 1707. He had now risen to the command of a brigade, and on the following 1st of January (1707/8) he was promoted brigadier-general in the British army. His next service was as second in command to James (1st earl) Stanhope in the expedition to Minorca in 1708. In 1710 he was again with the main Anglo-allied army in Spain, and took part in the great battle of Saragossa on the 20th of August, after which he was promoted major-general and given a command at home. The Jacobite outbreak of 1715 brought him into prominence in the new rôle of military governor. He twice detected important Jacobite conspiracies, and on the second occasion procured the arrest of the Swedish ambassador in London, Count Gyllenborg. In 1719 he was second in command of the land forces in the successful "conjunct" military and naval expedition to Vigo. In 1724 he was sent to the Highlands to make a thorough investigation of the country and its people, and two years later, having meantime been appointed commander-in-chief to give effect to his own recommendations, he began the system of metalled roads which is his chief title to fame, and is commemorated in the lines—

> "Had you seen these roads before they were made.
> You would lift up your hands and bless General Wade."

In the course of this engineering work Wade superintended the construction of no less than 40 stone bridges. At the same time, slowly and with the tact that came of long experience, he disarmed the clans. In 1742 he was made a privy councillor and lieutenant-general of the ordnance, and in 1743 field marshal. In this year he commanded the British contingent in Flanders, and was associated in the supreme command with the duke d'Aremberg, the leader of the Austrian contingent. The campaign [illegible] when the enemy was of one nation, [illegible] led by Saxe, was a failure, and Wade, [illegible] and in [illegible] resigned the [illegible] Georg [illegible] made him [illegible] Field [illegible] rection of [illegible] rapidity [illegible] nt of the [illegible] Wade

WADE, THOMAS (1805-1875), English poet and dramatist, was born at Woodbridge, Suffolk, in 1805. He early went to London, where he began to publish verse of considerable merit under the inspiration of Byron, Keats and especially Shelley. He wrote some plays that were produced on the London stage with a certain measure of success, owing more perhaps to the acting of Charles and Fanny Kemble than to the merits of the dramatist. Wade frequently contributed verses to the magazines, and for some years he was editor as well as part-proprietor of *Bell's Weekly Messenger.* This venture proving financially unsuccessful, he retired to Jersey, where he edited the *British Press*, continuing to publish poetry from time to time until 1871. He died in Jersey on the 19th of September 1875. His wife was Lucy Eager, a musician of some repute.

The most notable of Wade's publications were: *Tasso and the Sisters* (1825), a volume of poems, among which "The Nuptials of Juno" in particular showed rare gifts of imagination, though like all Wade's work deficient in sense of melody and feeling for artistic form; *Woman's Love* (1828), a play produced at Covent Garden; *The Phrenologists*, a farce produced at Covent Garden in 1830; *The Jew of Arragon*, a play that was "howled from the stage" at Covent Garden in 1830 owing to its exaltation of the Jew; *Mundi et cordis carmina* (1835), a volume of poems, many of which had previously appeared in the *Monthly Repository*; *The Contention of Death and Love, Helena* and *The Shadow Seeker*—these three being published in the form of pamphlets in 1837; *Prothanasia and other Poems* (1839). Wade also wrote a drama entitled *King Henry II.*, and a translation of Dante's "Inferno" in the metre of the original, both of which remain in manuscript; and a series of sonnets inspired by his wife, some of which have been published.

See Alfred H. Mills, *The Poets and Poetry of the Century*, vol. iii. (10 vols., London, 1891-1897); *Literary Anecdotes of the 19th Century*, edited by Sir W. Robertson Nicoll and T. J. Wise (2 vols., London, 1895-1896), containing a number of Wade's sonnets, a specimen of his Dante translation and a reprint of two of his verse pamphlets.

WADE, SIR THOMAS FRANCIS (1818-1895), British diplomatist, born in London on the 25th of August 1818, was the son of Major Wade of the Black Watch, by his wife Anne, daughter of William Smythe of Barbavilla, Westmeath. In 1838 his father purchased for him a commission in the 81st Regiment. Exchanging (1839) into the 42nd Highlanders, he served with his regiment in the Ionian Islands, devoting his leisure to the congenial study of Italian and modern Greek. On receiving his commission as lieutenant in 1841 he exchanged into the 98th Regiment, then under orders for China, and landed in Hong-Kong in June 1842. The scene of the war had at that time been transferred to the Yangtze-kiang, and thither Wade was ordered with his regiment. There he took part in the attack on Chin-kiang-fu and in the advance on Nanking. In 1845 he was appointed interpreter in Cantonese to the Supreme Court of Hong-Kong, and in 1846 assistant Chinese secretary to the superintendent of trade, Sir John Davis. In 1852 he was appointed vice-consul at Shanghai. The Tai-ping rebellion had so disorganized the administration in the neighbourhood of Shanghai that it was considered advisable to put the collection of the foreign customs duties into commission, a committee of three, of whom Wade was the chief, being entrusted with the administration of the customs. This formed the beginning of the imperial maritime customs service. In 1855 Wade was appointed Chinese secretary to Sir John Bowring, who had succeeded Sir J. Davis at Hong-Kong. On the declaration of the second Chinese War in 1857, he was attached to Lord Elgin's staff as Chinese secretary, and with the assistance of H. N. Ley he conducted the negotiations which led up to the treaty of Tientsin (1858). In the following year he accompanied Sir Frederick Bruce in his attempt to exchange the ratification of the treaty, and was present at Taku when the force attending the mission was treacherously attacked and driven back from the Peiho. On Lord Elgin's return to China in 1860 he resumed his former post of Chinese secretary, and was mainly instrumental in arranging for the advance of the special envoys and the British and French forces to Tientsin, and subsequently towards Peking. For the purpose of arranging for a camping ground in the neighbourhood of Tungchow he accompanied Mr (afterwards Sir) Harry Parkes on his first visit to that city, where on the next day Parkes with

Mr Loch and others was by an act of shameless treachery made prisoner. In the succeeding negotiations Wade took a leading part, and on the establishment of the legation at Peking he took up the post of Chinese secretary of legation. In 1862 he was made a Companion of the Bath. On the return of Sir Frederick Bruce to England in 1864 he remained as *chargé d'affaires*, and again from 1869 to 1871, when he was appointed minister, he filled the acting post. The Tientsin massacre in 1870 entailed long and difficult negotiations, which were admirably conducted by Wade. On the assumption of power by the emperor T'ung-chih he, in common with his colleagues, requested an audience in accordance with the treaties, which was for the first time granted as a right. The murder of A. R. Margary near Manwyne in Yunnan in 1875 threatened at one time to cause a rupture with the Chinese government, and as a matter of fact Wade did leave Peking. But the Chinese, finding that he was in earnest, despatched Li Hung-Chang after him to Chefoo, where the two diplomatists arranged the penalties which were to be paid for the crime, and concluded a convention which, after a considerable interval, was ratified by the governments. Wade was then made K.C.B., and in 1883 retired from the service. On his return to England the attractions of his old university induced him to take up his residence at Cambridge, where he was appointed the first professor of Chinese. He died there on the 31st of July 1895. In 1889 he was made G.C.M.G. In 1868 he had married Amelia, daughter of Sir John Herschel. (R. K. D.)

WADE (or Waad), **SIR WILLIAM** (1546–1623), English statesman and diplomatist, was the eldest son of Armagil Wade (d. 1568), the traveller, who sailed with a party of adventurers for North America in 1536, and later became (1547) one of the clerks of the privy council in London and a member of parliament. William Wade obtained his entrance into official life by serving William Cecil, Lord Burghley, sending information to this statesman from Paris and from Italy. He also passed some time in Strassburg; then in 1581 he became secretary to Sir Francis Walsingham and in 1583 a clerk of the privy council. He visited Vienna, Copenhagen and Madrid on public business, and in 1585 he went to Paris, being waylaid and maltreated on his return near Amiens by influential personages who disliked the object of his mission. In 1586 he went to Chartley and took possession of Mary Stuart's papers, and in 1587 was again in France. During the remainder of Elizabeth's reign Wade was much occupied in searching for Jesuits and in discovering plots against the life of the queen. James I., who knighted him in 1603, employed him in similar ways, and he was fully occupied in unravelling the plots which marked the early years of the new reign. For some time Wade was a member of parliament. He retired from public life in 1613, and died on the 21st of October 1623. Sir William was a shareholder in the Virginia company, and the Wades of Virginia claim descent from his father.

WADEBRIDGE, a market town and seaport in the St Austell parliamentary division of Cornwall, England, on the Great Western and London & South-Western railways, 38 m. W.N.W. of Plymouth. Pop. of urban district (1901), 2186. It is picturesquely situated at the head of the estuary of the river Camel, 7 m. from its mouth in Padstow Bay on the north coast. A stone bridge, consisting of seventeen arches, was built in 1485 over the river, and made a county bridge under James I. The parish church of Egloshayle, nearly 2 m. from the town, is in the main Perpendicular, with a beautiful tower; but part of the fabric is Early English. The neighbouring church of St Breock is Decorated and Perpendicular, with a fine font of the earlier period. An ancient round-headed cross stands near the town. There is considerable agricultural trade, and iron founding is carried on; while in the neighbourhood some copper, lead, granite and slate are worked and exported in small vessels; coal, timber and general merchandise being imported.

, a station on the east bank of the Upper Nile in the
a, in 2° 50′ N., 31° 35′ E., 200 m.
be on Victoria Nyanza, and 72 m.
ert Nyanza. The government
200 ft. above the Nile at a spot where the river narrows to 482 ft. and attains a depth of 30 ft. At this place was a gauge for measuring the discharge of the river. Wadelai was first visited by a European, Lieut. H. Chippendall, in 1875, and was named after a chieftain who, when visited by Gessi Pasha (on the occasion of that officer's circumnavigation of Albert Nyanza), ruled the surrounding district as a vassal of Kabarega, king of Unyoro. The region was annexed to the Egyptian Sudan and Wadelai's village chosen as a government post. This post was on the western bank of the Nile, 1½ m. below the existing station. Here for some time Emin Pasha had his headquarters, evacuating the place in December 1888. Thereafter, for some years, the district was held by the Mahdists. In 1894 the British flag was hoisted at Wadelai, on both banks of the Nile, by Major E. R. Owen. Some twelve years later the government post was withdrawn. There is a native village at the foot of the hill.

WADHWAN, a town of India, in Kathiawar, Bombay, the capital of a petty state of the same name, and the junction of the Kathiawar railway system with the Bombay and Baroda line, 389 m. N. of Bombay. Pop. (1901) 16,223. It has considerable trade and manufactures. There is a school for *girasias* or subordinate chiefs. The civil station, under British administration, had a population in 1901 of 11,255. The state of Wadhwan has an area of 236 sq. m.; pop. (1901), 34,851; revenue, £25,000. Cotton trade and stone-quarrying are important, and there are manufactures of soap and saddlery.

WADI, also written wady, in some dialects wad; Arabic for a "valley," hence a stream or river flowing through a valley, as well as the valley itself. It is a common term in place names.

WADI HALFA, or Halfa, a town of the Anglo-Egyptian Sudan, in 21° 55′ N., 31° 19′ E., on the right bank of the Nile, 5 m. S. of the northern frontier of the Sudan. It is the chief town of the Halfa mudiria, is 770 m. S. of Cairo by rail and steamer, and 575 m. N.N.W. of Khartum by rail. Some 6 m. above the town is the second cataract, and on the west bank of the Nile opposite Halfa are the ruins of the ancient Egyptian city of Buhen (Bohon). Halfa is the northern terminus of the Sudan railway and the southern terminus of a steamboat service on the Nile, which, running to Shellal (Assuan), connects there with the Egyptian railways.

Wadi Halfa is a general designation including the native village of that name, the camp, founded by the British in 1884 as their base in the operations for the relief of General Gordon, and the civil cantonment established at the same time. This cantonment occupies the site of a Nubian village, and round it has grown a thriving town, at first named Taufikia, but now called Halfa. It has a population (1907) of about 3000. The camp is 1½ m. S. of Halfa. Here are the barracks, officers' quarters, railway works, and an esplanade along the river front. The village of Wadi Halfa is 3 m. S. of the camp.

WAD MEDANI, a town of the Anglo-Egyptian Sudan, capital of the Blue Nile mudiria, in 14° 24′ N., 33° 31′ E., on the left bank of the Blue Nile, 110 m. by rail and 147 m. by river, S.E. of Khartum. Pop. about 20,000. It is the chief depot for grain raised in the Gezira, has oil and soap works, and is a thriving commercial centre, being on the main trade route between Khartum and Abyssinia. The town, which is of considerable antiquity, contains some fine buildings, the chief mosque having a conspicuous tower. Wad Medani was almost destroyed during the *Mahdia*, but its return to prosperity under Anglo-Egyptian rule was rapid. In 1909 it was connected by railway with Khartum, and thus the hindrance to trade through the Blue Nile being scarcely navigable between January and June was overcome. In 1910 railway communication between the town and Kordofan was established. (See Sudan, § *Anglo-Egyptian*.)

WAFER, a thin flat cake or sheet of paste, usually circular in shape. The derivation of the word, which is the same as "waffle," a batter-cake cooked in waffle-irons and served hot, is given under "Goffer," which is adapted from the French form of the Teutonic original. As articles of stationery, wafers consist of thin brittle, adhesive disks, used for securing papers together, and for forming a basis for impressed official seals. They are made of a thin paste of very fine flour, baked between "wafer irons" over a charcoal fire till the thin stratum of paste becomes dry and brittle and the flour starch is partly transformed into glutinous adhesive dextrin. The cake is cut into round disks with suitable steel punches. Bright non-poisonous colouring matter is added to the paste for making coloured wafers. They are also made of gelatin. Wafers of dry paste are used in medical practice to enclose powders or other forms of drugs, thus rendering them easy to swallow.

In ecclesiastical usage the term "wafer" is applied to the thin circular disk of unleavened bread, stamped with a cross, the letters I.H.S. or the Agnus Dei, which is the form of the consecrated bread as used in the service of the Eucharist by the Roman Catholic Church.

WAGER (derived, through Fr. *wagier*, *gagier*, from Lat. *vadium*, a pledge), a bet or stake. Wagers in the ordinary sense of the term are dealt with under the headings GAMING and BETTING; but the method of wagering—in principle the putting of a decision to the hazard—has had extended employment in various cases which may be noticed here. The determination of cases, civil and criminal, by means of wager or analogous forms of procedure, was a characteristic feature of ancient law. The *legis actio sacramenti* at Rome—at first a real, then a fictitious, wager—and the wagers "of battle" and "of law" in England, of the highest antiquity in their origin, survived up to a comparatively late period in the history of both legal systems. The form of the wager survived long after its reason had been forgotten. The general prevalence of the wager form of proceeding is perhaps to be attributed to the early conception of a judge as a mere referee who decided the dispute submitted to him, not as an executive officer of the state, but as an arbitrator casually called in (see Maine, *Ancient Law*, c. x.).

"Wager of battle" in England was a mode of trial allowed in certain cases, viz. on a civil writ of right for recovery of land (see WRIT), and on criminal appeals of treason and felony (see APPEAL). Trial by battle, or single combat, was a common Teutonic custom in days when criminal "appeal" was really a prosecution by a private individual; and it remained in vogue on the continent of Europe (where hired champions were allowed) to a much greater extent than in England, where after the Conquest it was to some extent substituted for trial by ordeal (*q.v.*). It was an institution suited to the days of chivalry, and may be regarded as the parent of the duel (*q.v.*). In England the "appellant" first formulated his charge, which was proclaimed at five successive county courts. If the "appellee" did not appear he was outlawed; if he did he could plead various exemptions; and unless the court upheld them he was obliged to offer battle by throwing down his glove as gage. When an ordinary court ordered the battle, it was fought on foot with staves and leather shields; but when a court of chivalry[1] ordered it, on horse with spear and sword. If defeated, the appellee was liable to sentence of death by hanging, and an undecided fight still left him liable, though acquitted on the appeal, to trial by indictment; if the appellant yielded, the appellee was free. The right of "wager of battle" was claimed as late as 1818 by a man named Thornton, who had been acquitted at assizes of a charge of murdering a girl named Ashford; her brother brought an "appeal," and the judges upheld Thornton's claim, but the appellant then withdrew. Next year appeals for felony or treason were abolished by statute.[2]

"Wager of law" (*vadiatio legis*) was a right of a defendant in actions of simple contract, debt and detinue. It superseded the ordeal (itself called *lex* in the Assize of Clarendon and other ancient constitutional records). The procedure in a wager of law is traced by Blackstone to the Mosaic law, Ex. xxii. 10; but it seems historically to have been derived from the system of compurgation, introduced into England from Normandy, a system which is now thought to have had an appreciable effect on the development of the English jury (*q.v.*). It also has some points of resemblance, perhaps some historical connexion, with the *sponsio* and the decisory oath of Roman law, and the reference to oath of Scots law (see OATH). The use of the oath instead of the real or feigned combat—real in English law, feigned in Roman law—no doubt represents an advance in legal development. The technical term *sacramentum* is the bond of union between the two stages of law. In the wager of law the defendant, with eleven compurgators, appeared in court, and the defendant swore that he did not owe the debt, or (in detinue) that he did not detain the plaintiff's chattel; while the compurgators swore that they believed that he spoke the truth. It was an eminently unsatisfactory way of arriving at the merits of a claim, and it is therefore not surprising to find that the policy of the law was in favour of its restriction rather than of its extension. Thus it was not permitted where the defendant was not a person of good character, where the king sued, where the defendant was the executor or administrator of the person alleged to have owed the debt, or in any form of action other than those named, even though the cause of action were the same. No wager of law was allowed in *assumpsit*, even though the cause of action were a simple debt. This led to the general adoption of *assumpsit*—proceeding originally upon a fictitious averment of a promise by the defendant—as a means of recovering debts. Where a penalty was created by statute, it became a common form to insert a proviso that no wager of law was to be allowed in an action for the penalty. Wager of law was finally abolished in 1833 (3 & 4 William IV. c. 42).

Another form of judicial wager in use up to 1845 was the feigned issue, by which questions arising in the course of chancery proceedings were sent for trial by jury in a common law court. The plaintiff averred the laying of a wager of £5 with the defendant that a certain event was as he alleged; the defendant admitted the wager, but disputed the allegation; on this issue was joined. This procedure was abolished by s. 19 of the Gaming Act 1845. (W. F. C.)

WAGES (the plural of "wage," from Late Lat. *wadium*, a pledge, O. Fr. *wagier*, *gagier*). Wages, although one of the most common and familiar terms in economic science, is at the same time one of the most difficult to define accurately. The natural definition is that wages is the "reward for labour," but then we are at once confronted with the difficulty so well stated by Adam Smith: "The greater part of people understand better what is meant by a quantity of a particular commodity than by a quantity of labour; the one is a plain palpable object, the other an abstract notion, which, though it can be made sufficiently intelligible, is not altogether so natural and obvious." If we regard wages as the reward for a quantity of labour, it is clear that to make the meaning precise we must give a precise meaning to this abstract notion of Adam Smith. From the point of view of the labourer the quantity of labour refers not so much to the work accomplished (*e.g.* raising so many foot-pounds) as to "all the feelings of a disagreeable kind, all the bodily inconvenience or mental annoyance, connected with the employment of one's *thoughts* or muscles or both in a particular occupation" (J. S. Mill). But this analysis seems only to make the task of definition more difficult, for the class of labourers, in this wide sense of the term labour, would include the capitalist who racks his brains in making plans just as much as the navvy who digs with the sweat of his brow. Thus "profits," in the ordinary sense of the term, instead of being contrasted, would to a large extent be classified with wages, and in fact the wages of superintendence or of management is one of the recognized elements in the classical analysis of profits. It is only when we refer to the list of "occupations" in any civilized country that we can really form an adequate idea of the variety of classes to which the term labour, as defined by Mill, may be extended.

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[1] The medieval court of chivalry had both civil and criminal jurisdiction, and was held jointly by the lord high constable and the earl marshal. The last sitting of a court of chivalry for criminal business in England was in 1631; and as a civil court (for cases of honour and questions of precedence) it gradually decayed through want of power to enforce its decisions. There is an interesting account of the rules of battle ordered by a court of chivalry in Ashmolean MSS. 856 of the Bodleian Library (transcribed in *Illustrations of Ancient State and Chivalry*, Roxburghe Club, 1840).

[2] See G. Neilson, *Trial by Combat* (Glasgow, 1891).

It may be granted that in certain economic inquiries it is extremely useful to bring out the points of resemblance between "workers" at the various stages of the social scale, and it is especially serviceable in showing that the opposition between "employer" and the "employed," and the "classes" and the "masses," is often exaggerated. At the same time the differences, if not in kind at any rate in degree, are so great that if the analogy is carried very far it becomes misleading. Accordingly it seems natural to adopt as the preliminary definition of "wages" something equivalent to that of Francis Walker in his standard work on the *Wages Question*, viz. "the reward of those who are employed in production with a view to the profit of their employers and are paid at stipulated rates."

It may be observed that by extending the meaning of production, as is now done by most economists, to include all kinds of labour, and by substituting benefit for profit, this definition will include all grades of wages.

Nominal and real wages.

Having thus limited the class of those who earn "wages," the next point is to consider the way in which the wages ought to be measured. The most obvious method is to take as the rate of *time-wages* the amount of *money* earned in a certain *time*, and as the rate of *task-wages* the amount of *money* obtained for a given amount of *work* of a given quality; and in many inquiries this rough mode of measurement is sufficient. But the introduction of money as the measure at once makes it necessary to assume that for purposes of comparison the value of the money to the wage-earners may be considered constant. This supposition does not hold good even between different places in the same country at the same time, and still less with variations in time as well as place. To the labourers, however, the amount of money they obtain is only a means to an end, and accordingly economists have drawn a sharp distinction between *nominal* and *real* wages. "Labour, like commodities," says Adam Smith, "may be said to have a real and a nominal price. Its real price may be said to consist in the quantity of the necessaries and conveniences of life which are given for it; its nominal price in the quantity of money. The labourer is rich or poor, is well or ill rewarded, in proportion to the real not to the nominal price of his labour."

Variations in real wages.

Walker (*op. cit.* pp. 12 sqq.) has given a full analysis of the principal elements which ought to be taken into account in estimating the *real* wages of labour. They may be classified as follows. (1) Variations in the purchasing power of money may be due in the first place to causes affecting the general level of prices in a country. Such, for instance, is a debasement of the coinage, of which a good example is furnished in English history in the reigns of Henry VIII. and Edward VI Thorold Rogers has ascribed much of the degradation of labour which ensued to this fact, and Macaulay has given a graphic account of the evils suffered by the labouring classes prior to the recoinage of 1696. The issues of inconvertible paper notes in excess have frequently caused a disturbance of real wages, and it is generally asserted that in this case wages as a rule do not rise so quickly as commodities. A general rise in prices due to great discoveries of the precious metals would, if nominal wages remained the same, of course cause a fall in real wages. There are, however, good grounds for supposing that the stimulus given to trade in this case would raise wages at least in proportion; and certainly the great gold discoveries in Australia and California raised wages in England, as is shown in Tooke's *History of Prices*, vol. v. p. 284. Similarly it is possible that a general fall in prices, owing to a relative scarcity of the precious metals, may lower the prices of commodities before it lowers the price of labour, in which case there is a rise in real wages. In the controversy as to the possible advantages of bimetallism this was one of the points most frequently discussed. It is impossible to say a priori whether a rise or fall in general prices, or a change in the value of money, will raise or lower real wages, since the result is effected principally by indirect influences. But, apart from these general movements in prices, we must, in order to find the real value of nominal wages, consider variations [illegible]d in making this estimate we must notice the principal items in the expenditure of the labourers. Much attention has been given recently by statisticians to this subject, with the view of finding a good "index number" for real wages. (2) Varieties in the form of payment require careful attention. Sometimes the payment is only partly in money, especially in agriculture in some places. In many parts of Scotland the labourers receive meal, peats, potatoes, &c (3) Opportunities for extra earnings are sometimes of much importance, especially if we take as the wage-earning unit the family and not the individual At the end of the 18th century Arthur Young, in his celebrated tours, often calls attention to this fact. In Northumberland and other counties a "hind" (*i.e.* agricultural labourer) is more valued if he has a large working family, and the family earnings are relatively large. (4) Regularity of employment is always, especially in modern times, one of the most important points to be considered. Apart from such obvious causes of fluctuation as the nature of the employment, *e.g.* in the case of fishermen, guides, &c., there are various social and industrial causes (for a particular and able investigation of which the reader may consult Professor Foxwell's essay on the subject). Under the system of production on a large scale for foreign markets, with widely extended division of labour, it seems impossible to adjust accurately the supply to the demand, and there are in consequence constant fluctuations in the employment of labour. A striking example, happily rare, is furnished by the cotton famine during the American Civil War (5) In forming a scientific conception of real wages we ought to take into account the longer or the shorter duration of the power to labour: the man whose employment is healthy and who lives more comfortably and longer at the same nominal rate of wages may be held to obtain a higher real wage than his less fortunate competitor. It is worth noting, in this respect, that in nearly every special industry there is a liability to some special form of disease: *e.g.* lace-workers often suffer from diseases of the eyes, miners from diseases of the lungs, &c. Thus, in attempting to estimate real wages, we have to consider all the various discomforts involved in the "quantity of labour" as well as all the conveniences which the nominal wages will purchase and all the supplements in kind.

General rate of wages in any country at any time.

In a systematic treatment of the wages question it would be natural to examine next the causes which determine the general rate of wages in any country at any time. This is a problem to which economists have given much attention, and is one of great complexity. It is difficult, when we consider the immense variety of "occupations" in any civilized country and the constant changes which are taking place, even to form an adequate conception of the general rate of wages. There are thousands of occupations of various kinds, and at first sight it may seem impossible to determine, in a manner sufficiently accurate for any useful purpose, an average or general rate of wages, especially if we attempt to take real and not merely nominal wages. At the same time, in estimating the progress of the working-classes, or in comparing their relative positions in different countries, it is necessary to use this conception of a general rate of wages in a practical manner. The difficulties presented are of the same kind as those met with in the determination of the value of money or the general level of prices, and may be overcome to some extent by the same methods. An "index number" may be formed by taking various kinds of labour as fair samples, and the nominal wages thus obtained may be corrected by a consideration of the elements in the real wages to which they correspond. Care must be taken, however, that the quantity and quality of labour taken at different times and places are the same, just as in the case of commodities similar precautions are necessary. Practically, for example, errors are constantly made by taking the rate of wages for a short time (say an hour), and then, without regard to regularity of employment, constructing the annual rate on this basis; and again, insufficient attention is paid to Adam Smith's pithy caution that "there may be more labour in an hour's hard work than in two hours' easy business." But, however difficult it may be to obtain an accurate measure of the general rate of wages for practical purposes, there can be no doubt as to the value and necessity of the conception in economic theory. For, as soon as it is assumed that industrial competition is the principal economic force in the distribution of the wealth of a community—and this is in reality the fundamental assumption of modern economic science,—a distinction must be drawn between the most general causes which affect all wages and the particular causes which lead to differences of wages in different employments. In other words, the actual rate of wages obtained in any particular occupation depends partly on causes affecting that group compared with others, and partly on the general conditions which determine the relations between labour, capital and production over the whole area in which the industrial competition is effective. (See A. L. Bowley's *Wages in the United Kingdom in the Nineteenth Century* (1900), § 3, for an account of the meaning and use of the average wage.)

Wages-fund theory.

Thus the theory of the wages question consists of two parts, or gives the answers to two questions. (1) What are the causes which determine the general rate of wages? (2) Why are wages in some occupations and at some times and places above or below this general rate?

With regard to the first question, Adam Smith, as in almost every important economic theory, gives an answer which combines two views which were subsequently differentiated into antagonism. "The produce of labour constitutes the natural recompense or wages of labour," is the opening sentence of his chapter on wages. But then he goes on to say that "this original state of things, in which the labourer enjoyed the whole produce of his own labour, could not last beyond the first introduction of the appropriation of land and the accumulation of stock." And he thus arrives at the conclusion that "the demand for those who live by wages, it is evident, cannot increase but in proportion to the increase of the *funds* which are *destined* to the payment of wages." This is the germ of the celebrated wages-fund theory which was carried to an extreme by J. S. Mill and others; and, although Mill abandoned the theory some time before his death, he was unable to eradicate it from his systematic treatise and to reduce it to its proper dimensions. It is important to observe that in the hands of Mill this theory was by no means, as was afterwards maintained by Elliot Cairnes, a mere statement of the problem to be solved. According to Cairnes (*Leading Principles of Political Economy*, bk. ii.), the wages-fund theory, as given in Mill's *Principles* (bk. ii. ch. xi. § 1), embraces the following statements: (1) the wages-fund is a general term used to express the aggregate of all wages at any given time in possession of the labouring population; (2) the average wage depends on the proportion of this fund to the number of people; (3) the amount of the fund is determined by the amount of general wealth applied to the direct purchase of labour. These propositions Cairnes easily reduces to mere verbal statements, and he then states that the real difficulty is to determine the causes which govern the demand and supply of labour. But the most superficial glance, as well as the most careful survey, will convince the reader of Mill's chapters on wages that he regarded the theory not as the statement but as the solution of the problem. For he applies it directly to the explanation of movements in wages, to the criticism of popular remedies for low wages, and to the discovery of what he considers to be legitimate and possible remedies. In fact, it was principally on account of the application of the theory to concrete facts that it aroused so much opposition, which would have been impossible if it had been a mere statement of the problem.

The wages-fund theory as a real attempt to solve the wages question may be resolved into three propositions, which are very different from the verbal truisms of Cairnes. (1) In any country at any time there is a determinate amount of capital unconditionally destined for the payment of labour This is the wages-fund. (2) There is also a determinate number of labourers who must work independently of the rate of wages—that is, whether the rate is high or low. (3) The wages-fund is distributed amongst the labourers solely by means of competition, masters competing with one another for labour, and labourers with one another for work, and thus the average rate of wages depends on the proportion between wage-capital and population. It follows then, according to this view, that wages can only rise either owing to an increase of capital or a diminution of population, and this accounts for the exaggerated importance attached by Mill to the Malthusian theory of population. It also follows from the theory that any restraint of competition in one direction can only cause a rise of wages by a corresponding fall in another quarter, and in this form it was the argument most frequently urged against the action of trade unions. It is worth noting, as showing the vital connexion of the theory with Mill's principles, that it is practically the foundation of his propositions on capital in his first book, and is also the basis of the exposition in his fourth book of the effects of the progress of society on the condition of the working-classes.

It has often been remarked that, in economics as in other sciences, what eventually assumes the form of the development of or supplement to an old theory at first appears as if in direct antagonism to it, and there is reason to think that the criticism of the wages-fund theory was carried to an extreme, and that the essential elements of truth which it contains were overlooked. In many respects the theory may be regarded as a good first approximation to the complete solution of the problem. The plan favoured by some modern economists of regarding wages simply as the price of labour determined as in the case of other prices simply by demand and supply, though of advantage from some points of view, is apt to lead to a maladjustment of emption in other directions. The supply of labour, for example, is in many ways on a different footing from the supply of commodities. The causes which the wages-fund theory emphasizes too exclusively are after all *verae causae*, and must always be taken into account. There can be no doubt, for example, that under certain conditions a rapid increase in the labouring population may cause wages to fall, just as a rapid decline may make them rise. The most striking example of a great improvement in the condition of the labouring classes in English economic history is found immediately after the occurrence of the Black Death in the middle of the 14th century. The sudden and extensive thinning of the ranks of labour was manifestly the principal cause of the great improvement in the condition of the survivors.

Again, as regards the amount of capital competing for labour, the reality of the cause admits of no dispute, at any rate in any modern society. The force of this element is perhaps best seen by taking a particular case and assuming that the general wages-fund of the country is divided into a number of smaller wages-funds. Take, for example, the wages of domestic servants when the payment of wages is made simply for the service rendered. We may fairly assume that the richer classes of the community practically put aside so much of their revenue for the payment of the wages of their servants. The aggregate of these sums is the domestic wages-fund. Now, if owing to any cause the amount available for this purpose falls off, whilst the number of those seeking that class of employment remains the same, the natural result would be a fall in wages. It may of course happen in this as in other cases that the result is not so much a direct fall in the rate of wages as a diminution of employment—but even in this case, if people employ fewer servants, they must do more work. Again, if we were to seek for the reason why the wages of governesses are so low, the essence of the answer would be found in the excessive supply of that kind of labour compared with the funds destined for its support And similarly through the whole range of employments in which the labour is employed in perishable services and not in material products, the wages-fund theory brings into prominence the principal causes governing the rate of wages, namely, the number of people competing, the amount of the fund competed for, and the effectiveness of the competition. This view also is in harmony with the general principles of demand and supply. If we regard labour as a commodity and wages as the price paid for it, then we may say that the price will be so adjusted that the quantity demanded will be made equal to the quantity offered at that price,—the agency by which the equation is reached being competition.

But when we turn to other facts for the verification of the theory we easily discover apparent if not real contradictions. The case of Ireland after the potato famine affords an instance of a rapidly declining population without any corresponding rise in wages, whilst in new countries we often find a very rapid increase of population accompanied by an increase in wages. In a similar manner we find that the capital of a country may increase rapidly without wages rising in proportion—as, for example, seems to have been the case in England after the great mechanical improvements at the end of the 18th century up to the repeal of the Corn Laws—whilst in new countries where wages are the highest there are generally complaints of the scarcity of capital. But perhaps the most striking conflict of the theory with facts is found in the periodical inflations and depressions of trade. After a commercial crisis, when the shock is over and the necessary liquidation has taken place, we generally find that there is a period during which there is a glut of capital and yet wages are low. The abundance of capital is shown by the low rate of interest and the difficulty of obtaining remunerative investments. Accordingly this apparent failure of the theory, at least partially, makes it necessary to examine the propositions into which it was resolved more carefully, in order to discover, in the classical economic phraseology, the "disturbing causes." As regards the first of these propositions—that there is always a certain amount of capital destined for the employment of labour—it is plain that this destination is not really unconditional. In a modern society whether or not a capitalist will supply capital to labour depends on the rate of profit expected, and this again depends proximately on the course of prices. But the theory as stated can only consider profits and prices as acting in an indirect roundabout manner upon wages. If profits are high then more capital can be accumulated and there is a larger wages-fund, and if prices are high there may be some stimulus to trade, but the effect on real wages is considered to be very small In fact Mill writes it down as a popular delusion that high prices make high wages. And if the high prices are due purely to currency causes the criticism is in the main correct, and in some cases, as was shown above, high prices may mean real low wages. If, however, we turn to the great classes of employments in which the labour is embodied in a material product, we find on examination that wages vary with prices in a real and not merely in an illusory sense. Suppose, for example, that, owing to a great increase in the foreign demand for British produce, a rise in prices takes place, there will be a corresponding rise in nominal wages, and in all probability a rise in real wages. Such was undoubtedly the case in Great Britain on the conclusion of the Franco-German War.

On the other hand, if prices fall and profits are low, there will so far be a tendency to contract the employment of labour. At the same time, however, to some extent the capital is applied unconditionally—in other words, without obtaining what is considered adequate remuneration, or even at a positive loss. The existence of a certain amount of fixed capital practically implies the constant employment of a certain amount of labour.

Nor is the second proposition perfectly true, namely, that there are always a certain number of labourers who must work independently of the rate of wages. For the returns of pauperism and other statistics show that there is always a proportion of "floating" labour sometimes employed and sometimes not. Again, although, as Adam Smith says, man is of all luggage the most difficult to be transported, still labour as well as capital may be attracted to foreign fields. The constant succession of strikes resorted to in order to prevent a fall in wages shows that in practice the labourers do not at once accept the "natural" market rate. Still, on the whole, this second proposition is a much more adequate expression of the truth than the first; for labour cannot afford to lie idle or to emigrate so easily as capital.

The third proposition, that the wages-fund is distributed solely by competition, is also found to conflict with facts. Competition may be held to imply in its positive meaning that every individual strives to attain his own economic interests regardless of the interests of others. But in some cases this end may be attained most effectively by means of combination, as, for example, when a number of people combine to create a practical monopoly. Again, the end may be attained by leaving the control to government, or by obeying the unwritten rules of long-established custom. But these methods of satisfying economic interests are opposed to competition in the usual sense of the term, and certainly as used in reference to labour. Thus on the negative side competition implies that the economic interests of the persons concerned are attained neither by combination, nor by law, nor by custom. Again, it is also assumed, in making competition the principal distributing force of the national income, that every person knows what his real interests are, and that there is perfect mobility of labour both from employment to employment and from place to place. Without these assumptions the wages-fund would not be evenly distributed according to the quantity of labour. It is, however, obvious that, even in the present industrial system, competition is modified considerably by these disturbing agencies; and in fact the tendency seems to be more and more for combinations of masters on one side and of men on the other to take the place of the competition of individuals.

Wages paid from the produce of labour.

The attempted verification of the wages-fund theory leads to so many important modifications that it is not surprising to find that in recent times the tendency has been to reject it altogether. And thus we arrive at the development of Adam Smith's introductory statement, namely, that the produce of labour constitutes the natural recompense or wages of labour. The most important omission of the wages-fund theory is that it fails to take account of the quantity produced and of the price obtained for the product. If we bring in these elements, we find that there are several other causes to be considered besides capital, population and competition. There are, for example, the various factors in the efficiency of labour and capital, in the organization of industry, and in the general condition of trade. To some extent these elements may be introduced into the old theory, but in reality the point of view is quite different. This is made abundantly clear by considering Mill's treatment of the remedies for low wages. His main contention is that population must be rigidly restrained in order that the average rate of wages may be kept up. But, as several American economists have pointed out, in new countries especially every increase in the number of labourers may be accompanied by a more than proportionate increase in the produce and thus in the wages of labour. Again, the older view was that capital must be first accumulated in order afterwards to be divided up into wages, as if apparently agriculture was the normal type of industry, and the workers must have a store to live on until the new crop was grown and secured. But the "produce" theory of wages considers that wages are paid continuously out of a continuous product, although in some cases they may be advanced out of capital or accumulated stores. According to this view wages are paid out of the annual produce of the land, capital and labour, and not out of the savings of previous years. There is a danger, however, of pushing this theory to an untenable extreme, and overlooking altogether the function of capital in determining wages; and the true solution seems to be found in a combination of the "produce" theory with the "fund" theory.

An industrial society may be regarded, in the first place, as a great productive machine turning out a vast variety of products for the consumption of the members of the society. The distribution of these products, so far as it is not modified by other social and moral conditions, depends upon the principle of "reciprocal demand." In a preliminary rough classification we may make three groups—the owners of land and natural agents, the owners of capital or reserved products and instruments, and the owners of labour. To obtain the produce requisite even for the necessary wants of the community a combination of these three groups must take place, and the relative reward obtained by each will vary in general according to the demands of the others for its services. Thus, if capital, both fixed and circulating, is scanty, whilst labour and land are both abundant, the reward of capital will be high relatively to rent and wages. This is well illustrated in the high rate of profits obtained in early societies. According to this view of the question the aggregate amount paid in wages depends partly on the general productiveness of all the productive agents and partly on the relative power of the labourers as compared with the owners of land and capital (the amount taken by government and individuals for taxes, charity, &c., being omitted). Under a system of perfect industrial competition the general rate of wages would be so adjusted that the demand for labour would be just equal to the supply at that rate. (Compare Marshall's *Principles of Economics*, bk. vi. ch. ii.)

Relative wages.

If all labour and capital were perfectly uniform it would not be necessary to carry the analysis further, but as a matter of fact, instead of two great groups of labourers and capitalists, we have a multitude of subdivisions all under the influence of reciprocal demand. Every subgroup tries to obtain as much as possible of the general product, which is practically always measured in money. The determination of relative wages depends on the constitution of these groups and their relations to one another. Under any given social conditions there must be differences of wages in different employments, which may be regarded as permanent until some change occurs in the conditions; in other words, certain differences of wages are stable or normal, whilst others depend simply on temporary fluctuations in demand and supply. A celebrated chapter in the *Wealth of Nations* (bk. i. ch. x.) is still the best basis for the investigation of these normal differences—which, as stated above, is the *second* principal problem of the wages question. First of all, a broad distinction may be drawn between the natural and artificial causes of difference, or, in Adam Smith's phraseology, between those due to the nature of the employments and those due to the policy of Europe. In the former division we have (1) the agreeableness or disagreeableness of the employment, illustrated by two classical examples —"honour makes a great part of the reward of all honourable professions," and "the most detestable of all employments—that of public executioner—is, in proportion to the work done, better paid than any common trade whatever." There is, however, much truth in Mill's criticism, that in many cases the worst paid of all employments are at the same time the most disagreeable, simply because those engaged in them have practically no other choice. (2) The easiness and cheapness or the reverse of learning the business. This factor operates in two ways. A difficult business implies to some extent peculiar natural qualifications, and it also involves the command of a certain amount of capital to subsist on during the process of learning, and thus in both respects the natural supply of labour is limited. (3) The constancy or inconstancy in the employment—a point already noticed under real wages. (4) The great or small trust reposed in the workmen, an important consideration in all the higher grades of labour, *e.g.* bankers, lawyers, doctors, &c. (5) The chance of success or the reverse. Here it is to be observed that, owing to the hopefulness of human nature and its influence on the gambling spirit, the chance of success is generally overestimated, and therefore that the wages in employments where the chance of success is really small are lower than they ought to be. The most striking instance is furnished by the labour in gold mines, diamond fields, and the like, and the same cause also operates in many of the professions.

Natural causes of difference.

All these causes of differences of wages in different employments may be explained by showing the way in which they operate on the demand and supply of labour in the particular group. If the "net advantages," to adopt Marshall's phraseology, of any group are relatively high, then labour will be directly attracted to that group, and the children born in it will be brought up to the same occupation, and thus in both ways the supply of labour will be increased. But the "net advantages" embrace the conditions just enumerated. Again, if the other members of the community require certain forms of labour to a greater extent, there is an increase in the demand and a rise in their price.

In addition to these so-called natural causes of difference, there are those arising from law, custom, or other so-called artificial causes. They may be classified under four headings. (1) Certain causes artificially restrain industrial competition by limiting the number of any particular group. Up to the close of the 18th century, and in many instances to a much later date, the regulations of gilds and corporations limited the numbers in each trade (cf. Brentano, *Gilds and Trade Unions*). This they did by making a long apprenticeship compulsory on those wishing to learn the craft, by restricting the number of apprentices to be taken by any master, by exacting certain qualifications as to birth or wealth, by imposing heavy entrance fees, either in money or in the shape of a useless but expensive masterpiece. Some of these regulations were originally passed in the interests of the general public and of those employed in the craft, but in the course of time their effect was, as is stated by Adam Smith, simply to unduly restrain competition. The history of the craft-gilds is full of instructive examples of the principles governing wages. No doubt the regulations tended to raise wages above the natural rate, but as a natural consequence industry migrated to places where the oppressive regulations did not exist. In the time of the Tudors the decay of many towns during a period of rapid national progress was largely due to those "fraternities in evil," as Bacon called the gilds. At present one of the best examples of the survival of this species of artificial restriction is the limitation of the number of teachers qualifying for degrees in certain universities. (2) In some employments, however, law and custom tend unduly to increase the amount of competition. This was to a great extent the case in the church and the scholastic professions owing to the large amount of charitable education. Adam Smith points out that even in his day a curate was "passing rich on forty pounds a year," whilst many only obtained £20—below the wages earned by a journeyman shoemaker. In the same way state-aided education of a commercial and technical kind may result in lowering the rates (relatively) of the educated business classes. It is said that one reason why the Germans replace Englishmen in many branches is that, having obtained their education at a low rate, there are more of them qualified, and consequently they accept lower wages. The customary idea that the position of a clerk is more genteel than that of an artisan accounts largely for the excessive competition in the former class, especially now that education is practically universal. (3) In some cases law and custom may impede or promote the circulation of labour. At the time Adam Smith wrote the laws of settlement were still in full operation. "There is not a man of forty who has not felt most cruelly oppressed by this ill-contrived law of settlement." Differences in wages in different parts of the same country and in different occupations are still largely due to impediments in the way of the movement of labour, which might be removed or lessened by the government making provisions for migration or emigration. (4) On many occasions in the past the law often directly interfered to regulate wages. The Statute of Labourers, passed immediately after the Black Death, was an attempt in this direction, but it appears to have failed, according to the investigations of Thorold Rogers. The same writer, however, ascribes to the celebrated Statute of Apprentices (5th of Elizabeth) the degradation of the English labourer for nearly three centuries (*Agriculture and Prices*, vol. v.). This, he asserts, was due to the wages being fixed by the justices of the peace. It is, however, worth noting that Brentano, who is equally sympathetic with the claims of labour, asserts that so long as this statute was actually enforced, or the customs founded upon it were observed, the condition of the labourers was prosperous, and that the degradation only began when the statute fell into disuse (*Origin of Gilds and Trade Unions*. For a full account of the effect of the Statute of Apprentices see W. Cunningham's *Growth of English Industry and Commerce*, vol. ii.).

Artificial causes of difference.

State regulation of wages.

Something must be said as to the power of the state to regulate wages. As far as any direct regulation is concerned, it seems to be only possible within narrow limits. The state might of course institute certain complex sliding-scales for different classes of labour and make them compulsory, but this would rather be an official declaration of the natural market rate than a direct regulation. Any rate which the state of trade and prices would not bear could not be enforced: masters could not be compelled to work at a loss or to keep their capital employed when it might be more advantageously transferred to another place or occupation. Thus the legal rate could not exceed to any considerable extent the market rate. Nor, on the other hand, could a lower rate in general be enforced, especially when the labourers have the right of combination and possess powerful organizations. And even apart from this the competition of capitalists for labour would tend to raise wages above the legal rate, and evasion would be extremely easy.

Poor relief in aid of wages.

The best illustration of the failure to raise the rate of wages directly by authority is found in the English poor law system between 1796 and 1834. "In the former year (1796) the decisively fatal step of legalizing out-relief to the able-bodied, and *in aid of wages*, was taken," and "in February 1834 was published perhaps the most remarkable and startling document to be found in the whole range of English, perhaps indeed of all social history" (Fowle's *Poor Law*). The essence of the system was in the justices determining a natural rate of wages, regard being paid to the price of necessaries and the size of the labourer's family, and an amount was given from the rates sufficient to make up the wages received to this natural level. The method of administration was certainly bad, but the best administration possible could only have kept the system in existence a few years longer. In one parish the poor-rate had swallowed up the whole value of the land, which was going out of cultivation, a fact which has an obvious bearing on land nationalization as a remedy for low wages. The labourers became careless, inefficient and improvident. Those who were in regular receipt of relief were often better off (in money) than independent labourers. But the most important consequence was that the real wages obtained were, in spite of the relief, lower than otherwise they would have been, and a striking proof was given that wages are paid out of the produce of labour. The *Report of the Poor Law Commissioners* (1834) states emphatically (p. 48) that "the severest sufferers are those for whose benefit the system is supposed to have been introduced and to be perpetuated, the labourers and their families." The independent labourers suffered directly through the unfair competition of the pauper labour, but, as one of the sub-reporters stated, in every district the general condition of the independent labourer was strikingly distinguishable from that of the pauper and superior to it, though the independent labourers were commonly maintained upon less money. In New Zealand and Australia in recent years a great extension has been made of the principle of state intervention in the regulation of wages.

Factory legislation.

But, although the direct intervention of the state, with the view of raising the nominal rates of wages, is, according to theory and experience, of doubtful advantage, still, when we consider real wages in the evident sense of the term, there seems to be an almost indefinite scope for state interference. The effect of the Factory Acts and similar legislation has been undoubtedly to raise the real wages of the working-classes as a whole, although at first the same arguments were used in opposition to these proposals as in the case of direct relief from the poor-rates. But there is a vital difference in the two cases, because in the former the tendency is to increase whilst in the latter it is to diminish the energy and self-reliance of the workers. An excellent summary of the results of this species of industrial legislation is given by John Morley (*Life of Cobden*, vol. i. p. 303):—

> "We have to-day a complete, minute, and voluminous code for the protection of labour. buildings must be kept pure of effluvia; dangerous machinery must be fenced; children and young persons must not clean it while in motion; their hours are not only limited but fixed; continuous employment must not exceed a given number of hours, varying with the trade but prescribed by the law in given cases; a statutable number of holidays is imposed; the children must go to school, and the employer must have every week a certificate to that effect; if an accident happens notice must be sent to the proper authorities; special provisions are made for bake-houses, for lace-making, for collieries, and for a whole schedule of other special callings; for the due enforcement and vigilant supervision of this immense host of minute prescriptions there is an immense host of inspectors, certifying surgeons, and other authorities whose business it is to 'speed and post o'er land and ocean' on sullen guardianship of every kind of labour, from that of the woman who plaits straw at her cottage door to the miner who descends into the bowels of the earth and the seaman who conveys the fruits and materials of universal industry to and fro between the remotest parts of the globe."

The analysis previously given of real wages shows that logically all these improvements in the conditions of labour, by diminishing the "quantity of labour" involved in work, are equivalent to a real rise in wages. Experience has also shown that the state may advantageously interfere in regulating the methods of paying wages. A curious poem, written about the time of Edward IV., on England's commercial policy (*Political Songs and Poems*, Rolls Series, ii. 282), shows that even in the 15th century the "truck" system was in full operation, to the disadvantage of the labourers. The cloth-makers, in particular, compelled the workers to take half of their wages in merchandise which they estimated at higher than its real value. The writer proposes that the "wyrk folk be paid in good moné," and that a sufficient ordinance be passed for the purpose, and a law to this effect was enacted in the 4th year of Edward IV. The Truck Acts have since been much further extended. Again, the legislation directed against the adulteration of all kinds of goods, which also finds its prototypes in the middle ages, is in its effects equivalent to a rise in real wages.[1]

Trade unions and wages.

The power of trade unions in regulating wages is in most respects analogous in principle to that of legislation just noticed. Nominal wages can only be affected within comparatively narrow limits, depending on the condition of trade and the state of prices, whilst in many cases a rise in the rate in some trades or places can only be accomplished by a corresponding depression elsewhere. At the same time, however, it can hardly be questioned that through the unions nominal wages have on the whole risen at the expense of profits—that is to say, that combinations of labourers can make better bargains than individuals. But the debatable margin which may make either extra profits or extra wages is itself small, and the principal direct effect of trade unions is to make wages fluctuate with prices, a rise at one time being compensated by a fall at another. The unions can, however, look after the interests of their members in many ways which improve their general condition or raise the real rate of wages, and when nominal wages have attained a natural maximum, and some method of arbitration or sliding-scale is in force, this indirect action seems the principal function of trade unions. The effects of industrial partnership (cf. Sedley Taylor's *Profit Sharing*) and of productive co-operation (cf. Holyoake's *History of Co-operation*) are small in amount (compared with the total industry of any country) though excellent in kind, and there seem to be no signs of the decay of the *entrepreneur* system.

Effects of machinery on wages.

The industrial revolution which took place about the end of the 18th century, involving radical changes in production, destroyed the old relations between capital and labour, and perhaps the most interesting part of the history of wages is that covered by the 19th century. For fifty years after the introduction of production on a large scale, the condition of the working-classes was on the whole deplorable, but great progress has since been made. The principal results may be summed up under the effects of machinery on wages—taking both words in their widest sense. Machinery affects the condition of the working-classes in many ways. The most obvious mode is the direct substitution of machinery for labour. It is clear that any sudden and extensive adoption of labour-saving machinery may, by throwing the labourers out of employment, lower the rate of wages, and it is easy to understand how riots arose repeatedly owing to this cause. But as a rule the effect of labour-saving machinery in diminishing employment has been greatly exaggerated, because two important practical considerations have been overlooked. In the first place, any radical change made in the methods of production will be only gradually and continuously adopted throughout the industrial world; and in the second place these radical changes, these discontinuous leaps, tend to give place to advances by small *increments* of *invention*. We have an instance of a great radical change in the steam-engine. Watt's patent for "a method of lessening" the consumption of steam and fuel in fire-engines was published on January 5, 1769, and the movement for utilizing steam-power still found room for extension for a century or more afterwards. The history of the power-loom again shows that the adoption of an invention is comparatively slow. In 1813 there were not more than 2400 power-looms at work in England. In 1820 they increased to 14,150. In 1853 there were 100,000, but the curious thing is that during this time the number of hand-looms had actually *increased* to some extent (Porter's *Progress of the Nation*, p. 186). The power-loom also illustrates the gradual continuous growth of improvements. This is clearly shown by Porter. A very good hand-weaver, twenty-five or thirty years of age, could weave two pieces of shirting per week. In 1823 a steam-loom weaver, about fifteen years of age, attending two looms, could weave nine similar pieces in a week. In 1826 a steam-loom weaver, about fifteen, attending to four looms, could weave twelve similar pieces a week. In 1833 a steam-loom weaver, from fifteen to twenty, assisted by a girl of twelve, attending to four looms, could weave eighteen pieces. This is only one example, for, as Porter remarks, it would fill many large volumes to describe the numerous inventions which during the 19th century imparted facility to manufacturing processes, and in every case we find a continuity in the improvements. This twofold progressive character of invention operates in favour of the labourer—in the first place, because in most cases the increased cheapness of the commodity consequent on the use of machinery causes a corresponding extension of the market and the amount produced, and thus there may be no actual diminution of employment even temporarily; and secondly, if the improvement takes place slowly, there is time for the absorption of the redundant labour in other employments. It is quite clear that on balance the great increase in population in the 19th century was largely caused, or rather rendered possible, by the increased use of labour-saving machinery. The way in which the working-classes were at first injured by the adoption of machinery was not so much by a diminution in the number of hands required as by a change in the nature of the employment. Skilled labour of a certain kind lost its peculiar value, and children and women were able to do work formerly only done by men. But the principal evils resulted from the wretched conditions under which, before the factory legislation, the work was performed; and there is good reason to believe that a deterioration of the type of labourer, both moral and physical, was effected. It is, however, a mistake to suppose that on the whole the use of machinery tends to dispense with skill. On the contrary, everything goes to prove that under the present system of production on a large scale there is on the whole far more skill required than formerly—a fact well brought out by Sir Robert Giffen in his essay on the progress of the working-classes (*Essays on Finance*, vol. ii. p. 365), and expressed by the official reports on wages in different countries. (J. S. N.)

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[1] On this subject compare Jevons, *The State in Relation to Labour*, new edition by F. A. Hirst.

Progress of the working-classes.

WAGGA-WAGGA, a town of Wynyard county, New South Wales, Australia, on the left bank of the river Murrumbidgee, 309 m. by rail W.S.W. of Sydney and 267 m. N.E. of Melbourne. Pop. (1901) 5114. The Murrumbidgee is here spanned by a steel viaduct, the approaches of which are formed by heavy embankments. Wagga-Wagga has a school of art with a library attached, a fine convent picturesquely situated on Mount Erin, a good racecourse and agricultural show-grounds. There is a considerable amount of gold-mining in the district, which, however, is chiefly pastoral, although cereals, tobacco and wine are produced in considerable quantities.

WAGNER, ADOLF (1835-   ), German economist, was born at Erlangen on the 25th of March 1835. Educated at Göttingen and Heidelberg, he was professor of political science at Dorpat and Freiburg, and after 1870 at Berlin. A prolific writer on economic problems, he brought out in his study of the subject the close relation which necessarily exists between economics and jurisprudence. He ranks without doubt as one of the most eminent German economists and a distinguished leader of the historical school. His leanings towards Christian socialism made him one of those to whom the appellation of "Katheder-Socialisten" or "socialists of the (professional) chair" was applied, and he was one of the founders of the *Verein für Socialpolitik*. In 1871 he undertook, in conjunction with Professor E. Nasse (1829–1890), a new edition of Rau's *Lehrbuch der politischen Ökonomie*, and his own special contributions, the *Grundlegung* and *Finanzwissenschaft*, afterwards published separately, are probably his most important works. He approaches economic studies from the point of view that the doctrine of the *jus naturae*, on which the physiocrats reared their economic structure, has lost its hold on belief, and that the old a priori and absolute conceptions of personal freedom and property have given way with it. He lays down that the economic position of the individual, instead of depending merely on so-called natural rights or even on his natural powers, is conditioned by the contemporary juristic system, which is itself an historical product. These conceptions, therefore, of freedom and property, half economic, half juristic, require a fresh examination. Wagner accordingly investigates, before anything else, the conditions of the economic life of the community, and in subordination to this, determines the sphere of the economic freedom of the individual. Among his works are *Beiträge zur Lehre von den Banken* (1857), *System der deutschen Zettelbankgesetzgebung* (1870–1873) and *Agrar- und Industriestaat* (1902).

His brother, HERMANN WAGNER (1840-   ), a distinguished geographer, joined the Geographical Institute of Justus Perthes in 1868, and was editor of the statistical section of the *Gothaer Almanack* up to 1876. In 1872 he founded *Die Bevölkerung der Erde*, a critical review of area and population, and in 1880 he was appointed professor of geography at Göttingen. He was editor of the *Geographisches Jahrbuch* from 1880 to 1908. His publications include *Lehrbuch der Geographie* (7th ed., 1903) and *Methodischer Schulatlas* (12th ed., 1907).

WAGNER, RUDOLPH (1805–1864), German anatomist and physiologist, was born on the 30th of June 1805 at Bayreuth, where his father was a professor in the gymnasium. He began the study of medicine at Erlangen in 1822, and finished his curriculum in 1826 at Würzburg, where he had attached himself mostly to J. L. Schönlein in medicine and to K. F. Heusinger in comparative anatomy. Aided by a public *stipendium*, he spent a year or more studying in the Jardin des Plantes, under the friendly eye of Cuvier, and in making zoological discoveries at Cagliari and other places on the Mediterranean. On his return he set up in medical practice at Augsburg, whither his father had been transferred; but in a few months he found an opening for an academical career, on being appointed prosector at Erlangen. In 1832 he became full professor of zoology and comparative anatomy there, and held that office until 1840, when he was called to succeed J. F. Blumenbach at Göttingen. At the Hanoverian university he remained till his death, being much occupied with administrative work as pro-rector for a number of years, and for nearly the whole of his residence troubled by ill-health (phthisis). In 1860 he gave over the physiological part of his teaching to a new chair, retaining the zoological, with which his career had begun. While at Frankfurt, on his way to examine the Neanderthal skull at Bonn, he was struck with paralysis, and died at Göttingen a few months later on the 13th of May 1864.

Wagner's activity as a writer and worker was enormous, and his range extensive, most of his hard work having been done at Erlangen while his health was good. His graduation thesis was on the ambitious subject of "the historical development of epidemic and contagious diseases all over the world, with the laws of their diffusion," which showed the influence of Schönlein. His first treatise was *Die Naturgeschichte des Menschen* (in 2 vols., Kempten, 1831). Frequent journeys to the Mediterranean, the Adriatic, and the North Sea gave him abundant materials for research on invertebrate anatomy and physiology, which he communicated first to the Munich academy of sciences, and republished in his *Beiträge zur vergleichenden Physiologie des Blutes* (Leipzig, 1832–1833), with additions in 1838). In 1834–1835 he brought out a text-book on the subject of his chair (*Lehrbuch der vergleichenden Anatomie*, Leipzig), which recommended itself to students by its clear and concise style. A new edition of it appeared in 1843 under the title of *Lehrbuch der Zootomie*, of which only the vertebrate section was corrected by himself. The precision of his earlier work is evidenced by his *Micrometric Measurements of the Elementary Parts of Man and Animals* (Leipzig, 1834). His zoological labours may be said to conclude with the atlas *Icones zootomicae* (Leipzig, 1841). In 1835 he communicated to the Munich academy of sciences his researches on the physiology of generation and development, including the famous discovery of the germinal vesicle of the human ovum. These were republished under the title *Prodromus historiae generationis hominis atque animalium* (Leipzig, 1836). As in zoology, his original researches in physiology were followed by a students' text-book, *Lehrbuch der speciellen Physiologie* (Leipzig, 1838), which soon reached a third edition, and was translated into French and English. This was supplemented by an atlas, *Icones physiologicae* (Leipzig, 1839). To the same period belongs a very interesting but now little known work on medicine proper, of a historical and synthetic scope, *Grundriss der Encyklopädie und Methodologie der medicinischen Wissenschaften nach geschichtlicher Ansicht* (Erlangen, 1838), which was translated into Danish. About the same time he worked at a translation of J. C. Prichard's *Natural History of Man*, and edited various writings of S. T. Sömmerring, with a biography of that anatomist (1844), which he himself fancied most of all his writings. In 1843, after his removal to Göttingen, he began his great *Handwörterbuch der Physiologie, mit Rücksicht auf physiologische Pathologie*, and brought out the fifth (supplementary) volume in 1852; the only contributions of his own in it were on the sympathetic nerve, nerve-ganglia and nerve-endings, and he modestly disclaimed all merit except as being the organizer. While resident in Italy for his health from 1845 to 1847, he occupied himself with researches on the electrical organ of the torpedo and on nervous organization generally; these he published in 1853–1854 (*Neurologische Untersuchungen*, Göttingen), and therewith his physiological period may be said to end. His next period was stormy and controversial. He entered the lists boldly against the materialism of "Stoff und Kraft," and avowed himself a Christian believer, whereupon he lost the countenance of a number of his old friends and pupils, and was unfeelingly told that he was suffering from an "atrophy of the brain." His quarrel with the materialists began with his oration at the Göttingen meeting of the Naturforscher-Versammlung in 1854, on "Menschenschöpfung und Seelensubstanz." This was followed by a series of "Physiological Letters" in the *Allgemeine Zeitung*, by an essay on "Glauben und Wissen," and by the most important piece of this series, "Der Kampf um die Seele" (Göttingen, 1857). Having come to the consideration of these philosophical problems late in life, he was at some disadvantage; but he endeavoured to join as he best could in the current of contemporary German thought. He had an exact knowledge of classical German writings, more especially of Goethe's, and of the literature connected with him. In what may be called his fourth and last period, Wagner became anthropologist and archaeologist, occupied himself with the cabinet of skulls in the Göttingen museum collected by Blumenbach and with the excavation of prehistoric remains, corresponded actively with the anthropological societies of Paris and London, and organized, in co-operation with the veteran K. E. von Baer, a successful congress of anthropologists at Göttingen in 1861. His last writings were memoirs on the convolutions of the human brain, on the weight of brains, and on the brains of idiots (1860–1862).

See memoir by his eldest son in the *Göttinger gelehrte Anzeigen*, "Nachrichten" for 1864.

WAGNER, WILHELM RICHARD (1813–1883), German dramatic composer, poet and essay-writer, was born at Leipzig on the 22nd of May 1813. In 1822 he was sent to the Kreuzschule at Dresden, where he did so well that, four years later, he translated the first twelve books of the *Odyssey* for amusement. In 1828 he was removed to the Nicolaischule at Leipzig, where he was less successful. His first music master was Gottlieb Müller, who thought him self-willed and eccentric; and his first production as a composer was an overture, performed at the Leipzig theatre in 1830. In that year he matriculated at the university, and took lessons in composition from Theodor Weinlig, cantor at the Thomasschule. A symphony was produced at the Gewandhaus concerts in 1833, and in the following year he was appointed conductor of the opera at Magdeburg. The post was unprofitable, and Wagner's life at this period was very unsettled. He had composed an opera called *Die Feen* adapted by himself from Gozzi's *La Donna Serpente*, and another, *Das Liebesverbot*, founded on Shakespeare's *Measure for Measure*, but only *Das Liebesverbot* obtained a single performance in 1836.

In that year Wagner married Wilhelmina Planer, an actress at the theatre at Königsberg. He had accepted an engagement there as conductor; but, the lessee becoming bankrupt, the scheme was abandoned in favour of a better appointment at Riga. Accepting this, he remained actively employed until 1839, when he made his first visit to Paris, taking with him an unfinished opera based on Bulwer Lytton's *Rienzi*, and, like his earlier attempts, on his own libretto. The venture proved most unfortunate. Wagner failed to gain a footing, and *Rienzi*, destined for the Grand Opera, was rejected. He completed it, however, and in 1842 it was produced at Dresden, where, with Madame Schroeder Devrient and Herr Tichatschek in the principal parts, it achieved a success which went far to make him famous.

But though in *Rienzi* Wagner had shown energy and ambition, that work was far from representing his preconceived ideal. This he now endeavoured to embody in *Der fliegende Holländer*, for which he designed a libretto quite independent of any other treatment of the legend. The piece was warmly received at Dresden on the 2nd of January 1843; but its success was by no means equal to that of *Rienzi*. Spohr, however, promptly discovered its merits, and produced it at Cassel some months later, with very favourable results.

On the 2nd of February 1843 Wagner was formally installed as Hofkapellmeister at the Dresden theatre, and he soon set to work on a new opera. He chose the legend of Tannhäuser, collecting his materials from the ancient *Tannhäuser-Lied*, the *Volksbuch*, Tieck's poetical *Erzählung*, Hoffmann's story of *Der Sängerkrieg*, and the medieval poem on *Der Wartburgkrieg*. This last-named legend introduces the incidental poem of "Loherangrin," and so led Wagner to the study of Wolfram von Eschenbach's *Parzival* and *Titurel*, with great results later on. But for the present he confined himself to the subject in hand; and on the 19th of October 1845 he produced his *Tannhäuser*, with Schroeder Devrient, Johanna Wagner,[1] Tichatschek and Mitterwurzer in the principal parts. Notwithstanding this powerful cast, the success of the new work was not brilliant, for it carried still further the principles embodied in *Der fliegende Holländer*, and the time was not ripe for them. But Wagner boldly fought for them, and might have prevailed earlier had he not taken part in the political agitations of 1849, after which his position in Dresden became untenable. In fact, after the flight of the king and the subsequent suppression of the riots, a warrant was issued for his arrest; and he had barely time to escape to Weimar, where Liszt was at that moment engaged in preparing *Tannhäuser* for performance, before the storm burst upon him with alarming violence. In all haste Liszt procured a passport and escorted his guest as far as Eisenach. Wagner fled to Paris and thence to Zürich, where he lived in almost unbroken retirement until the autumn of 1859. During this period most of his prose works—including *Oper und Drama*, *Über das Dirigieren*, *Das Judentum in der Musik*—were given to the world.

The medieval studies which Wagner had begun for his work at the libretto of *Tannhäuser* bore rich fruit in his next opera *Lohengrin*, in which he also developed his principles on a larger scale and with a riper technique than hitherto. He had completed the work before he fled from Dresden, but could not get it produced. But he took the score with him to Paris, and, as he himself tells us, "when ill, miserable and despairing, I sat brooding over my fate, my eye fell on the score of my *Lohengrin*, which I had totally forgotten. Suddenly I felt something like compassion that the music should never sound from off the death-pale paper. Two words I wrote to Liszt; his answer was the news that preparations were being made for the performance of the work, on the grandest scale that the limited means of Weimar would permit. Everything that care and accessories could do was done to make the design of the piece understood. Liszt saw what was wanted at once, and did it. Success was his reward; and with this success he now approaches me, saying "See, we have come thus far; now create us a new work, that we may go further.".

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[1] The composer's niece.

Lohengrin was, in fact, produced at Weimar under Liszt's direction on the 28th of August 1850. It was a severe trial to Wagner not to hear his own work, but he knew that it was in good hands, and he responded to Liszt's appeal for a new creation by studying the *Nibelungenlied* and gradually shaping it into a gigantic tetralogy. At this time also he first began to lay out the plan of *Tristan und Isolde*, and to think over the possibilities of *Parsifal*.

During his exile Wagner matured his plans and perfected his musical style; but it was not until some considerable time after his return that any of the works he then meditated were placed upon the stage. In 1855 he accepted an invitation to London, where he conducted the concerts of the Philharmonic Society with great success. In 1857 he completed the libretto of *Tristan und Isolde* at Venice, adopting the Celtic legend modified by Gottfried of Strasburg's medieval version. But the music was delayed until the strange incident of a message from the emperor of Brazil encouraged Wagner to complete it in 1859. In that year Wagner visited Paris for the third time; and after much negotiation, in which he was nobly supported by the Prince and Princess Metternich, *Tannhäuser* was accepted at the Grand Opera. Magnificent preparations were made; it was rehearsed 164 times, 14 times with the full orchestra; and the scenery and dresses were placed entirely under the composer's direction. More than £8000 was expended upon the venture; and the work was performed for the first time in the French language and with the new Venusberg music on the 13th of March 1861. But, for political reasons, a powerful clique was determined to suppress Wagner. A scandalous riot was inaugurated by the members of the Parisian Jockey Club, who interrupted the performance with howls and dog-whistles; and after the third representation the opera was withdrawn. Wagner was broken-hearted. But the Princess Metternich continued to befriend him, and by 1861 she had obtained a pardon for his political offences, with permission to settle in any part of Germany except Saxony. Even this restriction was removed in 1862

Wagner now settled for a time in Vienna, where *Tristan und Isolde* was accepted, but abandoned after fifty-seven rehearsals, through the incompetence of the tenor. *Lohengrin* was, however, produced on the 15th of May 1861, when Wagner heard it for the first time. His circumstances were now extremely straitened; it was the darkness before dawn. In 1863 he published the libretto of *Der Ring des Nibelungen*. King Ludwig of Bavaria was much struck with it, and in 1864 invited Wagner, who was then at Stuttgart, to come to Munich and finish his work there. Wagner accepted with rapture. The king gave him an annual grant of 1200 gulden (£120), considerably enlarging it before the end of the year, and placing a comfortable house in the outskirts of the city at his disposal. The master expressed his gratitude in a "Huldigungsmarsch." In the autumn he was formally commissioned to proceed with the tetralogy and to furnish proposals for the building of a theatre and the foundation of a Bavarian music school. All promised well, but no sooner did his position seem assured than a miserable court intrigue was formed against him. His political indiscretions at Dresden were made the excuse for bitter persecutions: scandalmongers made his friendship with the ill-fated king a danger to both; and Wagner was obliged to retire to Triebschen near Lucerne for the next six years.

On the 10th of June 1865 at Munich, *Tristan und Isolde* was produced for the first time, with Herr and Frau Schnorr in the principal parts. *Die Meistersinger von Nürnberg*, first sketched in 1845, was completed in 1867 and first performed at Munich under the direction of Hans von Bülow on the 21st of June 1868. The story, though an original one, is founded on the character of Hans Sachs, the poet-shoemaker of Nuremberg. The success of the opera was very great; but the production of the Nibelung-tetralogy as a whole still remained impracticable, though *Das Rheingold* and *Die Walküre* were performed, the one on the 22nd of September 1869 and the other on the 26th of June 1870. The scheme for building a new theatre at Munich having been abandoned, there was no opera-house in Germany fit for so colossal a work. A project was therefore started for the erection of a suitable building at Bayreuth (*q.v.*). Wagner laid the first stone of this in 1872, and the edifice was completed, after almost insuperable difficulties, in 1876.

After this Wagner resided permanently at Bayreuth, in a house named Wahnfried, in the garden of which he built his tomb. His first wife, from whom he had parted since 1861, died in 1865; and in 1870 he was united to Liszt's daughter Cosima, who had previously been the wife of von Bülow. Meantime *Der Ring des Nibelungen* was rapidly approaching completion, and on the 13th of August 1876 the introductory portion, *Das Rheingold*, was performed at Bayreuth for the first time as part of the great whole, followed on the 14th by *Die Walküre*, on the 16th by *Siegfried* and on the 17th by *Götterdämmerung*. The performance, directed by Hans Richter, excited extraordinary attention; but the expenses were enormous, and burdened the management with a debt of £7500. A small portion of this was raised (at great risk) by performances at the Albert Hall in London, conducted by Wagner and Richter, in 1877. The remainder was met by the profits upon performances of the tetralogy at Munich.

Wagner's next and last work was *Parsifal*, based upon the legend of the Holy Grail, as set forth, not in the legend of the *Morte d'Arthur*, but in the versions of Chrestien de Troyes and Wolfram von Eschenbach and other less-known works. The libretto was complete before his visit to London in 1877. The music was begun in the following year, and completed at Palermo on the 13th of January 1882. The first sixteen performances took place at Bayreuth, in July and August 1882, under Wagner's own directing, and fully realized all expectations.

Unhappily the exertion of directing so many consecutive performances seems to have been too much for the veteran master's strength, for towards the close of 1882 his health began to decline rapidly. He spent the autumn at Venice, and was well enough on Christmas Eve to conduct his early symphony (composed in 1833) at a private performance given at the Liceo Marcello. But late in the afternoon of the 13th of February 1883 his friends were shocked by his sudden death from heart-failure.

Wagner was buried at Wahnfried in the tomb he had himself prepared, on the 18th of February; and a few days afterwards King Ludwig rode to Bayreuth alone, and at dead of night, to pay his last tribute to the master of his world of dreams.

(W. S. R.; D. F. T.)

In the articles on MUSIC and OPERA, Wagner's task in music-drama is described, and it remains here to discuss his progress in the operas themselves. This progress has perhaps no parallel in any art, and certainly none in music, for even Beethoven's progress was purely an increase in range and power. Beethoven, we know, lost sympathy with his early works as he grew older; but that was because his later works absorbed his interest, not because his early works misrepresented his ideals. Wagner's earlier works have too long been treated as if they represented the pure and healthy childhood of his later ideal; as if *Lohengrin* stood to *Parsifal* as Haydn, Mozart and early Beethoven stand to Beethoven's last quartets. But Wagner never thus represented the childhood of an ideal, though he attained the manhood of the most comprehensive ideal yet known in art. To change the metaphor—the ideal was always in sight, and Wagner never swerved from his path towards it; but that path began in a blaze of garish false lights, and it had become very tortuous before the light of day prevailed. Beethoven was trained in the greatest and most advanced musical tradition of his time. For all his Wagnerian impatience, his progress was no struggle from out of a squalid environment; on the contrary, one of his latest discoveries was the greatness of his master Haydn. Now Wagner's excellent teacher Weinlig did certainly, as Wagner himself testifies, teach him more of good music than Beethoven, Haydn and Mozart could have seen in their youth; for he showed him Beethoven. But this would not help Wagner to feel that contemporary music was really a great art; indeed it could only show him that he was growing up in a pseudo-classical time, in which the approval of persons of "good taste" was seldom directed to things of vital promise. Again, he began with far greater facility in literature than in music, if only because a play can be copied ten times faster than a full score. Wagner was always an omnivorous reader, and books were then, as now, both cheaper than music and easier to read. Moreover, the higher problems of rhythmic movement in the classical sonata forms are far beyond the scope of academic teaching, which is compelled to be contented with a practical plausibility of musical design; and the instrumental music which was considered the highest style of art in 1830 was as far beyond Wagner's early command of such plausibility as it was obviously already becoming a mere academic game. Lastly, the rules of that game were useless on the stage, and Wagner soon found in Meyerbeer a master of grand opera who was dazzling the world by means which merely disgusted the more serious academic musicians of the day.

In *Rienzi* Wagner would already have been Meyerbeer's rival, but that his sincerity, and his initial lack of that musical *savoir faire* which is prior to the individual handling of ideas, put him at a disadvantage. Though Meyerbeer wrote much that is intrinsically more dull and vulgar than the overture to *Rienzi*, he never combined such serious efforts with a technique so like that of a military bandmaster. The step from *Rienzi* to *Der fliegende Holländer* is without parallel in the history of music, and would be inexplicable if *Rienzi* contained nothing good and if *Der fliegende Holländer* did not contain many reminiscences of the decline of Italian opera; but it is noticeable that in this case the lapses into vulgar music have a distinct dramatic value. Though Wagner cannot as yet be confidently credited with a satiric intention in his bathos, the fact remains that all the Rossinian passages are associated with the character of Daland, so as to express his vulgar delight at the prospect of finding a rich son-in-law in the mysterious Dutch seaman. Meanwhile the rest of the work (except in the prettily scored "Spinning Song," and other harmless and vigorous tunes) has more affinity with Wagner's mature style than the bulk of its much more ambitious successors, *Tannhäuser* and *Lohengrin*. The wonderful overture is more highly organized and less unequal than that of *Tannhäuser*; and although Wagner uses less *Leit-motif* than Weber (see Opera, *ad fin.*) and divides the piece into "numbers" of classical size, the effect is so continuous that the divisions could hardly be guessed by ear. Moreover, the work was intended to be in one act, and is now so performed at Bayreuth; and, although it is very long for a one-act opera, this is certainly the only form which does justice to Wagner's conception.[1]

Spohr's appreciation of *Der fliegende Holländer* is a remarkable point in musical history; and his criticism that Wagner's style (in *Tannhäuser*) "lacked rounded periods" shows the best effect of that style on a well-disposed contemporary mind. Of course, from Wagner's mature point of view his early style is far too much cut up by periods and full closes; and its prophetic traits are so incomparably more striking than its resemblance to any earlier art that we often feel that only the full closes stand between it and the true Wagner. But Spohr would feel Wagner's works to be an advance upon contemporary romantic opera rather than a foreshadowing of an unknown future. When we listen to the free declamation of the singers at the outset of *Der fliegende Holländer*—a declamation which is accompanied by an orchestral and thematic texture as far removed from that of mere recitative as it is from the forms of the classical aria—the repetition of a whole sentence in order to form a firm musical close has almost as quaint a ring as a Shakespearean rhymed tag would have in a prose drama of Ibsen. To Spohr the frequency of these incidents must have produced the impression that Wagner was perpetually beginning arias and breaking them off at once. With all its defects, *Der fliegende Holländer* is the most masterly and the least unequal of Wagner's early works. As drama it stood immeasurably above any opera since Cherubini's *Medée*. As a complete fusion between dramatic and musical movement, its very crudities point to its immense advance towards the solution of the problem, propounded chaotically at the beginning of the 17th century by Monteverde, and solved in a simple form by Gluck. And as the twofold musical and dramatic achievement of one mind, it already places Wagner beyond parallel in the history of art.

Tannhäuser is on a grander scale, but its musical execution is disappointing. The weakest passages in *Der fliegende Holländer* are not so helpless as the original recitatives of Venus in the first act; or Tannhäuser's song, which was too far involved in the whole scheme to be ousted by the mature "New Venusberg music" with which Wagner fifteen years later got rid both of the end of the overture and what he called his "Palais-Royal" Venus. It is really very difficult to understand Schumann's impression that the musical technique of *Tannhäuser* shows a remarkable improvement. Not until the third act does the great Wagner arbitrate in the struggle between amateurishness and theatricality in the music, though at all points his epoch-making stagecraft asserts itself with a force that tempts us to treat the whole work as if it were on the Wagnerian plane of Tannhäuser's account of his pilgrimage in the third act. But the history of mid-19th-century music is unintelligible until we face the fact that, when the anti-Wagnerian storm was already at its height, Wagner was still fighting for the recognition of music which was most definite just where it realized with ultra-Meyerbeerian brilliance all that Wagner had already begun to detest. No contemporary, unaided by personal knowledge, could be expected to trust in Wagner's purity of ideal on the strength of *Tannhäuser*, which actually achieved popularity by such coarse methods of climax as the revivalistic end of the overture, by such maudlin pathos as *O du mein holder Abendstern*, and by the amiably childish grand-opera skill with which half the action is achieved by processions and a considerable fraction of the music is represented by fanfares. These features established the work in a position which it will always maintain by its unprecedented dramatic qualities and by the glory reflected from Wagner's later achievements; but we shall not appreciate the marvel of its nobler features if we continue at this time of day to regard the bulk of the music as worthy of a great composer.

After even the finest things in *Tannhäuser*, the *Vorspiel* to *Lohengrin* comes as a revelation, with its quiet solemnity and breadth of design, its ethereal purity of tone-colour, and its complete emancipation from earlier operatic forms. The suspense and climax in the first act is so intense, and the whole drama is so well designed, that we must have a very vivid idea of the later Wagner before we can see how far the quality of musical thought still falls short of his ideals. The elaborate choral writing sometimes rises to almost Hellenic regions of dramatic art; and there is no crudeness in the passages that carry on the story quietly in reaction from the climaxes—a test far too severe for *Tannhäuser* and rather severe for even the mature works of Gluck and Weber. The orchestration is already almost classically Wagnerian; though there remains an excessive amount of tremolo, besides a few lapses into comic violence, as in the yelpings which accompany Ortrud's rage in the night-scene in the second act. But the mere tone-colours of that scene are enough to make a casual listener imagine that he is dealing with the true Wagner: the variety of tone never fails, and depends on no immoderate paraphernalia; for, far-reaching as are the results of the systematic increase of the classical pairs of wind-instruments to groups of three, this is a very modest reform compared to the banausic "extra attractions" of every new production of Meyerbeer's.

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[1] The subsequent division into three acts, as given in all the published editions, has been effected in the crudest way by inserting a full close in the orchestral interludes at the changes of scene, and then beginning the next scene by taking up the interludes again. The true version can be recovered from the published score as follows: In act I skip from the last bar but four to the 41st bar of the introduction to the 2nd act; and at the end of the 2nd act skip from the last bar but five [illegible] the entr'acte to the 3rd act.

But there is another side to the picture. With the growing certainty of touch a stiffness of movement appears which gradually disturbs the listener who can appreciate freedom, whether in the classical forms which Wagner has now abolished, or in the majestic flow of Wagner's later style. Full closes and repeated sentences no longer confuse the issue, but in their absence we begin to notice the incessant squareness of the ostensibly free rhythms. The immense amount of pageantry, though (as in *Tannhäuser*) good in dramatic motive and executed with splendid stage-craft, goes far to stultify Wagner's already vigorous attitude of protest against grand-opera methods; by way of preparation for the ethereally poetic end he gives us a disinfected present from Meyerbeer at the beginning of the last scene, where mounted trumpeters career round the stage in full blast for three long minutes; and the prelude to the third act is an outburst of sheer gratuitous vulgarity. Again, the anti-Wagnerians were entirely justified in penetrating below the splendidly simple and original orchestration of the night-scene between Ortrud and Telramund, and pointing out how feebly its music drifts among a dozen vague keys by means of the diminished 7th; a device which teachers have tried to weed out of every high-flown exercise since that otiose chord was first discovered in the 17th century. The mature Wagner would not have carried out twenty bars in his flattest scenes with so little musical invention. We must not forget that these boyish demerits belong to the work of a man of thirty-five whose claims and aspirations already purported to dwarf the whole record of the classics. And the defects are in all respects commonplace; they have no resemblance to that uncanny discomfort which often warns the wise critic that he is dealing with an immortal.

The crowning complication in the effect of *Der fliegende Holländer*, *Tannhäuser* and *Lohengrin* on the musical thought of the 19th century was that the unprecedented fusion of their musical with their dramatic contents revealed some of the meaning of serious music to ears that had been deaf to the classics. Wagnerism was henceforth proclaimed out of the mouths of babes and sucklings; learned musicians felt that it had an unfair advantage; and by the time Wagner's popularity began to thrive as a persecuted heresy he had left it in the lurch.

Wagner had hardly finished the score of *Lohengrin* before he was at work upon the poem of *Der Ring des Nibelungen*. And with this he suddenly became a mature artist. On a superficial view this is a paradox, for there are many more violations of probability and much graver faults of structure in the later works than in the earlier. Every critic could recognize the structural merits of the earlier plays, for their operatic conventionalities and abruptness of motive are always intelligible as stage devices. Jealousy might prompt a doubt whether these plays were within the scope of "legitimate" music; but they were obviously stories of exceptional musical and romantic beauty, presented with literary resources unprecedented in operatic libretti. Now the later dramas are often notoriously awkward and redundant; while the removal of those convenient operatic devices which symbolize situations instead of developing them, does not readily appear to be compensated for by any superior artistic resource. But there is a higher point of view than that of story-telling. In the development of characters and intellectual ideas Wagner's later works show a power before which his earlier stagecraft shrinks into insignificance. It would not have sufficed even to indicate his later ideas. To handle these so successfully that we can discriminate defects from qualities at all, is proof of the technique of a master, even though the faults extend to whole categories of literature. The faults make analysis exceptionally difficult, for they are no longer commonplace; indeed, the gravest dangers of modern Wagnerism arise from the fact that there is hardly any non-musical aspect in which Wagner's later work is not important enough to produce a school of essentially non-musical critics who have no notion how far Wagner's mature music transcends the rest of his thought, nor how often it rises where his philosophy falls. Thus the prominent school of criticism which appraised Wagner in the 19th century by his approximation to Darwin and Herbert Spencer, appraises him in the 20th by his approximation to Bernard Shaw; with the absurd result that *Götterdämmerung* is ruled out as a reactionary failure. It is true that its only conceivable moral is flatly the opposite of that "redemption by love" which Wagner strenuously preaches in a passage at the end which remained unset because he considered it already expressed by the music. Indeed, though Wagner's later treatment of love is perhaps the main source of his present popularity it seldom rises to his loftiest regions except where it is thwarted. The love that is disguised in the deadly feud between Isolde and Tristan, before the drinking of the fatal potion, rises even above the music; the love-duet in the second act depends for its greatness on its introduction, before the lovers have met, and its wonderful slow movement (shortly before the catastrophe) where they are almost silent and leave everything to the music: the intervening twenty minutes is an exhausting storm in which the words are the sophisticated rhetoric of a 19th-century novel of passion, translated into terribly turgid verse and set to music that is more interesting as an intellectual ferment than effective as a representation of emotions which previous dramatists have wisely left to the imagination. But so long as we treat Wagner like a prose philosopher, a librettist, a poet, a mere musician, or anything short of the complex and many-sided artist he really is, we shall find insuperable obstacles to understanding or enjoying his works. A true work of art is incomparably greater than the sum of its ideas; apart from the fact that, if its ideas are innumerable and various, prose philosophers are apt to complain that it has none. And every additional idea that does not merely derange an art enlarges it as it were by a new dimension in space. Wagner added all the arts to each other, and in one of them he attained so consummate a mastery that we can confidently turn to it when his words and doctrines fail us. Even when we treat him merely as a dramatist our enjoyment of his later works gains enormously if we take them as organic wholes, and not as mere plots dressed up in verse and action. It matters little that *Parsifal* requires two nameless attendant characters in a long opening scene, for the sole purpose of telling the antecedents of the story, when a situation is thereby revealed which for subtlety and power has hardly a parallel since Greek tragedy. The vast myth of the *Ring* is related in full several times in each of the three main dramas, with ruthless disregard for the otherwise magnificent dramatic effect of the whole; hosts of original dramatic and ethical ideas, with which Wagner's brain was even more fertile than his voluminous prose works would indicate, assert themselves at all points, only to be thwarted by repeated attempts to allegorize the philosophy of Schopenhauer; all efforts to read a consistent scheme, ethical or philosophical, into the result are doomed to failure; but all this matters little, so long as we have Wagner's unfailing later resources in those higher dramatic verities which present to us emotions and actions, human and divine, as things essentially complex and conflicting, inevitable as natural laws, incalculable as natural phenomena.

Wagner's choice of subjects had from the outset shown an imagination far above that of any earlier librettist; yet he had begun with stories which could attract ordinary minds, as he dismally realized when the libretto of *Der fliegende Holländer* so pleased the Parisian wire-pullers that it was promptly set to music by one of their friends. But with *Der Ring des Nibelungen* Wagner devoted himself to a story which any ordinary dramatist would find as unwieldy as, for instance, most of Shakespeare's subjects; a story in which ordinary canons of taste and probability were violated as they are in real life and in great art. Wagner's first inspiration was for an opera (*Siegfried's Tod*, projected in 1848) on the death of Germany's mythical hero; but he found that the story needed a preliminary drama to convey its antecedents. This preliminary drama soon proved to need another to explain it, which again finally needed a short introductory drama. Thus the plan of the *Ring* was sketched in reverse order; and it has been remarked that *Götterdämmerung* shows traces of the fact that Wagner had begun his scheme in the days when French grand opera, with its ballets and pageantry, still influenced him. There is little doubt that some redundant narratives in the *Ring* were of earlier conception than the four complete dramas, and that their survival is due partly to Wagner's natural affection for work on which he had spent pains, and partly to a dim notion that (like Browning's method in *The Ring and the Book*) they might serve to reveal the story afresh in the light of each character. Be this as it may, we may confidently date the purification of Wagner's music at the moment when he set to work on a story which carried him finally away from that world of stereotyped operatic passions into which he had already breathed so much disturbing life.

The disturbing life already appears in *Der fliegende Holländer*, at the point where Senta's father enters with the Dutchman, and Senta (who is already in an advanced state of *Schwärmerei* over the legend of the Flying Dutchman) stands rooted to the spot, comparing the living Dutchman with his portrait which hangs over the door. The conflict between her passionate fascination and her disgust at her father's vulgarity is finely realized both in music and drama; but, if we are able to appreciate it, then the operatic convention by which Senta avows her passion becomes crude. Ethical and operatic points of view are similarly confused when it is asserted that the Flying Dutchman can be saved by a faithful woman, though it appears from the relations between Senta and Erik that so long as the woman is faithful to the Dutchman it does not matter that she jilts some one else. Erik would not have been a sufficiently pathetic operatic tenor if his claim on Senta had been less complete. In *Tannhäuser* and *Lohengrin* Wagner's intellectual power develops far more rapidly in the drama than in the music. The *Sängerkrieg*, with its disastrous conflict between the sincere but unnatural asceticism of the orthodox Minnesingers and the irrepressible human passion of Tannhäuser, is a conception the vitality of which would reduce Tannhäuser's repentance to the level of *Robert le Diable*, were it not that the music of the *Sängerkrieg* has no structural power, and little distinction beyond a certain poetic value in the tones of violas which had long ago been fully exploited by Mozart and Méhul, while the music of Tannhäuser's pilgrimage ranks with the *Vorspiel* to *Lohengrin* as a wonderful foreshadowing of Wagner's mature style. Again, the appeal to "God's judgment" in the trial by battle in *Lohengrin* is a subject of which no earlier librettist could have made more than a plausible mess—which is the best that can be said for the music as music. But as dramatist Wagner compels our respect for the power that without gloss or apology brings before us the king, a model of royal fair-mindedness and good-nature, acquiescing in Telramund's monstrous claim to accuse Elsa without evidence, simply because it is a hard and self-evident fact that the persons of the drama live in an age in which such claims seemed reasonable. Telramund, again, is no ordinary operatic villain; there is genuine tragedy in his moral ruin; and even the melodramatic Ortrud is a much more life-like *intrigante* than might be inferred from Wagner's hyperbolical stage-directions, which almost always show his manner at its worst.

In *Lohengrin* we take leave of the early music that obscured Wagner's ideals, and in the *Ring* we come to the music which transcends all other aspects of Wagnerism. Had Wagner been a man of more urbane literary intellect he might have been less ambitious of expressing a world-philosophy in music-drama; and it is just conceivable that the result might have been a less intermittent dramatic movement in his later works, and a balance of ethical ideas at once more subtle and more orthodox. But it is much more likely that Wagner would then have found his artistic difficulties too formidable to let the ideas descend to us from Walhalla and the Hall of the Grail at all. More than a modicum of rusticity is needed as a protection to a man who attempts such colossal re[illegible] necessity had its consequences in the dis[illegible] Wagner's early work, [illegible] his fiery nature [illegible] system of culture [illegible] in a specially sacerdotal type of tradition, which makes progress even in the study of his works impossible except through revolt. Such are the penalties exacted by the irony of fate for the world's persecution of its prophets.

Genuinely dramatic music, even if it seem as purely musical as Mozart's, must always be approached through its drama; and Wagner's masterpieces demand that we shall use this approach; but, as with Mozart, we must not stop on the threshold. With Mozart there is no temptation to do so. But with Wagner, just as there are people who have never tried to follow a sonata but who have been awakened by his music-dramas to a sense of the possibilities of serious music, so there are lovers of music who avow that they owe to Wagner their appreciation of poetry. But people whose love of literature is more independent find it hard to take Wagner's poetry and prose seriously, unless they have already measured him by his music. He effected no reform in literature; his meticulous adherence to the archaic alliteration of the *Nibelungenlied* is not allied with any sense of beauty in verbal sound or verse-rhythm; and his ways of expressing emotion in language consist chiefly in the piling-up of superlatives. Yet he was too full of dramatic inspiration to remain perpetually victimized by the conscientious affectations of the amateur author; and, where dramatic situations are not only poetical but (as in the first act of *Die Walküre* and the *Waldweben* scene in *Siegfried*) too elemental for strained language, Wagner is often supremely eloquent simply because he has no occasion to try to write poetry. Sometimes, too, when a great dramatic climax has given place to a lyrical anticlimax, retrospective moods, subtleties of emotion and crowning musical thoughts press in upon Wagner's mind with a closeness that determines every word; and thus not only is the whole third act of *Tristan*, as Wagner said when he was working at it, of "overwhelming tragic power," but Isolde's dying utterances (which occupy the last five minutes and are, of course, totally without action or dramatic tension) were not unlike fine poetry even before the music was written. But, as a rule, Wagner's poetic diction must simply be tolerated by the critic who would submit himself to Wagner's ideas.

If we wish to know what Wagner means, we must fight our way through his drama to his music; and we must not expect to find that each phrase in the mouth of the actor corresponds word for note with the music. That sort of correspondence Wagner leaves to his imitators; and his views on "Leit-motif-hunting," as expressed in his prose writings and conversation, are contemptuously tolerant. We shall indeed find that his orchestra interprets the dramatic situations which his poetry roughly outlines. But we shall also find that, even if we could conceive the poetry to be a perfect expression of all that can be given in words and actions, the orchestra will express something greater; it will not run parallel with the poetry; the *Leitmotif* system will not be a collection of labels; the musical expression of singer and orchestra will not be a mere heightened resource of dramatic declamation. All that kind of pre-established harmony Wagner left behind him the moment he deserted the heroes and villains of romantic opera for the visionary and true tragedy of gods and demi-gods, giants and gnomes, with beauty, nobility and love in the wrong, and the forces of destruction and hate set free by blind justice.

Let us illustrate Wagner's mature use of *Leitmotif* by the theme which happens to be associated with Alberich's ring. The fact that this theme is commonly called the "Ring-motif" is a glaring instance of what Wagner has had to endure from his friends. Important as the ring is throughout the tetralogy, Wagner would no more think of associating a theme with it for its own sake than he would think of associating a theme with Wotan's hat. Why should a Ring-motif be transformed into the theme representing Walhalla? Are we to guess that the connexion of ideas is that Wotan had eventually to pay for Walhalla by the ring? But if we attend to the circumstances under which this theme arises, its purport and development become deep and natural. The Rhine-daughters have been teasing the Nibelung Alberich, and are rejoicing in the light of the Rhine-gold which shines at the top of a rock as the sun strikes it through the water. Alberich does not think much of the gold if its only use is for these water-children's games. But one of the Rhine-daughters tells him that "he who could make the gold into a ring would become master of the world," and to these words the so-called Ring-motif is first sung (see MELODY, Example 11). The Rhine-daughter sings it in a childlike, indolently graceful way which well expresses the kind of toy the ring or the world itself would be to her. One of her sisters bids her be careful, but they reassure themselves with the thought that the Rhine-gold is safe, since no one can win it who does not renounce love. Alberich broods over what he hears, and already the theme changes its character as he thinks of such mastery of the world as he might gain by it (MELODY, Ex. 12). He curses love and grasps the gold. The theme of world-mastery grows dark with the darkness of the Nibelung's mind. The waters of the Rhine change into black mists which grow grey and thin, while the now sinister theme becomes softer and smoother. Then it breaks gently forth in a noble, swinging rhythm and massively soft brazen tones, as Wotan awakes on a mountain height and gazes upon Walhalla, his newly finished palace which he has bid the giants build, so that from it he may rule the world (MELODY, Ex. 13). The theme thus shows no trivial connexion with a stage-property, mechanically important in the plot; but it represents the desire for power, and what that desire means to each different type of mind. The gods, as the giants plaintively admit, "rule by beauty"; hence the "Walhalla-motif." What it becomes in the mind of the Nibelung is grimly evident when Alberich uses his ring in Nibelheim. The Rhine-daughters' exultant cry of "Rhine-gold" is there tortured in an extremely remote modulation at the end of a very sinister transformation of the theme; and the orchestration, with its lurid but smothered brass instruments, its penetrating low reed tones and its weird drum-roll beaten on a suspended cymbal, is more awe-inspiring than anything dreamed of by the cleverest of those composers who do not create intellectual causes for their effects.

A famous and typical instance of Wagner's use of *Leitmotif* in tragic irony is the passage where Hagen gives Siegfried friendly welcome, to the melody of the curse which Alberich pronounced on the ring and all who approached it. The more subtle examples are inexhaustible in variety and resource; and perhaps the climax of subtlety is the almost entire absence of *Leitmotif* in the first scene of the third act of *Götterdämmerung*, when Siegfried throws away his last chance of averting his doom. The Rhine-daughters appear to him, and ask him to give them the ring that is on his finger. Siegfried refuses. They laugh at his stinginess and disappear. Siegfried is piqued, and calls them back to offer them the ring. Unfortunately they tell him of its curse, and prophesy death to him if he keeps it. This arouses his spirit of contradiction; and he tells them that they might have won it from him by coaxing, but never by threats, and that he values his life no more than the stone he tosses away as he speaks to them. In spite of the necessary allusions to the ominous theme of the curse, which would give any less great composer ample excuse for succumbing to the listener's sense of impending doom, Wagner's music speaks to us through the child-minds of the Rhine-daughters and terrifies us with the ruthless calm of Nature.

Almost as subtle, and much more directly impressive, is the pathos of the death of Siegfried, which is heightened by an unprecedented appeal to a sense of musical form on the scale of the entire tetralogy. Siegfried's whole character and career is, indeed, annihilated in the clumsy progress towards this consummation; but Shakespeare might have condoned worse plots for the sake of so noble a result; and indeed Wagner's awkwardness arises mainly from fear of committing oversights. Hagen, the Nibelung's son, has managed to make Siegfried unwittingly drink a love-potion with Gutrune, which causes him to forget his own bride, Brünnhilde. Siegfried is then persuaded to transform himself by his magic Tarnhelm into the likeness of his host, Gutrune's brother Gunther, in order to bring Brünnhilde (whose name is now quite new to him) from her fire-encircled rock, so that Gunther may have her for his bride and Siegfried may wed Gutrune. This is achieved; and Brünnhilde's horror and bewilderment at meeting Siegfried again as a stranger in his own shape creates a situation which Siegfried cannot understand, and which Hagen pretends to construe as damning evidence that Siegfried has betrayed Gunther's honour as well as Brünnhilde's. Hagen, Gunther and Brünnhilde therefore agree that Siegfried must die. In order to spare Gutrune's feelings it is arranged that his death shall appear as an accident in a hunting party. While the hunting party is resting Siegfried tells stories of his boyhood, thus recalling the antecedents of this drama with a charming freshness and sense of dramatic and musical repose. When he comes to the point where his memory has been clouded by Hagen's spells, Hagen restores his memory with another magic potion. Siegfried calmly continues to tell how he found Brünnhilde asleep on the fiery mountain. Hagen affects to construe this as a confession of guilt, and slays him as if in righteous wrath. The dying Siegfried calls on Brünnhilde to awaken, and asks "Who hath locked thee again in sleep?" He believes that he is once more with Brünnhilde on the Valkyries' mountain height; and the harmonies of her awakening move in untroubled splendour till the light of life fades with the light of day and the slain hero is carried to the Gibichung's hall through the moonlit mists, while the music of love and death tells in terrible triumph more of his story than he ever knew.

The bare conception of such art as this shows how perfect is the unity between the different elements in Wagner's later music-drama. If the music of *Tristan* is more polyphonic than that of *Lohengrin*, it is because it is hardly figurative to call its drama polyphonic also. Compare the mere fairy-tale mystery of Lohengrin's command that Elsa shall never ask to know his name, with the profound fatalism of Isolde's love-potion. Apart from the gain in tragic force resulting from Wagner's masterly development of the character of Brangaene, the raw material of the story was already suggestive of that astounding combination of the contrasted themes of love and death, the musical execution of which involves a harmonic range almost as far beyond that of its own day as the ordinary harmonic range of the 19th century is beyond that of the 16th. In his next work, *Die Meistersinger*, Wagner ingeniously made poetry and drama out of an explicit manifesto to musical critics, and proved the depth of his music by developing its everyday resources and so showing that its vitality does not depend on that extreme emotional force that makes *Tristan und Isolde* almost unbearably poignant. Few things are finer in music or literature than the end of the second act of *Die Meistersinger*, from the point where Sachs's apprentice begins the riot, to the moment when the watchman, frightened at the silence of the moonlit streets so soon after he has heard all that noise, announces eleven o'clock and bids the folk pray for protection against evil spirits, while the orchestra tells us of the dreams of Walther and Eva and ends by putting poetry even into the pedantic ineptitudes of the malicious Beckmesser. *Die Meistersinger* is perhaps Wagner's most nearly perfect work of art; and it is a striking proof of its purity and greatness that, while the whole work is in the happiest comic vein, no one ever thinks of it as in any way slighter than Wagner's tragic works. The overwhelming love-tragedy of *Tristan und Isolde* is hardly less perfect, though the simplicity of its action exposes its *longueurs* to greater notoriety than those which may be found in *Die Meistersinger*.

These two works interrupted the execution of the *Ring* and formed the stepping-stones to *Parsifal*, a work which may perhaps be said to mark a further advance in that subtlety of poetic conception which, as we have seen, gave the determining impulse to Wagner's true musical style. But in music he had no more to learn, and *Parsifal*, while the most solemn and concentrated of all Wagner's dramas, is musically not always unsuggestive of old age. Its harmonic style is, except in the Grail music, even more abstruse than in *Tristan*; and the intense quiet of the action is far removed from the forces which in that tumultuous tragedy carry the listener through every difficulty. Again, while the Eucharistic features in *Parsifal* attract some listeners, the material effect of their presentation on the stage has been known to repel others who are beyond suspicion of prejudice. But the greatness of the art is, like its subject, worlds away from material impressions; and a wide consensus regards Wagner's last work as his loftiest, both in music and poetry. Certainly no poet would venture to despise Wagner's imaginative conception of Kundry. In his letters to his friend Mathilde Wesendonck, it appears that while he was composing *Tristan* he already had the inspiration of working out the identification of Kundry, the messenger of the Grail, with the temptress who, under the spell of Klingsor, seduces the knights of the Grail; and he had, moreover, thought out the impressively obscure suggestion that she was Herodias, condemned like the wandering Jew to live till the Saviour's second coming. The quiet expression of these startling ideas is more remarkable than their adoption; for smaller artists live on still more startling ideas; but most remarkable of all is the presentation of Parsifal, both in his foolishness and in the widsom which comes to him through pity. The chief excuse for doubting whether Wagner's last work is really his greatest is that most of its dramatic subtleties are beyond musical expression, since they do not lead to definite conflicts and blendings of emotion. Where the orchestra shows that Parsifal is becoming half-conscious of his quest while Kundry is beguiling him with memories of his mother,—and also during the two changes of scene to the Hall of the Grail, where the orchestra mingles the agony of Amfortas and the sorrow of the knights with the tolling of the great bells,—the polyphony is almost as dramatic as in *Tristan*; while the prelude and the *Charfreitagszauber* are among the clearest examples of the sublime since Beethoven. But elsewhere there are few passages in which the extremely recondite harmonic style can be with certainty traced to anything but habit. This style originated, indeed, in a long experience of the profoundest dramatic impulses; but as a habit it does not seem, like the greatest things in art, the one inevitable treatment of the matter in hand. But, whatever our doubts, we may safely regard *Parsifal* as a work which, like Beethoven's last fugues, invites attack rather from those critics who demand what flatters their own vanity than from those who wish to be inspired by what they could never have foreseen for themselves.

In Wagner's harmonic style we encounter the entire problem of modern musical texture. Wagner effected vast changes in almost every branch of his all-embracing art, from theatre-building and stage-lighting to the musical declamation of words. Most of his reforms have since been intelligently carried out as normal principles in more arts than one; but, shocking as the statement may seem to 20th-century orthodoxy, Wagnerian harmony is a universe as yet unexplored, except by the few composers who are so independent of its bewildering effect on the generation that grew up with it, that they can use Wagner's resources as discreetly as he used them himself. The last two examples at the end of the article on HARMONY show almost all that is new in Wagner's harmonic principles. The peculiar art therein is that while the discords owe their intelligibility and softness to the smooth melodic lines by which in "resolving" they prove themselves but transient rainbow-hues on or below the surface, they owe their strangeness to the intense vividness with which at the moment of impact they suggest a mysteriously remote foreign key. Wagner's orthodox contemporaries regarded such mixtures of key as sheer nonsense; and it would seem that the rank and file of his imitators agree with that view, since they either plagiarize Wagner's actual progressions or else produce such mixtures with no vividness of key-colour and little attempt to follow those melodic trains of thought by which Wagner makes sense of them. There is far more of truly Wagnerian harmony to be found before his time than since. It was so early recognized as characteristic of Chopin that a magnificent example may be seen at the end of Schumann's little tone-portrait of him in the *Carnaval*: a very advanced Wagnerian passage on another principle constitutes the bulk of the development [illegible] first movement of Beethoven's sonata *Les Adieux*; while [illegible] in the "Golden Age" of music, and [illegible] diatonic concord, the unexpected[illegible] chords is hardly less Wagnerian than the perfect smoothness of the melodic lines which combine to produce them.

Wagnerian harmony is, then, neither a side-issue nor a progress *per saltum*, but a leading current in the stream of musical evolution. That stream is sure sooner or later to carry with it every reality that has been reached by side-issues and leaps; and of such things we have important cases in the works of Strauss and Debussy. Strauss makes a steadily increasing use of avowedly irrational discords, in order to produce an emotionally apt physical sensation. Debussy has this in common with Strauss, that he too regards harmonies as pure physical sensations; but he differs from Strauss firstly in systematically refusing to regard them as anything else, and secondly in his extreme sensibility to harshness. We have seen (in the articles on HARMONY and MUSIC) how harmonic music originated in just this habit of regarding combinations of sound as mere sensations, and how for centuries the habit opposed itself to the intellectual principles of contrapuntal harmony. These intellectual principles are, of course, not without their own ground in physical sensation; but it is evident that Debussy appeals beyond them to a more primitive instinct; and on it he bases an almost perfectly coherent system of which the laws are, like those of 12th-century music, precisely the opposite of these of classical harmony. The only illogical point in his system is that the beauty of his dreamlike chords depends not only on his artful choice of a timbre that minimizes their harshness, but also on the fact that they enter the ear with the meaning they have acquired through centuries of harmonic evolution on classical lines. There is a special pleasure in the subsidence of that meaning beneath a soothing sensation; but a system based thereon cannot be universal. Its phenomena are, however, perfectly real, and can be observed wherever artistic conditions make the tone of a mass of harmony more important than the interior threads of its texture. This is of constant occurrence in classical pianoforte music, in which thick chords are subjected to polyphonic laws only in their top and bottom notes, while the inner notes make a solid mass of sound in which numerous consecutive fifths and octaves are not only harmless but essential to the balance of tone. In Debussy's art the top and bottom are also involved in the antipolyphonic laws of such masses of sound, thus making these laws paramount.

The irrational discords of Strauss are also real phenomena in musical aesthetics. They are an extension of the principle on which gongs and cymbals and all instruments without notes of determinate pitch are employed in otherwise polyphonic music.

But it is important to realize that both these types of modern harmony are radically non-Wagnerian. Haydn uses a true Straussian discord in *The Seasons*, in order to imitate the chirping of a cricket; but the harshest realism in *Götterdämmerung* (the discord produced by the horns of Hagen and his churls in the mustering-scene in the second act) has a harmonic logic which would have convinced Corelli. And of Debussy's antipolyphonic art there is less in Wagner than in Beethoven. The present influence of Wagnerian harmony is, then, somewhat indefinite, since the most important real phenomena of later music indicate a revolt both from it and from earlier classical methods. It has had, however, a marked effect on weaker musical individualities. Musical public opinion now puts an extraordinary pressure on the young composer, urging him at all costs to abandon "out-of-date" styles however stimulating they may be to his invention. It is no exaggeration to say that a parallel condition in literature would be produced by a strong public opinion to the effect that any English style was hopelessly out of date unless it consisted exclusively of the most difficult types of phrase to be found in the works of Browning and Meredith. The brilliant success of Hump[illegible] and *Gretel*, in [illegible] technique [illegible] humorous [illegible]ts a moral [illegible]t until the [illegible]se becomes [illegible]ce of Wagner's [illegible]etter than nonsense.

The very sense of dramatic fitness has temporarily vanished from public musical opinion, together with the sense of musical form, in consequence of another prevalent habit, that of presenting shapeless extracts from Wagner's operas as orchestral pieces without voices or textbooks or any hint that such adjuncts are desirable. But this vandalism, which Wagner condoned with a very bad grace, now happily begins to give way to the practice of presenting long scenes or entire acts, with the singers, on the concert-platform. This has the merit of bringing the real Wagner to ears which may have no other means of hearing him, and it fosters no delusion as to what is missing in such a presentation. The guidance of Hans Richter has given us a sure bulwark against the misrepresentation of Wagner; and so there is hope that Wagner may yet be saved from such an oblivion in fetish-worship as has lost Handel to us for so long. As with Shakespeare and Beethoven, the day will never come when we can measure the influence of so vast a mind upon the history of art. Smaller artists can make history; the greatest absorb it into that daylight which is its final cause.

List of Wagner's Works

The following are Wagner's operas and music-dramas, apart from the unpublished *Die Hochzeit* (three numbers only), *Die Feen*, and *Das Liebesverbot* (*Das Liebesverbot* was disinterred in 1910).

1. *Rienzi, der letzte der Tribunen: grosse tragische Oper*; 5 acts (1838–1840).
2. *Der fliegende Holländer: romantische Oper*; 1 act, afterwards cut into 3 (1841).
3. *Tannhäuser und der Sängerkrieg auf Wartburg: romantische Oper*; 3 acts (libretto, 1843; music, 1844–1845; new Venusberg music, 1860–1861).
4. *Lohengrin: romantische Oper*; 3 acts (libretto, 1845; music, 1846–1848). This is the last work Wagner calls by the title of Opera.
5. *Das Rheingold*, prologue in 4 scenes to *Der Ring des Nibelungen; ein Bühnenfestspiel* (poem written last of the series, which was begun in 1848 and finished in 1851–1852; music, 1853–1854).
6. *Die Walküre: der Ring des Nibelungen, erster Tag*; 3 acts (score finished, 1856).
7. *Tristan und Isolde*; 3 acts (poem written in 1857; music, 1857–1859).
8. *Siegfried: der Ring des Nibelungen, zweiter Tag*; 3 acts, the first two nearly finished before *Tristan*, the rest between 1865 and 1869.
9. *Die Meistersinger von Nürnberg*; 3 acts (sketch of play, 1845; poem, 1861–1862; music, 1862–1867).
10. *Götterdämmerung: der Ring des Nibelungen, dritter Tag*; introduction and 3 acts (*Siegfried's Tod* already sketched dramatically in 1848; music, 1870–1874).
11. *Parsifal: ein Bühnenweihfestspiel* (a solemn stage festival play), 3 acts (poem, 1876–1877; music, 1877–1882, *Charfreitagszauber* already sketched in 1857).

As regards other compositions, the early unpublished works include a symphony, a cantata, some incidental music to a pantomime, and several overtures, four of which have recently been discovered and produced. The important small published works are *Eine Faust Overture* (1839–1840; rewritten, 1855); the *Siegfried Idylle* (an exquisite serenade for small orchestra on themes from the finale of *Siegfried*, written as a surprise for Frau Wagner in 1870); the *Kaisermarsch* (1871), the *Huldigungsmarsch* (1864) for military band (the scoring of the concert-version finished by Raff); *Fünf Gedichte* (1862), a set of songs containing two studies for *Tristan*; and the early quasi-oratorio scene for male-voice chorus and full orchestra, *Das Liebesmahl der Apostel* (1843). Wagner's retouching of Gluck's *Iphigenie en Aulide* and his edition of Palestrina's *Stabat Mater* demand mention as important services to music, by no means to be classified (as in some catalogues) with the hack-work with which he kept off starvation in Paris.

The collected literary works of Wagner in German fill ten volumes, and include political speeches, sketches for dramas that did not become operas, autobiographical chapters, aesthetic musical treatises and polemics of vitriolic violence. Their importance will never be comparable to that of his music; but, just as the reaction against Ruskin's ascendancy as an art-critic has coincided with an increased respect for his ethical and sociological thought, so the [illegible] forces that are compelling Wagnerism to grant music a [illegible] coincide with a growing admiration of his general mental powers. The prose works have been translated into English by W. A. Ellis (8 vols., 1892–1899). The translation by F. Jameson [illegible] of the *Ring* (first published in the pocket edition [illegible] is the most wonderful *tour de force* yet achieved in [illegible] reading of the score to this English text reveals [illegible] emphasis or loss of rhetorical point in the fitting of [illegible] a single extra note or halt in the music; and [illegible] seems stilted or absurd the original will be [illegible] equally so, while the spirit of Wagner's poetry [illegible]. Such work deserves more recognition than it is ever likely to get. Rapidly as the standard of musical translations was improving before this work appeared, no one could have foreseen what has now been abundantly verified, that the *Ring* can be performed in English without any appreciable loss to Wagner's art. The same translator has also published a close, purely literary version.

Literature.—The Wagner literature is too enormous to be dealt with here. The standard biography is that of Glasenapp (6 vols., of which five appeared between 1894 and 1909). Of readable English books we may cite Ernest Newman, *A Study of Wagner* (1899); H. E. Krehbiel, *Studies in the Wagnerian Drama* (1891); Jessie L. Weston, *Legends of the Wagner Dramas* (1906). *The Perfect Wagnerite*, by G. Bernard Shaw, though concerned mainly with the social philosophy of the *Ring*, gives a luminous account of Wagner's mastery of musical movement. The highest English authority on Wagner is his friend Dannreuther, whose article in *Grove's Dictionary* is classical.

See also Aria, Harmony, Instrumentation, Music, Opera, and Overture. (D.F.T.)

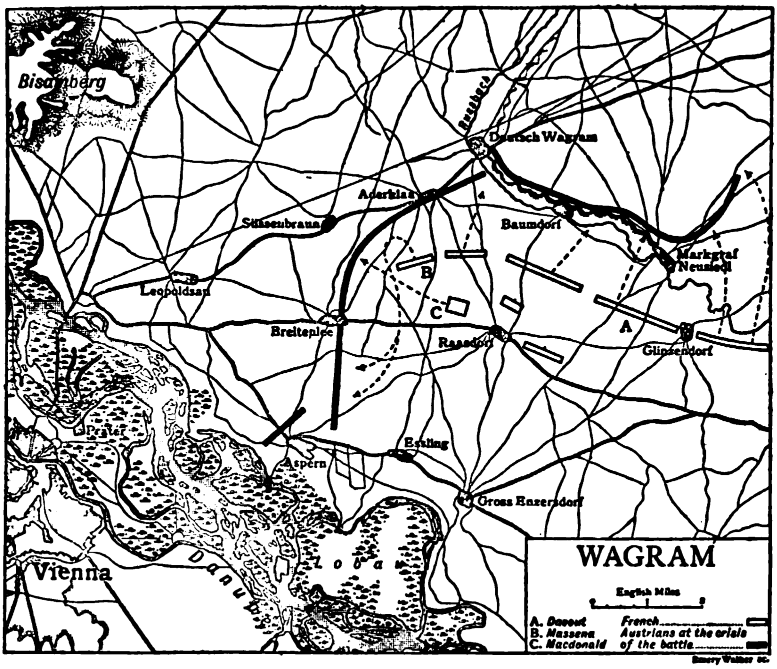
WAGON, or Waggon, a large four-wheeled vehicle for the carriage of heavy loads, and drawn by two or more horses. This is the general English use of the term, where it is more particularly confined to the large vehicles employed in the carrying of agricultural produce. It is also used of the uncovered heavy rolling stock for goods on railways. In America the term is applied also to lighter vehicles, such as are used for express delivery, police work, &c., and to various forms of four-wheeled vehicles used for driving, to which the English term "cart" would be given. The word "wagon" appears to be a direct adaptation of Du. *Wagen* (cf. Ger. *Wagen*, Swed. *Vagn*, &c.). Skeat finds the earliest use of the word in Lord Berner's translation of Froissart (1523–1525), so that it is by no means an early word. The O.E. cognate word was *wægn*, later *wæn*, by dropping of *g* (cf. *regn*, *ren*, *rain*), modern "wain." The root of all these cognate words, meaning to carry, is seen in Lat. *vehere*. The term "wagon" or "waggon" is applied technically in bookbinding to a frame of cane used for trimming the edges of gold leaf. In architecture a "wagon-ceiling" is a boarded roof of the Tudor time, either of semicircular or polygonal section. It is boarded with thin panels of oak or other wood ornamented with mouldings and with loops at the intersections.

WAGRAM (Deutsch-Wagram), a village of Austria situated in the plain of the Marchfeld, 11½ m. N.E. of Vienna. It gives its name to the battle of the 5th and 6th of July 1809, in which the French army under Napoleon defeated the Austrians commanded by the archduke Charles. On the failure of his previous attempt to pass his whole army across the Danube at Aspern (see Napoleonic Campaigns and Aspern), Napoleon set himself to accumulate, around Vienna and the island of Lobau, not only his own field forces, but also every man, horse and gun available from Italy and South Germany for a final effort. Every detachment was drawn in within forty-eight hours' call, his rearward communications being practically denuded of their covering troops. The island of Lobau itself was converted practically into a fortress, and 150 heavy guns were mounted on its banks to command the Austrian side of the stream. Giving up, in face of this artillery, the direct defence of the river-side, the Austrians drew up in a great arc of about 6 m. radius extending from the Bisamberg, overlooking the Danube, in the west, to Markgrafneusiedl on the east. From this point to the Danube below Lobau a gap was left for the deployment of the archduke Johann's army from Pressburg. This army, however, arrived too late. Their total front, therefore, was about 12 m. for 120,000 men, which by a forward march of a couple of hours could be reduced to about 6 m.—giving a density of occupation of about 20,000 men to the mile.

Meanwhile Napoleon reconstructed the bridge over the main stream (see Aspern) more solidly, protecting it by palisades of piles and floating booms, and organized an armed flotilla to command the waterway. On the island itself preparations were made to throw three bridges across the Lobau arm of the stream opposite Aspern and Essling, and seven more on the right, facing east between Gross Enzersdorf and the main river.

For several days previous to the great battle the French had sent across small detachments, and hence when, on the afternoon of the 4th of July, an advanced guard was put over near Gross

Enzersdorf, the attention of the Austrians was not particularly attracted and they did not interfere. The emperor, however, had now men available for the battle, and under cover of this detachment his pontoniers made the seven bridges. Long before daylight on the 6th the troops began to stream across, and about 9 A.M. the three corps destined for the first line (Davout, Oudinot and Masséna) had completed their deployment on a front of some 6000 yds. and were moving forward to make way for the second line (Eugene and Bernadotte) and the third line (Bessières and the guard). About noon the general advance began, the French opening outwards like a fan to obtain space for manœuvre, Davout direct on Markgrafneusiedl and the Austrian left, Masséna (slightly refused to cover the French left) by Breitenlee on Süssenbrunn.



WAGRAM

A. Davout
B. Massena
C. Macdonald

French ▭
Austrians at the crisis of the battle ▬

The Austrians held a strong position along the line of the Russbach from Deutsch-Wagram to Markgrafneusiedl with their left, whilst their right was held ready for a counter-attack intended to roll up the French attack from left to right when the proper moment should come. The movements of the great French masses in the confined space were slow, and the attack on the line of the Russbach did not declare itself till 8 P.M.; the corps did not attack simultaneously, and failed altogether to make any serious impression on the Austrian position. Masséna on the left was scarcely engaged.

But, hearing of the success of his left wing on the Russbach, the archduke determined to anticipate the French next morning on that side, and four corps were directed upon Masséna, who had bivouacked his troops overnight on the line Leopoldsau-Süssenbrunn-Aderklaa, the latter, a strongly built village, forming, as it were, a bridge-head to the passages of the Russbach at Deutsch-Wagram. Another corps with a strong cavalry force was also directed to pivot round Markgrafneusiedl and to attack Davout on his right; on this flank also the arrival of the archduke Johann was expected later in the day.

The Austrian movements were somewhat ill-connected; nevertheless, by 11 A.M. Masséna's left had been driven back almost to Aspern, and his right, though aided by Bernadotte, had failed to recapture Aderklaa, from which the Austrians had driven his advanced posts early in the morning. The situation for the French looked very serious, for their troops were not fighting with the dash and spirit of former years. But Napoleon was a master in the psychology of the battlefield, and knew that on the other side things were much the same. He therefore sent orders along the whole line for a gigantic counter-stroke. Davout on the right was to attack Markgrafneusiedl again. Masséna was to move against the troops immediately to his front; Bernadotte and Marmont to advance respectively against Breitenlee and Aderklaa, whilst in the gap which would thus open between them marched the 5th corps (Macdonald) on Süssenbrunn, covered by a battery of 104 guns and followed by the guard and reserve cavalry.

Macdonald formed his 30,000 men in a gigantic hollow square—on a front of one battalion, fourteen battalions deployed at six paces distance leading, whilst the remainder of the infantry marched in column of sections on either flank, and cavalry closed the rear. The idea was to compel even the weakest to go on, on pain of being trampled to death under the feet of the following men and horses, but the terror caused by the Austrian round-shot tearing huge gaps through the mass proved enough to counteract even this danger, and the men in the advance threw themselves down wholesale. It is admitted by French authors (Ardant du Picq) that of the 30,000 only 3000 actually delivered the attack, about 3000 were killed or wounded, but 24,000 evaded their duty somehow, and the trail of the column appeared one mass of dead and dying, creating a terrible impression on all who saw it. Nevertheless, Macdonald reached his destination, for the guns had literally torn a gap in the opposing line, and the guards and cavalry then followed intact. At the same time Davout also had made progress, and, learning that the archduke Johann could not be counted on for that day, the archduke Charles issued orders for a retreat. The whole Austrian army was gradually withdrawn, unbeaten and still available for a renewed offensive if necessary the following day.

The French, however, were in no condition to follow up their advantage. They had seen more of the slaughter than their adversaries, and except the emperor and Davout all seem to have been completely shaken. Even in Davout's command, always the steadiest in danger, the limit of endurance had been passed, for when about 5 P.M. the advanced patrols of the archduke Johann's force appeared on their flank, panic on a scale hitherto unknown in the *Grande Armée* seized the whole right wing, and Napoleon had to confess that no further advance was possible with these men for several days.

Berndt (*Zahl im Kriege*) gives the following [illegible]
181,700 (including 20,000 cavalry [illegible]
whom 23,000 men [illegible]
(16%); 11 guns [illegible]

128,600 (including 14,600 cavalry) men and 410 guns engaged; losses, 19,110 killed and wounded, and 6740 missing (20%); 9 guns and one colour were lost. The casualties in general officers were unusually severe, 21 French and 15 Austrians being killed and wounded.

WAGTAIL (*Wagsterd* and *Wagstyrt*, 15th century *fide* T. Wright, *Vol. Vocabularies*, ii. 221, 253; *Uuagtale*, Turner, 1544, p. 53), the popular name for birds of the subfamily *Motacillinae*, which, together with the *Anthinae* (see PIPIT), form the passerine family *Motacillidae*.

The pied wagtail *Motacilla lugubris* is a common and generally distributed species in the British Islands, and common throughout northern Europe, but migrating southwards over a relatively narrow range in winter. The white wagtail, *M. alba* of Linnaeus, has a wide range in Europe, Asia and Africa, visiting England almost yearly, and chiefly differing from the ordinary British in its lighter-coloured tints—the cock especially having a clear grey instead of a black back. Three other species occur in England, but the subfamily with several genera and very many species ranges over the Old World, except Australia and Polynesia, whilst the Asiatic species reach North-West America.

Wagtails are generally parti-coloured birds, frequenting streams and stagnant water, and feeding on seeds, insects, worms, small molluscs and crustaceans. The bill is thin and elongated, and the tail is very long. The nests are made of moss, grass and roots, with a lining of hair and feathers; four to six eggs are laid, bluish white or brown, or yellowish with spots and markings.

The genus *Motacilla* (an exact rendering of the English "wagtail," the Dutch *Kwikstaart*, the Italian *Codatremola* and other similar words), which, as originally founded by Linnaeus, contained nearly all the "soft-billed" birds of early English ornithologists, was restricted by various authors in succession, following the example set by Scopoli in 1769, until none but the wagtails remained in it. (A. N.)

WAHHĀBIS, a Mahommedan sect, the followers of Ibn 'Abd ul-Wahhāb, who instituted a great reform in the religion of Islam in Arabia in the 18th century. Mahommed ibn 'Abd ul-Wahhāb was born in 1691 (or 1703) at al-Hauta of the Nejd in central Arabia, and was of the tribe of the Banī Tamīm. He studied literature and jurisprudence of the Hanifite school. After making the pilgrimage with his father, he spent some further time in the study of law at Medina, and resided for a while at Isfahan, whence he returned to the Nejd to undertake the work of a teacher. Aroused by his studies and his observation of the luxury in dress and habits, the superstitious pilgrimages to shrines, the use of omens and the worship given to Mahomet and Mahommedan saints rather than to God, he began a mission to proclaim the simplicity of the early religion founded on the Koran and *Sunna* (*i.e.* the manner of life of Mahomet). His mission in his own district was not attended by success, and for long he wandered with his family through Arabia, until at last he settled in Dara'īyya, or Deraiya (in the Nejd), where he succeeded in converting the greatest notable, Mahommed ibn Sa'ud, who married his daugther, and so became the founder of an hereditary Wahhābite dynasty. This gave the missionary the opportunity of following the example of Mahomet himself in extending his religious teaching by force. His instructions in this matter were strict. All unbelievers (*i.e.* Moslems who did not accept his teaching, as well as Christians, &c.) were to be put to death. Immediate entrance into Paradise was promised to his soldiers who fell in battle, and it is said that each soldier was provided with a written order from Ibn 'Abd ul-Wahhāb to the gate-keeper of heaven to admit him forthwith. [illegible] th[illegible] established in the greater part of Arabia [illegible] broken [illegible] Ali (see [illegible] Wahhāb [illegible] died in [illegible] f Ibn [illegible] d ibn [illegible] made [illegible] close study of the writer. Ibn Taimīyya, although a Hanbalite by training, refused to be bound by any of the four schools, and claimed the power of a *mujtahid*, *i.e.* of one who can give independent decisions. These decisions were based on the Koran, which, like Ibn Hazm (*q.v.*), he accepted in a literal sense, on the *Sunna* and *Qiyās* (analogy). He protested strongly against all the innovations of later times, and denounced as idolatry the visiting of the sacred shrines and the invocation of the saints or of Mahomet himself. He was also a bitter opponent of the Sufis of his day. The Wahhābites also believe in the literal sense of the Koran and the necessity of deducing one's duty from it apart from the decisions of the four schools. They also pointed to the abuses current in their times as a reason for rejecting the doctrines and practices founded on *Ijmā'*, *i.e.* the universal consent of the believer or their teachers (see MAHOMMEDAN RELIGION). They forbid the pilgrimage to tombs and the invocation of saints. The severe simplicity of the Wahhābis has been remarked by travellers in central Arabia. They attack all luxury, loose administration of justice, all laxity against infidels, addiction to wine, impurity and treachery. Under 'Abd ul-Aziz they instituted a form of Bedouin (Bedawi) commonwealth, insisting on the observance of law, the payment of tribute, military conscription for war against the infidel, internal peace and the rigid administration of justice in courts established for the purpose.

It is clear that the claim of the Wahhābis to have returned to the earliest form of Islam is largely justified; Burckhardt (vol. ii. p. 112) says, "The only difference between his (*i.e.* ul-Wahhāb's) sect and orthodox Turks, however improperly so termed, is that the Wahabys rigidly follow the same laws which the others neglect or have ceased altogether to observe." Even orthodox doctors of Islam have confessed that in Ibn 'Abd ul-Wahhāb's writings there is nothing but what they themselves hold. At the same time the fact that so many of his followers were rough and unthinking Bedouins has led to the over-emphasis of minor points of practice, so that they often appear to observers to be characterized chiefly by a strictness (real or feigned) in such matters as the prohibition of silk for dress, or the use of tobacco, or of the rosary in prayer.

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WAI, a town in Satara district, Bombay, on the Kistna river. Pop. (1901) 13,989. It is a place of Hindu pilgrimage, with a large Brahman population, the river being lined with temples and bathing *ghats*. In the neighbourhood are Buddhist caves.

WAIBLINGEN, a town of Germany, in the kingdom of Württemberg, in the centre of a fruitful vine-growing district on the Rems, 10 m. N.E. from Stuttgart by the main line of railway to Nuremberg via Nördlingen and at the junction of a branch to Hessenthal. Pop. (1005) 5997. It has two Evangelical churches, one of which is a fine Gothic structure of the 15th century, restored in 1866, a Roman Catholic church and a modern town hall. Its industries, which include the making of pottery and silk and the cultivation of fruit and vines, are considerable. Waiblingen is mentioned in the 9th century, when it had a palace of the Carolingian sovereigns. Subsequently it belonged to the dukes of Franconia, and gave a surname to the emperor Conrad II. It was in this way that the Hohenstaufen family, which was descended in the female line from Conrad, received the name of Waiblingen, corrupted by the Italians into Ghibelline.

WAILLY, NOËL FRANÇOIS DE (1724–1801), French grammarian and lexicographer, was born at Amiens on the 31st of July 1724. His life was spent in Paris, where for many years he carried on a school which was extensively patronized by foreigners who wished to learn French. In 1754 he published *Principes généraux de la langue française*, which revolutionized the teaching of grammar in France. The book was adopted as a textbook by the university of Paris and generally used throughout France, an abstract of it being prepared for primary educational purposes.

In 1771 de Wailly published *Moyens simples et raisonnés de diminuer les imperfections de notre orthographe*, in which he advocated phonetic spelling. He was a member of the Institute from its foundation (1795), and took an active part in the preparation of the *Dictionnaire de l'Académie*. His works, in addition to those
cited, include *L'Orthographe des dames* (1782) and *Le Nouvea*
Vocabulaire français, ou abrégé du dictionnaire de l'Académ
(1801) He died in Paris on the 7th of April 1801

WAINEWRIGHT, THOMAS GRIFFITHS (1794–1852), Engli
journalist and subject-painter, was born at Chiswick in Octo
1794 He was educated by his distant relative Dr Cha
Burney, and served as an orderly officer in the guards, an
cornet in a yeomanry regiment. In 1819 he entered on a lite
life, and began to write for *The Literary Pocket-Book*, *B*
wood's Magazine and *The Foreign Quarterly Review* I
however, most definitely identified with *The London Ma*
to which, from 1620 to 1823, he contributed some sma
flippant art and other criticisms, under the signatures of '
Weathercock," "Egomet Bonmot" and "Herr Vink
He was a friend of Charles Lamb—who thought we
literary productions, and in a letter to Bernard Barto
him the "kind, light-hearted Wainewright"—and of
brilliant contributors to the journal. He also practi
artist, designing illustrations to Chamberlayne's poems
1821 to 1825 exhibiting in the Royal Academy figu
including a "Romance from Undine," "Paris in the
Helen" and the "Milkmaid's Song." Owing to his
habits, Wainewright's affairs became deeply involv
he insured the life of his sister-in-law in various
sum of £18,000, and when she died, in the Decemb
year, payment was refused by the companies on
misrepresentation. Wainewright retired to Fran
by the authorities as a suspected person, and im
months. He had in his possession a quantity of
it was afterwards found that he had destroye
sister-in-law, but also his uncle, his mother-in-la
shire friend, by this poison. He returned to Lo
was at once arrested on a charge of forging, thi
a transfer of stock, and was sentenced to tran
He died of poplexy in Hobart Town hospital i

The *Essays and Criticisms* of Wainewright we
with an account of his life, by W. Carew Haz
of his crimes suggested to Dickens his sto
and to Bulwer Lytton his novel of *Lucretia*,
artist and poisoner, has interested latter-day
Wilde in "Pen, Pencil and Poison" (*Fortnigh*
and A. G. Allen, in T. Seccombe's *Twelve Ba*

WAINGANGA, a river of India, flowin
Provinces in a very winding course of
joining the Wardha the united stream,
ultimately falls into the Godavari.

WAINSCOT, properly a superior quali
panel work, hence such panel-work a
covering of the interior walls of an apa
to be Dutch and came into use in En
and occurs in lists of imported timbe
schot, adapted in English as *wayn*
Voyages, i. 173, has "boords called
the best kind of oak, well-grained,
from knots. The form shows that i
formed from *wagen* (*i.e.* wain, wag
has a large number of meanings, s
enclosure of boards, cf. "sheet," a
panelling used in coach-building
and relations have been suggested
with O. Eng. *wah*, wall, or with
wave, the reference being to t
The term "wainscot" is someti
the lining, whether of paper,
lower portion of the walls of a
cube; Lat. *datum*, something
O. Fr. *det*, mod. *dé*, Eng. "die
cube on the base of a pedesta

household. He had a livery given him and during illness an extra allowance of food. Besides "piping the watch" and guarding the palace against thieves and fire, this wait had to attend at the installation of knights of the Bath. London and all the chief boroughs had their corporation waits certainly from the early 16th century, for in the privy purse accounts of Henry VIII. occurs (1532) the entry "Item, the XI daye (of October) paied to the waytes of Canterbery in rewarde . . . vijs. vjd." In 1582 Dudley, earl of Leicester, writes to the corporation of London asking that a servant of his should be admitted to the city waits. These borough waits appear, however, to have been more nearly akin to the medieval troubadours or minstrels who played to kings and nobles at and after the evening meal. The duties of the London waits, which included playing before the mayor during his annual progress through the streets and at city dinners, seem to have been typical of all 16th- and 17th-century city waits. The London waits had a special uniform of blue gowns with red sleeves and caps, and wore a silver collar or chain round the neck. In the 18th and early 19th century the ordinary street watchmen appear to have arrogated to themselves the right to serenade householders at Christmas time, calling round on Boxing Day to receive a gratuity for their tunefulness as well as their watchfulness. When in 1829 their place as guardians of the city's safety was taken by police, it was left for private individuals to keep up the custom.

WAITZ, GEORG (1813–1886), German historian, was born at Flensburg, in the duchy of Schleswig, on the 9th of October 1813. He was educated at the Flensburg gymnasium and the universities of Kiel and Berlin. The influence of Ranke early diverted him from his original purpose of studying law, and while still a student he began that series of researches in German medieval history which was to be his life's work. On graduating at Berlin in August 1836, Waitz went to Hanover to assist Pertz in the great national work of publishing the *Monumenta Germaniae historica*; and the energy and learning he displayed in that position won him a summons to the chair of history at Kiel in 1842. The young professor soon began to take an interest in politics, and in 1846 entered the provincial diet as representative of his university. His leanings were strongly German, so that he became somewhat obnoxious to the Danish government, a fact which made an invitation in 1847 to become professor of history at Göttingen peculiarly acceptable. The political events of 1848–1849, however, delayed his appearance in his new chair. When the German party in the northern duchies rose against the Danish government, Waitz hastened to place himself at the service of the provisional government. He was sent to Berlin to represent the interests of the duchies there, and during his absence he was elected by Kiel as a delegate to the national parliament at Frankfort. Waitz was an adherent of the party who were eager to bring about a union of the German states under a German emperor; and when the king of Prussia declined the imperial crown the professor withdrew from the assembly in disappointment, and ended his active share in public life. In the autumn of 1849 Waitz began his lectures at Göttingen. His style of speaking was dry and uninteresting; but the matter of his lectures was so practical and his teaching so sound that students were attracted in crowds to his lecture-room, and the reputation of the Göttingen historical school spread far and wide. At the same time Waitz's pen was not idle, and his industry is to be traced in the list of his works and in the *Proceedings* of the different historical societies to which he belonged. In 1875 [illegible] rlin to succeed Pertz as principal editor [illegible] spite of advancing [illegible] work with all his [illegible] France and Italy [illegible] He died at Berlin [illegible] —in 1842 to a [illegible] 8 to a daughter [illegible]

[illegible] iple of Ranke, [illegible] mental attitude he has more affinity with Pertz or Dahlmann. His special domain was medieval German history, and he rarely travelled beyond it.

Waitz's chief works, apart from his contributions to the *Monumenta*, are:—*Deutsche Verfassungsgeschichte* (8 vols., Kiel, 1844–1878; 2nd ed., 2 vols. only, 1865–1870); *Schleswig-Holsteins Geschichte* (2 vols., Göttingen, 1851–1854; the 3rd vol. was never published); *Lübeck unter Jürgen Wullenwever und die europäische Politik* (3 vols.; Berlin, 1855–1856); and *Grundzüge der Politik* (Kiel, 1862). Among his smaller works, which, however, indicate the line of his researches, are the following:—*Jahrbücher des deutschen Reichs unter Heinrich I.* (Berlin, 1837, 3rd ed., 1885); *Über das Leben und die Lehre des Ulfila* (Hanover, 1840); *Das alte Recht der salischen Franken* (Kiel, 1846); and *Deutsche Kaiser von Karl dem Grossen bis Maximilian* (Berlin, 1872). In conjunction with other scholars Waitz took a leading part in the publication of the *Forschungen zur deutschen Geschichte* (Munich, 1862 seq.), and in the *Nordalbingische Studien*, published in the *Proceedings* of the Schleswig-Holstein Historical Society (Kiel, 1844–1851). A *Bibliographische Übersicht über Waitz's Werke* was published by E. Steindorff at Göttingen in 1886.

Obituary notices of Waitz are to be found in the *Historische Zeitschrift*, new series, vol. xx.; in the publications for 1886 of the Berlin Akademie der Wissenschaften, the Göttingen Gesellschaft der Wissenschaften, and the Hansischer Geschichtsverein; in the *Historisches Jahrbuch der Görres Gesellschaft*, vol. viii.; and in the *Revue historique*, vol. xxxi.

WAITZ, THEODOR (1821–1864), German psychologist and anthropologist, was born at Gotha on the 17th of March 1821. Educated at Leipzig and Jena, he made philosophy, philology and mathematics his chief studies, and in 1848 he was appointed professor of philosophy in the university of Marburg. He was a severe critic of the philosophy of Fichte, Schelling and Hegel, and considered psychology to be the basis of all philosophy. His researches brought him into touch with anthropology, and he will be best remembered by his monumental work in six volumes, *Die Anthropologie der Naturvölker*. He died on the 21st of May 1864 at Marburg.

In addition to his *Anthropologie*, the first four volumes of which appeared at Leipzig, 1859–1864, the last two posthumously, he published *Grundlegung der Psychologie* (1846); *Lehrbuch der Psychologie als Naturwissenschaft* (1849); *Allgemeine Pädagogik* (1852); and a critical edition of the *Organon of Aristotle* (1844).

WAKE, THOMAS (1297–1349), English baron, belonged to a Lincolnshire family which had lands also in Cumberland, being the son of John Wake (d. 1300), who was summoned to parliament as a baron in 1295, and the grandson of Baldwin Wake (d. 1282), both barons and warriors of repute. Among Thomas Wake's guardians were Piers Gaveston and Henry, earl of Lincoln, whose daughter Blanche (d. 1357) he married before 1317. This lady was the niece of Thomas, earl of Lancaster, and her husband was thus attached to the Lancastrian party, but he did not follow Earl Thomas in the proceedings which led to his death in 1322. Hating the favourites of Edward II. Wake joined Queen Isabella in 1326 and was a member of the small council which advised the young king, Edward III.; soon, however, he broke away from the queen and her ally, Roger Mortimer, and in conjunction with his father-in-law, now earl of Lancaster, he joined the malcontent barons. He was possibly implicated in the plot which cost his brother-in-law, Edmund, earl of Kent, his life in 1330, and he fled to France, returning to England after the overthrow of Isabella and Mortimer. Edward III. made him governor of the Channel Islands and he assisted Edward Bruce to invade Scotland, being afterwards sent on an errand to France. In 1341 he incurred the displeasure of the king and was imprisoned, but he had been restored and had been employed in Brittany and elsewhere when he died childless on the 31st of May 1349. His estates passed to his sister Margaret (d. 1349), widow of Edmund, earl of Kent, and her son John (d. 1352), and later to the Holand family. Wake established a house for the Austin canons at Newton near Hull; this was afterwards transferred to Haltemprice in the same neighbourhood.

WAKE, WILLIAM (1657–1737), English archbishop, was born at Blandford, Dorset, on the 26th of January 1657, and educated at Christ Church, Oxford. He took orders, and in 1682 went to Paris as chaplain to the ambassador Richard Graham, Viscount Preston (1648–1695). Here he became acquainted with many of the savants of the capital, and was much interested in French clerical affairs. He also collated some Paris manuscripts of the Greek Testament for John Fell, bishop of Oxford. He returned to England in 1685; in 1688 he became preacher at Gray's Inn, and in 1689 he received a canonry of Christ Church, Oxford. In 1693 he was appointed rector of St James's, Westminster. Ten years later he became dean of Exeter, and in 1705 he was consecrated bishop of Lincoln. He was translated to the see of Canterbury in 1716 on the death of Thomas Tenison. During 1718 he negotiated with leading French churchmen about a projected union of the Gallican and English churches to resist the claims of Rome (see J. H. Lupton, *Archbishop Wake and the Project of Union*, 1896). In dealing with nonconformity he was tolerant, and even advocated a revision of the Prayer Book if that would allay the scruples of dissenters. His writings are numerous, the chief being his *State of the Church and Clergy of England . . . historically deduced* (London, 1703). He died at Lambeth on the 24th of January 1736/7.

Sir Isaac Wake (*c.* 1580–1632), the diplomatist, was a kinsman of the archbishop. He commenced his diplomatic career in Venice, and then he represented his county for sixteen years at Turin; he was knighted in 1619, and after being sent on various special missions by James I. he was British ambassador in Paris from 1630 until his death in June 1632. Among Sir Isaac's writings is *Rex platonicus*, a description of the entertainment of James I. at Oxford in 1605; this was published in 1607 and has often been reprinted.

WAKE (A.S. *wacan*, to "wake" or "watch"), a term now restricted to the Irish custom of an all-night "waking" or watching round a corpse before burial, but anciently used in the wider sense of a vigil kept as an annual church celebration in commemoration of the completion or dedication of the parish church. This strictly religious wake consisted in an all-night service of prayer and meditation in the church. These services, popularly known as "wakes," were officially termed *Vigiliae* by the church, and appear to have existed from the earliest days of Anglo-Saxon Christianity. Tents and booths were set up in the churchyard before the dawn which heralded in a day devoted to feasting, dancing and sports, each parish keeping the morrow of its vigil as a holiday. Wakes soon degenerated into fairs; people from neighbouring parishes journeyed over to join in the merry-making, and as early as Edgar's reign (958–975) the revelry and drunkenness had become a scandal. The *vigiliae* usually fell on Sundays or saints' days, those being the days oftenest chosen for church dedications, and thus the abuse was the more scandalous. In 1445 Henry VI. attempted to suppress markets and fairs on Sundays and holy days. In 1536 an Act of Convocation ordered that the yearly "wake" should be held in every parish on the same day, viz. the first Sunday in October, but this regulation was disregarded. Wakes are specially mentioned in the *Book of Sports* of James I. and Charles I. among the feasts which should be observed.

Side by side with these church wakes there existed from the earliest times the custom of "waking" a corpse. The custom, as far as England was concerned, seems to have been older than Christianity, and to have been at first essentially Celtic. Doubtless it had a superstitious origin, the fear of evil spirits hurting or even removing the body, aided perhaps by the practical desire to keep away rats and other vermin. The Anglo-Saxons called the custom lich-wake or like-wake (A.S. *lic*, a corpse). With the introduction of Christianity the offering of prayer was added to the mere vigil, which until then had been characterized by formal mourning chants and recitals of the life [illegible] the dead. As a rule the corpse, with a plate of salt [illegible] placed under the table, on which was liquor [illegible] These private wakes soon tended to become [illegible] during the reign of Edward III. the [illegible] London proclaimed by his 10th canon th[illegible] the offering of pr[illegible] the dead, and [illegible] none but near r[illegible] The penalty [illegible] Reformati[illegible] the cust[illegible] in [illegible] out. M[illegible] custom equivalent to "waking," which, however, must be distinguished from the funeral feasts pure and simple.

For detailed accounts of Irish wakes see Brand's *Antiquities of Great Britain* (W. C. Hazlitt's edition, 1905) under "Irish Wakes."

WAKEFIELD, EDWARD GIBBON (1796–1862), British colonial statesman, was born in London on the 20th of March 1796, of an originally Quaker family. His father, Edward Wakefield (1774–1854), author of *Ireland, Statistical and Political* (1812), was a surveyor and land agent in extensive practice; his grandmother, Priscilla Wakefield (1751–1832), was a popular author for the young, and one of the introducers of savings banks. Wakefield was for a short time at Westminster School, and was brought up to his father's profession, which he relinquished on occasion of his elopement at the age of twenty with Miss Pattle, the orphan daughter of an Indian civil servant. The young lady's relatives ultimately became reconciled to the match, and procured him an appointment as attaché to the British legation at Turin. He resigned this post in 1820, upon the death of his wife, to whom he was fondly attached, and, though making some efforts to connect himself with journalism, spent the years immediately succeeding in idleness, residing for the most part in Paris. In 1826 he appeared before the public as the hero of a most extraordinary adventure, the abduction of Miss Ellen Turner, daughter of William Turner, of Shrigley Park, Cheshire. Miss Turner was decoyed from school by means of a forged letter, and made to believe that she could only save her father from ruin by marrying Wakefield, whom she accordingly accompanied to Gretna Green. This time the family refused to condone his proceedings; he was tried with his confederates at Lancaster assizes, March 1827, convicted, and sentenced to three years' imprisonment in Newgate. The marriage, which had not been consummated, was dissolved by a special act of parliament. A disgrace which would have blasted the career of most men made Wakefield a practical statesman and a benefactor to his country. Meditating, it is probable, emigration upon his release, he turned his attention while in prison to colonial subjects, and acutely detected the main causes of the slow progress of the Australian colonies in the enormous size of the landed estates, the reckless manner in which land was given away, the absence of all systematic effort at colonization, and the consequent discouragement of immigration and dearth of labour. He proposed to remedy this state of things by the sale of land in small quantities at a sufficient price, and the employment of the proceeds as a fund for promoting immigration. These views were expressed with extraordinary vigour and incisiveness in his *Letter from Sydney* (1829), published while he was still in prison, but composed with such graphic power that it has been continually quoted as if written on the spot. After his release Wakefield seemed disposed for a while to turn his attention to social questions at home, and produced a tract on the *Punishment of Death*, with a terribly graphic picture of the condemned sermon in Newgate, and another on incendiarism in the rural districts, with an equally powerful exhibition of the degraded condition of the agricultural labourer. He soon, however, became entirely engrossed with colonial affairs, and, having impressed John Stuart Mill, Colonel Torrens and other leading economists with the value of his ideas, became a leading though not a conspicuous manager of the South Australian Company, by which the colony of South Australia was ultimately founded. In 1833 he published anonymously *England and America*, a work primarily intended to develop his own colonial theory, which is done in the appendix entitled "[illegible] of Colonization." The body of the work, [illegible] in seminal ideas, though some statements [illegible] conclusions extravagant. It contains the [illegible] the transport of letters should be wholly [illegible] of subsequent reform—and the [illegible] given circumstances, "the Americans [illegible] corn than has ever been raised." In 1836 [illegible] the first volume of an edition of Adam [illegible]lete. In 1837 the New Zealand [illegible] and he became its managing [illegible] this great undertaking fairly commenced when he accepted the post of private secretary to Lord Durham on the latter's appointment as special commissioner to Canada. The Durham Report, the charter of constitutional government in the colonies, though drawn up by Charles Buller, embodied the ideas of Wakefield, and the latter was the means of its being given prematurely to the public through *The Times*, to prevent its being tampered with by the government. He acted in the same spirit a few months later, when (about July 1839), understanding that the authorities intended to prevent the despatch of emigrants to New Zealand, he hurried them off on his own responsibility, thus compelling the government to annex the country just in time to anticipate a similar step on the part of France. For several years Wakefield continued to direct the New Zealand Company, fighting its battles with the colonial office and the missionary interest, and secretly inspiring and guiding many parliamentary committees on colonial subjects, especially on the abolition of transportation. The company was by no means a financial success, and many of its proceedings were wholly unscrupulous and indefensible; its great object, however, was attained, and New Zealand became the Britain of the south. In 1846 Wakefield, exhausted with labour, was struck down by apoplexy, and spent more than a year in complete retirement, writing during his gradual recovery his *Art of Colonization*. The management of the company had meanwhile passed into the hands of others, whose sole object was to settle accounts with the government, and wind up the undertaking. Wakefield seceded, and joined Lord Lyttelton and John Robert Godley in establishing the Canterbury settlement as a Church of England colony. A portion of his correspondence on this subject was published by his son as *The Founders of Canterbury* (Christchurch, 1868). As usual with him, however, he failed to retain the confidence of his coadjutors to the end. In 1853, after the grant of a constitution to New Zealand, he took up his residence in the colony, and immediately began to act a leading part in colonial politics. In 1854 he appeared in the first New Zealand parliament as extra-official adviser of the acting governor, a position which excited great jealousy, and as the mover of a resolution demanding the appointment of a responsible ministry. It was carried unanimously, but difficulties, which will be found detailed in W. Swainson's *New Zealand and its Colonization* (ch. 12), prevented its being made effective until after the mover's retirement from political life. In December 1854, after a fatiguing address to a public meeting, followed by prolonged exposure to a south-east gale, his constitution entirely broke down. He spent the rest of his life in retirement, dying at Wellington on the 16th of May 1862. His only son, Edward Jerningham Wakefield (1820–1879), was a New Zealand politician. Three of Wakefield's brothers were also interested in New Zealand. After serving in the Spanish army William Hayward Wakefield (1803–1848) emigrated to New Zealand in 1839. As an agent of the New Zealand Land Company he was engaged in purchasing enormous tracts of land from the natives, but the company's title to the greater part of this was later declared invalid. He remained in New Zealand until his death on the 19th of September 1848. Arthur Wakefield (1790–1843), who was associated with his brother in these transactions about land, was killed during a fight with some natives at Wairau on the 17th of June 1843. The third brother was Felix Wakefield (1807–1875), an engineer.

Wakefield was a man of large views and lofty aims, and in private life displayed the warmth of heart which commonly accompanies these qualities. His main defect was unscrupulousness: he hesitated at nothing necessary to accomplish an object, and the conviction of his untrustworthiness gradually alienated his associates, and left him politically powerless. Excluded from parliament by the fatal error of his youth, he was compelled to resort to indirect means of working out his plans by influencing public men. But for a tendency to paradox, his intellectual powers were of the highest order, and as a master of nervous idiomatic English he is second to Cobbett alone. After every deduction it remains true that no contemporary showed equal genius as a colonial statesman, or in this department rendered equal service to his country.

For an impartial examination of the Wakefield system, see Leroy-Beaulieu, *De la colonisation chez les peuples modernes* (3rd ed. pp. 562-575 and 696-700). See also R. Garnett's *Life of Wakefield* (1898). (R. G.)

WAKEFIELD, GILBERT (1756–1801), English classical scholar and politician, was born at Nottingham on the 22nd of February 1756. He was educated at Jesus College, Cambridge (fellow, 1776). In 1778 he took orders, but in the following year quitted the church and accepted the post of classical tutor at the Nonconformist academy at Warrington, which he held till the dissolution of the establishment in 1783. After leaving Warrington, he took private pupils at Nottingham and other places, and also occupied himself with literary work. His most important production at this period was the first part of the *Silva critica*, the design of which was the "illustration of the Scriptures by light borrowed from the philology of Greece and Rome." In 1790 he was appointed professor of classics at the newly-founded Unitarian college at Hackney, but his proposed reforms and his objection to religious observances led to unpleasantness and to his resignation in the following year. From this time he supported himself by his pen. His edition of *Lucretius*, a work of high pretensions and little solid performance, appeared in 1796–1799, and gained for the editor a very exaggerated reputation (see Munro's *Lucretius*, i. pp. 19, 20). His light-hearted criticism of Porson's edition of the *Hecuba* was avenged by the latter's famous toast: "Gilbert Wakefield; what's Hecuba to him or he to Hecuba?" About this time Wakefield, who hated Pitt and condemned war as utterly unchristian, abandoned literature for political and religious controversy. After assailing with equal bitterness writers so entirely opposed as William Wilberforce and Thomas Paine, in January 1798 he "employed a few hours" in drawing up a reply to Bishop Watson's *Address to the People of Great Britain*, written in defence of Pitt and the war and the new "tax upon income." He was charged with having published a seditious libel, convicted in spite of an eloquent defence, and imprisoned for two years in Dorchester gaol. A considerable sum of money was subscribed by the public, sufficient to provide for his family upon his death, which took place on the 9th of September 1801. While in prison he corresponded on classical subjects with Charles James Fox, the letters being subsequently published.

See the second edition of his *Memoirs* (1804). The first volume is autobiographical; the second, compiled by J. T. Rutt and A. Wainewright, includes several estimates of his character and performances from various sources, the most remarkable being one by Dr Parr; see also *Gentleman's Magazine* (September 1801); Henry Crabb Robinson's *Diary* (3rd ed., 1872); John Aikin in Aikin's *General Biography* (1799–1815).

WAKEFIELD, a city and municipal and parliamentary borough in the West Riding of Yorkshire, England, 175¾ m. N.N.W. from London. Pop. (1901) 41,413. It is served by the Great Northern, Midland and Great Central railways (Westgate station), and the Lancashire and Yorkshire and North-Eastern railways (Kirkgate station), the Great Northern Company using both stations. It lies on the river Calder, mainly on the north bank, in a pleasant undulating country, towards the eastern outskirts of the great industrial district of the West Riding. The river is crossed by a fine bridge of eight arches on which stands the chapel of St Mary, a beautiful structure 50 ft. long by 25 wide, of the richest Decorated character. Its endowment is attributed to Edward IV., in memory of his father Richard, duke of York, who fell at the battle of Wakefield (1460). It was completely restored in 1847. In 1888 the bishopric of Wakefield was formed, almost entirely from that of Ripon, having been sanctioned in 1878. The diocese includes about one-seventh of the parishes of Yorkshire, and also covers a very small portion of Lancashire. The cathedral church of All Saints occupies a very ancient site, but only slight traces of buildings previous to the 14th century can be seen. In the early part of that century the church was almost rebuilt, and was consecrated by Archbishop William de Melton in 1329. Further great alterations took place in the 15th century, and the general effect of the building as it stands is Perpendicular. The church consists of a clerestoried nave and choir, with a western tower; the eastward extension of the choir, the construction of the retrochoir and other works were undertaken in 1900 and consecrated in 1905 as a memorial to Dr Walsham How, the first bishop. During restoration of the spire (the height of which is 247 ft.) in 1905, records of previous work upon it were discovered in a sealed receptacle in the weather-vane. Among the principal public buildings are the town hall (1880), in the French Renaissance style; the county hall (1898), a handsome structure with octagonal tower and dome over the principal entrance; the large corn exchange (1837, enlarged 1862), including a concert-room; the market house, the sessions house, the county offices (1896) and the prison for the West Riding; the mechanics' institution with large library, church institute and library, and the fine art institution. A free library was founded in 1905, and a statue of Queen Victoria unveiled in the Bull Ring at the same time. Benevolent institutions include the Clayton hospital (1879), on the pavilion system, and the West Riding pauper lunatic asylum with its branches. The Elizabethan grammar school, founded in 1592, is the principal educational establishment. Among several picturesque old houses remaining, that known as the Six Chimneys, an Elizabethan structure, is the most striking.

Formerly Wakefield was the great emporium of the cloth manufacture in Yorkshire, but in the 19th century it was superseded in this respect by Leeds. Foreign weavers of cloth were established at Wakefield by Henry VII.; and Leland, writing in the time of Henry VIII., states that its "whole profit standeth by coarse drapery." During the 18th century it became noted for the manufacture of worsted yarn and woollen stuffs. Although its manufacturing importance is now small in comparison with that of several other Yorkshire towns, it possesses mills for spinning worsted and carpet yarns, coco-nut fibre and China grass. It has also rag-crushing mills, chemical works, soap-works and iron-works; and there are a number of collieries in the neighbourhood. Wakefield is the chief agricultural town in the West Riding, and has one of the largest corn markets in the north of England. It possesses agricultural implement and machine works, grain and flour mills, malt-works and breweries. A large trade in grain is carried on by means of the Calder, and the building of boats for inland navigation is a considerable industry. There are extensive market-gardens in the neighbourhood. In the vicinity of Wakefield is Walton Hall, the residence of the famous naturalist Charles Waterton (1782–1865). The parliamentary borough returns one member. The municipal borough is under a mayor, 9 aldermen and 27 councillors. Area, 4060 acres.

In the reign of Edward the Confessor, Wakefield (*Wachefeld*) was the chief place in a large district belonging to the king and was still a royal manor in 1086. Shortly afterwards it was granted to William, Earl Warenne, and his heirs, under whom it formed an extensive baronial liberty, extending to the confines of Lancashire and Cheshire. It remained with the Warenne family until the 14th century, when John Warenne, earl of Warenne and Surrey, having no legitimate heir, settled it on his mistress, Maud de Keirford and her two sons. They, however, predeceased him, and after Maud's death in 1360 the manor fell to the crown. Charles I. granted it to Henry, earl of Holland, and after passing through the hands of Sir Gervase Clifton and Sir Christopher Clapham, it was purchased about 1700 by the duke of Leeds, ancestor of the present duke, who is now lord of the manor. In 1203–1204 William Earl Warenne received a grant of a fair at Wakefield on the vigil, day and morrow of All Saints' day. As early as 1231 the town seems to have had some form of burghal organization, since in that year a burgage there is mentioned in a fine. In 1331, at the request of John de Warenne, earl of Surrey, the king granted the "good men" of the town pavage there for three years, and in the same year the earl obtained a grant of another fair there on the vigil, day and morrow of St Oswald. There is no other indication of a borough. The battle of Wakefield was fought in 1460 on the banks of the river Calder just outside the town.

Leland gives an interesting account of the town in the 16th century, and while showing that the manufacture of clothing was the chief industry, says also that Wakefield is "a very quik market town and meatly large, well served of flesh and fish both from sea and by rivers . . . so that all vitaile is very good and chepe there. A right honest man shall fare well for 2d. a meal. . . There be plenti of se coal in the quarters about Wakefield." The corn market, held on Fridays, is of remote origin. A cattle market is also held on alternate Wednesdays under charter of 1765. The town was enfranchised in 1832, and was incorporated in 1848 under the title of the mayor, aldermen and councillors of the borough of Wakefield. Before this date it was under the superintendence of a constable appointed by the steward of the lord of the manor.

See *Victoria County History, Yorkshire*; W. S. Banks, *History of Wakefield* (1871); E. Parsons, *History of Leeds, &c.* (1834); T. Taylor, *History of Wakefield* (1886).

WAKEFIELD, a township of Middlesex county, Massachusetts, U.S.A., about 10 m. N. of Boston. Pop. (1890) 6982; (1900) 9290, of whom 2347 were foreign-born; (1910, census) 11,404. Wakefield is served by three branches of the Boston & Maine railway and by electric interurban railway to neighbouring towns and cities. It contains the outlying villages of Greenwood, Montrose and Boyntonville; and, larger than these, Wakefield, near the centre of the township. In this village is the town hall, the gift of Cyrus Wakefield (1811–1873), and the Beebe Town Library, founded in 1856 as the Public Library of South Reading, and later renamed in honour of Lucius Beebe, a generous patron. The town park (about 25 acres), shaded by some fine old elms, extends to the S. shore of Lake Quannapowitt and contains a soldiers' monument; and in the S. part of the township are Crystal Lake and Hart's Hill (30 acres), a public park. In the township is the Wakefield Home for Aged Women, and a Y.M.C.A. building. Manufacturing is the principal industry; and among the manufactures are rattan goods, hosiery, stoves and furnaces, boots and shoes, and pianos. The value of the factory products increased from $2,647,130 in 1900 to $4,807,728 in 1905, or 81·6 %. The township owns and operates the electric lighting and gas plants and the water-works.

Within the present limits of Wakefield the first settlement was made, in 1639, in that part of the old township of Lynn which in 1644 was incorporated as Reading. In 1812 the southern or "Old Parish" of Reading, which was strongly Democratic-Republican while the other two parishes were strongly Federalist, was set apart and incorporated as the town of South Reading. In 1868 the present name was adopted in honour of Cyrus Wakefield, who established the rattan works here. A portion of Stoneham was annexed to Wakefield in 1889.

See C. W Eaton, "Wakefield," in S. A. Drake's *History of Middlesex County* (Boston, 1880).

WAKKERSTROOM, a town and district of the Transvaal. The district occupies part of the S.E. of the Transvaal, being bounded S. by the Orange Free State and Natal. The frontier line is in part the crest of the Drakensberg. The town of Wakkerstroom, pop. (1904) 1402, lies 18 m. E. of Volksrust and 4 m. N. of the Natal frontier. It is built on the high veld, at an elevation of 5900 ft., and possesses a bracing climate. The neighbouring hills rise over 7000 ft. The plain on which the town stands is drained by the Slang and other tributaries of the Buffalo affluent of the Tugela. The district, a fertile agricultural region, was organized as one of the divisions of the Transvaal in 1859 by President M. W. Pretorius, and after his Christian names the town was called Marthinus-Wessel-Stroom, an unwieldy designation dropped in favour of Wakkerstroom. During the war of 1880–81 the town was unsuccessfully besieged by the Boers. In 1903 a small portion of the district was annexed to Natal.

WAKLEY, THOMAS (1795–1862), English medical and social reformer, was born in Devonshire, and was early apprenticed to a Taunton apothecary. He then went to London and qualified as a surgeon, setting up in practice in Regent Street, and marrying (1820) Miss Goodchild, whose father was a merchant and a governor of St Thomas's Hospital. All through his career Wakley proved to be a man of aggressive personality, and his experiences in this respect had a sensational beginning. In August 1820 a gang of men who had some grievance against him burnt down his house and severely wounded him in a murderous assault. The whole affair was obscure, and Wakley was even suspected, unjustly, of setting fire to his house himself; but he won his case against the insurance company which contested his claim. He became a friend of William Cobbett, with whose radicalism he was in sympathy. In 1823 he started the well-known medical weekly paper, the *Lancet*, and began a series of attacks on the jobbery in vogue among the practitioners of the day, who were accustomed to treat the medical profession as a close borough. In opposition to the hospital doctors he insisted on publishing reports of their lectures and exposing various malpractices, and he had to fight a number of lawsuits, which, however, only increased his influence. He attacked the whole constitution of the Royal College of Surgeons, and obtained so much support from among the general body of the profession, now roused to a sense of the abuses he exposed, that in 1827 a petition to parliament resulted in a return being ordered of the public money granted to it. But reform in the college was slow, and Wakley now set himself to rouse the House of Commons from within. He became a radical candidate for parliament, and in 1835 was returned for Finsbury, retaining his seat till 1852. In this capacity, and also as coroner for West Middlesex—an appointment he secured in 1839—he was indefatigable in upholding the interests of the working classes and advocating humanitarian reforms, as well as in pursuing his campaign against medical restrictions and abuses; and he made the *Lancet* not only a professional organ but a powerful engine of social reform. He died on the 16th of May 1862, leaving three sons, the proprietorship of the *Lancet* remaining in the family.

See Samuel Squire Sprigge, *Life and Times of Thomas Wakley* (1897).

WALACHIA, or **WALLACHIA**, a former principality of south-eastern Europe, constituting, after its union with Moldavia on the 9th of November 1859, a part of Rumania (*q.v.*).

WALAFRID[1] **STRABO** (or Strabus, *i.e.* "squint-eyed") (d. 849), German monk and theological writer, was born about 808 in Swabia. He was educated at the monastery of Reichenau, near Constance, where he had for his teachers Tatto and Wettin, to whose visions he devotes one of his poems. Then he went on to Fulda, where he studied for some time under Hrabanus Maurus before returning to Reichenau, of which monastery he was made abbot in 838. There is a story—based, however, on no good evidence—that Walafrid devoted himself so closely to letters as to neglect the duties of his office, owing to which he was expelled from his house; but, from his own verses, it seems that the real cause of his flight to Spires was that, notwithstanding the fact that he had been tutor to Charles the Bald, he espoused the side of his elder brother Lothair on the death of Louis the Pious in 840. He was, however, restored to his monastery in 842, and died on the 18th of August 849, on an embassy to his former pupil. His epitaph was written by Hrabanus Maurus, whose elegiacs praise him for being the faithful guardian of his monastery.

Walafrid Strabo's works are theological, historical and poetical. Of his theological works the most famous is the great exegetical compilation which, under the name of *Glosa ordinaria* or the *Glosa*, remained for some 500 years the most widespread and important quarry of medieval biblical science, and even survived the Reformation, passing into numerous editions as late as the 17th century (see *Hist. littéraire de la France*, t. v. p. 59 ff.). The oldest known copy, in four folio volumes, of which the date and origin are unknown, but which is certainly almost entirely Walafrid's work, gives us his method. In the middle of the pages is the Latin text of the Bible; in the margins are the "glosses," consisting of a very full collection of patristic excerpts in illustration and explanation of the text. There is also an exposition of the first twenty psalms (published by Pez in *Anecdota nova*, iv.) and an epitome of Hrabanus Maurus's commentary on Leviticus. An *Expositio quatuor Evangeliorum* is also ascribed to Walafrid. Of singular interest also is his *De exordiis et incrementis rerum ecclesiasticarum*, written between 840 and 842 and dedicated to Regenbert the librarian. It deals in 32 chapters with ecclesiastical usages, churches, altars, prayers, bells, pictures, baptism and the Holy Communion. Incidentally he introduces into his explanations the current German expressions for the things he is treating of, with the apology that Solomon had set him the example by keeping monkeys as well as peacocks at his court. Of special interest is the fact that Walafrid, in his exposition of the Mass, shows no trace of any belief in the doctrine of transubstantiation as taught by his famous contemporary Radbertus (*q.v.*); according to him, Christ gave to his disciples the sacraments of his Body and Blood in the substance of bread and wine, and taught them to celebrate them as a memorial of his Passion.

Walafrid's chief historical works are the rhymed *Vita sancti Galli*, which, though written nearly two centuries after this saint's death, is still the primary authority for his life, and a much shorter life of St Othmar, abbot of St Gall (d. 759).[2] A critical edition of them by E. Dummler is in the *Monumenta Germaniae hist. Poëtae Latini*, ii. (1884), p. 259 ff. Walafrid's poetical works also include a short life of St Blaithmaic, a high-born monk of Iona, murdered by the Danes in the first half of the 9th century; a life of St Mammas; and a *Liber de visionibus Wettini*. This last poem, like the two preceding ones written in hexameters, was composed at the command of "Father" Adalgisus, and based upon the prose narrative of Heto, abbot of Reichenau from 806 to 822. It is dedicated to Wettin's brother Grimald. At the time he sent it to Grimald Walafrid had, as he himself tells us, hardly passed his eighteenth year, and he begs his correspondent to revise his verses, because, "as it is not lawful for a monk to hide anything from his abbot," he fears he may be beaten with deserved stripes. In this curious vision Wettin saw Charles the Great suffering purgatorial tortures because of his incontinence. The name of the ruler alluded to is not indeed introduced into the actual text, but "Carolus Imperator" form the initial letters of the passage dealing with this subject. Many of Walafrid's other poems are, or include, short addresses to kings and queens (Lothair, Charles, Louis, Pippin, Judith, &c.) and to friends (Einhard, Grimald, Hrabanus Maurus, Tatto, Ebbo, archbishop of Reims, Drogo, bishop of Metz, &c.). His most famous poem is the *Hortulus*, dedicated to Grimald. It is an account of a little garden that he used to tend with his own hands, and is largely made up of descriptions of the various herbs he grows there and their medicinal and other uses. Sage holds the place of honour; then comes rue, the antidote of poisons; and so on through melons, fennel, lilies, poppies, and many other plants, to wind up with the rose, "which in virtue and scent surpasses all other herbs, and may rightly be called the flower of flowers." The curious poem *De Imagine Tetrici* takes the form of a dialogue; it was inspired by an equestrian statue of Theodoric the Great which stood in front of Charlemagne's palace at Aix-la-Chapelle.

For a bibliography of Walafrid's historical works, and of writings dealing with them, see Potthast, *Bibliotheca hist. med. aevi* (Berlin, 1894), p. 1102 ff. Walafrid's works are published in Migne's *Patrologia Latina*, vols. cxiii. and cxiv. For further references see the article by Eduard Reuss and A. Hauck in Herzog-Hauck, *Realencyklopädie* (Leipzig, 1908), xx. 790.

WALCH, JOHANN GEORG (1693–1775), German theologian, was born on the 17th of June 1693 at Meiningen, where his father, Georg Walch, was general superintendent. He studied at Leipzig and Jena, amongst his teachers being J. F. Buddeus (1667–1729), whose only daughter he married. He published in 1716 a work, *Historia critica Latinae linguae*, which soon came into wide use. Two years later he became professor extraordinarius of philosophy at Jena. In 1719 he was appointed professor ordinarius of rhetoric, in 1721 of poetry, and in 1724 professor extraordinarius of theology. In 1728 he became professor ordinarius of theology, and in 1750 professor primarius. His theological position was that of a very moderate orthodoxy, which had been influenced greatly by the philosophy and controversies of the Deistic period. His university lectures and published works ranged over the wide fields of church history in its various branches, particularly the literature and the controversies of the church, dogmatics, ethics and pastoral theology. He died on the 13th of January 1775.

Of his works the most valuable were *Bibliotheca theologica* (1757–1765); *Bibliotheca patristica* (1770, new ed. 1834); his edition of Luther's works in 24 vols. (1740–1752); *Historische und theologische Einleitung in die religiösen Streitigkeiten, welche sonderlich ausser der ev.-lutherischen Kirche entstanden* (5 vols., 1733 ff.); the companion work to this, *Einleitung in die Religionsstreitigkeiten der evangel. luth. Kirche* (1730–1739), and *Philosophisches Lexikon* (1726, 4th ed. 1775). His life, with a complete list of his writings, which amounted to 287, *Leben und Charakter des Kirchenraths J. G. Walch*, was published anonymously by his son C. W. F. Walch (Jena, 1777). Cf. Wilhelm Gass, *Protestantische Dogmatik*, iii. p. 205 sq.

His son, JOHANN ERNST IMMANUEL (1725–1778), studied Semitic languages at Jena, and also natural science and mathematics. In 1749 he published *Einleitung in die Harmonie der*

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[1] In the oldest MSS. this is always spelt "Walahfrid."

[2] Walafrid also edited Thetmar's *Life of Louis the Pious*, prefixing a preface and making a few additions, and divided Einhard's *Vita Caroli* into chapters, adding an introduction.

Evangelisten, and in 1750 was appointed professor extraordinarius of theology. Five years later he became professor ordinarius of logic and metaphysics; in 1759 he exchanged this for a professorship of rhetoric and poetry. Amongst other theological works he published *Dissertationes in Acta Apostolorum* (1756–1761); *Antiquitates symbolicae* (1772); and after his death appeared *Observationes in Matthaeum ex Graecis inscriptionibus* (1779). He also published a periodical *Der Naturforscher* (1774–1778), and during the years 1749–1756 took an active part in editing the *Zeitungen von gelehrten Sachen*.

See article in *Allgemeine deutsche Biographie*; also *Lebensgeschichte J. E. I. Walch* (Jena, 1880), and J. G. Meusel's *Lexikon der verstorbenen teutschen Schriftsteller*, vol. xiv.

Another son, Christian Wilhelm Franz (1726–1784), was educated at Jena under his father's direction, and as early as 1745–1747 lectured in the university in branches of exegesis, philosophy and history. He then travelled with his brother, J. E. I. Walch, for a year in Holland, France, Switzerland and Italy. On his return he was in 1750 made professor extraordinarius of philosophy in Jena, but in 1753 he accepted an invitation to become professor ordinarius at Göttingen. Here in 1754 he became professor extraordinarius of theology, and three years later received an ordinary professorship. He lectured on dogmatics, church history, ethics, polemics, natural theology, symbolics, the epistles of Paul, Christian antiquities, historical theological literature, ecclesiastical law and the fathers, and took an active interest in the work of the *Göttinger Societät der Wissenschaften*. In 1766 he was appointed professor primarius. His permanent place amongst learned theologians rests on his works on church history. Semler was much his superior in originality and boldness, and Mosheim in clearness, method and elegance. But to his wide, deep and accurate learning, to his conscientious and impartial examination of the facts and the authorities at first hand, and to "his exact quotation of the sources and works illustrating them, and careful discussion of the most minute details," all succeeding historians are indebted. His method is critical and pragmatic, "pursuing everywhere the exact facts and the supposed causes of the outward changes of history," leaving wholly out of sight the deeper moving principles and ideas which influence its course. He died on the 10th of March 1784.

His principal work was his *Entwurf einer vollständigen Historie der Ketzereien, Spaltungen, und Religionsstreitigkeiten, bis auf die Zeit der Reformation* (11 vols., Leipzig, 1762–1785). Of his other valuable works may be mentioned *Geschichte der evangelisch-lutherischen Religion, als ein Beweis, dass sie die wahre sei* (1753), *Entwurf einer vollständigen Historie der römischen Päpste* (1756, 2nd ed. 1758; Eng. trans. 1759), *Entwurf einer vollständigen Historie der Kirchenversammlungen* (1759), *Grundsätze der Kirchengeschichte des Neuen Testaments* (1761, 2nd ed. 1773, 3rd ed. 1792), *Bibliotheca symbolica vetus* (1770), *Kritische Untersuchung vom Gebrauch der heiligen Schrift unter den alten Christen* (1779), occasioned by the controversy between G. E. Lessing and J. M. Goeze, and to which Lessing began an elaborate reply just before his death.

On C. W. F. Walch as historian see F. Baur, *Epochen der kirchlichen Geschichtsschreibung* (1852), p. 145 sq., and *Dogmengeschichte*, p. 38 sq. (1867, 3rd ed.); W. Gass, *Geschichte der protestantischen Dogmatik*, iii. p. 267 sq.; J. G. Meusel, *Lexicon verstorbener teutschen Schriftsteller*, vol. xiv. For his life, see the article in the *Allgemeine deutsche Biographie*.

A third son, Karl Friedrich (1734–1799), devoted himself to the study of law, and became professor of law at Jena in 1759. His most important works were *Introductio in controversias juris civilis recentioris* (Jena, 1771) and *Geschichte der in Deutschland geltenden Rechte* (Jena, 1780). He died on the 20th of July 1799.

WALCOTT, CHARLES DOOLITTLE (1850–   ), American geologist, was born at the village of New York Mills, New York, on the 31st of March 1850. He received a school education at [illegible]. In 1876 he was appointed assistant on the New York [illegible] Survey, and in 1879 assistant geologist on the United [illegible] Survey; in 1888 he became one of the palae[illegible] of the invertebrata, in 1893 chief palae[illegible] 1894 director of the Geological Survey. In [illegible] Secretary of the Smithsonian Institution. [illegible] the Geological Society of Washington he [illegible] important address on *The United States Geological Survey*. He added largely to contemporary knowledge of the fauna of the Older Palaeozoic rocks of North America, especially with reference to the crustacea and brachiopoda; he dealt also with questions of ancient physical geography and with mountain structure.

His more important works include "Palaeontology of the Eureka district" (*Mon. U.S. Geol. Survey*, 1884); "Cambrian faunas of North America" (*Bull. U.S. Geol. Survey*, 1884); *Fauna of the Lower Cambrian or Olenellus Zone* (1890, issued 1891), and *Fossil Medusae* (*Mon. U.S. Geol. Survey*, 1898).

WALDECK-PYRMONT, a principality of Germany and a constituent state of the German empire, consisting of two separate portions lying about 30 m. apart, viz. the county of Waldeck, embedded in Prussian territory between the provinces of Westphalia and Hesse-Nassau, and the principality of Pyrmont, farther to the north, between Lippe, Brunswick, Westphalia and Hanover. Waldeck comprises an area of 407 sq. m., covered for the most part with hills, which culminate in the Hegekopf (2775 ft.). The centre is occupied by the plateau of Corbach. The chief rivers are the Eder and the Diemel, both of which eventually find their way into the Weser. Pyrmont, only 26 sq. m. in extent, is also mountainous. The Emmer, also belonging to the Weser system, is its chief stream. The united area is thus 433 sq. m., or about half the size of Cambridgeshire in England, and the united population in 1905 was 59,127, showing a density of 138 to the square mile. The population is almost wholly Protestant. In consequence of the comparatively high elevation of the country—the lowest part being 540 ft. above the sea-level—the climate is on the whole inclement. Agriculture and cattle-rearing are the main resources of the inhabitants in both parts of the principality, but the soil is nowhere very fertile. Only 57% of the area is occupied by arable land and pasture; forests, one-tenth of which are coniferous, occupy 38%. Oats is the principal crop, but rye, potatoes and flax are also grown in considerable quantities. Fruit is also cultivated in the principality. Iron mines, slate and stone quarries are worked at various points, and, with live stock, poultry, wool and timber form the chief exports. A few insignificant manufactures are carried on in some of the little towns, but both trade and manufactures are much retarded by the comparative isolation of the country from railways. Wildungen, in the extreme south of Waldeck, is the terminus of a branch line from Wabern, and a light railway runs from Warburg to Marburg; Pyrmont is intersected by the trunk line running from Cologne, via Paderborn, to Brunswick and Berlin.

The capital and the residence of the prince is Arolsen (pop. 2811 in 1905) in Waldeck; twelve smaller townships and about one hundred villages are also situated in the county. The only town in Pyrmont is Bad Pyrmont, with about 1500 inhabitants, a highly fashionable watering-place with chalybeate and saline springs. The annual number of visitors is about 23,000. Wildungen is also a spa of repute. The inhabitants to the north of the Eder are of Saxon stock, to the south of Franconian, a difference which is distinctly marked in dialect, costumes and manners.

Waldeck-Pyrmont has one vote in the federal council (Bundesrat) and one in the Reichstag. The constitution, dating from 1852, is a reactionary modification of one carried in 1849, which had been a considerable advance upon one granted in 1816. The Landtag of one chamber consists of fifteen members, three of whom represent Pyrmont, elected indirectly for three years. In the event of the male line of the present ruling family becoming extinct, the female line will succeed in Waldeck, but Pyrmont will fall to Prussia. In terms of a treaty concluded in 1867 for ten years, renewed in 1877 for a similar period, and continued in 1887 with the proviso that it should be terminable on two years' notice, the finances and the entire government of Waldeck-Pyrmont are managed by Prussia, the little country having found itself unable to support unassisted the military and other burdens involved by its share in the North German Confederation of 1867–1871 and subsequently as a constituent state of the German empire. The government is conducted in the name of the prince by a Prussian

"Landesdirector," while the state officials take the oath of allegiance to the king of Prussia. The prince of Waldeck reserves his whole rights as head of the church, and also the right of granting pardons, and in certain circumstances may exercise a veto on proposals to alter or enact laws. Education and similar matters are thus all conducted on the Prussian model; a previous convention had already handed over military affairs to Prussia. The budget for 1910 showed a revenue of £57,000 and a like expenditure. The public debt was £79,710, paying interest at 3½%. The prince is supported by the income derived from crown lands. As regards the administration of justice, Waldeck and Pyrmont belong to the districts of Cassel and Hanover respectively.

The princes of Waldeck-Pyrmont are descendants of the counts of Schwalenberg, the earliest of whom known to history was one Widukind (d. 1137). His son Volkwin (d. 1178) acquired by marriage the county of Waldeck, and his line was divided into two branches, Waldeck and Landau, in 1397. In 1438 the landgrave of Hesse obtained rights of suzerainty over Waldeck, and the claims arising from this action were not finally disposed of until 1847, when it was decided that the rights of Hesse over Waldeck had ceased with the dissolution of the Holy Roman Empire. The Landau branch of the family became extinct in 1495, and in 1631 Waldeck inherited the county of Pyrmont, which had originally belonged to a branch of the Schwalenberg family. For a few years Waldeck was divided into Wildungen and Eisenberg, but in 1692, when the Wildungen branch died out with George Frederick, the imperial field-marshal, the whole principality was united under the rule of Christian Louis of Eisenberg. From 1692 the land has been undivided with the exception of a brief period from 1805 to 1812, when Waldeck and Pyrmont were ruled by two brothers. Frederick Anthony Ulrich (d. 1728), who succeeded his father, Christian Louis, in 1706, was made a prince of the empire in 1712. In 1807 Waldeck joined the confederation of the Rhine, and in 1815 entered the German confederation. Its first constitution was granted in 1816 by Prince George II. (d. 1845). Prince Frederick (b. 1865) succeeded his father, George Victor (1831–1893), as ruler on the 12th of May 1893. The most important fact in the recent history of the principality is its connexion with Prussia, to which reference has already been made.

See Curtze, *Geschichte und Beschreibung des Fürstentums Waldeck* (Arolsen, 1850); Löwe, *Heimatskunde von Waldeck* (Arolsen, 1887); J. C. C. Hoffmeister, *Historisch-genealogisches Handbuch über alle Grafen und Fürsten von Waldeck seit 1228* (Cassel, 1883); Böttcher, *Das Staatsrecht des Fürstentums Waldeck* (Freiburg, 1884); A. Wagner, *Die Geschichte Waldecks und Pyrmonts* (Wildungen, 1888), and the *Geschichtsblätter für Waldeck und Pyrmont* (Mengeringhausen, 1901, fol.).

WALDECK-ROUSSEAU, PIERRE MARIE RENÉ ERNEST (1846–1904), French statesman, was born at Nantes on the 2nd of December 1846. His father, René Valdec-Rousseau (1809–1882), a barrister at Nantes and a leader of the local republican party, figured in the revolution of 1848 as one of the deputies returned to the Constituent Assembly for Loire Inférieure. With Jules Simon, Louis Blanc and others he sat on the commission appointed to inquire into the labour question, making many important proposals, one of which, for the establishment of national banks, was partially realized in 1850. After the election of Louis Napoleon to the presidency he returned to his practice at the bar, and for some time after the *coup d'état* was in hiding to escape arrest. He came back to political life in the crisis of 1870, when he became mayor of Nantes in August and proclaimed the third republic there on the 4th of September. He shortly afterwards resigned municipal office in consequence of differences with his colleagues on the education question.

The son was a delicate child whose defective eyesight forbade him the use of books, and his early education was therefore entirely oral. He studied law at Poitiers and in Paris, where he took his licentiate in January 1869. His father's record ensured his reception in high republican circles. Jules Grévy stood sponsor for him at the Parisian bar, and he was a regular visitor at the houses of Stanislas Dufaure and of Jules Simon. After six months of waiting for briefs in Paris, he decided to return home and to join the bar of St Nazaire, where he inscribed his name early in 1870. In September he became, in spite of his youth, secretary to the municipal commission temporarily appointed to carry on the town business. He organized the National Defence at St Nazaire, and himself marched out with the contingent, though no part of the force saw active service owing to lack of ammunition, their private store having been commandeered by the state. In 1873 he removed to the bar of Rennes, and six years later was returned to the Chamber of Deputies. In his electoral programme he had stated that he was prepared to respect all liberties except those of conspiracy against the institutions of the country and of educating the young in hatred of the modern social order. In the Chamber he supported the policy of Gambetta. The Waldeck-Rousseau family was strictly Catholic in spite of its republican principles; nevertheless Waldeck-Rousseau supported the anti-clerical education law submitted by Jules Ferry as minister of education in the Waddington cabinet. He further voted for the abrogation of the law of 1814 forbidding work on Sundays and fête days, for compulsory service of one year for seminarists and for the re-establishment of divorce. He made his reputation in the Chamber by a report which he drew up in 1880 on behalf of the committee appointed to inquire into the French judicial system. But then as later he was chiefly occupied with the relations between capital and labour. He had a large share in 1884 in securing the recognition of trade unions. In 1881 he became minister of the interior in Gambetta's *grand ministère*, and he held the same portfolio in the Jules Ferry cabinet of 1883–1885, when he gave proof of great administrative powers. He sought to put down the system by which civil posts were obtained through the local deputy, and he made it clear that the central authority could not be defied by local officials. He had begun to practise at the Paris bar in 1886, and in 1889 he did not seek re-election to the Chamber, but devoted himself to his legal work. The most famous of the many noteworthy cases in which his cold and penetrating intellect and his power of clear exposition were retained was the defence of M. de Lesseps in 1893. In 1894 he returned to political life as senator for the department of the Loire, and next year stood for the presidency of the republic against Félix Faure and Henri Brisson, being supported by the Conservatives, who were soon to be his bitter enemies. He received 184 votes, but retired before the second ballot to allow Faure to receive an absolute majority. During the political anarchy of the next few years he was recognized by the moderate republicans as the successor of Jules Ferry and Gambetta, and at the crisis of 1899 on the fall of the Dupuy cabinet he was asked by President Loubet to form a government. After an initial failure he succeeded in forming a coalition cabinet which included such widely different politicians as M. Millerand and General de Galliffet. He himself returned to his former post at the ministry of the interior, and set to work to quell the discontent with which the country was seething, to put an end to the various agitations which under specious pretences were directed against republican institutions, and to restore independence to the judicial authority. His appeal to all republicans to sink their differences before the common peril met with some degree of success, and enabled the government to leave the second court-martial of Captain Dreyfus at Rennes an absolutely free hand, and then to compromise the affair by granting a pardon to Dreyfus. Waldeck-Rousseau won a great personal success in October by his successful intervention in the strikes at Le Creusot. With the condemnation in January 1900 of Paul Déroulède and his monarchist and nationalist followers by the High Court the worst of the danger was past, and Waldeck-Rousseau kept order in Paris without having recourse to irritating displays of force. The Senate was staunch in support of M. Waldeck-Rousseau, and in the Chamber he displayed remarkable astuteness in winning support from various groups. The Amnesty Bill, passed on 19th December, chiefly through his unwearied advocacy, went far to smooth down the acerbity of the preceding years. With the object of aiding the industry of wine-producing, and of discouraging the consumption of spirits and other deleterious liquors, the government passed a bill suppressing the *octroi* duties on the three "hygienic" drinks—wine, cider and beer. The act came into force at the beginning of 1901. But the most important measure of his later administration was the Associations Bill of 1901. Like many of his predecessors, he was convinced that the stability of the republic demanded some restraint on the intrigues of the wealthy religious bodies. All previous attempts in this direction had failed. In his speech in the Chamber M. Waldeck-Rousseau recalled the fact that he had endeavoured to pass an Associations Bill in 1882, and again in 1883. He declared that the religious associations were now being subjected for the first time to the regulations common to all others, and that the object of the bill was to ensure the supremacy of the civil power The royalist bias given to the pupils in the religious seminaries was undoubtedly a principal cause of the passing of this bill; and the government further took strong measures to secure the presence of officers of undoubted fidelity to the republic in the higher positions on the staff. His speeches on the religious question were published in 1901 under the title of *Associations et congrégations*, following a volume of speeches on *Questions sociales* (1900). As the general election of 1902 approached all sections of the Opposition united their efforts, and M. Waldeck-Rousseau's name served as a battle-cry for one side, and on the other as a target for the foulest abuse. The result was a decisive victory for republican stability. With the defeat of the machinations against the republic M. Waldeck-Rousseau considered his task ended, and on the 3rd of June 1902 he resigned office, having proved himself the "strongest personality in French politics since the death of Gambetta." He emerged from his retirement to protest in the Senate against the construction put on his Associations Bill by M. Combes, who refused in mass the applications of the teaching and preaching congregations for official recognition. His health had long been failing when he died on the 10th of August 1904.

His speeches were published as *Discours parlementaires* (1889); *Pour la république, 1883–1903* (1904), edited by H. Leyret; *L'État et la liberté* (1906); and his *Plaidoyers* (1906, &c.) were edited by H. Barboux. See also H. Leyret, *Waldeck-Rousseau et la troisième république* (1908), and the article France: *History*.

WALDEGRAVE, the name of an English family, taken from its early residence, Walgrave in Northamptonshire. Its founder was Sir Richard Waldegrave, or Walgrave, who was member of parliament for Lincolnshire in 1335; his son, Sir Richard Waldegrave (d. 1402), was speaker of the House of Commons in 1402. One of Sir Richard's descendants was Sir Edward Waldegrave (*c.* 1517–1561) of Borley, Essex, who was imprisoned during the reign of Edward VI. for his loyalty to the princess, afterwards Queen Mary. By Mary he was knighted, and he received from her the manor of Chewton in Somerset, now the residence of Earl Waldegrave. He was a member of parliament and chancellor of the duchy of Lancaster. After Mary's decease he suffered a reverse of fortune, and he was a prisoner in the Tower of London when he died on the 1st of September 1561. Sir Edward's descendant, another Sir Edward Waldegrave, was created a baronet in 1643 for his services to Charles I.; and his descendant, Sir Henry Waldegrave, Bart. (1660–1689), was created Baron Waldegrave of Chewton in 1686. Sir Henry married Henrietta (d. 1730), daughter of King James II. and Arabella Churchill, and their son was James, 1st Earl Waldegrave (1684–1741).

Educated in France, James Waldegrave soon crossed over to England, and under George I. he declared himself a Protestant and took his seat as Baron Waldegrave in the House of Lords. Having become friendly with Sir Robert Walpole, he was sent to Paris as ambassador extraordinary in 1725, and from 1727 to 1730 he was British ambassador at Vienna. In 1729 he was created Viscount Chewton and Earl Waldegrave, and in 1730 he succeeded Sir Horatio Walpole as ambassador in Paris, filling this post during ten very difficult years. He died on the 11th of April 1741. Much of his diplomatic correspondence is in the British Museum.

His son James, the 2nd earl (1715–1763), was perhaps the most intimate friend of George II., and was for a time governor of his grandson, the future king George III. He was very much in evidence during the critical years 1755–1757, when the king employed him to negotiate in turn with Newcastle, Devonshire, Pitt and Fox about the formation of a ministry. Eventually, in consequence of a deadlock, Waldegrave himself was first lord of the treasury for five days in June 1757. He died on the 28th of April 1763, leaving some valuable and interesting *Memoirs*, which were published in 1821.

His brother John, the 3rd earl (1718–1784), was a soldier, who distinguished himself especially at the battle of Minden and became a general in 1772. He was a member of parliament from 1747 to 1763. His younger son, William Waldegrave (1753–1825), entered the British navy in 1766, and after many years of service was third in command at the battle of Cape St Vincent in 1797. In 1800 he was created an Irish peer as Baron Radstock, and in 1802 he became an admiral. His son, George Granville, 2nd Baron Radstock (1786–1857), followed in his father's footsteps, and was made a vice-admiral in 1851. In 1857 his son, Granville Augustus William (b. 1833), became 3rd Baron Radstock.

George, 4th Earl Waldegrave (1751–1789), the eldest son of the 3rd earl, was a soldier and a member of parliament. His sons, George (1784–1794) and John James (1785–1835), were the 5th and 6th earls. In 1797 the 6th earl inherited from Horace Walpole his famous residence, Strawberry Hill, Twickenham, but his son, George Edward, the 7th earl (1816–1846), was obliged in 1842 to sell the valuable treasures collected there. His wife, Frances, Countess Waldegrave (1821–1879), a daughter of the singer John Braham, was a prominent figure in society. He was her second husband, and after his death she married George Granville Vernon Harcourt of Nuneham Park, Oxfordshire, and later Chichester Fortescue, Baron Carlingford.

The 7th earl was succeeded by his uncle William (1788–1859), a son of the 4th earl, and in 1859 William's grandson, William Frederick (b. 1851), became the 9th earl.

WALDEN, ROGER (d. 1406), English prelate, was a man of obscure birth, little or nothing, moreover, being known of his early years. He had some connexion with the Channel Islands, and resided for some time in Jersey; and he held livings in Yorkshire and in Leicestershire before he became archdeacon of Winchester in 1387. His days, however, were by no means fully occupied with his ecclesiastical duties, and in 1387 also he was appointed treasurer of Calais, holding about the same time other positions in this neighbourhood. In 1395, after having served Richard II. as secretary, Walden became treasurer of England, adding the deanery of York to his numerous other benefices. In 1397 he was chosen archbishop of Canterbury in succession to Thomas Arundel, who had just been banished from the realm, but he lost this position when the new king Henry IV. restored Arundel in 1399, and after a short imprisonment he passed into retirement, being, as he himself says, "in the dust and under feet of men." In 1405, through Arundel's influence, he was elected bishop of London, and he died at Much Hadham in Hertfordshire on the 6th of January 1406. An *Historia Mundi*, the manuscript of which is in the British Museum, is sometimes regarded as the work of Walden; but this was doubtless written by an earlier writer.

See J. H. Wylie, *History of England under Henry IV.* vol. iii. (1896).

WALDENBURG, a town of Germany, in the Prussian province of Silesia, 39 m. S.W. of Breslau by the line to Hirschberg and Görlitz Pop. (1905) 16,435. It contains a handsome town hall, three Protestant and two Roman Catholic churches. Waldenburg lies in the centre of the productive coal district of the Waldenburger Gebirge, a branch of the Sudetic chain, and its inhabitants are largely occupied in the mining industry. Among other industrial establishments are a large porcelain and earthenware factory, extensive fireclay works, glassworks and a china-painting establishment; there are also numerous flax-spinneries and linen-factories in the neighbourhood. Adjoining the town on the south is the village of Oberwaldenburg, pop. (1905)

4758, with a château and some coal mines. Waldenburg became a town in 1426.

WALDENSES. The Waldensian valleys lie to the south-west of Turin, in the direction of Monte Viso, but include no high or snowy mountains, while the glens themselves are (with one or two exceptions) fertile and well wooded. The principal town near the valleys is Pinerolo (Pignerol). Just to its south-west there opens the chief Waldensian valley, the Val Pellice, watered by the stream of that name, but sometimes called inaccurately the Luserna valley, Luserna being simply a village opposite the capital, Torre Pellice; near Torre Pellice the side glens of Angrogna and Rora join the Pellice valley. To the north-west of Pinerolo, up the Chisone valley, there opens at Perosa Argentina the valley of St Martin, another important Waldensian valley, which is watered by the Germanasca torrent, and at Perrero splits into two branches, of which the Prali glen is far more fertile than that of Massello, the latter being the wildest and most savage of all the Waldensian valleys.

The name Waldenses was given to the members of an heretical Christian sect which arose in the south of France about 1170. The history of the sects of the middle ages is obscure, because the earliest accounts of them come from those who were concerned in their suppression, and were therefore eager to lay upon each of them the worst enormities which could be attributed to any. In later times the apologists of each sect reversed the process, and cleared that in which they were interested at the expense of others. In early times these sectaries produced little literature of their own; when they produced a literature at the beginning of the 15th century they attempted to claim for it a much earlier origin. Hence there is confusion on every side; it is difficult to distinguish between various sects and to determine their exact opinions or the circumstances under which they came into being. The polemical conception which has done much to perpetuate this confusion is that of the historical continuity of Protestantism from the earliest times. According to this view the church was pure and uncorrupt till the time of Constantine, when Pope Sylvester gained the first temporal possession for the papacy, and so began the system of a rich, powerful and worldly church, with Rome for its capital. Against this secularized church a body of witnesses silently protested; they were always persecuted but always survived, till in the 13th century a desperate attempt was made by Innocent III. to root them out from their stronghold in southern France. Persecution gave new vitality to their doctrines, which passed on to Wycliffe and Huss, and through these leaders produced the Reformation in Germany and England.

This view rests upon a series of suppositions, and is entirely unhistorical. So far as can be discovered the heretical sects of the middle ages rested upon a system of Manichaeism which was imported into Europe from the East (see MANICHAEISM). The Manichaean system of dualism, with its severe asceticism, and its individualism, which early passed into antinomianism, was attractive to many minds in the awakening of the 11th century. Its presence in Europe can be traced in Bulgaria soon after its conversion in 862,[1] where the struggle between the Eastern and Western churches for the new converts opened a way for the more hardy speculations of a system which had never entirely disappeared, and found a home amongst the Paulicians (*q.v.*) in Armenia. The name of Cathari (see CATHARS), taken by the adherents of this new teaching, sufficiently shows the Oriental origin of their opinions, which spread from Bulgaria amongst the Slavs, and followed the routes of commerce into central Europe. The earliest record of their presence there is the condemnation of ten canons of Orleans as Manichees in 1022, and soon after this we find complaints of the prevalence of heresy in northern Italy and in Germany. The strongholds of these heretical opinions were the great towns, the centres of civilization, because there the growing sentiment of municipal independence, and the rise of a burgher class through commerce, created a spirit of criticism which was dissatisfied with the worldly lives of the clergy and their undue influence in affairs. The system of Catharism recognized two classes of adherents, *credentes* and *perfecti*. The *perfecti* only were admitted to its esoteric doctrines and to its superstitious practices. To the ordinary men it seemed to be a reforming agency, insisting on a high moral standard, and upholding the words of Scripture against the traditions of an overgrown and worldly church. Its popular aim and its rationalistic method made men overlook its real contents, which were not put clearly before them. It may be said generally that Catharism formed the abiding background of medieval heresy. Its dualistic system and its anti-social principles were known only to a few, but its anti-ecclesiastical organization formed a permanent nucleus round which gathered a great deal of political and ecclesiastical discontent. When this discontent took any independent form of expression, zeal, which was not always accompanied by discretion, brought the movement into collision with the ecclesiastical authorities, by whom it was condemned as heretical. When once it was in conflict with authority it was driven to strengthen its basis by a more pronounced hostility against the system of the church, and generally ended by borrowing something from Catharism. The result was that in the beginning of the 13th century there was a tendency to class all bodies of heretics together: partly their opinions had coalesced; partly they were assumed to be identical.

Most of these sects were stamped out before the period of the middle ages came to a close. The Waldenses, under their more modern name of the Vaudois, have survived to the present day in the valleys of Piedmont, and have been regarded as at once the most ancient and the most evangelical of the medieval sects. It is, however, by no means easy to determine their original tenets, as in the 13th and 14th centuries they were a body of obscure and unlettered peasants, hiding themselves in a corner, while in the 16th century they were absorbed into the general movement of the Reformation. As regards their antiquity, the attempts to claim for them an earlier origin than the end of the 12th century can no longer be sustained. They rested upon the supposed antiquity of a body of Waldensian literature, which modern criticism has shown to have been tampered with. The most important of these documents, a poem in Provençal, "La Nobla Leyczon," contains two lines which claimed for it the date of 1100:—

> Ben ha mil e cent anez compli entierament
> Que fo scripta l' ora, car sen al derier temp.

But it was pointed out[2] that in the oldest MS. existing in the Cambridge university library the figure 4 had been imperfectly erased before the word "cent," a discovery which harmonized with the results of a criticism of the contents of the poem itself. This discovery did away with the ingenious attempts to account for the name of Waldenses from some other source than from the historical founder of the sect, Peter Waldo or Valdez. To get rid of Waldo, whose date was known, the name Waldenses or Vallenses was derived from Vallis, because they dwelt in the valleys, or from a supposed Provençal word Vaudes, which meant a sorcerer.

Putting these views aside as unsubstantial, we will consider the relation of the Waldenses as they appear in actual history with the sects which preceded them. Already in the 9th century there were several protests against the rigidity and want of spirituality of a purely sacerdotal church. Thus Berengar of Tours (999–1088) upheld the symbolic character of the Eucharist and the superiority of the Bible over tradition. The Paterines in Milan (1045) raised a protest against simony and other abuses of the clergy, and Pope Gregory VII. did not hesitate to enlist their Puritanism on the side of the papacy and make them his allies in imposing clerical celibacy. In 1110 an apostate monk in Zeeland, Tanchelm, carried their views still farther, and asserted that the sacraments were only valid through the merits and sanctity of the ministers. In France, at Embrun, Peter de Bruys founded a sect known as Petrobrusians, who denied infant baptism, the need of consecrated churches, transubstantiation, and masses for the dead. A follower of his, a monk, Henry, gave the name to another body known as Henricians, who centred in Tours. The teachers of these new opinions were men of high character and holy lives, who in spite of persecution wandered from place to place, and made many converts from those who were dissatisfied at the want of clerical discipline which followed upon the struggle for temporal supremacy into which the reforming projects of Gregory VII. had carried the church.

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[1] Schmidt, *Histoire des Cathares*, i. 7.

[2] Bradshaw, in *Transactions of Cambridge Antiquarian Society* (1842). The text edited by Montet, 4to (1887).

It was at this time (1170) that a rich merchant of Lyons, Peter Waldo, sold his goods and gave them to the poor; then he went forth as a preacher of voluntary poverty His followers, the Waldenses, or poor men of Lyons, were moved by a religious feeling which could find no satisfaction within the actual system of the church, as they saw it before them. Like St Francis, Waldo adopted a life of poverty that he might be free to preach, but with this difference that the Waldenses preached the doctrine of Christ while the Franciscans preached the person of Christ, Waldo reformed teaching while Francis kindled love; hence the one awakened antagonisms which the other escaped. For Waldo had a translation of the New Testament made into Provençal, and his preachers not only stirred up men to more holy lives but explained the Scriptures at their will. Such an interference with the ecclesiastical authorities led to difficulties. Pope Alexander III., who had approved of the poverty of the Waldensians, prohibited them from preaching without the permission of the bishops (1179). Waldo answered that he must obey God rather than man. The result of this disobedience was excommunication by Lucius III. in 1184. Thus a reforming movement became heresy through disobedience to authority, and after being condemned embarked on a course of polemical investigation how to justify its own position. Some were readmitted into the Catholic Church, and one, Durandus de Osca (1210), attempted to found an order of Pauperes Catholici, which was the forerunner of the order of St Dominic. Many were swept away in the crusade against the Albigenses (*q.v.*). Others made an appeal to Innocent III., protesting their orthodoxy. Their appeal was not successful, for they were formally condemned by the Lateran council of 1215.

The earliest definite account given of the Waldensian opinion is that of the inquisitor Sacconi about 1250.[1] He divides them into two classes: those north of the Alps and those of Lombardy. The first class hold (1) that oaths are forbidden by the gospel, (2) that capital punishment is not allowed to the civil power, (3) that any layman may consecrate the sacrament of the altar, and (4) that the Roman Church is not the Church of Christ. The Lombard sect went farther in (3) and (4), holding that no one in mortal sin could consecrate the sacrament, and that the Roman Church was the scarlet woman of the Apocalypse, whose precepts ought not to be obeyed, especially those appointing fast-days. This account sufficiently shows the difference of the Waldenses from the Cathari: they were opposed to asceticism, and had no official priesthood; at the same time their objection to oaths and to capital punishment are closely related to the principles of the Cathari. Their other opinions were forced upon them by their conflict with the authority of the Church. When forbidden to preach without the permission of the bishop, they were driven to assert the right of all to preach, without distinction of age or sex. This led to the further step of setting up personal merit rather than ecclesiastical ordination as the ground of the priestly office. From this followed again the conclusion that obedience was not due to an unworthy priest, and that his ministrations were invalid.

These opinions were subversive of the system of the medieval church, and were naturally viewed with great disfavour by its officials; but it cannot fairly be said that they have much in common with the opinions of the Reformers of the 16th century. The medieval church set forth Christ as present in the orderly community of the faithful; Protestantism aimed at setting the individual in immediate communion with Christ, without the mechanical intervention of the officers of the community; the Waldenses merely set forward a new criterion of the orderly arrangement of the church, according to which each member was to sit in judgment on the works of the ministers, and consequently on the validity of their ministerial acts. It was a rude way of expressing a desire for a more spiritual community. The earliest known document proceeding from the Waldensians is an account of a conference held at Bergamo in 1218 between the Ultramontane and the Lombard divisions, in which the Lombards showed a greater opposition to the recognized priesthood than did their northern brethren.[2].

As these opinions became more pronounced persecution became more severe, and the breach between the Waldenses and the church widened The Waldenses withdrew altogether from the ministrations of the church, and chose ministers for themselves whose merits were recognized by the body of the faithful. Election took the place of ordination, but even here the Lombards showed their difference from the Ultramontanes, and recognized only two orders, like the Cathari, while the northern body kept the old three orders of bishops, priests and deacons. Gradually the separation from the church became more complete: the sacraments were regarded as merely symbolical; the priests became helpers of the faithful; ceremonies disappeared; and a new religious society arose equally unlike the medieval church and the Protestantism of the 16th century.

The spread of these heretical sects led to resolute attempts at their suppression. The crusade against the Albigensians could destroy prosperous cities and hand over lands from a heedless lord to one who was obedient to the church; but it could not get rid of heresy. The revival of preaching, which was the work of the order of St Dominic, did more to combat heresy, especially where its persuasions were enforced by law. The work of inquisition into cases of heresy proceeded slowly in the hands of the bishops, who were too busy with other matters to find much time for sitting in judgment on theological points about which they were imperfectly informed. The greatest blow struck against heresy was the transference of the duty of inquiry into heresy from the bishops to Dominican inquisitors. The secular power, which shared in the proceeds of the confiscation of those who were found guilty of heresy, was ready to help in carrying out the judgments of the spiritual courts. Everywhere, and especially in the district round Toulouse, heretics were keenly prosecuted, and before the continued zeal of persecution the Waldenses slowly disappeared from the chief centres of population and took refuge in the retired valleys of the Alps. There, in the recesses of Piedmont, where the streams of the Pelice, the Angrogne, the Clusone and others cleave the sides of the Alps into valleys which converge at Susa, a settlement of the Waldensians was made who gave their name to these valleys of the Vaudois. In the more accessible regions north and south heresy was exposed to a steady process of persecution, and tended to assume shifting forms. Among the valleys it was less easily reached, and retained its old organization and its old contents. Little settlements of heretics dispersed throughout Italy and Provence looked to the valleys as a place of refuge, and tacitly regarded them as the centre of their faith. At times attempts were made to suppress the sect of the Vaudois, but the nature of the country which they inhabited, their obscurity and their isolation made the difficulties of their suppression greater than the advantages to be gained from it. However, in 1487 Innocent VIII. issued a bull for their extermination, and Alberto de' Capitanei, archdeacon of Cremona, put himself at the head of a crusade against them. Attacked in Dauphiné and Piedmont at the same time, the Vaudois were hard pressed; but luckily their enemies were encircled by a fog when marching upon their chief refuge in the valley of the Angrogne, and were repulsed with great loss. After this Charles II., duke of Piedmont, interfered to save his territories from further confusion, and promised the Vaudois peace. They were, however, sorely reduced by the onslaught which had been made upon them, and lost their ancient spirit of independence. When the Lutheran movement began they were ready to sympathize with it, and ultimately to adapt their old beliefs to those of the rising Protestantism. Already there were scattered bodies of Waldenses in Germany who had influenced, and afterwards joined, the Hussites and the Bohemian Brethren.

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[1] D'Argentré, *Collectio judiciorum de novis erroribus*, i. 50, &c.

[2] Preger, *Beiträge zur Geschichte der Waldesier*.

The last step in the development of the Waldensian body was taken in 1530, when two deputies of the Vaudois in Dauphiné and Provence, Georges Morel and Pierre Masson, were sent to confer with the German and Swiss Reformers. A letter addressed to Oecolompadius[1] gives an account of their practices and beliefs at that time, and shows us a simple and unlettered community, which was the survival of an attempt to form an esoteric religious society within the medieval church. It would appear that its members received the sacraments of baptism and the holy communion from the regular priesthood, at all events sometimes, but maintained a discipline of their own and held services for their own edification. Their ministers were called *barba*, a Provençal word meaning *guide*. They were chosen from among labouring men, who at the age of twenty-five might ask the body of ministers to be admitted as candidates. If their character was approved they were taught during the winter months, when work was slack, for a space of three or four years; after that they were sent for two years to serve as menial assistants at a nunnery for women, which curiously enough existed in a recess of the valleys. Then they were admitted to office, after receiving the communion, by the imposition of hands of all ministers present. They went out to preach two by two, and the junior was bound absolutely to obey the senior. Clerical celibacy was their rule, but they admit that it created grave disorders. The ministers received food and clothing from the contributions of the people, but also worked with their hands; the result of this was that they were very ignorant, and also were grasping after bequests from the dying. The affairs of the church were managed by a general synod held every year. The duties of the barbas were to visit all within their district once a year, hear their confessions, advise and admonish them; in all services the two ministers sat side by side, and one spoke after the other. In point of doctrine they acknowledged the seven sacraments, but gave them a symbolical meaning; they prayed to the Virgin and saints, and admitted auricular confession, but they denied purgatory and the sacrifice of the mass, and did not observe fasts or festivals. After giving this account of themselves they ask for information about several points in a way which shows the exigencies of a rude and isolated society, and finally they say that they have been much disturbed by the Lutheran teaching about freewill and predestination, for they had held that men did good works through natural virtue stimulated by God's grace, and they thought of predestination in no other way than as a part of God's foreknowledge.

Oecolampadius gave them further instruction, especially emphasizing the wrongfulness of their outward submission to the ordinances of the church: "God," he said, "is a jealous God, and does not permit His elect to put themselves under the yoke of Antichrist." The result of this intercourse was an alliance between the Vaudois and the Swiss and German Reformers. A synod was held in 1532 at Chanforans in the valley of the Angrogne, where a new confession of faith was adopted, which recognized the doctrine of election, assimilated the practices of the Vaudois to those of the Swiss congregations, renounced for the future all recognition of the Roman communion, and established their own worship no longer as secret meetings of a faithful few but as public assemblies for the glory of God.

Thus the Vaudois ceased to be relics of the past, and became absorbed in the general movement of Protestantism. This was not, however, a source of quiet or security. In France and Italy alike they were marked out as special objects of persecution, and the Vaudois church has many records of martyrdom. The most severe trial to which the Vaudois of Piedmont were subjected occurred in 1655. The Congregation *de Propaganda Fide* established, in 1650, a local council in Turin, which exercised a powerful influence on Duke Charles Emmanuel II., who ordered that the Vaudois should be reduced within the limits of their ancient territory. Fanaticism took advantage of this order; and an army, composed partly of French troops of Louis XIV., partly of Irish soldiers who had fled before Cromwell, entered the Vaudois valleys and spread destruction on every side. They treated the people with horrible barbarity, so that the conscience of Europe was aroused, and England under Cromwell called on the Protestant powers to join in remonstrance to the duke of Savoy and the French king. The pen of Milton was employed for this purpose, and his famous sonnet is but the condensation of his state papers. Sir Samuel Morland was sent on a special mission to Turin, and to him were confided by the Vaudois leaders copies of their religious books, which he brought back to England, and ultimately gave to the university library at Cambridge. Large sums of money were contributed in England and elsewhere, and were sent to the suffering Vaudois.

By this demonstration of opinion peace was made for a time between the Vaudois and their persecutors; but it was a treacherous peace, and left the Vaudois with a hostile garrison established among them. Their worship was prohibited, and their chief pastor, Leger, was obliged to flee, and in his exile at Leiden wrote his *Histoire générale des églises vaudoises* (1684). The revocation of the edict of Nantes in 1685 began a new period of persecution, which aimed at entire extermination. This was found so difficult that the remnant of the Vaudois, to the number of 2600, were at last allowed to withdraw to Geneva. But the love of their native valleys was strong among the exiles, and in 1689 one of their pastors, Henri Arnaud, led a band of 800 men to the reconquest of their country. His first attempts against the French were successful; and the rupture between Victor Amadeus, duke of Savoy, and Louis XIV. brought a sudden change of fortune to the Vaudois. They were recognized once more as citizens of Savoy, and in the war against France which broke out in 1696 the Vaudois regiment did good service for its duke. The peace of Utrecht saw the greater part of the French territory occupied by the Vaudois annexed to Savoy, and, though there were frequent threatenings of persecution, the idea of toleration slowly prevailed in the policy of the house of Savoy. The Vaudois, who had undergone all these vicissitudes, were naturally reduced to poverty, and their ministers were partially maintained by a subsidy from England, which was granted by Queen Anne. The 18th century, however, was a time of religious decadence even among the Alpine valleys, and the outbreak of the French Revolution saw the Vaudois made subjects of France. This led to a loss of the English subsidy, and they applied to Napoleon for an equivalent. This was granted, and their church was organized by the state. On the restoration of the house of Savoy in 1816 English influence was used on behalf of the Vaudois, who received a limited toleration. From that time onwards the Vaudois became the objects of much interest in Protestant countries. Large sums of money were collected to build hospitals and churches among their valleys, and they were looked upon as the possible centre of a Protestant church in Italy. Especially from England did they receive sympathy and help. An English clergyman, Dr Gilly, visited the valleys in 1823, and by his writings on the Vaudois church attracted considerable attention, so that he was enabled to build a college at La Torre. Moreover, Dr Gilly's book (*A Visit to the Valleys of Piedmont*), chancing to fall into the hands of an officer who had lost his leg at Waterloo, Colonel Beckwith, suggested an object for the energies of one who was loth at the age of twenty-six to sink into enforced idleness. Beckwith visited the valleys, and was painfully struck by the squalor and ignorance of a people who had so glorious a past. He settled among them, and for thirty-five years devoted himself to promote their welfare. During this period he established no fewer than 120 schools; moreover he brought back the Italian language which had been displaced by the French in the services of the Vaudois church, and in 1849 built a church for them in Turin. He lived in La Torre till his death in 1862, and the name of the English benefactor is still revered by the simple folk of the valleys. (M. C.)

The parent church in the valleys is ecclesiastically governed by a court for internal affairs called the "Table," after the old stone table round which the ancient barbas used to sit, and a mission board, with an annual synod to which both the home and mission boards are subject. The total population of the Waldensian valleys (for they also contain Roman Catholics in no small number) amounts to about 20,000 all told. In 1900 there were 16 parishes, with 18 pasteurs and 22 temples, and also 2 Sunday schools (3017 children) and 194 day schools (with 4218 children); the full members (*i.e.* communicants) of the Waldensian faith amounted to 12,695. There were, besides, branches at Turin (1 temple, 2 pasteurs and 750 members), in other parts of Italy, including Sicily (46 temples and as many pasteurs, while the number of members was 5613, of day scholars 2704, and of Sunday school scholars 3707). It is also reckoned that in Uruguay and the Argentine Republic there are about 6000 Waldensians; of these 1253 were in 1900 full members, while the day scholars numbered 364 and the Sunday school children 670.

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[1] Scultetus, *Annales*, ii. 294, &c.

The literature on the subject of the Waldensian and other sects is copious. For their rise the most important authorities are to be found in Moneta, *Adversus Catharos et Waldenses*; D'Argentré, *Collectio judiciorum de novis erroribus*; Alanus, *Adversus haereticos*; D'Achery, *Spicilegia*, vol. i.; Gretser, *Opera*, vol. x.; Limborch, *Historia Inquisitionis*, at the end of which is the *Liber sententiarum* of the Inquisition of Toulouse from 1307–1322. Of modern books may be mentioned Schmidt, *Histoire des Cathares*; Hahn, *Geschichte der neumanichäischen Ketzer*; Dieckhoff, *Die Waldenser im Mittelalter*; Preger, *Beiträge zur Geschichte der Waldesier*; Cantù, *Gli Eretici in Italia*; Comba, *Storia della Riforma in Italia*, and *Histoire des Vaudois d'Italie*; Tocco, *L'Eresia nel medio evo*; Montet, *Histoire littéraire des Vaudois*; Lea, *History of the Inquisition of the Middle Ages*. Amongst books dealing with the more modern history of the Vaudois specially are Léger, *Histoire des églises vaudoises*; Arnaud, *Histoire de la rentrée des Vaudois*; Perrin, *Histoire des Vaudois*; Monastier, *Histoire de l'église vaudoise*; Muston, *L'Israel des Alpes*; Gilly, *Excursion to the Valleys of Piedmont*, and *Researches on the Waldensians*; Todd, *The Waldensian Manuscripts*; Melia, *Origin, Persecution and Doctrines of the Waldensians*; Jules Chevalier, *Mémoires sur les hérésies en Dauphiné avant le XVI^e siècle, accompagnés de documents inédits sur les sorciers et les Vaudois* (Valence, 1890); J. A. Chabrand, *Vaudois et Protestants des Alpes: recherches historiques* (Grenoble, 1886); H. Haupt, article in Von Sybel's *Historische Zeitschrift* (1889), pp. 39–68; W. A. B. Coolidge, articles in the *Guardian* for 18th August 1886 and 4th December 1889.

WALDERSEE, ALFRED, COUNT (1832–1904), Prussian general field marshal, came of a soldier family. Entering the Guard Artillery of the Prussian army in 1850, he soon attracted the favourable notice of his official superiors, and he made his first campaign (that of 1866) as aide-de-camp to General of Artillery Prince Charles of Prussia, with whom he was present at Königgrätz. In the course of this campaign Count Waldersee was promoted major and placed on the general staff, and after the conclusion of peace he served on the staff of the X. Army Corps (newly formed from the conquered kingdom of Hanover). In January 1870 he became military attaché at Paris and aide-de-camp to King William. In the Franco-German War Lieut.-Colonel Count Waldersee, on account of both his admitted military talents and his recent experience of the enemy's army, proved a most useful assistant to the "supreme War-Lord." He was present at the great battles around Metz, in which he played more than an orderly officer's part, and in the war against the republic he was specially sent to the staff of the grand duke of Mecklenburg-Schwerin, who was operating against Chanzy's army on the Loir. The grand duke was a good soldier, but not a brilliant strategist, and the fortunate outcome of the western campaign was largely due to his adviser. At the end of the war Waldersee received the First Class of the Iron Cross, and was entrusted with the exceedingly delicate and difficult post of German representative at Paris, in which his tact and courtesy were very marked. At the end of 1871 Waldersee took over the command of the 13th Uhlans at Hanover, and two years later he became chief of the staff of the Hanoverian army corps, in which he had served before 1870. In 1881 he became Moltke's principal assistant on the great general staff at Berlin, and for seven years was intimately connected with the great field marshal's work, so that, when Moltke retired in 1888, Waldersee's appointment to succeed him was a foregone conclusion. Three years later the chief of the general staff was sent to command the IX. Corps at Altona, an appointment which was interpreted as indicating that his close and intimate friendship with Bismarck had made him, at this time of the chancellor's dismissal, a *persona non grata* to the young emperor. In 1898, however, he was appointed inspector-general of the III. "Army Inspection" at Hanover, the order being accompanied by the most eulogistic expressions of the kaiser's goodwill. On the despatch of European troops to quell the Boxer insurrection in China in 1900, it was agreed that Count Waldersee should have the supreme command of the joint forces. The preparations for his departure from Germany caused a good deal of satirical comment on what was known as the "Waldersee *Rummel*" or "theatricals." He arrived at the front, however, too late to direct his troops in the fighting before Peking. At the end of the war he returned to Europe. He resumed at Hanover his duties of inspector-general, which he performed almost to his death, which took place on the 5th of March 1904.

WALDO, SAMUEL LOVETT (1783–1861), American artist, was born in Windham, Connecticut, on the 6th of April 1783. He had a studio in Charleston, South Carolina. In 1806 he went to London, where he painted portraits for some years with success. In 1809 he returned to New York, and was a conspicuous figure in the city's art life until his death there on the 16th of February 1861. He became an associate of the National Academy in 1847. Among his works are a series of portraits of the early mayors of New York, now in the New York City Hall, a portrait of Peter Remsen, in possession of the New York Historical Society, and two portraits of John Trumbull.

WALENSEE, also called the LAKE OF WALENSTADT, a Swiss lake between the basins of the Rhine and the Linth (Limmat), lying S.E. of the Lake of Zürich. It is formed by the Seez river (descending from the Weisstannen glen), which once certainly sent its waters to the Rhine, but now enters the lake at its eastern end. Near its western end the Linth has been diverted through the Escher canal (completed in 1811) into the lake, from which it soon again issues in order, by means of the Linth canal (completed in 1816), to flow into the Lake of Zürich. The Walensee has an area of 9 sq. m., is about 9 m. in length, 1¼ m. wide and 495 ft. deep, while its surface is 1388 ft. above sea-level. It forms part of the Canton of St Gall, save 1¾ sq. m. towards its west end, which are in that of Glarus. It lies in a deep trench between two comparatively lofty ranges of mountains, so that its scenery is more gloomy than is usual with Swiss lakes. On the north shore there is but a single village of any size (Quinten), while above it rise the cliffs of the seven-peaked range of the Kurfürsten (7576 ft.), at the west end of which the village of Amden nestles in a hollow high above the lake. On the south side the hills rise less steeply from the shore (on which are Mühlehorn and Murg) towards the fine terrace of the Kerenzenberg, on which are the frequented summer resorts of Obstalden and Filzbach, backed on the south by the singularly imposing crags of the Mürtschenstock (8012 ft.). The small towns of Weesen and Walenstadt are situated respectively at the western and the eastern extremities of the lake, a railway along the south shore of which connects them with each other (11 m.). Since the construction of this line no steamers ply on the lake. (W. A. B. C.)

WALES (*Cymru*, *Gwalia*, *Cambria*), a Principality occupying the extreme middle-west of the southern part of the island of Great Britain, bounded E. by the English counties of Cheshire, Shropshire, Herefordshire and Monmouthshire; S. by the Bristol Channel; W. by St George's Channel; and N. by the Irish Sea. (For map see ENGLAND, V.) Its area is 7467 sq. m. Its greatest length from N. to S. (from the Point of Air in Flint to Barry Island on the Glamorgan coast) is 136 m., while its breadth varies from 92 m. (from St Davids Head to the English border beyond Crickhowell) to 37 m. (the distance between Aberystwyth and the Shropshire boundary at Clun Forest). Its total circuit is about 540 m., of which 390 consist of coast-line. The principal headlands are Great Ormes Head in Carnarvonshire; Braich-y-Pwll, the most westerly point of

Carnarvonshire; St Davids Head, the most westerly point of South Wales; Worms Head, the western extremity of Gower; and Lavernock Point to the W. of Cardiff. The principal islands are Holy Island, off the W. coast of Anglesea; Bardsey (Ynys Enlli), near Braich-y-Pwll; and the islands of Ramsey, Grassholm, Skomer, Skokholm and Caldy (Ynys Pyr) off the Pembrokeshire coast. The chief inlets are the mouth of the Dee, dividing Flint from Cheshire; the Menai Straits, separating Anglesea from the mainland; Carnarvon Bay; Cardigan Bay, stretching from Braich-y-Pwll to St Davids Head; St Brides Bay; Milford Haven; Carmarthen Bay; and Swansea Bay.

In common parlance, as well as for judicial purposes of circuits, the Principality is divided into North Wales and South Wales, each of which consists of six counties.

North Wales.

	Acreage.	Population (1901).
Anglesea (Ynys Fôn) . . .	176,630	50,606
Carnarvon (Sir Arfon) . . .	361,156	126,883
Denbigh (Sir Dinbych). . .	423,499	129,942
Flint (Sir Fflint)	164,744	81,700
Merioneth (Sir Feirionydd). .	427,810	49,149
Montgomery (Sir Drefaldwyn) .	510,111	54,901

South Wales.

	Acreage.	Population (1901).
Brecon or Brecknock (Sir Frycheiniog)	475,224	59,907
Cardigan (Sir Aberteifi) . .	440,630	60,240
Carmarthen (Sir Gaerfyrddin) .	587,816	135,328
Glamorgan (Sir Forganwg) . .	518,863	859,931
Pembroke (Sir Benfro). . .	395,151	88,732
Radnor (Sir Faesyfed) . .	301,164	23,281

Mountains.—Almost the whole surface of Wales is mountainous or undulating. The most important hill system is that of the North Wales mountains, covering the county of Carnarvon and parts of Merioneth and Denbigh, wherein the Snowdonian range reaches the height of 3571 ft. in Snowdon itself; of 3484 ft. in Carnedd Llywelyn; and of 3426 ft. in Carnedd Dafydd. South of this system, and separated from it by the upper valley of the Dee, the Berwyn range extends from N.E. to S.E., and is itself adjacent to Aran-fawddy (2970 ft.), the highest point in the Cader Idris group. The system of Mid-Wales or Powys stretches from Cardigan Bay to the English border, and contains Plinlimmon (2462 ft.) in north Cardigan; Drygarn Fawr (2115 ft.) in north Brecon; and Radnor Forest (2163 ft.) in mid-Radnor. From Plinlimmon a range of hills runs in a south-westerly direction towards St Davids, terminating in the Preselly range of north Pembroke (1760 ft.) and dividing the broad valleys of the Teifi and Towy. The three combined ranges of the Black Mountains, the Brecknock Beacons and the Black Forest sweep across south Brecon from W. to E., the chief elevations being the Carmarthen Van (2632 ft.), the Brecon Beacon (2862 ft.) and Pen-y-gader fawr (2660 ft.) near the English border.

Lakes and Rivers.—Small lakes, such as Llyn Ogwen, Llyn Safaddan (Llangorse Lake), Talyllyn, the Teifi Pools, &c., are fairly numerous in the mountainous districts, but the only natural lake of importance is Bala Lake, or Llyn Tegid, in Merionethshire, 4 m. long and about 1 m. wide. But the great reservoir known as Lake Vyrnwy, which supplies Liverpool with water, is equal in size to Bala; and the chain of four artificial lakes constructed by the Birmingham corporation in the valleys of the Elan and Claerwen covers a large area in west Radnorshire. The longest river in Wales is the Severn (180 m.), in Welsh Hafren; which rises in Plinlimmon, and takes a north-easterly direction through Montgomeryshire before reaching the English border. The Wye (130 m.) also rises in Plinlimmon, and forms for some 30 m. the boundary between the counties of Radnor and Brecon before encountering English soil near Hay. The Usk (56 m.) flows through Breconshire, and joins the Bristol Channel at Newport in Monmouthshire. The Dee (70 m.) traverses Bala Lake, and drains parts of the counties of Merioneth, Denbigh and Flint. The Towy (68 m.) flows through Carmarthenshire, entering Carmarthen Bay at Llanstephan; the Teifi (50 m.) rises near Tregaron and falls into Cardigan Bay below the town of Cardigan. The Taff (40 m.), rising amongst the Brecon Beacons, enters the Bristol Channel at Cardiff. Other rivers are the Dovey (30 m.), falling into Cardigan Bay at Aberdovey; the Tâf (25 m.), entering Carmarthen Bay at Laugharne; and the broad navigable Conway (24 m.), dividing the counties of Carnarvon and Denbigh.

Welsh Place-Names.—The place-names throughout the Principality may be said to group themselves roughly into four divisions: (i.) Pure and unaltered Celtic names; (ii.) Corrupted or abbreviated Celtic names; (iii.) English names; (iv.) Scandinavian and foreign names. To the first division belong the vast majority of place-names throughout the whole of Wales and Monmouthshire. Except in some districts of the Marches and in certain tracts lying along the South Wales coast, nearly all parishes, villages, hamlets, farms, houses, woods, fields, streams and valleys possess native appellations, which in most cases are descriptive of natural situation, *e.g. Nantyffin*, the boundary brook; *Aberporth*, mouth of the harbour; *Talybont*, end of the bridge; *Troedyrhiw*, foot of the hill; *Dyffryn*, a valley, &c. Other place-names imply a personal connexion in addition to natural features, *e.g. Nantygôf*, the blacksmith's brook; *Trefecca*, the house of Rebecca; *Llwyn Madoc*, Madoc's grove; *Pantsaeson*, the Saxons' glen, &c. An historical origin is frequently commemorated, notably in the many foundations of the Celtic missionaries of the 5th, 6th and 7th centuries, wherein the word *llan* (church) precedes a proper name; thus every *Llanddewi* recalls the early labours of Dewi Sant (St David); every *Llandeilo*, those of St Teilo; and such names as *Llandudno*, *Llanafan*, *Llanbadarn* and the like commemorate SS. Tudno, Afan, Padarn, &c. To the second division—those place-names which have been corrupted by English usage—belong most of the older historic towns, in striking contrast with the rural villages and parishes, which in nearly all cases have retained unaltered their original Celtic names. Anglicized in spelling and even to some extent changed in sound are *Carmarthen* (Caerfyrddin); *Pembroke* (Penfro); *Kidwelly* (Cydweli); *Cardiff* (Caerdydd); *Llandovery* (Llanymddyfri); while *Lampeter*, in Welsh Llanbedr-pont-Stephan, affords an example of a Celtic place-name both Anglicized and abbreviated. In not a few instances modern English nomenclature has supplanted the old Welsh place-names in popular usage, although the town's original appellation is retained in Welsh literature and conversation, *e.g. Holyhead* is Caergybi (fort of Cybi, a Celtic missionary of the 6th century); *Presteign* is Llanandras (church of St Andrew, or Andras); *St Asaph* is Llanelwy; the English name commemorating the reputed founder of the see, and the Welsh name recalling the church's original foundation on the banks of the Elwy. *Cardigan*, in Welsh Aberteifi, from its situation near the mouth of the Teifi, and *Brecon*, in Welsh Aberhonddu, from its site near the confluence of the Usk and Honddu, are examples of corrupted Welsh names in common use—Ceredigion, Brychan—which possess in addition pure Celtic forms. In the third division, English place-names are tolerably frequent everywhere and predominate in the Marches and on the South Wales coast. Even in so thoroughly Welsh a county as Cardiganshire, English place-names are often to be encountered, *e.g.* New Quay, High Mead, Oakford, &c.; but many of such names are of modern invention, dating chiefly from the 18th and 19th centuries. Of the many English names occurring in south Pembroke and south Glamorgan, some are exact or fanciful translations of the original Welsh, *e.g. Cowbridge* (Pontyfon) and *Ludchurch* (Eglwys Llwyd), others are of direct external origin, as Bishopstone, Flemingstone, Butter Hill, Briton Ferry, Manselfield, &c. Names derived straight from an Anglo-Norman source are rare; Beaupré, Beaumaris, Beaufort, Fleur-de-Lis, Roche, may be cited as examples of such. Scandinavian influence can easily be traced at various points of the coast-line, but particularly in south Pembrokeshire, wherein occur such place-names as Caldy, Tenby, Goodwick, Dale, Skokholm, Hakin and Milford Haven. Specimens of Latinized names in connexion with ecclesiastical foundations are preserved in Strata Florida and Valle Crucis Abbeys. Hybrid place-names are occasionally to be met with in the colonized portions of Wales, as in Gelliswick (a combination of the Celtic *gelli*, a hazel grove, and the Norse *wick*, a haven), and in Fletherhill, where the English suffix *hill* is practically a translation of the Celtic prefix. A striking peculiarity of the Principality is the prevalence of Scriptural place-names; a circumstance due undoubtedly to the popular religious movements of the 19th century. Not only are such names as Horeb, Zion, Penuel, Siloh, &c., bestowed on Nonconformist chapels, but these Biblical terms have likewise been applied to their surrounding houses, and in not a few instances to growing towns and villages. A notable example of this curious nomenclature occurs in Bethesda, Carnarvonshire, where the name of the Congregational chapel erected early in the 19th century has altogether supplanted the original Celtic place-name of Cilfoden. But although English and foreign place-names are fairly numerous throughout Wales, yet the vast majority remain Celtic either in a pure or in a corrupted form, so that some knowledge of the Celtic language is essential to interpret their meaning.

A small glossary of some of the more common component words is appended below.

Aber, the mouth or estuary of a river—Aberystwyth, Abergwili.

Ach, water—Clydach, Clarach.

Afon, a river—a word which retains its primitive meaning in Wales, whilst it has become a proper name in England—Glanafon, Manorafon.

Bettws, a corrupt form of the English "bead-house," or possibly of the Latin "beatus"—Bettws-y-coed, Bettws Ifan.

Blaen, the top—Blaendyffryn, Blaencwm.

Bod, house or abode—Bodfuan, Hafod.

Bron, the human breast, hence breast of hill—Brongest, Cilbronnau.

Bryn, a hill—Brynmawr, Penbryn.

Bwlch, a gap—Bwlchbychan, Tanybwlch.

Cae, a field—Caeglas, Tynycae.

Caer, a fortress or fortified camp—Caerlleon, Caersws.

Capel, a corrupt form of the Latin "capella" applied to chapels, ancient and recent—Capel Dewi, Capel-issaf, Parc-y-capel.

Carn, a cairn or heap of stones—Moel-trigarn.

Carnedd, a tumulus—Carnedd Llywelyn.

Cefn, a ridge—Cefn-Mably, Cefn-y-bedd.

Cil, a retreat, said to be akin to the Goidelic *kil*—Ciliau-Aeron, Cilcennin.

Cnwc, a knoll or mound—Cnwcglas (Anglicized into Knucklas, in Radnorshire).

Coed, a wood—Coedmawr, Penycoed.

Craig, a rock or crag—Pen-y-graig.

Crûg, a heap or barrow—Crûg Mawr, Trichrûg.

Cwm, a low valley, Anglicized into "coomb"—Cwm Gwendraeth, Blaencwm.

Din, a fortified hill, hence *Dinas*, a fortified town—Dinefawr, Pen Dinas.

Dol, a meadow—Dolwilym, Dolau.

Dwr, *Dwfr*, water—Glyndwrdu, the patrimony of the celebrated Owen Glendower, of which his Anglicized name is a corruption.

Eglwys, a corruption of the Latin "ecclesia," a church—Eglwyswrw, Tanyreglwys.

Gallt, in North Wales a steep slope; in South Wales a hanging wood—Galltyfyrddin, Penyrallt.

Gelli, a grove—Gellideg, Pengelly Forest.

Glan, a bank—Glanymôr, Glandofan.

Glyn, a glen or narrow valley—Glyncothi, Tyglyn.

Llan, a sacred enclosure, hence a church—a most interesting and important Celtic prefix—Llandeilo, Llansaint.

Llech, a stone—Llechryd, Trellech.

Llwyn, a grove—Penllwyn, Llwynybrân.

Llys, a court or palace—Henllys, Llysowen.

Maes, open land, or battlefield—Maesyfed (the Welsh name for Radnorshire), Maesllwch.

Moel, bald, hence a bare hill-top—Moelfre.

Môr, the sea—Brynmôr, Glanymôr.

Mynydd, mountain—Llanfynydd, Mynydd Dû.

Nant, a ravine, hence also a brook—Nantgwyllt, Nannau, Nantgaredig.

Pant, a glen or hollow—Pantycelyn, Blaenpant.

Parc, an enclosed field—Parc-y-Marw, Penparc.

Pen, a summit—Penmaenmawr, Penmark.

Pont, a bridge, a corruption of the Latin "pons"—Pontbirwen, Talybont.

Porth, a gate or harbour—perhaps a corrupt form of the Latin "porta"—Aberporth, Pump Porth ("the Five Gates").

Rhiw, ascent or slope—Troedyrhiw, Rhiwlas.

Rhos, a moor—Rhosllyn, Tyr'hos.

Rhyd, a ford—Rhydyfewch, Glanrhyd.

Sarn, a causeway, generally descriptive of the old Roman paved roads—Tallarn, Sarnau, Sarn Badrig.

Tal, an end, also head—Tallaris, Talyllyn.

Tref, a homestead, hence *cantref*, a hundred—Hendref, Cantref-y-gwaelod.

Troed, a base—Troed-y-bryn.

Ty, a house, a cottage—Tynewydd, Mynachty.

Wy or *gwy*, an obsolete Celtic word for water, preserved in the names of many Welsh rivers—Elwy, Gwili, Wye or Gwy.

Ynys, [illegible] in the midst of a bog—Ynys Enlli (the W[illegible], Ynyshir, Clynrynys.

[illegible] form of the Latin "hospitium," often used of the guest-house of an abbey—Yspytty Ystwyth, Tafarn Spite.

Ystrad, a meadow or rich lowland—Ystrad Mynach, Llanfihangel Ystrad.

Population.—The total population of the twelve counties of the Principality was: 1,360,513 (1881), 1,519,035 (1891), 1,720,600 (1901). These figures prove a steady upward tendency, but the increase itself is confined entirely to the industrial districts of the Principality, and in a special degree to Glamorganshire; while the agricultural counties, such as Pembroke, Merioneth, Cardigan or Montgomery, present a continuous though slight decrease owing to local emigration to the centres of industry. The whole population of Wales in Tudor, Stuart and early Georgian times can scarcely have exceeded 500,000 souls, and was probably less. But with the systematic development of the vast mineral resources of the South Wales coalfield, the population of Glamorganshire has increased at a more rapid rate than that of any other county of the United Kingdom, so that at present this county contains about half the population of all Wales. It will be noted, therefore, that the vast mass of the inhabitants of Wales are settled in the industrial area which covers the northern districts of Glamorganshire and the south-eastern corner of Carmarthenshire; whilst central Wales, comprising the four counties of Cardigan, Radnor, Merioneth and Montgomery, forms the least populous portion of the Principality. The following towns had each in 1901 a population exceeding 10,000: Cardiff, Ystradyfodwg, Swansea, Merthyr Tydfil, Aberdare, Pontypridd, Llanelly, Ogmore and Garw, Pembroke, Caerphilly, Maesteg, Wrexham, Penarth, Neath, Festiniog, Bangor, Holyhead, Carmarthen. Only four towns in North Wales are included in these eighteen, and the combined populations of these four—Wrexham (14,966), Festiniog (11,435), Bangor (11,269) and Holyhead (10,079)—fall far below that of Merthyr Tydfil (69,228), the fourth largest town in Glamorganshire.

Industries.—The chief mineral product of the Principality is coal, of which the output amounts to over 23,000,000 tons annually. The great South Wales coalfield, one of the largest in the kingdom, covers the greater part of Monmouthshire and Glamorganshire, the south-eastern corner of Carmarthenshire, and a small portion of south Pembrokeshire, and the quality of its coal is especially suitable for smelting purposes and for use in steamships. The supply of limestone and ironstone in Glamorganshire is said to be practically unlimited. About 400,000 tons of pig iron are produced yearly, and some of the largest iron-works in the world are situated at Merthyr Tydfil and Dowlais. Copper, tin and lead works are everywhere numerous in the busy valleys of north Glamorgan and in the neighbourhoods of Swansea, Neath, Cardiff and Llanelly. In North Wales, Wrexham, Ruabon and Chirk are centres of coal-mining industry. There are valuable copper mines in Anglesea, and lead mines in Flint and in north Cardiganshire, which also yield a certain deposit of silver ore. Gold has been discovered and worked, though only to a small extent, in Merionethshire and Carmarthenshire. Slate quarries are very numerous throughout the Principality, the finest quality of slate being obtained in the neighbourhood of Bangor and Carnarvon, where the Penrhyn and Bethesda quarries give employment to many thousands of workmen.

By far the larger portion of Wales is purely agricultural in character, and much of the valley land is particularly fertile, notably the Vale of Glamorgan, the Vale of Clwyd and the valleys of the Towy, the Teifi, the Usk and the Wye, which have long been celebrated for their rich pastures. The holdings throughout Wales are for the most part smaller in extent than the average farms of England. Stock-raising is generally preferred to the growing of cereals, and in western Wales the oat crops exceed in size those of wheat and barley. The extensive tracts of unenclosed and often unimprovable land, which still cover a large area in the Principality, especially in the five counties of Cardigan, Radnor, Brecon, Montgomery and Merioneth, support numerous flocks of the small mountain sheep, the flesh of which supplies the highly prized Welsh mutton. The wool of the sheep is manufactured into flannel at numberless factories in the various country towns, and the supply meets an important local demand. The upland tracts also afford good pasturage for a number of cobs and ponies, which obtain high prices at the local fairs, and Pembrokeshire and Cardiganshire have long been famous for their breed of horses and ponies. The cattle of Wales present all varieties of race, the Hereford breed prevailing in the eastern counties, and Shorthorns and the black Castlemartins in the south-western parts. The great herds of goats, which in medieval times subsisted on the Welsh hills, have entirely disappeared since the general adoption of the sheep-farming industry.

The deep-sea fisheries on the south-western coasts are of some importance; the Mumbles, Tenby and Milford Haven being the chief centres of this industry. Lobsters and crabs are caught in Cardigan Bay, and oysters are found at various points of the Pembrokeshire coast. The large rivers produce salmon, which are usually sent to the great towns for sale. The Wye, the Usk, the Dee, the Dovey, the Teifi, the Towy and most of the Welsh rivers and lakes are frequented by anglers for salmon and trout.

Communications.—The two principal railways serving the Principality are the London & North-Western, which passes along the North Wales coast-line by way of Conway and Bangor, crosses the Menai Strait and has its terminus at Holyhead; and the Great Western, which traverses South Wales by way of Cardiff, Landore, Llanelly and Carmarthen, and has its principal terminal station at Fishguard Harbour. The lines of the Cambrian railway serve North and Mid-Wales, and branches of the London & North-Western and the Midland penetrate into South Wales as far as Swansea. A network of lines connects the great industrial districts of Glamorganshire with the main line of the Great Western railway. There are steamship services between Holyhead and Dublin in connexion with the trains of the London & North-Western railway; and an important traffic for dairy produce, live-stock and passengers between Fishguard and Rosslare on the Irish coast was opened in 1906 in connexion with the Great Western railway. There is also a boat service between Holyhead and Greenore on the Ulster coast. Steamboats likewise ply between Milford, Tenby, Swansea and Cardiff and Bristol; also between Swansea and Cardiff and Dublin; and there is a regular service between Swansea and Ilfracombe. The principal canals are the Swansea, the Neath, the Aberdare & Glamorgan, and the Brecon & Abergavenay, all worked in connexion with the industrial districts of north Glamorganshire.

Government.—In all acts of parliament Wales is invariably included under the term of "England and Wales," and whenever an act, or any section of an act, is intended to apply to the Principality alone, then Wales is always coupled with Monmouthshire. The extinction of the Welsh Court of Great Sessions in 1830 served to remove the last relic of separate jurisdiction in Wales itself, but in 1881 special legislation was once more inaugurated by the Welsh Sunday Closing Act (46 Victoria), forbidding the sale of spirituous liquors by all inn-keepers on Sundays to any but bona fide travellers throughout Wales and Monmouthshire. A separate act on behalf of Welsh education was likewise passed in 1889, when the Welsh Intermediate Education Act made special provision for intermediate and technical education throughout the Principality and Monmouthshire. Except for the administration of these two special acts, the system of government in Wales is identical in every respect with that of England (see ENGLAND and UNITED KINGDOM). Royal commissions dealing with questions peculiar to Wales have been issued from time to time, notably of recent years, in the Welsh Land Tenure Commission of 1893, and the Welsh Church Commission of 1906 (see *History*).

Religion.—Ecclesiastically, the whole of Wales lies within the province of Canterbury. The four Welsh sees, however, extend beyond the borders of the twelve counties, for they include the whole of Monmouthshire and some portions of the English border shires; on the other hand, the sees of Hereford and Chester encroach upon the existing Welsh counties. The diocese of St Davids (Tyddewi), the largest, oldest and poorest of the four Cambrian sees, consists of the counties of Pembroke, Carmarthen and Cardigan, almost the whole of Brecon, the greater part of Radnor, and west Glamorgan with Swansea and Gower. The cathedral church of St Davids is situated near the remote headland of St Davids in Pembrokeshire, but the episcopal residence has been fixed ever since the Reformation at Abergwili near Carmarthen, the most central spot in this vast diocese. The see of Llandaff comprises Monmouthshire, all Glamorganshire as far west as the Tawe, and some parishes in Brecon and Hereford. The diocese of Bangor consists of the counties of Anglesea, Carnarvon and large portions of Merioneth and Montgomery. The diocese of St Asaph (Llanelwy) consists of the county of Denbigh, nearly the whole of Flint, with portions of Montgomery, Merioneth and Shropshire.

Since the beginning of the 19th century dissent has been strongly represented in the Principality, the combined numbers of the various Nonconformist bodies far outstripping the adherents of the Church. Universally accepted statistics as to the various religious bodies it has been found impossible to obtain, but the Report (1910) of the Welsh Church Commission stated that, exclusive of Roman Catholics, there were 743,361 communicants or fully admitted members of some denomination, of whom 193,081 were Churchmen and 550,280 Nonconformists. The gentry and landowners are all, broadly speaking, members of the established Church, but it is impossible to name any other class of society as belonging definitely either to "Church" or "Chapel." According to the above Report, the three most powerful dissenting bodies in Wales are the Congregationalists or Independents, whose members number 175,147 throughout Wales and Monmouthshire; the Calvinistic Methodists—a direct offshoot of the Church since the schism of 1811—with a membership of 170,617; and the Baptists, 143,835. Wesleyan and Presbyterian chapels are likewise numerous, and the Unitarian or Socinian body has long been powerful in the valley of the Teifi. Nearly every existing sect is represented in Wales, including Swedenborgians and Moravians. The Roman Catholic Church has many followers amongst the labouring population of Irish descent in the industrial districts. The diocese of Newport (known till 1896 as Newport and Menevia) consists of the counties of Monmouth, Glamorgan and Hereford; whilst the remaining eleven counties were in 1895 formed into the Vicariate of Wales, which in 1898 was erected into a diocese under a bishop with the title of Menevia. Since the expulsion of the religious orders from France in 1903 several communities of French monks and nuns have taken up their abode in the Principality.

History.—At the time of the Roman invasion of Britain, 55 B.C., four distinct dominant tribes, or families, are enumerated west of the Severn, viz. the Decangi, owning the island of Anglesea (Ynys Fôn) and the Snowdonian district; the Ordovices, inhabiting the modern counties of Denbigh, Flint and Montgomery; the Dimetae, in the counties of Cardigan, Carmarthen and Pembroke; and the Silures, occupying the counties of Glamorgan, Brecknock, Radnor and Monmouth. It is interesting to note that the existing four Welsh sees of Bangor, St Asaph, St Davids and Llandaff correspond in the main with the limits of these four tribal divisions. On the advance of Ostorius into western Britain, he met with considerable resistance from Caractacus (Caradog), king of the Silures, but after some encounters this prince was eventually captured and sent in chains to Rome. The partial conquest by Ostorius was completed under Julius Frontinus by the year 78, after which the Romans set to work in order to pacify and develop their newly annexed territory. At this period the copper mines of Mona or Anglesea, the silver mines near Plinlimmon and the gold mines in the valley of the Cothi in Carmarthenshire were exploited and worked with some success by the conquerors. In spite of the mountainous and boggy character of the country, roads were now constructed in all directions. Of these the most important are the military road leading S. from Deva (Chester) by way of Uriconium (Wroxeter) and Gobannium (Abergavenny) to Isca Silurum (Caerleon-on-Usk) and Venta Silurum (Caerwent); another from Deva to Conovium (Conway), whence a road, the Sarn Helen, extended due S. to Carmarthen (Maridunum), by way of Loventium (Pont Llanio), which was also connected with Gobannium; from Maridunum a road led E. through the modern county of Glamorgan by way of Leucarum (Loughor) and Nidum (Neath) to Venta Silurum. With the accession of Constantine, Christianity was introduced by the Romans into the parts of Wales already colonized, and the efforts of the Roman priests were later supplemented during the 5th, 6th and 7th centuries by the devoted labours of Celtic missionaries, of whom nearly five hundred names still remain on record. Foremost in the work of preaching and educating were SS. David, Teilo, Illtyd and Cadoc in Dyfed, Morganwg, Gwent and Brycheiniog, comprising South Wales; Cynllo, Afan and Padarn in Ceredigion and Maesyfed, or Mid-Wales; and Deiniol, Dunawd, Beuno, Kentigern and Asaph in North Wales. To this period succeeding the fall of the Roman power is also ascribed the foundation of the many great Celtic monasteries, of which Bangor-Iscoed on the Dee, Bardsey Island, Llancarvan and Llantwit Major in the Vale of Glamorgan, Caerleon-on-Usk and St Davids are amongst the most celebrated in early Welsh ecclesiastical annals. With the withdrawal of the Roman legions, the recognized powers of the *Dux Britanniarum*, the Roman official who governed the upper province of Britain, were in the 5th century assumed by the Celtic prince Cunedda under the title of Gwledig (the Supreme), who fixed his court and residence at Deganwy, near the modern Llandudno. During the 6th century the battle of Deorham gained by the West Saxons in 577 cut off communication with Cornwall, and in 613 the great battle of Chester, won by King Ethelfrith, prevented the descendants of Cunedda from ever again asserting their sovereignty over Strathclyde; the joint effect, therefore, of these two important Saxon victories was to isolate Wales and at the same time to put an end to all pretensions of its rulers as the inheritors of the ancient political claims of the Roman governors of the northern province of Britain. The 8th century saw a further curtailment of the Welsh territories under Offa, king of Mercia, who annexed Shrewsbury (Amwythig) and Hereford (Henfordd) with their surrounding districts, and constructed the artificial boundary known as Offa's Dyke running due N. and S. from the mouth of the Dee to that of the Wye. It was during these disastrous Mercian wars that there first appeared on the Welsh coasts the Norse and Danish pirates, who harried and burnt the small towns and flourishing monasteries on the shores of Cardigan Bay and the Bristol Channel. In the 9th century, however, the Welsh, attacked by land and sea, by Saxons and by Danes, at length obtained a prince capable of bringing the turbulent chieftains of his country into obedience, and of opposing the two sets of invaders of his realm. This was Rhodri Mawr, or Roderick the Great, a name always cherished in Cymric annals. Like Alfred of Wessex, Rhodri also built a fleet in order to protect Anglesea, "the mother of Wales," so called on account of its extensive cornfields which supplied barren Gwynedd with provisions. In 877 Rhodri, after many vicissitudes, was slain in battle, and his dominions of Gwynedd (North Wales), Deheubarth (South Wales) and Powys (Mid Wales) were divided amongst his three sons, Anarawd, Cadell and Mervyn. Consolidation of Cambro-British territory was found impossible; there was no settled capital; and the three princes fixed their courts respectively at Aberffraw in Anglesea, at Dynevor (Dinefawr) near Llandilo in Deheubarth, and at Mathrafal in Powys. Howel, son of Cadell, commonly known as Howel Dda the Good, is ever celebrated in Welsh history as the framer, or rather the codifier, of the ancient laws of his country, which were promulgated to the people at his hunting lodge, Ty Gwyn ar Tâf, near the modern Whitland. In Howel's code the prince of Gwynedd with his court at Aberffraw is recognized as the leading monarch in Wales; next to him ranks the prince of Deheubarth, and third in estimation is the prince of Powys. The laws of Howel Dda throw a flood of interesting light upon the ancient customs and ideas of early medieval Wales, but as their standard of justice is founded on a tribal and not a territorial system of society, it is easy to understand the antipathy with which the Normans subsequently came to regard this famous code. The dissensions of the turbulent princes of Gwynedd, Powys and Deheubarth, and of their no less quarrelsome chieftains, now rent the country, which was continually also a prey to Saxon incursions by land and to Scandinavian attacks by sea. Some degree of peace was, however, given to the distracted country during the reign of Llewelyn ap Seissyllt, the husband of Angharad, heiress of Gwynedd, who at length secured the overlordship or sovereignty of all Wales, and reigned till 1022. His son, Griffith ap Llewelyn, who, after having been driven into exile, recovered his father's realm in the battle of Pencader, Carmarthenshire, in 1041, for many years waged a war of varying success against Harold, earl of Wessex, but in 1062 he was treacherously slain, and Harold placed Wales under the old king's half-brothers, Bleddyn and Rhiwallon.

With the advent of the Normans, William the Conqueror, with the object of placing a firm feudal barrier between Wales and the earldom of Mercia, erected three palatine counties along the Cymric frontier. Thus Hugh the Wolf was placed in Chester (Caer), Roger de Montgomery at Shrewsbury and William Fitz-Osbern at Hereford. In 1081 William himself visited the Principality, and even penetrated as far west as St Davids. But the most important result of this first Norman invasion was to be found in the marvellous and rapid success of Robert Fitz-Hamon, earl of Gloucester, who, accompanied by a number of knightly adventurers, quickly overran South Wales, and erected a chain of castles stretching from the Wye to Milford Haven. The rich low-lying lands of Morganwg and Gwent were thus firmly occupied, nor were they ever permanently recovered by the Welsh princes; and such natives as remained were kept in subjection by the almost impregnable fortresses of stone erected at Caerphilly, Cardiff, Cowbridge, Neath, Kidwelly and other places. The important castles of Carmarthen and Pembroke were likewise built at this period. At the accession of William Rufus the domain of Gwynedd had been reduced to Anglesea and the Snowdonian district, and that of South Wales, or Deheubarth, to the lands contained in the basins of the rivers Towy and Teifi, known as Ystrad Tywi and Ceredigion. Griffith ap Cynan, of the royal house of Gwynedd, who had been first an exile in Ireland, and later a prisoner at Chester, once more returned to his native land, and defied the Norman barons with success, whilst Henry I. vainly endeavoured to make his liege and follower, Owen of Powys, ruling prince in Wales. Meanwhile the house of Dynevor once more rose to some degree of power under Griffith ap Rhys, whose father, Rhys ap Tudor, had been slain in 1093. The confused reign of Stephen was naturally favourable to the development of Cymric liberty, and with such strong princes as Owen, son of Griffith ap Cynan, heir to the throne of Gwynedd, and with Griffith ap Rhys ruling at Dynevor, the prospects of the Cymry grew brighter. In 1136 the army of Griffith ap Rhys met with a large English force near Cardigan, composed of the denizens of the South Wales castles and of the hated Flemish colonists, who had been lately planted by Henry I. in Dyfed. A fierce engagement took place wherein the Norman and Flemish troops were utterly routed, and the victorious Cymry slew thousands of their fugitives at the fords of the Teifi close to the town of Cardigan. The following year (1137) saw the deaths of the two powerful princes, Griffith ap Cynan, "the sovereign and protector and peacemaker of all Wales," and Griffith ap Rhys, "the light and the strength and the gentleness of the men of the south." With the accession of Henry II. peace was made with Owen of Gwynedd, the successor of Griffith ap Cynan, and with Rhys ap Griffith of South Wales. In 1169 Owen Gwynedd died and was buried in Bangor cathedral after a reign of 33 years, wherein he had successfully defended his own realm and had done much to bring about that union of all Wales which his grandson was destined to complete. On the other hand, "The Lord Rhys," as he is usually termed, did homage to Henry II. at Pembroke in 1171, and was appointed the royal justiciar of all South Wales. At the castle of Cardigan in 1176, Prince Rhys held a historic bardic entertainment, or *eisteddfod*, wherein the poets and harpists of Gwynedd and Deheubarth contended in amicable rivalry. This enlightened prince died in 1196, and as at his death the house of Dynevor ceased to be of any further political importance, the overlordship of all Wales became vested indisputably in the house of Gwynedd, which from this point onwards may be considered as representing in itself alone the independent principality of Wales. The prince of Gwynedd henceforth considered himself as a sovereign, independent, but owing a personal allegiance to the king of England, and it was to obtain a recognition of his rights as such that Llewelyn ap Iorwerth, "the Great," consistently strove under three English kings, and though his resources were small, it seemed for a time as though he might be able by uniting his countrymen to place the recognized autonomy of Gwynedd on a firm and enduring basis. By first connecting himself with John through his marriage with the English king's daughter Joan, by straining every nerve to repress dissensions and enforce obedience amongst the Welsh chieftains, and later by allying himself with the English barons against his suzerain, this prince during a reign of 44 years was enabled to give a considerable amount of peace and prosperity to his country, which he persistently sought to rule as an independent sovereign, although acknowledging a personal vassalage to the king of England.

The close of the 12th century saw the final and complete subjection of the ancient Cambro-British Church to the supremacy of Canterbury. As part of the Roman Upper Province of Britain, Wales would naturally have fallen under the primacy of York, but the Welsh sees had continued practically independent of outside control during Saxon times. The bishops of St Davids had from time to time claimed metropolitan rights over the remaining sees, but in 1115 St Anselme's appointment of the monk Bernard (d. 1147) to St Davids, in spite of the opposition of the native clergy, definitely marked the end of former Welsh ecclesiastical independence. In 1188 Archbishop Baldwin with a distinguished train, whilst preaching the Third Crusade, made an itinerary of the Welsh sees and visited the four cathedral churches, thereby formally asserting the supremacy of Canterbury throughout all Wales. But in 1199 the celebrated Gerald de Barri (Giraldus Cambrensis), archdeacon of Brecon and a member of the famous Norman baronial house of de Barri, and also through his grandmother Nesta a great-grandson of Prince Rhys ap Tudor of Deheubarth, was elected bishop by the chapter of St Davids. This enthusiastic priest at once began to re-assert the ancient metropolitan claims of the historic Welsh see, and between the years 1199–1203 paid three visits to Rome in order to obtain the support of Pope Innocent III. against John and Archbishop Hubert, who firmly refused to recognize Gerald's late election. Innocent was inclined to temporize, whilst the Welsh chieftains, and especially Gwenwynwyn of Powys, loudly applauded Gerald's action, but Llewelyn ap Iorwerth himself prudently held aloof from the controversy. Finally, in 1203, Gerald was compelled to make complete submission to the king and archbishop at Westminster, and henceforth Canterbury remained in undisputed possession of the Welsh sees, a circumstance that undoubtedly tended towards the later union of the two countries.

In 1238 Llewelyn, growing aged and infirm, summoned all his vassals to a conference at the famous Cistercian abbey of Strata Florida, whereat David, his son by the Princess Joan of England, was acknowledged his heir by all present. Two years later Llewelyn, the ablest and most successful of all the Welsh princes, expired and was buried in the monastery of his own foundation at Aberconway. He was succeeded by David II., at whose death without children in 1246 the sovereignty of Gwynedd, and consequently of Wales, reverted to his three nephews, sons of his half-brother Griffith, who had perished in 1244 whilst trying to escape from the Tower of London, where Henry III. was holding him as hostage for the good behaviour of Prince David. Of Griffith's three sons, Owen, Llewelyn and David, the most popular and influential was undoubtedly Llewelyn, whose deeds and qualities were celebrated in extravagant terms by the bards of his own day, and whose evil fate has ever been a favourite theme of Welsh poets. Though to this, the last prince of Wales, political sagacity and a firm desire for peace have often been ascribed, it must be admitted that he showed himself both turbulent and rash at a time when the most cautious diplomacy on his part was essential for his country's existence. For Edward, Henry III.'s son and heir, who had been created earl of Chester by his father and put in possession of all the royal claims in Wales, was generally credited with a strong determination to crush for ever Welsh independence, should a fitting opportunity to do so present itself. Nevertheless, the hostile policy of Llewelyn, who had closely associated himself with the cause of Simon de Montfort and the barons, was at first successful. For after the battle of Evesham a treaty was concluded between the English king and the Welsh prince at Montgomery, whereby the latter was confirmed in his principality of Gwynedd and was permitted to receive the homage of all the Welsh barons, save that of the head of the house of Dynevor, which the king reserved to himself; whilst the four fertile *cantrefs* of Perfeddwlad, lying between Gwynedd and the earldom of Chester, were granted to the prince. Llewelyn was, however, foolish enough to lose the results of this very favourable treaty by intriguing with the de Montfort family, and in 1273 he became betrothed to Eleanor de Montfort, the old Earl's only daughter, a piece of political folly which may possibly in some degree account for Edward's harsh treatment of the Welsh prince. In 1274 Llewelyn refused to attend at Edward's coronation, although the Scottish king was present. In 1276 Edward entered Wales from Chester, and after a short campaign brought his obstinate vassal to submit to the ignominious treaty of Conway, whereby Llewelyn lost almost all the benefits conferred on him by the compact of Montgomery ten years before. Llewelyn, utterly humbled, now behaved with such prudence that Edward at last sanctioned his marriage with Eleanor de Montfort (although such an alliance must originally have been highly distasteful to the English king), and the ceremony was performed with much pomp in Worcester Cathedral in 1278. In 1281 discontent with the king and his system of justice had again become rife in Wales, and at this point the treacherous Prince David, who had hitherto supported the king against his own brother, was the first to proclaim a national revolt. On Palm Sunday 1282, in a time of peace, David suddenly attacked and burnt Hawarden Castle, whereupon all Wales was up in arms. Edward, greatly angered and now bent on putting an end for ever to the independence of the Principality, hastened into Wales; but whilst the king was campaigning in Gwynedd, Prince Llewelyn himself was slain in an obscure skirmish on the 11th of December 1282 at Cefn-y-bedd, near Builth on the Wye, whither he had gone to rouse the people of Brycheiniog. Llewelyn's head was brought to Edward at Conway Castle, who ordered it to be exhibited in the capital, surrounded by a wreath of ivy, in mocking allusion to an ancient Cymric prophecy concerning a Welsh prince being crowned in London. His body is said, on doubtful authority, to have been buried honourably by the monks of Abbey Cwm Hir, near Rhayader. Llewelyn's brother, now David III., designated by the English "the last survivor of that race of traitors," for a few months defied the English forces amongst the fastnesses of Snowdon, but ere long he was captured, tried as a disloyal English baron by a parliament at Shrewsbury, and finally executed under circumstances of great barbarity on the 3rd of October 1283. With David's capture practically all serious Welsh resistance to the English arms ceased, if we except the unsuccessful attempt made to rouse the crushed nation in 1293 by Llewelyn's natural son, Madoc, who ended his days as a prisoner in the Tower of London.

Having suppressed the independence of Wales, Edward now took steps to keep Gwynedd itself in permanent subjection by building the castles of Conway, Carnarvon, Criccieth and Harlech within the ancient patrimony of the princes of North Wales, whose legitimate race was now extinct save for Llewelyn's daughter Gwenllian, who had entered the convent of Sempringham. In April 1284 Queen Eleanor, who had meanwhile joined her husband in Wales, gave birth to a son in the newly built castle of Carnarvon, and this infant the victorious king, half in earnest and half in jest, presented to the Welsh people for a prince who could speak no word of English. On the 7th of February 1301, Edward of Carnarvon was formally created "prince of Wales" by his father, and henceforward the title and honours of Prince of Wales became associated with the recognized heir of the English crown.

By the Statute, or rather Ordinance of Rhuddlan, promulgated in 1284, many important changes were effected in the civil administration of Wales. Glamorgan and the county palatine of Pembroke had hitherto been the only portions of the country subject to English shire law, but now Edward parcelled out the ancient territory of the princes of Gwynedd and of Deheubarth into six new counties, with sheriffs, coroners and bailiffs. Thus Anglesea, Carnarvon, Merioneth and Flint were erected in North Wales; whilst out of the districts of Ystrad Tywi and Ceredigion in South Wales, the old dominions of the house of Dynevor, the counties of Carmarthen and Cardigan were formed. The old Welsh land tenure by gavelkind was, however, still permitted to remain in force amongst the natives of all Wales, whilst it was henceforth arranged to administer justice in the eight counties by special royal judges, and in the Marches by the officers appointed by the various lords-marchers according to the terms of their tenure. Another distinguishing mark of Edward's policy towards Wales is to be found in the commercial and administrative powers given to the fortified towns, inhabited solely by people of English birth and by Welshmen who acquiesced in English rule. Municipal charters and market privileges were now granted to such towns as Cardiff, Carmarthen, Builth, Cardigan, Montgomery, Aberystwith, Newborough, &c., and this wise policy was continued under Edward II. and Edward III. Many of the turbulent Welsh warriors having now become mercenaries on the continent or else enlisted under the English king, and the whole of the land west of Severn at last enjoying internal peace, the commercial resources of Wales were developed in a manner that had hitherto not been possible. Coal, copper, timber, iron, and especially wool, were exported from the Principality, and by the Statute Staple of 1353 Carmarthen was declared the sole staple for the whole Welsh wool trade, every bale of wool having first to be sealed or "cocketed" at this important town, which during the 14th century may almost be accounted as the English capital of the Principality, so greatly was it favoured by the Plantagenet monarchs. A natural result of this partial treatment of the towns by the king and his vassals was that the English tongue and also English customs became prevalent if not universal in all the towns of Wales, whilst the rural districts remained strongly Cymric in character, language and sympathy.

After more than a century of enforced repose in the land and of prosperity in the towns, all Wales was suddenly convulsed by a wide-spread revolt against the English crown, which reads more like a tale of romance than a piece of sane history. The deposition of Richard II. and the usurpation of Henry IV., combined with the jealousy of the rural inhabitants of Wales against the privileged dwellers of the towns, seem to have rendered the country ripe for rebellion. Upon this troubled scene now appeared Owen Glendower (Owain Glyndwfrdwy: died ? 1415), a descendant of the former princes of Powys and a favourite courtier of the late King Richard, smarting under the effect of personal wrongs received from Henry of Lancaster. With a success and speed that contemporary writers deemed miraculous, Owen stirred up his countrymen against the king, and by their aid succeeded in destroying castle after castle, and burning town after town throughout the whole length and breadth of the land between the years 1401 and 1406. In 1402 he routed the forces of the Mortimers at Bryn Glas near Knighton in Maesyfed, where he captured Sir Edmund Mortimer, the uncle and guardian of the legitimate heir to the English throne, the young earl of March. The aims of Owen were described by himself in a letter addressed to Charles VI., king of France, who had hastened to acknowledge the upstart as Prince of Wales and had sent 12,000 troops on his behalf to Milford Haven. In this letter Owen, who was holding his court in Llanbadarn near Aberystwith, demands his own acknowledgment as sovereign of Wales; the calling of a free Welsh parliament on the English model; the independence of the Welsh Church from the control of Canterbury; and the founding of national colleges in Wales itself. An assembly of Welsh nobles was actually summoned to meet in 1406 at Machynlleth in an ancient building still standing and known to this day as "Owen Glendower's Parliament House." In vain did Henry and his lords-marchers endeavour to suppress the rebellion, and to capture, by fair means or foul, the person of Glendower himself; the princely adventurer seemed to bear a charmed existence, and for a few years Owen was practically master of all Wales. Nevertheless, his rule and power gradually declined, and by the year 1408 Owen himself had disappeared as suddenly and mysteriously as he had arisen, and the land once more fell into undisputed possession of the king and his chosen vassals. For Owen's brilliant but brief career and ruthless treatment of English settlers and Anglophil Welshmen, his countrymen had not unnaturally to pay a heavy penalty in the severe statutes which the affrighted parliaments of Henry IV. framed for the protection of the English dwellers in Wales and the border counties, and which were not repealed until the days of the Tudors. Of the part played by the Cymry during the wars of the Roses it is needless to speak, since the period forms a part of English rather than of Welsh history. The Yorkist faction seems to have been strongest in the eastern portion of the Principality, where the Mortimers were all-powerful, but later the close connexion of the house of Lancaster with Owen Tudor, a gentleman of Anglesea (beheaded in 1461) who had married Catherine of France, widow of Henry V., did much to invite Welsh sympathy on behalf of the claims of Henry Tudor his grandson, who claimed the English throne by right of his grandmother. Through the instrumentality of the celebrated Sir Rhys ap Thomas (1451–1527), the wealthiest and the most powerful personage in South Wales, Henry Tudor, earl of Richmond, on his landing at Milford Haven in 1485 found the Welsh ready to rise in his behalf against the usurper Richard III. With an army largely composed of Sir Rhys's adherents, Henry was enabled to face Richard III. at Bosworth, and consequently to obtain the crown of England. Thus did a Welshman revenge the ignominious deaths of Prince Llewelyn and Prince David by becoming two centuries later king of England and prince of Wales.

With the Tudor dynasty firmly seated on the throne, a number of constitutional changes intended to place Welsh subjects on a complete social and political equality with Englishmen have to be recorded. The all-important Act of Union 1536 (27 Henry VIII.), converted the whole of the Marches of Wales into shire ground, and created five new counties: Denbigh, Montgomery, Radnor, Brecknock, or Brecon and Monmouth. At the same time the remaining lordships were added to the English border counties of Gloucester, Shropshire and Hereford, and also to the existing Welsh shires of Cardigan, Carmarthen, Glamorgan and Pembroke, all of which found their boundaries considerably enlarged under this statute. Clause 26 of the same act likewise enacted that the 12 Welsh counties should return 24 members to the English parliament: one for each county, one for the boroughs in each county (except Merioneth), and one for the town and county of Haverfordwest. It is probable that Welsh members attended the parliaments of 1536 and 1539, and certain it is that they were present at the parliament of 1541 and every parliament subsequently held. This act of union was followed in 1542 by an "Act for certain Ordinances in the King's Majesty's Dominion and Principality of Wales" (34 & 35 Henry VIII.), which placed the court of the president and council of Wales and the Marches on a legal footing. This court, with a jurisdiction somewhat similar to that of the Star Chamber, had originally been called into being under Edward IV. with the object of suppressing private feuds and other illegalities amongst the lords-marchers and their retainers. This council of Wales, the headquarters of which had been fixed at Ludlow, undoubtedly did good service on behalf of law and order under such capable presidents as Bishop Rowland Lee and William Herbert, earl of Pembroke; but it had long ceased to be of any practical use, and had in fact become an engine of oppression by the time of the Commonwealth, although it was not definitely abolished till the revolution of 1688. The act of 1542 also enacted that courts of justice under the name of "The King's Great Sessions in Wales" should sit twice a year in every one of the counties of Wales, except Monmouth, which was thus formally declared an English shire. For this purpose four circuits, two for North and two for South Wales, each circuit containing a convenient group of three counties, were created; whilst justices of the peace and *custodes rotulorum* for each shire were likewise appointed. At the same time all ancient Welsh laws and customs, which were at variance with the recognized law of England, were now declared illegal, and Cymric land tenure by gavelkind, which had been respected by Edward I., was expressly abolished and its place taken by the ordinary practice of primogeniture. It was also particularly stated that all legal procedure must henceforth be conducted in the English tongue, an arrangement which fell very heavily on poor monoglot Welshmen and appears an especially harsh and ungracious enactment when coming from a sovereign who was himself a genuine Welshman by birth. Under the system of the Great Sessions justice was administered throughout the twelve counties of Wales for nearly three hundred years, and it was not until 1830 that this system of jurisdiction was abolished (not without some protest from Welsh members at Westminster), and the existing North and South Wales circuits were brought into being.

With the peaceful absorption of the Principality into the realm of the Tudor sovereigns, the subsequent course of Welsh history assumes mainly a religious and educational character. The influence of the Renaissance seems to have been tardy in penetrating into Wales itself, nor did the numerous ecclesiastical changes during the period of the Reformation cause any marked signs either of resentment or approval amongst the mass of the Welsh people, although some of the ancient Catholic customs lingered on obstinately. As early as the reign of Henry VIII. there were, however, to be found at court and in the universities a number of ardent and talented young Welshmen, adherents mostly of the reforming party in Church and State, who were destined to bring about a brilliant literary revival in their native land during the reigns of Elizabeth and James I. Of this distinguished band the most memorable names are those of Bishop Richard Davies (*c.* 1501–1581) and of William Salesbury, the squire-scholar of Llanrwst (*c.* 1520–*c.* 1600) in Denbighshire, who is commonly credited with the honour of having produced the first printed book in the Welsh language, a small volume of proverbs published in London about the year 1545. With the accession of Elizabeth a novel and vigorous ecclesiastical policy on truly national lines was now inaugurated in Wales itself, chiefly through the instrumentality of Richard Davies, nominated bishop of St Asaph in 1559 and translated thence to St Davids in 1561, who was mainly responsible for the act of parliament of 1563, commanding the bishops of St Davids, Llandaff, Bangor, St Asaph and Hereford to prepare with all speed for public use Welsh translations of the Scriptures and the Book of Common Prayer. Of the five prelates thus named, Davies alone was competent to undertake the task, and for assistance in the work of translation he called upon his old friend and former neighbour, William Salesbury, who like the bishop was an excellent Greek and Hebrew scholar. The pair laboured with such diligence that before the close of the year 1567 the required translations of the Liturgy and the New Testament were published in London; the former being the exclusive work of the bishop, whilst the latter was principally the product of Salesbury's pen, although some portions of it were contributed by Bishop Davies and by Thomas Huet, or Hewett, precentor of St Davids (d. 1591). Having accomplished so much in so small a space of time, the two friends were next engaged upon a translation of the Old Testament, but owing to a quarrel, the cause of which remains obscure, this interesting literary partnership was brought to an abrupt ending about 1570. The honour of presenting his countrymen with a complete Welsh version of the Bible was reserved for William Morgan (*c.* 1547–1604), vicar of Llanrhayader, in Denbighshire, and afterwards bishop successively of Llandaff and of St Asaph. For eight years Morgan was busied with his self-imposed task, being greatly encouraged thereto by Archbishop Whitgift, by Bishop William Hughes (d. 1600) of St Asaph, and by other leading dignitaries of the Church both in England and in Wales. In December 1588 the first complete Welsh Bible, commonly known as "Bishop Morgan's Bible," was issued from the royal press at Westminster under the patronage of queen and primate, about 800 copies being supplied for distribution amongst the parish churches of Wales. This famous *editio princeps* of the Welsh Bible, first and foremost of Welsh classics, was further supplemented under James I. by the Authorized Version, produced by Richard Parry (1560–1623), bishop of St Asaph, with the help of Dr John Davies of Mallwyd (1570–1644), the first great Welsh lexicographer. At the tercentenary of "Bishop Morgan's Bible" in 1888 a national movement of appreciation was set on foot amongst Welshmen of all denominations both at home and abroad, with the result that a memorial cross was erected in the cathedral close of St Asaph in order to perpetuate the names and national services of the eight leading Welsh translators of the Scriptures:—Bishops Davies, Morgan and Parry; William Salesbury; Thomas Huet; Dr Davies of Mallwyd; Archdeacon Edmund Prys (1541–1624), author of a popular Welsh metrical version of the Psalter; and Gabriel Goodman, dean of Westminster (1528–1601), a native of Ruthin, who greatly assisted Bishop Morgan in his task. Two circumstances attending the production of these Welsh translations should be noted:—(1) That the leaders of this remarkable religious, literary and educational revival within the Principality were chiefly natives of North Wales, where for many years St Asaph was regarded as the chief centre of Cambro-British intellectual life; and (2) that all these important works in the Welsh tongue were published of necessity in London, owing to the absence of an acknowledged capital, or any central city of importance in Wales itself.

It would be well-nigh impossible to exaggerate the services rendered to the ancient British tongue, and consequently to the national spirit of Wales, by these Elizabethan and Jacobean translations, issued in 1567, 1588 and 1620, which were able definitely to fix the standard of classical Welsh, and to embody the contending dialects of Gwynedd, Dyfed and Gwent for all time in one literary storehouse. But for this sudden revival of Cymric literature under the patronage of Elizabeth (for the obtaining of which Wales must ever owe a deep debt of gratitude to Bishop Richard Davies, "her second St David"), there is every reason to believe that the ancient language of the Principality must either have drifted into a number of corrupt dialects, as it then showed symptoms of doing, or else have tended to ultimate extinction, much as the Cornish tongue perished in the 17th century.

The growth of Puritanism in Wales was neither strong nor speedy, although the year 1588, which witnessed the appearance of Bishop Morgan's Bible, also gave birth to two fierce appeals to the parliament, urging a drastic Puritanical policy in Wales, from the pen of the celebrated John Penry, a native of Brecknockshire (1559–1593). Far more influential than Penry amongst the Welsh were Rhys Prichard (? 1579–1644), the famous vicar of Llandovery,[1] Carmarthenshire, and William Wroth (d. 1642), rector of Llanfaches, Monmouthshire. Of these two Puritan divines, Vicar Prichard, who was essentially orthodox in his behaviour, forms an interesting connecting link between the learned Elizabethan translators of the Bible and the great revivalists of the 18th century, and his moral rhymes in the vernacular, collected and printed after his death under the title of *The Welshman's Candle* (Canwyll y Cymry), still retain some degree of popularity amongst his countrymen. Although a strong opponent of Laud's and Charles's ecclesiastical policy, Prichard lived unmolested, and even rose to be chancellor of St Davids; but the indiscreet Wroth, "the founder and father of nonconformity in Wales," being suspended in 1638 by Bishop Murray of Llandaff, founded a small community of Independents at Llanfaches, which is thus commonly accounted the first Nonconformist chapel in Wales. During the years prior to the Great Rebellion, however, in spite of the preaching and writings of Vicar Prichard, Wroth and others, the vast mass of Welshmen of all classes remained friendly to the High Church policy of Laud and staunch supporters of the king's prerogative. Nor were the effects of the great literary revival in Elizabeth's reign by any means exhausted, for at this time Wales undoubtedly possessed a large number of native divines that were at once active parish priests and excellent scholars, many of whom had been educated at Jesus College, Oxford, the Welsh college endowed by Dr Hugh Price (d. 1574) and founded under Elizabeth's patronage in 1573. So striking was the devotion shown throughout the Principality to the king, who fought his last disastrous campaign in the friendly counties of Wales and the Marches, that on the final victory of the parliament there was passed within a month of Charles's execution in 1649 (perhaps as a special measure of punishment) an "Act for the better Propagation and Preaching of the Gospel in Wales," by the terms of which a packed body of seventy commissioners was presented with powers that were practically unlimited to deal with all matters ecclesiastical in Wales. To assist these commissioners in their task of inquiry and ejectment, a body of twenty-five "Approvers" was likewise constituted, with the object of selecting itinerant preachers to replace the dismissed incumbents; and amongst the Approvers are conspicuous the names of Walter Cradock (d. 1659), a suspended curate of St Mary's, Cardiff, and a follower of Wroth's; and of Vavasor Powell (1617–1670), an honest but injudicious zealot. Some 330 out of a possible total of 520 incumbents were now ejected in South Wales and Monmouthshire, and there is every reason to suppose that the beneficed clergy of North Wales suffered equally under the new system. The greed and tyranny of several of the commissioners, and the bigotry and mismanagement of well-meaning fanatics such as Cradock and Powell, soon wrought dire confusion throughout the whole Principality, so that a monster petition, signed alike by moderate Puritans and by High Churchmen, was prepared for presentation to parliament in 1652 by Colonel Edward Freeman, attorney-general for South Wales. Despite the fierce efforts of Vavasor Powell and his brother itinerant preachers to thwart the reception of this South Wales petition at Westminster, Colonel Freeman was able to urge the claims of the petitioners, or "Anti-Propagators" as they were termed, at the bar of the House of Commons, openly declaring that by the late policy of ejectment and destruction "the light of the Gospel was almost extinguished in Wales." A new commission was now appointed to inquire into alleged abuses in Wales, and the existing evidence clearly shows how harsh and unfair was the treatment meted out to the clergy under the act of 1649, and also how utterly subversive of all ancient custom and established order were the reforms suggested by the commissioners and approvers. At the Restoration all the ejected clergy who survived were reinstated in their old benefices under the Act of Uniformity of 1662, whilst certain Puritan incumbents were in their turn dismissed for refusing to comply with various requirements of that act. Amongst these Stephen Hughes of Carmarthen (1623–1688), a devoted follower of Vicar Prichard and an editor of his works, was ejected from the living of Mydrim in Carmarthenshire, whereby the valuable services of this eminent divine were lost to the Church and gained by the Nonconformists, who had increased considerably in numbers since the Civil Wars. The old ecclesiastical policy of Elizabeth, which had hitherto borne such good fruit in Wales, was now gradually relaxed under the later Stuarts and definitely abandoned under Anne, during whose reign only Englishmen were appointed to the vacant Welsh sees. From 1702 to 1870, a period of nearly 170 years, no Welsh-speaking native bishop was nominated (with the solitary exception of John Wynne, consecrated to St Asaph in 1715), and it is needless to point out that this selfish and unjust policy was largely responsible for the neglect and misrule which distinguished the latter half of the 18th and the early part of the 19th centuries. The Church, which had so long played a prominent and valuable part in the moral and literary education of the Welsh people, was now gradually forced out of touch with the nation through the action of alien and unsympathetic Whig prelates in Wales itself, which still remained mainly High Church and Jacobite in feeling.

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[1] Sometimes known as vicar of Llandingat, his church being in that parish.

All writers agree in stating that the mass of the Welsh people at the close of the 17th century were illiterate, and many divines of Cymric nationality charge their countrymen also with immorality and religious apathy. English was little spoken or understood amongst the peasant population, and there was a great dearth of Welsh educational works. Some efforts to remedy this dark condition of things had already been made by Thomas Gouge, with the assistance of Stephen Hughes, and also by the [illegible] for the Promotion of Christian Know-[illegible] Jones (1683–1761), rector of Lland-[illegible]shire, who was destined to become the true pioneer of Welsh education, religious and secular. Early in the reign of George I. this excellent man, whose name and memory will ever be treasured so long as the Welsh tongue survives, began a system of catechizing in the vernacular amongst the children and adults of his own parish. With the cordial help of Sir John Philipps (d. 1736) of Picton Castle, the head of an ancient family in Dyfed, and of Mrs Bridget Bevan of Laugharne (d. 1779), who is still affectionately remembered in Wales as the donor of "Madam Bevan's Charity," Griffith Jones was enabled to extend his scheme of educating the people throughout South Wales, where numerous "circulating charity schools," as they were called, were set up in many parishes with the approval of their incumbents. The results obtained by the growth of these schools were speedy and successful beyond the wildest hopes of their founder. This educational system, invented by Griffith Jones and supported by the purse of Mrs Bevan, in 1760 numbered 215 schools, with a total number of 8687 contemporary scholars; and by the date of Jones's death in 1761 it has been proved that over 150,000 Welsh persons of every age and of either sex, nearly a third of the whole population of Wales at that time, were taught to read the Scriptures in their own language by means of these schools. With this newly acquired ability to read the Bible in their own tongue, the many persons so taught were not slow to express a general demand for Cymric literature, which was met by a supply from local presses in the small country towns; the marvellous success of the Welsh circulating charity schools caused in fact the birth of the Welsh vernacular press. In spite, however, of the marked improvement in the conditions and behaviour of the Welsh people, owing to this strictly orthodox revival within the pale of the Church, Griffith Jones and his system of education were regarded with indifference by the English prelates in Wales, who offered no preferment and gave little encouragement to the founder of the circulating schools. Meanwhile the writings and personal example of the pious rector of Llanddowror were stirring other Welshmen in the work of revival, chief amongst them being Howell Harris of Trevecca (1713–1773), a layman of brilliant abilities but erratic temperament; and Daniel Rowland (1713–1790), curate of Llangeitho in Mid-Cardiganshire, who became in time the most eloquent and popular preacher throughout all Wales. Two other clergymen, who figure prominently in the Methodist movement, and whose influence has proved lasting, were Peter Williams of Carmarthen (1722–1796), the Welsh Bible commentator, and William Williams of Pantycelyn (1717–1791), the celebrated Welsh hymn-writer. Incidentally, it will be noticed that this important Methodist revival had its origin and found its chief supporters and exponents in a restricted corner of South Wales, of which Carmarthen was the centre, in curious contrast with the literary movement in Elizabeth's reign, which was largely confined to the district round St Asaph.

During the lifetime of Griffith Jones the course of Welsh Methodism had run in orthodox channels and had been generally supported by the Welsh clergy and gentry; but after his death the tendency to exceed the bounds of conventional Church discipline grew so marked as to excite the alarm of the English bishops in Wales. Nevertheless, the bulk of the Methodists continued to attend the services of the Church, and to receive the sacraments from regularly ordained parish priests, although a schism was becoming inevitable. Towards the close of the 18th century the Methodist revival spread to North Wales under the influence of the celebrated Thomas Charles, commonly called Charles of Bala (1755–1814), formerly curate of Llanymowddwy and the founder of Welsh Sunday schools. So strained had the relations between the English rulers of the Church and the Methodists themselves now grown, that in 1811 the long-expected schism took place, much to the regret of Charles of Bala himself, who had ever been a devoted disciple of Griffith Jones. The great bulk of the farming and labouring members of the Church now definitely abandoned their "Ancient Mother," to whom, however, the Welsh gentry still adhered. The Great Schism of 1811 marks in fact the lowest point to which the fortunes of the once powerful and popular Church in Wales had sunk;—in 1811 there were only English-speaking prelates to be found, whilst the abuses of non-residence, pluralities and even nepotism were rampant everywhere. As instances of this clerical corruption then prevailing in Wales, mention may be made of the cases of Richard Watson (d. 1816), the non-resident bishop of Llandaff, who rarely visited his diocese during an episcopate of thirty years; and of another English divine who held the deanery, the chancellorship and nine livings in a North Welsh see, his curates-in-charge being paid out of Queen Anne's Bounty, a fund expressly intended for the benefit of impoverished livings. An honourable exception to the indolent and rapacious divines of this stamp was Thomas Burgess (bishop of St Davids), to whose exertions is mainly due the foundation of St David's College at Lampeter in 1822, an institution erected to provide a better and cheaper education for intending Welsh clergymen. The foundation of Lampeter College was one of the earliest signs of a new era of revived vigour and better government within the Church, although it was not till 1870 that, by Mr Gladstone's appointment of Dr Joshua Hughes to the see of St Asaph, the special claims of the Welsh Church were officially recognized, and the old Elizabethan policy was one more reverted to after a lapse of nearly two hundred years. After 1870 Welsh ecclesiastical appointments were made in a more truly national spirit, and this official acknowledgment of the peculiar duties and claims of the Church in Wales largely helped to win back no small amount of the strength and popularity that had been lost during Georgian times.

With the old national Church enthralled by English political prelates, and consequently hindered from ministering to the special needs of the people, the progress of dissent throughout the Principality was naturally rapid. Although primary education was largely supplied by the many Church schools in all parts of Wales, yet it was in the three most important denominations—the Congregationalists, the Baptists and the Calvinistic Methodists (that new-born sect of which the Church herself was the unwilling parent)—that almost all Welsh spiritual development was to be found during the first half of the 19th century. Thus between the year 1811 (the date of the Methodist secession) and 1832 (the year of the great Reform Bill), the number of dissenting chapels had risen from 945 to 1428: a truly marvellous increase even allowing for the speedy growth of population, since every chapel so built had of necessity to be well attended in order to render it self-supporting. From this religious guidance of the people by the well-organized forces of dissent, it was but a step to political ascendancy, and as the various constitutional changes from the Reform Bill onward began to lower the elective franchise, and thus to throw more and more power into the hands of the working classes, that spirit of radicalism, which is peculiarly associated with political dissent, began to assert itself powerfully throughout the country. As early as the reign of William IV. there appeared the weekly *Times of Wales* (Amserau Cymry), founded and edited by the able William Rees, who may be styled the father of the Welsh political press; and the success of Rees's venture was so marked that other journals, arranged to suit the special tenets of each sect, speedily sprang into existence. In the year 1870—a date that for many reasons marks the opening of an important era in modern Welsh history—the dissenting bodies of Wales were supporting two quarterly, sixteen monthly and ten weekly papers, all published in the vernacular and all read largely by peasants, colliers and artisans. With so powerful a press behind it, it is no wonder that Welsh political dissent was largely responsible for the changed attitude of the Imperial government in its treatment of the Principality—as evinced in the Sunday Closing Act of 1881, a measure which was very dear to the strong temperance party in Wales, and in the Welsh Intermediate Education Act, granted by Lord Salisbury's government in 1889. It was certainly owing to the pressure of Welsh political dissent that Lord Rosebery's cabinet issued the Welsh Land Tenure Commission in 1893—an inquiry which did much to exonerate the Welsh squirearchy from a number of vague charges of extortion and sectarian oppression; and that Sir H. Campbell-Bannerman's cabinet appointed the Welsh Church Commission (21st June 1906). This Commission was authorized to "inquire into the origin, nature, amount and application of the temporalities, endowments and other properties of the Church of England in Wales and Monmouthshire; and into the provision made and the work done by the Churches of all denominations in Wales and Monmouthshire for the spiritual welfare of the people, and the extent to which the people avail themselves of such provision." The Report and Memoranda of the Commission were published on the 2nd of December 1910.

Mention must be made of the Rebecca riots in 1843–1844 in South Wales, wherein many toll gates were destroyed by mobs of countrymen dressed in female garb, "as the daughters of Rebecca about to possess the gates of their enemies"; and the Anti-Tithe agitation of 1885–1886—largely traceable to the inflammatory language used concerning clerical tithe by certain organs of the vernacular press—which led to some disorderly scenes between distraining parties of police and crowds of excited peasants in the more remote rural districts. There have been occasional strikes accompanied by acts of lawlessness in the industrial and mining districts of Glamorganshire, and also amongst the workmen employed in the quarries of Gwynedd.

The University College of Wales was founded at Aberystwyth in 1872; that of South Wales at Cardiff in 1883; and of North Wales at Bangor in 1884. In 1889 the system of intermediate schools, arranged to form an educational link between the primary schools and the colleges, was inaugurated. In November 1893 the University of Wales was incorporated by royal charter, with Lord Aberdare (d. 1895) as its first chancellor. All the religious bodies, including the Church, have been extremely active in educational and pastoral work; whilst the peculiar religious movement known as a revival (Diwygiad) has occurred from time to time throughout the Principality, notably in the years 1859 and 1904.

But the most remarkable phenomenon in modern Wales has been the evident growth of a strong national sentiment, the evolution of a new Welsh Renaissance, which demanded special recognition of the Principality's claims by the Imperial parliament. This revived spirit of nationalism was by outsiders sometimes associated, quite erroneously, with the aims and actions of the Welsh parliamentary party, the spokesmen of political dissent in Wales; yet in reality this sentiment was shared equally by the clergy of the Established Church, and by a large number of the laity within its fold. Nor is the question of the vernacular itself of necessity bound up with this new movement, for Wales is essentially a bi-lingual country, wherein every educated Cymro speaks and writes English with ease, and where also large towns and whole districts—such as Cardiff, south Monmouth, the Vale of Glamorgan, Gower, south Glamorgan, south Pembroke, east Flint, Radnorshire and Breconshire—remain practically monoglot English-speaking. Nor are the Welsh landowners and gentry devoid of this new spirit of nationalism, and although some generations ago they ceased as a body to speak the native tongue, they have shown a strong disposition to study once more the ancient language and literature of their country. It is true that a Young Wales party has arisen, which seeks to narrow this movement to the exclusion of English ideas and influences; and it is also true that there is a party which is abnormally suspicious of and hostile to this Welsh Renaissance; but in the main it is correct to say that the bulk of the Welsh nation remains content to assert its views and requirements in a reasonable manner. How wide-spread and enthusiastic is this true spirit of nationalism amongst all classes and sects of Welsh society to-day may be observed at the great meetings of the National Eisteddfod, which is held on alternate years in North and South Wales at some important centre, and at which the immense crowds collected and the interest displayed make a deep impression on the Anglo-Saxon or foreign visitors. The sincere, if somewhat narrow-minded religious feelings; the devotion manifested by all classes towards the land of their fathers; the extraordinary vitality of the Cambro-British tongue—these are the main characteristics of modern Wales, and they seem to verify the terms of Taliesin's ancient prophecy concerning the early dwellers of Gwalia:—

> "Their Lord they shall praise;
> Their Tongue they shall keep;
> Their Land they shall lose
> Except Wild Wales."
> (H. M. V.)

Welsh Literature.—The Welsh language possesses an extensive literature, ranging from the 9th century to the present day. A detailed account of it will be found in the article CELT: *Celtic Literature*, § iv.

Welsh Language.—Welsh, the Celtic language spoken by the ancient Britons (see CELT: *Language*), is the domestic tongue of the majority of the inhabitants of the Principality. With the final destruction of Welsh independence under Edward I. the Cambro-British language, in spite of the disappearance of a court, continued to be spoken by Welshmen of all classes residing west of Severn, and the 14th and 15th centuries are remarkable for producing some of the finest Welsh bards and historians. With the union of Wales with England by the Act of 27 Henry VIII. (1536) the subsequent administration of all law and justice in the English tongue throughout the Principality threatened for a time the ancient language of the people with practical extinction. From such a fate it was largely preserved by the various translations of the Scriptures, undertaken at the command of Queen Elizabeth and performed by a number of native scholars and divines, amongst whom appear prominent the names of Bishops Davies, Morgan and Parry, and of William Salesbury of Llanrwst. Although the assertion of the celebrated Rhys Prichard of Llandovery that in his time (*c.* 1630) only 1% of the people of Wales could read the native language is probably an exaggeration, yet the number of persons who could read and write Welsh must have been extremely small outside the ranks of the clergy. During the earlier half of the 17th century the number of Welsh Bibles distributed throughout the Principality could hardly have exceeded 8000 in all, and except the Bible there was scarcely any Welsh work of importance in circulation. The system of the Welsh circulating charity schools, set up by Griffith Jones, rector of Llanddowror, in the 18th century, undoubtedly gave an immense impetus to the spread of popular education in Wales, for it has been stated on good authority that about one-third of the total population was taught to read and write Welsh by means of this system. As a result of Griffith Jones's efforts there quickly arose a vigorous demand for Welsh books of a pious and educational character, which was largely supplied by local Welsh printing-presses. The enthusiastic course of the Methodist movement under Howell Harris, Daniel Rowland and William Williams; the establishment of Welsh Sunday Schools; the founding of the Bible Society under Thomas Charles of Bala; and the revival early in the 19th century of the *Eisteddfodau* (the ancient bardic contests of music, poetry and learning), have all contributed to extend the use of the Welsh language and to strengthen its hold as a popular medium of education throughout the Principality. In 1841 the Welsh-speaking population was computed at 67% of the total, and in 1893 Welsh was understood or spoken by over 60% of the inhabitants in the twelve Welsh counties with the exception of the following districts, wherein English is the prevailing or the sole language employed:—viz. nearly the whole of Radnorshire; east Flint, including the neighbouring districts of Ruabon and Wrexham in Denbighshire; east Brecknock; east Montgomery; south Pembroke, with the adjoining district of Laugharne in Carmarthenshire; and the districts of Gower, Vale of Glamorgan and Cardiff in south Glamorgan. In Mon- [illegible] of the county is purely English- [illegible] districts English also prevails [illegible] *of Wales*).

[illegible] Welsh sounds, it will be convenient [illegible] in the modern alphabet:—

Voiceless spirants: *ff* or *ph* (=Eng. *f*); *th* (=Eng. *th* in *thick*); *ch* (=Scottish *ch* in *loch*).

Voiced spirants: *f* (=Eng. *v*); *dd* (=Eng. *th* in *this*); the guttural voiced spirant (γ) disappeared early in Welsh.

Voiceless nasals: *mh*; *nh*; *ngh*.

Voiced nasals: *m*; *n*; *ng*.

Voiceless liquids: *ll* (unilateral voiceless *l*); *rh* (voiceless *r*).

Voiced liquids: *l*; *r*.

Sibilant: *s* (Welsh has no *z*).

Aspirate: *h*.

Semi-vowels: *i* (=Eng. *y* in *yard*); *w* (=Eng. *w*).

The sounds of *t* and *d* are more dental than in English, though they vary; the voiced spirants are very soft; the voiceless nasals are aspirated, thus *nh* is similar to Eng. *nh* in *inhale*; *r* is trilled as in Italian.

Vowels: *a*, *e*, *i*, *o* have the same values as in Italian; *w* as a vowel=north Eng. *oo* in *book* or Italian *u*; *y* has two sounds—(1) the clear sound resembling the Eng. *i* in *bit*, but pronounced farther back; (2) the obscure sound=Eng. *i* in *fir*; *u* in Med. Welsh had the sound of French *u*, but now has the clear sound of *y* described above, which is similar to the ear, and has the same pitch.

The Welsh language belongs to the Celtic branch of the Aryan or Indo-European family of languages. Primitive Celtic split up, as already shown, into two dialects, represented in modern times by two groups of languages—(1) the *Goidelic* group, comprising Irish, Scottish, Gaelic and Manx. (2) The *Brythonic* or Brittonic[1] group, comprising Welsh, Breton and Cornish. In the Goidelic group *qu* appears as *c*, thus Irish *cethir*, "four"; in the Brythonic group it is changed into *p*, as in Welsh *pedwar*, "four." Gaulish, which was supplanted in France by Latin, had *p*, as in *petor-ritum*, "four-wheeled car," and is thus allied to the Brythonic group; but it is believed that remains of a continental Celtic *qu*- dialect appear in such names as *Sequani*, and in some recently discovered inscriptions. The sounds of parent Aryan appeared in Primitive Celtic with the following modifications:—*p* disappeared, thus Aryan **peter*, which gave Latin *pater*, Eng. *father*, gave in Irish *athir*; corresponding to Eng. *floor*, we have Irish *lár*, Welsh *llawr*. The velar tenuis *q*, when labialized, became *qu*, without labialization became *k*; the velar media *g* became *b* or *g*. The aspirated mediae *bh*, *dh*, *gh*, *gh* were treated as unaspirated *b*, *d*, *g*, *g*; probably also the rare aspirated tenues fell together with the unaspirated. The other Aryan consonants seem generally to have remained. Aryan *ā*, *ī*, *ū* remained. Aryan *ē* became *ī*, as in Irish *fír*, Welsh *gwir*, "true," cognate with Latin *vēr-us*. Aryan *ō* became *ā*, as in Irish *lár*, cognate with Anglo-Saxon *flōr*, Eng. *floor*. The short vowels remained, except that Aryan *ə* became *a*, as in the other European branches.

In Brythonic, primitive Celtic *qu* became *p*, as above noted. Probably also Celtic *ū* was advancing or had advanced to a forward position, for it appears in Welsh as *ī*, as in *din*, "stronghold," from Celtic **dūn-on*, cognate with Eng. *town*, while Latin *u*, borrowed in the Brythonic period, gives *u* with its Welsh sound above described, as in *mur*, "wall," from Latin *mūr-us*.

The Aryan system of inflexion was preserved in Celtic, as may be seen in Stokes's restoration of Celtic declension (*Trans. Philol. Soc.*, 1885–1886, pp. 97-201); and Brythonic was probably as highly inflected as Latin. The development of Brythonic into Welsh is analogous to that of Latin into French. Unfortunately, the extant remains of Brythonic are scanty; but in the Roman period it borrowed a large number of Latin words, which, as we know their original forms, and as they underwent the same modifications as other words in the language, enable us to trace the phonetic changes by which Brythonic became Welsh.

These changes are briefly as follows:—

1. *Loss of Syllables.*—The last syllable of every word of more than one syllable was dropped; thus Latin *termin-us* gives in Welsh *terfyn*; the name *Sabrin-a*[2] "Severn" became *Hafren*. The loss extends to the stem-ending of the first element of a compound, thus the personal name *Maglo-cūnos* became *Maelgwn*; and generally to unaccented syllables, thus *episcopus* became **epscop*, whence *esgob*; *trinitāt-em* gives *trindod*. The accusative is often the case represented in Welsh; but we have also the nominative, and sometimes both, as in *ciwed* from *cīvit-as*, and *ciwdod* from *cīvitāt-em*, now two words, not two cases of the same word. Aryan declension naturally disappeared with the loss of final syllables.

2. *Consonant Changes.*—(1) Between two vowels, or a vowel and a liquid, the seven consonants *p*, *t*, *c*, *b*, *d*, *g*, *m*, became respectively *b*, *d*, *g*, *f*, *dd*, -, *f*, where "-" represents the lost voiced spirant γ. Examples: Latin *cupidus* gave *cybydd*; *Tacitus* gave

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[1] The Bretons call their language *Brezonek*; the Welsh bards sometimes call Welsh *Brythoneg*: both forms imply an original **Brittonica*.

[2] The *i* was short: *Sabrīna* would have given *Hefrin* in Welsh.

Tegyd; *labōrem* gave *llafur*; *sagitta* gave *saeth*; *rēmus* gave *rhwyf*. This change is called the "soft mutation." (2) After nasals *p, t, c, b, d, g* became respectively *mh, nh, ngh, m, n, ng*; thus *imperātor* gave *ymherawdr*, and *ambactos* (evidently a Brythonic as well as a Gaulish word) gave *amaeth* (*m*, though etymologically double, is written single). This change is called the "nasal mutation." (3) *pp, tt, cc* became respectively *ph* or *ff, th, ch*; thus *peccātum* gave *pechawd*, later *pechod*; and *Brittones* gave *Brython*. This change is called the "spirant mutation." The tenuis becomes a spirant also after *r* or *l*, as in *corff* from *corpus*, and *Elffin* from *Alpīnus*, but *lt* gives *llt* or *ll*. The combinations *act, ect, oct, uct* gave *aeth, aith, oeth, wyth*, respectively; as in *doeth*, "wise," from Lat. *doctus*, *ffrwyth* from *fructus*. (4) Original *s* between vowels (but not Latin *s*) became *h*, and disappeared; initially it generally appears as *h*, as in *halen*, "salt," sometimes as *s*, as in *saith*, "seven." Initial *l* and *r* became *ll* and *rh*, as seen in examples in (1) above, but between vowels they remained. Similarly initial *v* became *gw*, as in *gwin*, from Latin *vīnum*, remaining between vowels, though now written *w*, as in *ciwed* from *cīvitas*.

A consonant occurring medially is, generally speaking, invariable in the present language; thus the *p* and *d* of *cupidus* are *b* and *dd* in *cybydd*, but with the initial consonant the case is different. In one combination the initial may remain, thus **oinos cupidus* gave *un cybydd*, "one miser", in another combination it may have originally stood between vowels, and so is mutated, as in **duō cupidō*, which gave *dau gybydd*, "two misers." Thus arose the system of "initial mutation": an initial consonant may retain its original form, or may undergo any of the changes to which it is subject. The names given above to these changes are those by which they are known when they occur initially, the unchanged form being called the "radical." The liquids *l* and *r* were brought into the system, the initial forms *ll* and *rh* being regarded as "radical." The initial mutations, then, are as follows:—

Radical	*p*	*t*	*c*	*b*	*d*	*g*	*m*	*ll*	*rh*
Soft	*b*	*d*	*g*	*f*	*dd*	—	*f*	*l*	*r*
Nasal	*mh*	*nh*	*ngh*	*m*	*n*	*ng*	No change.		
Spirant	*ph*	*th*	*ch*	No change.			No change.		

The initial mutation of any word depends upon its position in the sentence, and is determined by a grammatical rule which can ordinarily be traced to a generalization of the original phonetic conditions. Thus the second element of a compound word, even though written and accented as a separate word, has a soft initial, because in Brythonic the first element of a compound generally ended in a vowel, as in the name *Maglo-cunos*. The more important rules for initial mutation are the following: the soft mutation occurs in a feminine singular noun after the article, thus *y fam*, "the mother" (radical *mam*); in an adjective following a feminine singular noun, as in *mam dda*, "a good mother" (*da*, "good"); in a noun following a positive adjective, as in *hên ddŷn*, "old man," because this order represents what was originally a compound; in a noun following *dy*, "thy," and *ei*, "his," thus *dy ben*, "thy head," *ei ben*, "his head" (*pen*, "head"); in the object after a verb; in a noun after a simple preposition; in a verb after the relative *a*. The nasal mutation occurs after *fy*, "my," and *yn*, "in"; thus *fy mhen*, "my head" (*pen*, "head"), *yn Nhalgarth*, "at Talgarth." The spirant mutation occurs after *a*, "and," "with," *ei*, "her"; thus *a phen*, "and a head," *ei phen*, "her head."

3. *Vowel Changes.*—(1) Long *ā*, whether from Aryan *ā* or *ō* or from Latin *ā*, becomes *aw* in monosyllables, as in *brawd*, "brother" from **brāter*; in the penult it is *o*, as in *broder*, "brothers," in the ultima *aw*, later *o*, as in *pechawd*, now *pechod*, from *peccātum*. Long *ī*, whether from Aryan *ī* or *ī*, or from Latin *ī*, remains as *i*, see examples above. Latin *ē* was identified with a native diphthong *ei*, and becomes *wy*, as in *rhwyf* from *rēmus*. Latin *ō* and *ū* appear as *u*; see examples above. A long vowel when unaccented counts short, thus *peccātōrem* treated as **peccătōrem*, gave *pechadur*. (2) Short *ă, ĕ, ŏ* remain; short *ĭ* became *y*; and *ŭ* became *y* (with its obscure sound) in the penult, remaining in the ultima, though now written *w*. But short vowels have been affected by vowels in succeeding syllables. These "affections" of vowels are as follows:—(α) I-affection, caused by *ī* in a lost termination: *ă* becomes *ai* or *ei*, and *ĕ, ŏ, ŭ* became *y*, more rarely *ai* or *ei*. Thus **bardos* gave *bardd*, but pl. **bardī* gave *beirdd*; *episcopī* gave *esgyb*, "bishops." This change is also caused by *-ō*, as in *lleidr*, "thief," from *latrō*. (β) A-affection, caused by *ā* in a lost ending: *ĭ* becomes *e* (instead of *y*); *ŭ* becomes *o*. Thus *cīvitas* gave *ciwed*; *colŭmna* gave *colofn*. (γ) Penultimate affection: *i* or *y* in the ultima causes several changes in the penult, as *arch*, "order," *erchi*, "to bid"; *saer*, "carpenter," pl. *seiri*; *caer*, "fort," pl. *ceyrydd*. (3) In the modern language other vowel changes occur by a change of position; thus *ai, au, aw* in the ultima become *ei, eu, o* respectively in the penult, as *dail*, "leaves," *deilen*, "leaf"; *haul*, "sun," *heulog*, "sunny"; *brawd*, "brother," pl. *broder* or *brodyr*. The last is an old interchange of sounds, and probably the others are older than their first appearance in writing (13th century) suggests.

Accidence.—Welsh has a definite article *yr*, "the," which becomes *'r* after a vowel, and *y* before a consonant unless already reduced to *'r*. Thus *yr oen*, "the lamb," *i'r ty*, "into the house," *yn y ty*, "in the house."

The noun has two numbers, and two genders, masculine and feminine. A plural noun is formed from the singular by *i*-affection: thus *bardd*, "bard," pl. *beirdd*; *ffon*, "stick," pl. *ffyn*; or by adding a termination as *ffenestr*, "window," pl. *ffenestri*, with any consequent vowel change, as *brawd*, "brother," pl. *brodyr*; *gwlad*, "country," pl. *gwledydd*. The terminations chiefly used are *-au*, *-ion*, *-on*, *-i*, *-ydd*, *-oedd*. These are old stem endings left after the loss of the original *-es*, thus *latrō* gives *lleidr*, *latrones* gives *lladron*; the forms having *dd* represent *i̯* stems, *i̯* becoming *dd* in certain positions.

In some cases the singular is formed from the plural by the addition of *-yn* or *-en*; thus *sêr*, "stars," *seren*, "star."

Feminine names of living things are formed from the masculine by the addition of *-es*, as *brenin*, "king," *brenhines*, "queen"; *llew*, "lion," *llewes*, "lioness." It is difficult to lay down rules for the determination of the gender of names of inanimate objects.

Adjectives are inflected for number and gender. Plural adjectives are formed from the singular by *i*-affection or by adding the termination *-ion* or *-on*, thus *hardd*, "beautiful," pl. *heirdd*; *glas*, "blue," pl. *gleision*.

Adjectives having *y* or *w* are made feminine by *a*-affection, due to the lost feminine ending *-a*, thus *gwyn*, "white," fem. *gwen*; *trwm*, "heavy," fem. *trom*.

The adjective has *four* degrees of comparison—positive, equative, comparative, superlative, as *glân*, "clean," *glaned*, "as clean (as)," *glanach*, "cleaner," *glanaf*, "cleanest." A few adjectives are compared irregularly.

The personal pronouns are: simple sing. 1. *mi*, 2. *ti*, 3. masc. *ef*, fem. *hi*; pl. 1. *ni*, 2. *chwi*, 3. *hwy*, *hwynt*; reduplicated, *myfi*, *tydi*, &c.; conjunctive, *minnau*, *tithau*, &c. Prefixed genitive: sing. 1 *fy*, "my," 2. *dy*, 3. *i*, *ei*; pl. 1. *yn*, *ein*, 2. *ych*, *eich*, 3. *eu*. Infixed genitive and accusative: sing. 1. *'m*, 2. *'th*, 3. *'s*; pl. 1. *'n*, 2. *'ch*, 3. *'u*. Affixed: sing. 1. *i*, 2, *di*, 3. *ef*, &c., like the simple forms.

The demonstrative pronouns are *hwn*, "this," *hwnnw*, "that," fem. *hon*. *honno*, pl. *hyn*, *hynny*.

The relative pronouns are nominative and accusative *a*, oblique cases *ydd*, *yr*, *y*. The expressions *yr hwn*, *y neb*, "the one," are mistaken for relatives by the old grammarians; the true relative follows *yr hwn a* = "the one who."

The interrogative pronouns are substantival *pwy ?* = "who ?" adjectival *pa ?* Substantival "what ?" is expressed by *pa beth ?* "what thing ?" or shortly *beth ?*

The verb has four tenses in the indicative, one in the subjunctive, and one in the imperative. The old passive voice has become an impersonal active, each tense having one form only. The regular verb *caraf*, "I love," is conjugated thus:—

Indicative—Pres. (and fut.) sing. 1. *caraf*, 2. *ceri*, 3. *câr*; pl. 1. *carwn*, 2. *cerwch*, 3. *carant*; impers. *cerir*. Imperfect sing. 1. *carwn*, 2. *carit*, 3. *carai*; pl. 1. *carem*, 2. *carech*, 3. *cerynt*, *carent*; impers. *cerid*. Aorist sing. 1. *cerais*, 2. *ceraist*, 3. *carodd*; pl. 1. *carasom*, 2. *carasoch*, 3. *carasant*; impers. *carwyd*. Pluperfect sing. 1. *caraswn*, 2. *carasit*, 3. *carasai*; pl. 1. *carasem*, 2. *carasech*, 3. *caresynt*, *-asent*; impers. *caresid*.

Subjunctive—Pres. sing. 1. *carwyf*, 2. *cerych*, 3. *caro*; pl. 1. *carom*, 2. *caroch*, 3. *caront*; impers. *carer*.

Imperative—Pres. sing. 2. *câr*, 3. *cared*; pl. 1. *carwn*, 2. *cerwch*, 3. *carent*; impers. *carer*.

Verbal noun, *caru*, "to love." Verbal adjectives, *caredig*, "loved," *caradwy*, "lovable."

As in other languages the verb "to be" and its compounds are irregular; the number of other irregular verbs is comparatively small.

Prepositions also are "conjugated" in Welsh, their objects, if pronominal, being expressed by endings. Thus *ar*, "on," *arnaf*, "on me," *arnat*, "on thee," *arno*, "on him," *arni*, "on her," *arnom*, "on us," *arnoch*, "on you," *arnynt*, "on them." The second conjugation has for endings *-of*, *-ot*, *-ddo*, *-ddi*; *-om*, *-och*, *-ddynt*; the third *-yf*, *-yt*, *-ddo*. *-ddi*; *-ym*, *-ych*, *-ddynt*.

The negative adverbs are *ni*, *nid*, conjunctive *na*, *nad*. Interrogative particles: *a*, *ai*. Affirmative particles: *yr*, *fe*.

The commoner conjunctions are *a*, *ac*, "and"; *ond*, *eithr*, "but"; *o*, *os*, "if"; *pan*, "when"; *tra*, "while."

Syntax.—A qualifying adjective follows its noun, and agrees with it in gender and generally in number. It may, however, precede its noun, and a compared adjective generally does so.

In a simple sentence the usual order of words is the following:—verb, subject, object, adverb; as *prynodd Dafydd lyfr yno*, "David bought a book there." The verb may be preceded by an affirmative, a negative, or an interrogative particle.

When a noun comes first, it is followed by a relative pronoun, thus, *Dafydd a brynodd lyfr yno*, which really means "(it is) David who bought a book there," and is never used in any other sense in the spoken language, though in literary Welsh it is used rhetorically for the simple statement which is properly expressed by putting the verb first. In negative and interrogative sentences this rhetorical use does not occur.

In a simple interrogative sentence the introductory particle before the verb is *a*, and the positive answer consists in a repetition of the verb, *a ddaw Dafydd? Daw.* "Will David come? Yes." If the verb is aorist the answer is *do* for all verbs. In negative answers *na* precedes the verb. In sentences in which a noun comes first, the interrogative particle is *ai*, and the answer is always, positive *ie*, negative *nage*, as *ai Dafydd a ddaw? ie.* "Is it David who will come? Yes."

A relative pronoun immediately precedes its verb and can only be separated from it by an infixed pronoun, thus *Dafydd a'i prynodd*, "(it is) David who bought it," *yno y'm gweli*, "(it is) there that thou wilt see me." If the relative is the object of a preposition, the latter is put at the end of the clause, and has a personal ending, thus *y ty y bûm ynddo*, literally, "the house which I-was in-it."

The verb does not agree with its subject unless the latter is a personal pronoun; when the subject is a noun the verb is put in the third person singular; thus *carant*, "they love," can take a pronominal subject—*carant hwy*, "they love"; but "the men love" is *câr y dynion* (not *carant y dynion*, which can only mean "they love the men"). In relative clauses the verb is sometimes made to agree, but in the oldest poetry we generally find the singular verb, as in the oft-repeated *Gododin* phrase *Gwyr a aeth Gatraeth*, "men who went (to) Catraeth" (not *Gwŷr a aethant*).

AUTHORITIES.—J. D. Rhys, *Cambrobrytannicae Cymraecaeve linguae institutiones* (1592); John Davies, *Antiquae linguae Britannicae . . . rudimenta* (1621); *Antiquae linguae Britannicae . . . dictionarium duplex* (1632); Edward Lhuyd, *Archaeologia Britannica* (1707); W. O. Pughe, *Grammar and Dictionary*[2] (1832), vitiated by absurd etymological theories; J. C. Zeuss, *Grammatica Celtica* (2nd ed. by H. Ebel, 1871)—an index to the O. Welsh glosses cited in this work was compiled by V. Tourneur in *Archiv für celt. Lexikographie*, iii. 109-137; T. Rowland, *Grammar of the Welsh Language*[4] (1876), containing a large collection of facts about the modern language, badly arranged and wholly undigested; Rhys, *Lectures on Welsh Philology*[2] (1879); J. Strachan, *An Introduction to Early Welsh*, with a Reader (Manchester, 1909); Stokes, "Urkeltischer Sprachschatz," in Fick's *Vergleichendes Wörterbuch der idg. Sprachen*[4], ii. (1894); E. Anwyl, *Welsh Grammar for Schools*, i. (1898), ii. (1899); J. Morris Jones, *Historical Welsh Grammar*, i. (1911); W. Spurrell, *Welsh-English and English-Welsh Dictionary* (Carmarthen[5], 1904); D. Silvan Evans, *Welsh Dictionary*, A-E (1888–1906). The last-named received a subsidy from the British government. Some corrections and additions to the early volumes, by J. Loth, will be found in *Arch. f. celt. Lex.* vol. i. See also H. Sweet, "Spoken N. Welsh," in *Trans. of the London Phil. Soc.*, 1882–1884; T. Darlington, "Some Dialectal Boundaries in Mid-Wales," in *Trans. of the Hon. Soc. of Cymmrodorion*, 1900–1901; and M. Nettlau, *Beiträge zur cymrischen Grammatik* (Leipzig, 1887), also in *Rev. celt.* vol. ix. (J. M. J.)

WALEWSKI, ALEXANDRE FLORIAN JOSEPH COLONNA, COMTE (1810–1868), French politician and diplomatist, was born at Walewice near Warsaw on the 4th of May 1810, the son of Napoleon I. and his mistress Marie, Countess Walewska. At fourteen Walewski refused to enter the Russian army, escaping to London and thence to Paris, where the French government refused his extradition to the Russian authorities. Louis Philippe sent him to Poland in 1830, and he was then entrusted by the leaders of the Polish revolution with a mission to London. After the fall of Warsaw he took out letters of naturalization in France and entered the French army, seeing some service in Algeria. In 1837 he resigned his commission and began to write for the stage and for the press. He is said to have collaborated with the elder Dumas in *Mademoiselle de Belle-Isle*, and a comedy of his, *L'École du monde*, was produced at the Théâtre Français in 1840. In that year his paper, *Le Messager des chambres*, was taken over by Thiers, who sent him on a mission to Egypt, and under the Guizot ministry he was sent to Buenos Aires to co-operate with the British minister Lord Howden (Sir J. Caradoc). The accession of Louis Napoleon to the supreme power in France guaranteed his career. He was sent as envoy extraordinary to Florence, to Naples and then to London, where he announced the *coup d'état* to Palmerston (*q.v.*). In 1855 Walewski succeeded Drouyn de Lhuys as minister of foreign affairs, and acted as French plenipotentiary at the Congress of Paris next year. When he left the Foreign Office in 1860 it was to become minister of state, an office which he held until 1863. Senator from [illegible] he entered the Corps Législatif in 1865, and was [illegible] emperor's interest, as president of the [illegible] his authority two years later sent [illegible] at Strassburg on the 27th of [illegible] te in 1866, was a member of the Academy of Fine Arts and a grand cross of the Legion of Honour

WALFISH BAY, a harbour of South-West Africa with a coast-line of 20 m. terminated southward by Pelican Point in 22° 54′ S., 14° 27′ E. It belongs to Great Britain, together with a strip of territory extending 15 m. along the coast south of Pelican Point and with a depth inland from 10 to 15 m. The total area is 430 sq. m. Except seaward Walfish Bay is surrounded by German South-West Africa. The northern boundary is the Swakop river, east and south there are no natural frontiers. The coast district, composed of sand dunes, is succeeded by a plateau covered in part with sparse vegetation. The river Kuisip, usually dry, has its mouth in the bay—which forms the finest harbour along a coast-line of over 1000 m The harbour is provided with a pier 200 yds. long and is safe in all weathers. It was formerly frequented by whaling vessels (hence its name). The town has a small trade with the Hereros of the adjoining German protectorate. A tramway, 11 m. long, runs inland to Rooikop on the German frontier Pop. (1904), 997, including 144 whites.

Walfish Bay forms a detached portion of the Cape province of the Union of South Africa. It was proclaimed British territory on the 12th of March 1878, and was annexed to Cape Colony on the 7th of August 1884 (see AFRICA, § 5) The delimitation of the southern frontier was in 1909 referred to the king of Spain as arbitrator between Great Britain and Germany

WALKER, FRANCIS AMASA (1840–1897), American soldier and economist, was born in Boston, Massachusetts, on the 2nd of July 1840. His father, Amasa Walker (1799–1875), was also a distinguished economist, who, retiring from commercial life in 1840, lectured on political economy in Oberlin College from 1842 to 1848, was examiner in the same subject at Harvard from 1853 to 1860, and lecturer at Amherst from 1859 to 1869. He was a delegate to the first international peace congress in London 1843, and in 1849 to the peace congress in Paris. He was secretary of state of Massachusetts from 1851 to 1853 and a representative in Congress 1862–1863. His principal work, *The Science of Wealth*, attained great popularity as a textbook. Francis Walker graduated at Amherst College in 1860, studied law, and fought in the Northern army during the whole of the Civil War of 1861–65, rising from the rank of sergeant-major to that of brevet brigadier-general of volunteers—awarded him at the request of General Winfield S. Hancock. As a soldier he excelled in analysis of the position and strength of the enemy. In 1864 he was captured and detained for a time in the famous Libby Prison, Richmond. After the war he became editorial writer on the Springfield (Massachusetts) *Republican*, and in 1869 was made chief of the government bureau of statistics. He was superintendent of the ninth and tenth censuses (those of 1870 and 1880), and (1871–72) commissioner of Indian affairs. From 1873 to his death his work was educational, first as professor (1873–1881) of political economy in the Sheffield Scientific School at Yale, and then as president of the Massachusetts Institute of Technology, Boston. While superintendent of the census he increased the scope and accuracy of the records; and at the Institute of Technology he enlarged the resources and numbers of the institution, which had 302 students when he assumed the presidency and 1198 at his death. In other fields he promoted common-school education (especially in manual training), the Boston park system, and the work of the public library, and took an active part in the discussion of monetary, economic, statistical and other public questions, holding many offices of honour and responsibility. As an author he wrote on governmental treatment of the Indians, *The Wages Question* (1876), *Money* (1878), *Land and its Rent* (1883) and general political economy (1883 and 1884), besides producing monographs on the life of General Hancock (1884) and the history of his own *Second Army Corps* (1886). As an economist, from the time of the appearance of his book on the subject, he so effectively combated the old theory of the "wage-fund" as to lead to its abandonment or material modification by American students; while in his writings on finance, from 1878 to the end of his life, he advocated international bimetallism, without, however, seeking to justify any one nation in the attempt to maintain parity between gold and silver. A collection of posthumously published *Discussions in Education* (1899) was made up of essays and addresses prepared after his taking the presidency of the Institute of Technology: their most noteworthy argument is that chemistry, physics and the other sciences promote a more exact and more serviceable mental training than metaphysics or rhetoric. Walker's general tendency was towards a rational conservatism. On the question of rent he called himself a "Ricardian of the Ricardians." To his *Wages Question* is due in great part the conception formed by English students of the place and functions of the employer in modern industrial economics. A remarkable feature of his writings is his treatment of economic tendencies not as mere abstractions, but as facts making for the happiness or misery of living men. General Walker died in Boston on the 5th of January 1897.

WALKER, FREDERICK (1840–1875), English subject painter, the son of a designer of jewelry, was born in Marylebone, London, on the 24th of May 1840. When very young he began to draw from the antique in the British Museum, and at the age of sixteen he was placed in the office of an architect named Baker. The occupation proved uncongenial; at the end of eighteen months he resumed his work from the Elgin marbles at the British Museum, and attended Leigh's life school in Newman Street. In March 1858 he was admitted a student of the Royal Academy. But his study in the academy schools was disconnected, and ceased before he reached the life class, as he was anxious to begin earning his own living. As a means to this end, he turned his attention to designing for the wood-engravers, and worked three days a week for about two years in the studio of J. W. Whymper, under whose tuition he quickly mastered the technicalities of drawing on wood. His earliest book illustrations appeared in 1860 in *Once a Week*, a periodical to which he was a prolific contributor, as also to the *Cornhill Magazine*, where his admirable designs appeared to the works of Thackeray and those of his daughter. These woodcuts, especially his illustrations to Thackeray's *Adventures of Philip* and *Denis Duval*, are among the most spirited and artistic works of their class, and entitle Walker to rank with Millais at the very head of the draughtsmen who have dealt with scenes of contemporary life. Indeed, by his contributions to *Once a Week* alone he made an immediate reputation as an artist of rare accomplishment, and although he was associated on that periodical with such men as Millais, Holman Hunt, Leech, Sandys, Charles Keene, Tenniel, and Du Maurier, he more than held his own against all competitors. In the intervals of work as a book illustrator he practised painting in water-colours, his subjects being frequently more considered and refined repetitions in colour of his black-and-white designs. Among the more notable of his productions in water-colour are "Spring," "A Fishmonger's Shop," "The Ferry," and "Philip in Church," which gained a medal in the Paris International Exhibition of 1867. He was elected an associate of the Society of Painters in Water Colours in 1864 and a full member in 1866; and in 1871 he became an associate of the Royal Academy. In this same year he was made an honorary member of the Belgian Society of Painters in Water Colours. His first oil picture, "The Lost Path," was exhibited in the Royal Academy in 1863, where it was followed in 1867 by "The Bathers," one of the artist's finest works, in 1868 by "The Vagrants," now in the National Gallery of British Art, in 1869 by "The Old Gate," and in 1870 by "The Plough," a powerful and impressive rendering of ruddy evening light, of which the landscape was studied in Somerset. In 1871 he exhibited his tragic life-sized figure of "A Female Prisoner at the Bar," a subject which now exists only in a finished oil study, for the painter afterwards effaced the head, with which he was dissatisfied, but was prevented by death from again completing the picture. The last of his fully successful works was "A Harbour of Refuge," shown in 1872 (also in the National Gallery of British Art); for "The Right of Way," exhibited in 1875, bears evident signs of the artist's failing strength. He had suffered indeed for some years from a consumptive tendency; in 1868 he made a sea voyage, for his health's sake, to Venice, where he stayed with Orchardson and Birket Foster, and at the end of 1873 he went for a while to Algiers with J. W. North, in the hope that he might derive benefit from a change of climate. But, returning in the bitter English spring, he was again prostrated; and on the 5th of June 1875 he died of consumption at St Fillan's, Perthshire.

The works of Frederick Walker are thoroughly original and individual, both in the quality of their colour and handling and in their view of nature and humanity. His colour, especially in his water-colours, is distinctive, powerful and full of delicate gradations. He had an admirable sense of design, and the figures of his peasants at their daily toil show a grace and sweeping largeness of line in which can be plainly traced the effect produced upon his taste by his early study of the antique; at the same time the sentiment of his subjects is unfailingly refined and poetic. His vigour of design may be seen in his poster for Wilkie Collins's *The Woman in White*, now in the National Gallery of British Art.

See *Life and Letters of Frederick Walker, A.R.A.*, by John George Marks (1896), a full biography of a personal rather than a critical kind. *Frederick Walker and his Works*, by Claude Phillips (1897), should be consulted as an excellent critical supplement to the larger volume. See also *Essays on Art*, by J. Comyns Carr, which includes a judicious essay on Walker.

WALKER, GEORGE (*c.* 1618–1690), hero of the siege of Londonderry, was the son of George Walker, rector of Kilmore and chancellor of Armagh (d. 1677), and of Ursula, daughter of Sir John Stanhope of Melwood, and is said to have been born in 1618 in Tyrone. He was educated at Glasgow University, and appointed to the livings of Lessan and Desertlyn, in the diocese of Armagh, near Londonderry, in 1669. In 1674 he obtained that of Donaghmore, which he held with Lessan. At the outbreak of the Civil War in Ireland towards the close of 1688, Walker, though in Holy Orders and advanced in years, raised a regiment and endeavoured to concert measures with Robert Lundy, the acting governor of Londonderry, for the defence of Dungannon. But Lundy, after having sent some troops to his support, ordered their withdrawal and the abandonment of the place on the 14th of March 1689. On the 17th of March Walker marched with his men to Strabane, and subsequently was ordered by Lundy to move to Rash and then to St Johnstown, 5 m. from Londonderry. On the approach of the enemy (April 13th) Walker rode hastily to Londonderry to inform Lundy, but was unable to convince him of his danger. He returned to his men at Lifford, where, on the 14th, he took part in a brush with the enemy, afterwards following the retreat of the army to Londonderry. The town was in great confusion, and Walker found the gates shut against him and his regiment. He was forced to pass the night outside, and only entered the next day "with much difficulty and some violence upon the Centry." Immediately on his arrival he urged Lundy to take the field and refused the demand to disband his own soldiers. On the 17th of April Lundy determined to give up the town to James, and called a council from which Walker and others were especially excluded; but the next day the king and his troops, who had advanced to receive the surrender, were fired upon from the walls contrary to Lundy's orders, and the arrival of Captain Adam Murray with a troop of horse saved the situation. Lundy was deprived of all power, and was allowed to escape in disguise from the town. On the 19th of April Walker and Baker were chosen joint-governors. Walker commanded fifteen companies, amounting to 900 men, and to him was also entrusted the supervision of the commissariat. He showed great energy, courage and resource throughout the siege, and led several successful sallies. Meanwhile his duties as a clergyman were not neglected. The Nonconformists were allowed the use of the cathedral on Sunday afternoons, but in the morning Walker preached. Those few of his sermons which remain, though simple in their language, are eloquent and inspiring. Meanwhile he had to contend with jealousies and suspicions within the town; but he succeeded in dispelling all misgivings and in reaffirming his credit with the garrison. At the close of the siege, which lasted 150 days, the town was at the last extremity; but at length, on the 30th of July, Walker preached the last of the sermons by which he had helped to inspire its defence. An hour afterwards the ships were seen approaching, and the town was relieved.

As regards the general course of the war the importance of the successful resistance at Londonderry can hardly be exaggerated. It was the first open act of hostility in Ireland against James, and the disaster to his arms not only embarrassed his campaign in Ireland but prevented the expeditions to Scotland and England, and Walker's share in it was abundantly recognized. He sailed for Scotland and England on the 9th of August, and was everywhere welcomed with immense public enthusiasm. On the 29th of August he was graciously received at Hampton Court by William and Mary, before whom he had with good sense refused to appear in his military costume, and delivered to them the petition from Londonderry. William presented him with £5000, part of which he appears to have given to the widow of Baker, his fellow-governor, who died during the siege. Shortly afterwards he was nominated bishop of Londonderry, but as Bishop Hopkins, whom it was determined to remove, only died three weeks before Walker, the latter was never consecrated. Walker succeeded in obtaining a grant of £1200 for Londonderry from the city companies, and on the 18th of November his petition to the House of Commons for relief for the widows, orphans, clergy and dissenting ministers was read, and the king was asked to distribute £10,000 among them (House of Commons Journals, vol. x. p. 288). On the following day Walker was called in, received the thanks of the House, and made a short and dignified reply. On the 8th of October he had been granted the degree of D.D. at Cambridge in his absence, and on his return journey to Ireland he received the same diploma at Oxford (Feb. 1690). Walker met William on his arrival in Ireland on the 14th of June 1690 at Belfast, and followed his army. He was present at the battle of the Boyne on the 1st of July, but in what capacity, whether as spectator, as combatant or as minister to tend the wounded, is uncertain.[1] He was shot through the body at the passage of the river, according to one account, while he was going to the aid of the wounded Schomberg (G. Story, *A True . . . History of the Affairs in Ireland*, p. 82), and died almost immediately. His remains, or what were supposed to be such, were afterwards transferred from the battlefield and buried in his own church at Donaghmore, where a monument and inscription were placed to his memory. A more conspicuous memorial was erected in Londonderry itself.

Walker married Isabella Maxwell of Finnebrogue, and left several sons, four of whom during his lifetime were in the king's service, and from one of whom at least there are descendants at the present day.

While in London Walker had published *A True Account of the Siege of Londonderry* (1689), dedicated to the king, which went through several editions and was translated for perusal abroad. This pamphlet, and the ovations received by Walker in London, excited fierce jealousies, which had been subdued in the hour of peril, but which were now formulated in the *Narrative* (1698) of John Mackenzie, a dissenting minister who had been present during the siege. Walker was charged with having taken too much credit to himself, and of having passed over the services and names of the nonconformists. Base insinuations were added and it was declared that Walker had never even held the post of governor. These accusations fall by the weight of their own exaggeration. On the other hand, Walker's *Account*, though doubtless incomplete, is written with candour and simplicity and is free from any touch of egotistical self-consciousness; and both this tract and his subsequent *Vindication* (1689) are greatly superior, in their dignity and restraint, to the pamphlets of his opponents. His character was proof against the perils which attend a sudden rise to fame and popularity, and his "modesty" is especially observed by several of his contemporaries. There exists also too much positive and independent evidence to permit any doubt whatever as to the greatness of Walker's services. Burnet, in a passage which was not included in his published history perhaps because of the controversy, says: "There was a minister in the place, Dr Walker, who acted a very noble part in the government and defence of the town; he was but a man of ordinary parts, but they were suited to his work, for he did wonders in this siege" (Harleian MSS., 6584 *f.* 292 *b*, printed by H. C. Foxcroft. Supplement to Burnet's *Hist. of His Own Times*, 1902, p. 321).

In the *Siege of Derry* (1893) the Rev. Philip Dwyer has collected the most essential facts and materials relating to Walker and the siege, and has reprinted in his volume Walker's *True Account* and *Vindication*, together with Walker's sermons, various other documents and valuable notes.

WALKER, HENRY OLIVER (1843–), American artist, was born at Boston, Massachusetts, on the 14th of May 1843. He was a pupil of Léon Bonnat, Paris, and painted the figure and occasional portraits, but later devoted himself almost exclusively to mural decoration. His paintings symbolizing lyric poetry, for the Congressional Library, Washington; and his decorations for the Appellate Court House, New York; Bowdoin College, Maine; the enlarged State House, Boston; the Court House, Newark, New Jersey, and the Capitol at Saint Paul, Minnesota, are among his most important works. He became a member of the National Academy of Design, New York, in 1902.

WALKER, HORATIO (1858–), American artist, was born at Listowel, Ontario, Canada, on the 12th of May 1858. When he was a child his family settled at Rochester, New York. Although entirely self-taught, he became a distinguished painter of animals, the figure and landscape. His pictures, principally of Canadian peasant life and scenes, show the influence of Troyon and Millet, mainly in their feeling for largeness of composition, in solidity of painting and in the choice of theme. He became a member of the National Academy of Design, New York, in 1891; of the American Water Color Society and of the Royal Institute of Painters in Water Colours, London. He received a medal and a diploma at Chicago, 1893; and medals at Buffalo, 1901; Charleston, 1902; and St Louis, 1904. In 1888 he won the Evans prize of the American Water Color Society, New York.

WALKER, JOHN (1732–1807), English actor, philologist and lexicographer, was born at Colney Hatch, Middlesex, on the 18th of March 1732. Early in life he became an actor, his theatrical engagements including one with Garrick at Drury Lane, and a long season in Dublin. In 1768 he left the stage. After some experience in conducting a school at Kensington he commenced to teach elocution, and in this found his principal employment for the rest of his life. In 1775 he published his *Rhyming Dictionary*, which achieved a great success and has been repeatedly reprinted, and in 1791 his *Critical Pronouncing Dictionary*, which achieved an even greater reputation, and has run into some forty editions. He was the friend of the leading literary men of his time, including Johnson and Burke. He died in London on the 1st of August 1807.

WALKER, OBADIAH (1616–1699), master of University College, Oxford, was born at Darfield near Barnsley, Yorkshire, and was educated at University College, Oxford, becoming a fellow and tutor of this society and a prominent figure in university circles. In July 1648 the action of parliament deprived him of his academic appointments, and he passed some years in teaching, studying and travelling, returning to Oxford at the restoration of 1660, and beginning a few years later to take a leading part in the work of University College. In June 1676 he was elected to the headship of this foundation, and in this capacity he collected money for some rebuilding, and forwarded the preparation of a Latin edition of Sir John Spelman's *Life of Alfred the Great*, published by the college. This was the time of Titus Oates and the popish plots, and some of Walker's writings made him suspect; however, no serious steps were taken against him, although Oxford booksellers were forbidden to sell his book, *The benefits of our Saviour Jesus Christ to mankind*, and he remained a Protestant, in name at least, until the accession of James II. Soon after this event he came forward as a Roman Catholic, and he advised the new king with regard to affairs in Oxford, being partly responsible for the tactless conduct of James in forcing a quarrel with the fellows of Magdalen College. Mass was said in his residence, and later a chapel was opened in the college for the worship of the Roman Church; he and others received a royal licence to absent themselves from the services of the English Church, and he obtained another to supervise the printing of Roman Catholic books. In spite of growing unpopularity he remained loyal to James, and when the king fled from England Walker left Oxford, doubtless intending to join his master abroad. But in December 1688 he was arrested at Sittingbourne and was imprisoned; then, having lost his mastership, he was charged at the bar of the House of Commons with changing his religion and with other offences. Early in 1690 he was released from his confinement, and after subsisting for some years largely on the charity of his friend and former pupil, Dr John Radcliffe, he died on the 21st of January 1699.

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[1] Luttrell writes in his diary, vol. 2, p. 17 (Feb. 20, 1689–1690), "Mr Walker of Londonderry has taken his leave of the king to go to Ireland on some special command," and again, vol. 2, p. 44 (May 19, 1690), "Letters from Ireland say that Dr Walker, late governor of Londonderry, had a regiment of foot given him," but there [illegible] record of his having received a

Walker's principal writings are: *Of education, especially of young gentlemen* (Oxford, 1673, and six other editions); *Ars rationis ad mentem nominalium libri tres* (Oxford, 1673); and *Greek and Roman History illustrated by Coins and Medals* (London, 1692).

WALKER, ROBERT (d. *c.* 1658), British painter, was a contemporary and to a slight extent a follower of Van Dyck. The date of his birth is uncertain, and no details are known of his early life. Although influenced by Van Dyck's art, he had still a considerable degree of individuality and developed a sound style of his own which was more severe and restrained than that of the greater master. His greatest vogue was at the time of the Commonwealth, for in addition to several portraits of Cromwell he painted other portraits of Lambert, Ireton, Fleetwood, and many more members of the Parliamentarian party. In 1652 he was given rooms in Arundel House in the Strand, London, where he resided for the rest of his life. He died either in 1658 or in 1660, the authority for the earlier date being an inscription on an engraved portrait by Lombart. His work had much merit; it was vigorous and showed sound study of character. Several of his paintings, among them the portrait of William Faithorne the elder, are in the National Portrait Gallery, and there are others of notable importance at Hampton Court and in the University Galleries at Oxford. One of his portraits of Cromwell is in the Pitti Palace, where it is ascribed to Lely; it was bought in the artist's lifetime, but after the Protector's death, by the grand duke Ferdinand II. of Tuscany. Another is at Warwick Castle.

Walker painted also Robert Cromwell and his wife Elizabeth Steward, parents of the Protector. The portrait of the latter, attended by a page who is fastening his sash at the waist (now in the National Portrait Gallery, transferred from the British Museum, to which it was bequeathed by Sir Robert Rich, Bart., descendant of Cromwell's friend, Nathaniel Rich) was called by Walpole "Cromwell and Lambert"; but it is now certain that the page represents Cromwell's son Richard. Elizabeth Cromwell, afterwards Mrs Claypole, the Protector's daughter, also sat to him. As no complete account of Walker's work is in existence (that of Walpole being very incomplete, while Cunningham passes him over entirely), it may be added that the artist twice painted John Evelyn, in different sizes, as well as Bradshaw, John Hampden, Colonel Thomas Sanders, Cornet Joyce, and Speaker Lenthall, as well as Sir William and Lady Waller, Mrs Thomas Knight, and General George Monk, duke of Albemarle, and Sir Thomas Fairfax (engraved by Faithorne). A portrait of Secretary Thurlow, which was in the Lord Northwick Collection, was attributed to him. As Walker was in the camp of the Parliamentarians and Dobson was the court painter at Oxford, few aristocratic persons sat to the former. Exceptions are Mary Capel, duchess of Beaufort (engraved by J. Nutting), Aubrey, last earl of Oxford, and James Graham, marquess of Montrose; even a portrait of Charles I. in armour, with his hand on his helmet, is credited to Walker. Two versions, of a like size, of his own portrait exist, one at the National Portrait Gallery and the other at Oxford, engraved by Peter Lombart, and again, later, by T. Chambars. The Cromwell in the Scottish National Portrait Gallery is a copy. Walker's copy of Titian's famous "Venus at her Toilet," highly esteemed by Charles I., is considered a work of great merit.

WALKER, ROBERT JAMES (1801–1869), American political leader and economist, was born in Northumberland, Pennsylvania, on the 23rd of July 1801. He graduated from the University of Pennsylvania in 1819 and practised law in Pittsburg from 1822 to 1826, when he removed to Mississippi. Though living in a slave state he was consistently opposed to slavery, but he favoured gradual rather than immediate emancipation, and in 1838 he freed his own slaves. He became prominent, politically, during the nullification excitement of 1832–1833, as a vigorous opponent of nullification, and from 1836 to 1845 he sat in the United States Senate as a Unionist Democrat. Being an ardent expansionist, he voted for the recognition of the independence of Texas in 1837 and for the joint annexation resolution of 1845, and advocated the nomination and election of James K. Polk in 1844. He was secretary of the treasury throughout the Polk administration (1845–1849) and was generally recognized as the most influential member of the cabinet. He financed the war with Mexico and drafted the bill (1849) for the establishment of the department of the interior, but his greatest work was the preparation of the famous treasury report of the 3rd of December 1845. Although inferior in intellectual quality to Alexander Hamilton's *Report on Manufactures*, presenting the case against free trade, it is regarded as the most powerful attack upon the protection system which has ever been made in an American state paper. The "Walker Tariff" of 1846 was based upon its principles and was in fact largely the secretary's own work. Walker at first opposed the Compromise of 1850, but was won over later by the arguments of Stephen A. Douglas. He was appointed territorial governor of Kansas in the spring of 1857 by President Buchanan, but in November of the same year resigned in disgust, owing to his opposition to the Lecompton Constitution. He did not, however, break with his party immediately, and favoured the so-called English Bill (see KANSAS); in fact it was partly due to his influence that a sufficient number of anti-Lecompton Democrats were induced to vote for that measure to secure its passage. He adhered to the Union cause during the Civil War and in 1863–1864 as financial agent of the United States did much to create confidence in Europe in the financial resources of the United States, and was instrumental in securing a loan of $250,000,000 in Germany. He practised law in Washington, D.C., from 1864 until his death there on the 11th of November 1869. Both during and after the Civil War he was a contributor to the *Continental Monthly*, which for a short time he also, with James R. Gilmore, conducted.

For the tariff report see F. W. Taussig, *State Papers and Speeches on the Tariff* (Cambridge, Mass., 1892).

WALKER, SEARS COOK (1805–1853), American astronomer, was born at Wilmington, Massachusetts, on the 28th of March 1805. Graduating at Harvard in 1825, he was a teacher till 1835, was an actuary in 1835–1845, and then became assistant at the Washington observatory. In 1847 he took charge of the longitude department of the United States Coast Survey, where he was among the first to make use of the electric telegraph for the purpose of determining the difference of longitude between two stations, and he introduced the method of registering transit observations electrically by means of a chronograph. He also investigated the orbit of the newly discovered planet Neptune. He died near Cincinnati on the 30th of January 1853. His brother Timothy (1802–1856) was a leader of the Ohio bar.

See *Memoirs of the Roy. Astr. Soc.* vol. xxiii.

WALKER, THOMAS (1784–1836), English police magistrate, best known as author of *The Original*, was born on the 10th of October 1784 at Charlton-cum-Hardy, near Manchester, where his father was a prosperous cotton merchant and an active Whig politician. He was educated at Cambridge and called to the bar, and after devoting some years mainly to the study of the Poor Law was made police magistrate in Lambeth in 1829. In 1835 he started his weekly publication *The Original*, containing his reflections on various social subjects and especially on eating and drinking; and it is in the history of gastronomy, and the art of dining, that this curious and amusing work is famous. The weekly numbers continued for six months, and subsequently were republished, after Walker's death on the 20th of January 1836, in an American selection (1837), in editions by W. B. Jerrold (with memoir) (1874), W. A. Guy (1875), and Henry Morley (1887), and in another selection of Sir Henry Cole ("Felix Summerley"), called *Aristology* (1881).

WALKER, WILLIAM (1824–1860), American adventurer, was born in Nashville, Tennessee, on the 8th of May 1824. After graduating from the university of Nashville in 1838, he studied law, was admitted to the bar, and subsequently spent a year in the study of medicine at Edinburgh and Heidelberg. He practised medicine for a few months in Philadelphia and then removed to New Orleans, where he engaged in journalism. In 1850 he migrated to California and engaged in newspaper work at San Francisco and later at Marysville, where he also practised law. On the 15th of October 1853 he sailed from San Francisco with a filibustering force for the conquest of Mexican territory. He landed in Lower California, and on the 18th of January 1854 he proclaimed this and the neighbouring State of Sonora an independent republic. Starvation and Mexican attacks led to the abandonment of this enterprise, and Walker resumed his journalistic work in California. On the 4th of May 1855, with fifty-six followers, Walker again sailed from San Francisco, this time for Nicaragua, where he had been invited by one of the belligerent factions to come to its aid. In October Walker seized a steamer on Lake Nicaragua belonging to the Accessory Transit Company, a corporation of Americans engaged in transporting freight and passengers across the isthmus, and was thus enabled to surprise and capture Granada, the capital and the stronghold of his opponents, and to make himself master of Nicaragua. Peace was then made; Patricio Rivas, who had been neutral, was made provisional president, and Walker secured the real power as commander of the troops. At this time two officials of the Transit Company determined to use Walker as their tool to get control of that corporation, then dominated by Cornelius Vanderbilt, and they advanced him funds and transported his recruits from the United States free of charge. In return for these favours, Walker seized the property of the company, on the pretext of a violation of its charter, and turned over its equipment to the men who had befriended him. On the 20th of May 1856 the new government was formally recognized at Washington by President Pierce, and on the 3rd of June the Democratic national convention expressed its sympathy with the efforts being made to "regenerate" Nicaragua. In June Walker was chosen president of Nicaragua, and on the 22nd of September, from alleged economic necessity, and also to gain the sympathy and support of the slave states in America, he repealed the laws prohibiting slavery.

Walker managed to maintain himself against a coalition of Central American states, led by Costa Rica, which was aided and abetted by agents of Cornelius Vanderbilt, until the 1st of May 1857, when, to avoid capture by the natives, he surrendered to Commander Charles Henry Davis, of the United States navy, and returned to the United States. In November 1857 he sailed from Mobile with another expedition, but soon after landing at Punta Arenas he was arrested by Commodore Hiram Paulding of the American navy, and was compelled to return to the United States as a paroled prisoner. On his arrival he was released by order of President Buchanan. After several unsuccessful attempts to return to Central America, Walker finally sailed from Mobile in August 1860 and landed in Honduras. Here he was taken prisoner by Captain Salmon, of the British navy, and was surrendered to the Honduran authorities, by whom he was tried and condemned to be shot. He was executed on the 12th of September 1860.

See Walker's own narrative, accurate as to details, *The War in Nicaragua* (Mobile, 1860); William V. Wells, *Walker's Expedition to Nicaragua* (New York, 1856); Charles William Doubleday, *Reminiscences of the "Filibuster" War in Nicaragua* (New York, 1886), and James Jeffrey Roche, *The Story of the Filibusters* (London, 1891), revised and reprinted as [illegible] 1901). (W. O. S.)

[illegible] ...rts, either on road [illegible] the sport. The [illegible] ...ollows in 1910:—

Distance.	Name.	Time.			Date.	Place.
		hr.	min.	sec.		
1 mile	A. T. Yeomans. .		6	19⅗	1906	Bath
2 miles	A. T. Yeomans. .		12	53⅕	1906	Swansea
3 ,,	J. W. Raby (professional) . .		20	21⅕	1883	Lillie Bridge
4 ,,	G. E. Larner . .		27	14	1905	Brighton
5 ,,	J. W. Raby . .		35	10	1883	Lillie Bridge
10 ,,	J. W. Raby . .	1	14	45	1883	Lillie Bridge
15 ,,	J. W. Raby . .	1	55	56	1883	Lillie Bridge
20 ,,	W. Perkins . .	2	39	57	1877	Lillie Bridge
30 ,,	J. Butler . . .	4	29	52	1905	Putney
40 ,,	J. Butler . . .	6	11	17	1905	Putney
50 ,,	J. Butler . .	7	52	27	1905	Putney
100 ,,	T. E. Hammond .	17	25	22	1907	London to Brighton and back

The record distance walked in 1 hour was 8 m. 339 yds. by the English amateur G. E. Larner in 1905; in 8 hours, 50 m. 1190 yds. by another English amateur, J. Butler, in 1905; in 24 hours, 131 m. 580¾ yds. by T. E. Hammond in 1908.

About the year 1875 there was a revival of interest in professional walking, which took the form of "go-as-you-please" competitions, extending over several days, usually six. These may be classed as walking contests, for, although running was allowed, it was seldom practised, excepting for a few moments at a time, for the purpose of relief from cramped muscles. The great difficulty in competitive walking is to keep within the rules. A "fair gait" is one in which one foot touches the ground before the other leaves it, only one leg being bent in stepping, namely, that which is being put forward.

WALL, RICHARD (1694–1778), diplomatist and minister in the Spanish service, belonged to a family settled in Waterford. As he was a Roman Catholic he was debarred from public service at home, and like many of his countrymen he sought his fortune in Spain. He served, probably as a soldier in one of the Irish regiments of the Spanish army, during the expedition to Sicily in 1718, and was present at the sea fight off Cape Passaro. During the following years he continued to be employed as an officer, but in 1727 he was appointed secretary to the duke of Liria, son of the duke of Berwick, and Spanish ambassador at St Petersburg. Wall's knowledge of languages, his adaptability, his quick Irish wit and ready self-confidence made him a great favourite, not only with the duke of Liria, but with other Spanish authorities. Spain was at that time much dependent on the ability of foreigners, and for a man of Wall's parts and character there were ample openings for an important and interesting career. The climate of St Petersburg seems to have been too much for him, and he soon returned to military service in Italy. It is said that when he was presented to the duke of Montemar, the Spanish general, and was asked who he was, he replied, "The most important person in the army after your excellency, for you are the head of the serpent, and I am the tail." He became known to Don José Patiño, the most capable minister of King Philip V., and was sent by him on a mission to Spanish America—a very rare proof of confidence towards a man of foreign origin. He is also said to have laid a plan for retaking Jamaica from the English. In 1747 he was employed in the negotiations for the peace of Aix-la-Chapelle, and in 1748 was named minister in London. In England he made himself very popular. Though an exile through the operation of the Penal Laws, and though he proved loyal to his adopted country, he was a constant partisan of an English alliance. His views recommended him to the favour of King Ferdinand VI. (1746–1759), whose policy was resolutely peaceful. In 1752 Wall was recalled from London to assist in completing a treaty of commerce with England, which was then being negotiated in Madrid. Wall now became the candidate of the English party in the Spanish court for the post of Minister of Foreign Affairs, in opposition to the leader of the French party, the marquis de la Ensenada. He obtained the place in 1752, and in 1754 he had a large share in driving Ensenada from office. He retained his position till 1764. The despatches of the English minister, Sir Benjamin Keene, and of his successor, Lord Bristol, contain many references to Wall. They are creditable to him. Though a constant partisan of peace and good relations with England, Wall was firm in asserting the rights of the government he served. During the early stages of the Seven Years' War (1756–1763) he insisted on claiming compensation for the excesses of English privateers in Spanish waters. He frequently complained to the English ministers of the difficulties which the violence of these adventurers put in his way. As a foreigner he was suspected of undue favour to England, and was the object of incessant attacks by the French party. The new king, Charles III. (1759–1788), continued Wall in office. When war was declared by Spain in 1761 the minister carried out the policy of the king; but he confessed to the English ambassador, Lord Bristol, that he saw the failure of his efforts to preserve peace with grief. The close relations of Charles III. with the French branch of the House of Bourbon made Wall's position as foreign minister very trying. Yet the king, who detested changing his ministers, refused all his requests to be allowed to retire, till Wall extorted leave in 1764 by elaborately affecting a disease of the eyes which was in fact imaginary. The king gave him handsome allowances, and a grant for life of the crown land known as the Soto de Roma, near Granada, which was afterwards conferred on Godoy, and finally given to the duke of Wellington. Wall lived almost wholly at or near Granada, exercising a plentiful hospitality to all visitors, and particularly to English travellers, till his death in 1778. He left the reputation of an able minister and a very witty talker.

A full account will be found in volume iv. of Coxe's *Memoirs of the Kings of Spain of the House of Bourbon* (London, 1815). Further details of his early career can be gathered from the *Diario del viaje a Moscovia, 1727–1730*, of the duke of Liria (vol. xciii. of the *Documentos inéditos para la historia de España*), (Madrid, 1842, et seq.).

WALL (O. Eng. *weal*, *weall*, Mid. Eng. *wal*, *walle*, adapted from Lat. *vallum*, rampart; the original O. Eng. word for a wall was *wāg* or *wāh*), a solid structure of stone, brick or other material, used as a defensive, protecting, enclosing or dividing fence, or as the enclosing and supporting sides of a building, house or room. The Roman *vallum* was an earth rampart with stakes or palisades (*vallus*, stake; Gr. ἧλος, nail) and the Old English word was particularly applied to such earth walls; for the remains of the Roman walls in Britain see BRITAIN. The word, however, was also applied to stone defensive walls, for which the Latin word was *murus*. The history of the wall as a means of defence will be found in the article FORTIFICATION AND SIEGECRAFT, the architectural and constructional side under the headings ARCHITECTURE, MASONRY and BRICKWORK. In anatomy and zoology the term "wall," and also the Latin term *paries*, is used for an investing or enclosing structure, as in "cell-walls," walls of the abdomen, &c. In the days when footpaths were narrow and ill-paved or non-existent in the streets of towns and when the gutters were often overflowing with water and filth, the side nearest to the wall of the bordering houses was safest and cleanest, and hence to walk on that side was a privilege, hence the expressions "to take" or "to give the wall." The term "wall-rib" is given in architecture to a half-rib bedded in the wall, to carry the web or shell of the vault. In Roman and in early Romanesque work the web was laid on the top of the stone courses of the wall, which had been cut to the arched form, but as this was often irregularly done, and as sometimes the courses had sunk owing to the drying of the mortar, it was found better to provide an independent rib to carry the web; half of this rib was sunk in the wall and the other half moulded like the transverse and diagonal ribs, so that if the wall sank, or if it had to be taken down from any cause, the vault would still retain its position.

The word "wall eye" or "wall-eyed" is applied to a condition of the eye, particularly of a horse, in which there is a large amount of white showing or there is absence of colour in the iris, or there is leucoma of the cornea. It is also applied to the white staring eyes of certain fishes. The word has no connexion with "wall" as above, but is from the Icelandic *vagl-eygr*, *vagl*, a beam, sty in the eye, and *eygr*, eyed.

WALLABY, a native name, used in literature for any member of a section of the zoological genus *Macropus*, with naked muffle, frequenting forests and dense scrubs. With respect to their size they are distinguished as large wallabies and small wallabies, some of the latter being no bigger than a rabbit. From the localities in which they are found they are also called brush kangaroos. See KANGAROO.

WALLACE, ALFRED RUSSEL (1823–   ), British naturalist, was born at Usk, in Monmouthshire, on the 8th of January 1823. After leaving school he assisted an elder brother in his work as a land surveyor and architect, visiting various parts of England and Wales. Living in South Wales, about 1840 he began to take an interest in botany, and began the formation of a herbarium. In 1847 he took his first journey out of England, spending a week in Paris with his brother and sister. In 1844–1845, while an English master in the Collegiate School at Leicester, he made the acquaintance of H. W. Bates, through whose influence he became a beetle collector, and with whom he started in 1848 on an expedition to the Amazon. In about a year the two naturalists separated, and each wrote an account of his travels and observations. Wallace's *Travels on the Amazon and Rio Negro* was published in 1853, a year in which he went for a fortnight's walking tour in Switzerland with an old school-fellow. On his voyage home from South America the ship was burnt and all his collections lost, except those which he had despatched beforehand. After spending a year and a half in England, during which time, besides his book on the Amazon, he published a small volume on the *Palm Trees of the Amazon*, he started for the Malay Archipelago, exploring, observing and collecting from 1854 to 1862. He visited Sumatra, Java, Borneo, Celebes, the Moluccas, Timor, New Guinea and the Aru and Ké Islands. His deeply interesting narrative, *The Malay Archipelago*, appeared in 1869, and he also published many important papers through the London scientific societies. The chief parts of his vast insect collections became the property of the late W. W. Saunders, but subsequently some of the most important groups passed into the Hope Collection of the university of Oxford and the British Museum. He discovered that the Malay Archipelago was divided into a western group of islands, which in their zoological affinities are Oriental, and an eastern, which are Australian. The Oriental Borneo and Bali are respectively divided from Celebes and Lombok by a narrow belt of sea known as "Wallace's Line," on the opposite sides of which the indigenous mammalia are as widely divergent as in any two parts of the world. Wallace became convinced of the truth of evolution, and originated the theory of natural selection during these travels. In February 1855, staying at Sarawak, in Borneo, he wrote an essay "On the Law which has regulated the Introduction of New Species" (*Ann. and Mag. Nat. Hist.*, 1855, p. 184). He states the law as follows: "Every species has come into existence coincident both in time and space with a pre-existing closely allied species." He justly claims that such a law connected and explained a vast number of independent facts. It was, in fact, a cautious statement of a belief in evolution, and for three years from the time that he wrote the essay he tells us that "the question of *how* changes of species could have been brought about was rarely out of my mind." Finally, in February 1858, when he was lying muffled in blankets in the cold fit of a severe attack of intermittent fever at Ternate, in the Moluccas, he began to think of Malthus's *Essay on Population*, and, to use his own words, "there suddenly flashed upon me the *idea* of the survival of the fittest." The theory was thought out during the rest of the ague fit, drafted the same evening, written out in full in the two succeeding evenings, and sent to Darwin by the next post. Darwin in England at once recognized his own theory in the manuscript essay sent by the young and almost unknown naturalist in the tropics, then a stranger to him. "I never saw a more striking coincidence," he wrote to Lyell on the very day, on the 18th of June, when he received the paper: "if Wallace had my MS. sketch written out in 1842, he could not have made a better short abstract! Even his terms now stand as heads of my chapters." Under the advice of Sir Charles Lyell and Sir Joseph Hooker, the essay was read, together with an abstract of Darwin's own views, as a joint paper at the Linnean Society on the 1st of July 1858. The title of Wallace's section was "On the Tendency of Varieties to depart indefinitely from the Original Type." The "struggle for existence," the rate of multiplication of animals, and the dependence of their average numbers upon food supply are very clearly demonstrated, and the following conclusion was reached: "Those that prolong their existence can only be the most perfect in health and vigour; . . . the weakest and least perfectly organized must always succumb." The difference between Lamarck's theory and natural selection is very clearly pointed out. "The powerful retractile talons of the falcon and the cat tribes have not been produced or increased by the volition of those animals; but among the different varieties which occurred in the earlier and less highly organized forms of these groups, *those always survived longest which had the greatest facilities for seizing their prey.* Neither did the giraffe acquire its long neck by desiring to reach the foliage of more lofty shrubs, and constantly stretching its neck for the purpose, but because any varieties which occurred among its antitypes with a longer neck than usual *at once secured a fresh range of pasture over the same ground as their shorter-necked companions, and on the first scarcity of food were thereby enabled to outlive them.*" With such clear statements as these in the paper of the 1st of July 1858, it is remarkable that even well-known naturalists should have failed to comprehend the difference between Lamarck's and the Darwin-Wallace theory. Wallace also alluded to the resemblance of animals, and more especially of insects, to their surroundings, and points out that "those races having colours best adapted to concealment from their enemies would inevitably survive the longest." In 1871 Wallace's two essays, written at Sarawak and Ternate, were published with others as a volume, *Contributions to the Theory of Natural Selection.* Probably, next to the *Origin of Species*, no single work has done so much to promote clear understanding of natural selection and confidence in its truth; for in addition to these two historic essays, there are others in which the new theory is applied to the interpretation of certain classes of facts. Thus one treats of "Mimicry" in animals, another on "Instinct," another on "Birds' Nests." Each of these served as an example of what might be achieved in the light of the new doctrine, which, taught in this way and in an admirably lucid style, was easily absorbed by many who found the more complete exposition in the *Origin* very hard to absorb. In this work, and in many of his subsequent publications, Wallace differs from Darwin on certain points. Thus the two concluding essays contend that man has not, like the other animals, been produced by the unaided operation of natural selection, but that other forces have also been in operation. We here see the influence of his convictions on the subject of "spiritualism." More recently he expressed his dissatisfaction with the hypothesis of "sexual selection" by which Darwin sought to explain the conspicuous characters which are displayed during the courtship of animals. The expression of his opinion on both these points of divergence from Darwin will be found in *Darwinism* (1889), a most valuable and lucid exposition of natural selection, as suited to the later period at which it appeared as the *Essays* were to the ealier. Darwin died some years before the controversy upon the possibility of the hereditary transmission of acquired characters arose over the writings of Weismann, but Wallace has freely accepted the general results of the German zoologist's teaching, and in *Darwinism* has presented a complete theory of the causes of evolution unmixed with any trace of Lamarck's use or disuse [illegible] inheritance, or Buffon's hereditary effect of the direct [illegible] of surroundings. *Tropical Nature and other Essays* [illegible] 1878, since republished combined with the [illegible] it formed the natural conti[illegible] publications was the G[illegible] (1876), a monumental [illegible] tain fully justifies its [illegible] relation to th[illegible] *of Species* as M[illegible] *cation* bea[illegible] as a valuable supplement to the last-named work, appeared in 1880.

Turning to his other writings, Wallace published *Miracles and Modern Spiritualism* in 1881. Here is given an account of the reasons which induced him to accept beliefs which are shared by so small a proportion of scientific men. These reasons are purely experimental, and in no way connected with Christianity, for he had long before given up all belief in revealed religion. In 1882 he published *Land Nationalization*, in which he argued the necessity of state ownership of land, a principle which he had originated long before the appearance of Henry George's work. In *Forty-five Years of Registration Statistics* (1885) he maintained that vaccination is useless and dangerous. Wallace also published an account of what he held to be the greatest discoveries as well as the failures of the 19th century, *The Wonderful Century* (1899). His later works include *Studies, Scientific and Social* (1900), *Man's Place in the Universe* (1903) and his *Autobiography* (1905). Possessed of a bold and intensely original mind, his activities radiated in many directions, apparently rather attracted than repelled by the unpopularity of a subject. A non-theological *Athanasius contra mundum*, he has the truest missionary spirit, an intense faith which would seek to move the mountains of apathy and active opposition. Whatever may be the future history of his other views, he will always be remembered as an originator of a principle more illuminating than any which has appeared since the days of Newton, as one of its two discoverers whose scientific rivalry was only the beginning of a warm and unbroken friendship.

Wallace was married in 1866 to the eldest daughter of the botanist, Mr William Mitten, of Hurstpierpoint, Sussex. In 1871 he built a house at Grays, Essex, in an old chalk-pit, and after living there four years, moved successively to Dorking (two years) and Croydon (three years). In 1880 he built a cottage at Godalming near the Charterhouse school, and grew nearly 1000 species of plants in the garden which he made. In 1889 he moved to Dorsetshire. After his return to England in 1862 Wallace visited the continent, especially Switzerland, for rest and change (1866, 1896) and the study of botany and glacial phenomena (August 1895). He also visited Spa, in Belgium, about 1870, and in October 1887 went for a lecturing tour in the United States. He delivered a course of six Lowell lectures in Boston, and visited New York, New Haven, Baltimore, &c., spending the winter at Washington. The following March he went to Canada and Niagara, and then made his way westwards. He saw the Yosemite Valley, the Big Trees, and botanized in the Sierra Nevada and at Gray's Peak. In July he returned to Liverpool by way of Chicago and the St Lawrence.

The first Darwin medal of the Royal Society was awarded to A. R. Wallace in 1890, and he had received the Royal medal in 1868. A pension was awarded him by Mr Gladstone at the beginning of 1881. He received the degree of D.C.L. from Oxford in 1889, and of LL.D. from the university of Dublin in 1882. He was president of the Entomological Society of London in 1870–1871.

Apart from Wallace's own *Autobiography*, a good deal of useful information is given in the biographical introduction to Wallace's *Narrative of Travels on the Amazon and Rio Negro* by the editor, Mr G. T. Bettany.

WALLACE, LEWIS [Lew] (1827–1905), American soldier and author, was born at Brookville, Indiana, on the 10th of April [illegible] and received an academic education. He abandoned [illegible] the study of law in Indianapolis to recruit a com- [illegible] was made second lieutenant) [illegible] in 1846–1847 in the First [illegible] to the law, but at the begin- [illegible] colonel of the Eleventh Indiana [illegible] Virginia campaign, and on the 3rd [illegible] brigadier-general. After the [illegible] (February 16, 1862) he was promoted [illegible] 21, 1862), was engaged at Shiloh [illegible] afterwards commanded the Eighth Corps with headquarters at Baltimore. By delaying the Confederate general J. A. Early at Monocacy (July 9, 1864) he saved Washington from almost certain capture. General Wallace served as president of the court of inquiry (November 1862) which investigated the conduct of General D. C. Buell, and of the court which in 1865 tried and condemned Henry Wirz, commander of the Confederate prison at Andersonville, Ga. He was also a member of the court which tried the alleged conspirators against President Lincoln. He resigned from the army in 1865 to return to the bar. He served as governor of New Mexico Territory (1878–1881) and as minister to Turkey (1881–1885). Though exceedingly popular as a lecturer, his literary reputation rests upon three historical romances: *The Fair God* (1873), a story of the conquest of Mexico; *Ben Hur* (1880), a tale of the coming of Christ, which was translated into several languages and dramatized; and *The Prince of India* (1893), dealing with the Wandering Jew and the Byzantine empire.

WALLACE, SIR RICHARD, Bart. (1818–1890), English art collector and philanthropist, was born in London on the 26th of July 1818. According to Sir Walter Armstrong (see *Dict. of National Biography*, art. "Wallace"), he was a natural son of Maria, marchioness of Hertford (wife of the third marquess), under whose auspices the boy was educated, mainly at Paris; but it was generally supposed in his lifetime that he was a son of the fourth marquess (his elder by only eighteen years), and therefore her grandson. At Paris he was well known in society, and became an assiduous collector of all sorts of valuable *objets d'art*, but in 1857 these were sold and Wallace devoted himself to assisting the fourth marquess, who left London to reside entirely in Paris, to acquire a magnificent collection of the finest examples of painting, armour, furniture and *bric-à-brac*. In 1870 the marquess of Hertford died unmarried, bequeathing to Wallace an enormous property, including Hertford House and its contents, the house in Paris, and large Irish estates. Pending the reopening of Hertford House, which had been shut up since the marquess had gone to live in Paris, Wallace sent some of the finest of his pictures and other treasures to the Bethnal Green Museum for exhibition; they were then transferred to Hertford House, which had been largely transformed in order to receive them. In 1871 he was created a baronet for his services during the siege of Paris, when he equipped several ambulances, founded the Hertford British hospital, and spent money lavishly in relief. This munificence endeared Sir Richard Wallace to the French people. From 1873 to 1885 he had a seat in parliament for Lisburn, but he lived mostly in Paris, where, in the Rue Laffitte and in his villa in the Bois de Boulogne, he dwelt among art treasures not inferior to those at Hertford House. In 1878 he was made one of the British commissioners at the Paris Exhibition, and he was also a trustee of the National Gallery and a governor of the National Gallery of Ireland. He died in Paris on the 20th of July 1890. He had married in 1871 the daughter of a French officer, by whom he had a son, who, however, died in 1887; and Lady Wallace, who died in 1897, bequeathed his great art collection to the British nation. It is now housed in Hertford House, Manchester Square, which was acquired and adapted by the government for the purpose.

WALLACE, SIR WILLIAM (*c.* 1270–1305), the popular national hero of Scotland, is believed to have been the second son of Sir Malcolm Wallace of Elderslie and Auchinbothie, in Renfrewshire. The date of his birth is not certainly ascertained, but is usually given as 1270. The only authority for the events of his early life is the metrical history of Blind Harry. That authority cannot be implicitly relied on, though we need not conclude that the minstrel invented the stories he relates. He lived about two centuries later than Wallace, during which a considerable body of legend had probably gathered round the same, and these popular "gestis" he incorporates in his narrative. At the same time he professes to follow as his "autour" an account that had been written in Latin by John Blair, the personal friend and chaplain of Wallace himself. As Blair's account has perished, we cannot tell how far the minstrel has faithfully followed his authority, but some comparatively recent discoveries have confirmed the truth of portions of the narrative which had previously been doubted. At best, however, his authority must be regarded with suspicion, except when it is confirmed by other and more trustworthy evidence.

Only for a period of less than two years in his life—from the beginning of the insurrection in 1297 to the battle of Falkirk—does Wallace come before us in the clearest historical light. With the exception of one or two glimpses of him that we obtain from authentic historical documents, the recorded events of his later as of his earlier life rest on no more certain authority than that of Blind Harry.

In his boyhood, according to the usual accounts, he resided for some time at Dunipace, in Stirlingshire, with an uncle, who is styled "parson" of the place. By this uncle he was partially educated, and from him he imbibed an enthusiastic love of liberty. His education was continued at Dundee, where he made the acquaintance of John Blair. On account of an incident that happened at Dundee—his slaughter of a young Englishman named Selby, for an insult offered to him—he is said to have been outlawed, and so driven into rebellion against the English. Betaking himself to the wilds of the country, he gradually gathered round him a body of desperate men whom he led in various attacks upon the English. In consequence of the success of these early enterprises his following largely increased, several of the more patriotic nobles—including the steward of Scotland, Sir Andrew Moray, Sir John de Graham, Douglas the Hardy, Wishart, bishop of Glasgow, and others—having joined him. His insurrection now became more open and pronounced, and his enterprises of greater importance. An attack was made upon the English justiciar, Ormsby, who was holding his court at Scone. The justiciar himself escaped, but many of his followers were captured or slain. The burning of the Barns of Ayr, the quarters of English soldiers, in revenge for the treacherous slaughter of his uncle, Sir Ronald Crawford, and other Scottish noblemen, followed. The success of these exploits induced the English king to take measures for staying the insurrection. A large army, under the command of Sir Henry Percy and Sir Robert Clifford, was sent against the insurgents, and came up with them at Irvine. Dissensions broke out among the Scottish leaders, and all Wallace's titled friends left him and made submission to Edward, except the ever faithful Sir Andrew Moray. The treaty of Irvine, by which these Scottish nobles agreed to acknowledge Edward as their sovereign lord, is printed in Rymer's *Foedera*. It is dated the 9th of July 1297, and is the first public document in which the name of Sir William Wallace occurs. Wallace retired to the north, and although deserted by the barons was soon at the head of a large army. The vigour and success of his operations was such that in a short time he succeeded in recovering almost all the fortresses held by the English to the north of the Forth. He had begun the siege of Dundee when he received information that an English army, led by the earl of Surrey and Cressingham the treasurer, was on its march northward. Leaving the citizens of Dundee to continue the siege of the castle, he made a rapid march to Stirling. Encamping in the neighbourhood of the Abbey Craig—on which now stands the national monument to his memory—he watched the passage of the Forth. After an unsuccessful attempt to bring Wallace to terms, the English commander, on the morning of the 11th of September 1297, began to cross the bridge. When about one half of his army had crossed, and while they were still in disorder, they were attacked with such fury by Wallace, that almost all—Cressingham among the number—were slain, or driven into the river and drowned. Those on the south side of the river were seized with panic and fled tumultuously, having first set fire to the bridge. The Scots, however, crossed by a ford, and continued the pursuit of the enemy as far as Berwick. Sir Andrew Moray fell in this battle. The results of it were important. The English were everywhere driven from Scotland. To increase the alarm of the English, as well as to relieve the famine which then prevailed, Wallace organized a great raid into the north of England, in the course of which he devastated the country to the gates of Newcastle. On his return he was elected guardian of the kingdom. In this office he set himself to reorganize the army and to regulate the affairs of the country. His measures were marked by much wisdom and vigour, and for a short time succeeded in securing order, even in the face of the jealousy and opposition of the nobles. Edward was in Flanders when the news of this successful revolt reached him. He hastened home, and at the head of a great army entered Scotland in July 1298. Wallace was obliged to adopt the only plan of campaign which could give any hope of success. He slowly retired before the English monarch, driving off all supplies and wasting the country. The nobles as usual for the most part deserted his standard. Those that remained thwarted his councils by their jealousies. His plan, however, came very near being successful. Edward, compelled by famine, had already given orders for a retreat when he received information of Wallace's position and intentions. The army, then at Kirkliston, was immediately set in motion, and next morning (July 22, 1298) Wallace was brought to battle in the vicinity of Falkirk. After an obstinate fight the Scots were overpowered and defeated with great loss. Among the slain was Sir John de Graham, the bosom friend of Wallace, whose death, as Blind Harry tells, threw the hero into a frenzy of rage and grief. The account of his distress is one of the finest and most touching passages in the poem. With the remains of his army Wallace found refuge for the night in the Torwood—known to him from his boyish life at Dunipace. He then retreated to the north, burning the town and castle of Stirling on his way. He resigned the office of guardian, and betook himself again to a wandering life and a desultory and predatory warfare against the English. At this point his history again becomes obscure. He is known to have paid a visit to France, with the purpose of obtaining aid for his country from the French king. This visit is narrated with many untrustworthy details by Blind Harry; but the fact is established by other and indisputable evidence. When in the winter of 1303–1304 Edward received the submission of the Scottish nobles, Wallace was expressly excepted from all terms. And after the capture of Stirling Castle and Sir William Oliphant, and the submission of Sir Simon Fraser, he was left alone, but resolute as ever in refusing allegiance to the English king. A price was set upon his head, and the English governors and captains in Scotland had orders to use every means for his capture. On the 5th of August 1305 he was taken—as is generally alleged, through treachery—at Robroyston, near Glasgow, by Sir John Menteith, carried to the castle of Dumbarton, and thence conveyed in fetters and strongly guarded to London. He reached London on the 22nd of August, and next day was taken to Westminster Hall, where he was impeached as a traitor by Sir Peter Mallorie, the king's justice. To the accusation Wallace made the simple reply that he could not be a traitor to the king of England, for he never was his subject, and never swore fealty to him. He was found guilty and condemned to death. The sentence was executed the same day with circumstances of unusual cruelty.

The cause of national independence was not lost with the life of Wallace. Notwithstanding the cruelty and indignity amid which it terminated, that life was not a failure. It has been an inspiration to his countrymen ever since. The popular ideas regarding his stature, strength, bodily prowess and undaunted courage are confirmed by the writers nearest his own time—Wyntoun and Fordun. And indeed no man could in that age have secured the personal ascendancy which he did without the possession of these qualities. The little we know of [illegible] during the short period he was in power [illegible] political wisdom. His patriotism was conspicuous [illegible] skilled in the modes of warfare [illegible] times. That he failed [illegible] England [illegible]

[illegible]

WALLACE, WILLIAM (1768–1843), Scottish mathematician, was born on the 23rd of September 1768 at Dysart in Fifeshire, where he received his school education. In 1784 his family removed to Edinburgh, where he himself was set to learn the trade of a bookbinder; but his taste for mathematics had already developed itself, and he made such use of his leisure hours that before the completion of his apprenticeship he had made considerable acquirements in geometry, algebra and astronomy. He was further assisted in his studies by John Robison (1739–1805) and John Playfair, to whom his abilities had become known. After various changes of situation, dictated mainly by a desire to gain time for study, he became assistant teacher of mathematics in the academy of Perth in 1794, and this post he exchanged in 1803 for a mathematical mastership in the Royal Military College at Great Marlow (afterwards at Sandhurst). In 1819 he was chosen to succeed John Leslie in the chair of mathematics at Edinburgh, and in 1838, when compelled by ill-health to retire, he received a government pension for life. He died in Edinburgh on the 28th of April 1843.

In his earlier years Wallace was an occasional contributor to Leybourne's *Mathematical Repository* and the *Gentleman's Mathematical Companion*. Between 1801 and 1810 he contributed articles on "Algebra," "Conic Sections," "Trigonometry," and several others in mathematical and physical science to the fourth edition of the *Encyclopaedia Britannica*, and some of these were retained in subsequent editions from the fifth to the eighth inclusive. He was also the author of the principal mathematical articles in the *Edinburgh Encyclopaedia*, edited by David Brewster (1808–1830). He also contributed many important papers to the *Transactions* of the Royal Society of Edinburgh.

See *Transactions of the Roy. Ast. Soc.*, 1844.

WALLACE, WILLIAM (1844–1897), Scottish philosopher, was born at Cupar-Fife on the 11th of May 1844, the son of a housebuilder. Between the ages of sixteen and twenty-two he was educated at St Andrews, whence he proceeded as an exhibitioner in 1864 to Balliol College, Oxford. He took a first class in Moderations, and in Lit. Hum. (1867), was Gaisford prizeman in 1867 (Greek prose) and Craven Scholar in 1869. Three years later he was appointed fellow, and in 1871 librarian, of Merton College. In 1882 he was elected Whyte's professor of moral philosophy in succession to T. H. Green, and retained the position until his death. He died on the 18th of February 1897 from the effects of a bicycle accident near Oxford. His manner was somewhat brusque and sarcastic, and on this account, in his undergraduate days at Balliol, he was known as "The Dorian." But he was greatly respected both as a man and as a lecturer. His philosophical works are almost entirely devoted to German, and especially to Hegelian, doctrines, which he expounded and criticized with great clearness and literary skill. In dealing with Hegel he was, unlike many other writers, successful in expressing himself in a lucid literary manner, without artificial and incomprehensible terminology.

His principal works were *The Logic of Hegel* (1873), which contains a translation of the *Encyklopädie* with an introduction, a second edition of which, with a volume entitled *Prolegomena*, appeared in 1892; *Epicureanism* (1880); *Kant* (Blackwood's Philosophical Classics, 1882); *Life of Arthur Schopenhauer* (1890); *Hegel's Philosophy of Mind* (translated from the *Encyklopädie*, with five introductory essays); *Lectures and Essays on Natural Theology and Ethics*, being a selection from his papers edited with a biographical introduction by Edward Caird. He wrote several important articles for the 9th edition of the *Ency. Brit.*, which, with some revision, have been repeated in the present work.

WALLACE, WILLIAM VINCENT (1814–1865), British composer, was born at Waterford, Ireland, his father, of Scottish family, being a regimental bandmaster. Vincent Wallace learnt [illegible] boy to play several instruments, and became a leading [illegible] in Dublin. But in 1835 he married and went off to [illegible] sheep farming. A concert in Sydney revived his [illegible] passion; and having separated from his wife, he began [illegible] career, which had many romantic episodes, in Australia, the South Seas, India and South America. He returned to London in 1845 and made various appearances as a pianist; [illegible] in November of that year his opera *Maritana* was per[illegible] at Drury Lane with great success. This was followed [illegible] *Matilda of Hungary* (1847), *Lurline* (1860), *The Amber Witch*

(1861), *Love's Triumph* (1862) and *The Desert Flower* (1863). He also published a number of compositions for the piano, &c. Vincent Wallace was a cultivated man and an accomplished musician, whose *Maritana* still holds the stage, and whose work as an English operatic composer, at a period by no means encouraging to English music, has a distinct historical value. Like Balfe, he was born an Irishman, and his reputation as one of the few composers known beyond the British Isles at that time is naturally coupled with Balfe's. But he was a finer artist and a more original musician. In later years he became almost blind; and he died in poor circumstances on the 12th of October 1865, leaving a widow and two children.

WALLACK, JAMES WILLIAM (*c.* 1794–1864), Anglo-American actor and manager, was born in London, his parents being actors. He made his first stage appearance at Drury Lane in 1807. After three years in Dublin he was again at Drury Lane until he went to America in 1818. He settled in New York permanently in 1852, the first Wallack's theatre being an old one renamed at the corner of Broome Street and Broadway. The second, at 13th Street and Broadway, he built himself. Wallack was an actor of the old school. Thackeray praises his Shylock, Joseph Jefferson his Don Caesar de Bazan. He married the daughter (d. 1851) of John Henry Johnstone (1749–1828), a popular tenor and stage Irishman. Their son, JOHN LESTER WALLACK (1820–1888), was born in New York on the 1st of January 1820. At one time in the English army, then on the Dublin and London stage, he made his first stage appearance in New York in 1847 under the name of John Lester as Sir Charles Coldstream, in Boucicault's adaptation of *Used Up*. He was manager, using the name Wallack, of the second Wallack's theatre from 1861, and in 1882 he opened the third at 30th Street and Broadway. His greatest successes were as Charles Surface, as Benedick, and especially as Elliot Grey in his own play *Rosedale*, and similar light comedy and romantic parts, for which his fascinating manners and handsome person well fitted him. He married a sister (d. 1909) of Sir John Millais. He wrote his own *Memories of Fifty Years.*

WALLAROO, a seaport of Daly county, South Australia, situated in Wallaroo Bay, on the Spencer Gulf, 123 m. by rail N.W. by N. of Adelaide. It is connected by rail with the celebrated Wallaroo copper mines (near Kadina, at a distance of 6 m. from the port). At Wallaroo Bay are the largest smelting works in the state, ranking among the largest in the world. Gold, silver and concentrated ores are received from other parts of the continent and from Tasmania for smelting at these works, which have ample facilities for shipment. Population of town (1901) 2920; of town and mines, 4866.

WALLASEY, an urban district in the Wirral parliamentary division of Cheshire, England, 2 m. N.W. of Birkenhead, of which it forms a suburb. Pop. (1901) 53,579. The former marshy estuary called Wallasey Pool is occupied by the Great Float, forming an immense dock (see BIRKENHEAD). The church of St Hilary, to which is assigned a foundation in the 10th century, was rebuilt in the 18th century, with the exception of the tower bearing the date 1536. It was gutted by fire in 1857, and the whole was again rebuilt in the Early English style. On the shore of the Irish Sea is Leasowe Castle, once known as Mock-Beggar Hall, and supposed to have been erected by the earls of Derby in the reign of Elizabeth, in order to witness the horse-races held here. Under Wallasey Pool are remains of a submerged forest, in which various animal skeletons have been found.

At the Conquest Wallasey formed part of the possessions of Robert de Rhuddlan, and on his decease became part of the fee of Halton. In the reign of Elizabeth it had a small port, to which there belonged three barques and fourteen men. In 1668 the manor was possessed by the earl of Derby, but various parts afterwards became alienated. For a considerable time the horse-races held on what was then a common had considerable reputation, but they were discontinued in 1760. At these races the duke of Monmouth, son of Charles II., once rode his own horse and won the plate.

WALLA WALLA, a city and the county-seat of Walla Walla county, Washington, U.S.A., in the S.E. part of the state, on Mill Creek, about 200 m. S. by W. of Spokane. Pop. (1880) 3588; (1890) 4709; (1900) 10,049, of whom 1522 were foreign-born; (1910 census) 19,364. Walla Walla is served by the Northern Pacific and the Oregon Railroad & Navigation Co.'s (Union Pacific) railways, and by an interurban electric line. In the city are a state penitentiary, Fort Walla Walla (a U.S. cavalry post), a Federal Land Office, a Young Men's Christian Association building, a Carnegie library, the State Odd Fellows' Home, and the Stubblefield Home for Widows and Orphans. Sessions of Federal District and Circuit courts are held here. Walla Walla is the seat of Whitman College (chartered, 1859; opened, 1866; rechartered, 1883), originally Congregational, but now non-sectarian, which was founded by the Rev. Cushing Eells and was named in honour of Marcus Whitman, and includes a college, a conservatory of music and a preparatory academy, and occupies a campus of 30 acres; and of Walla Walla College (Adventist). Here are also St Paul's School (Protestant Episcopal) for girls, and St Vincent's Academy for girls and De La Salle Academy for boys (both Roman Catholic). The city is situated in a farming (especially wheat-growing), stock-raising and fruit-growing region, is a distributing centre for the adjacent territory in Washington, Oregon and Idaho, and has a large wholesale business. Among its manufactures are flour and grist-mill products, agricultural implements, lumber, foundry and machine-shop products, leather and malted liquors. The value of the factory product in 1905 was $1,485,791, 54·1% more than in 1900. The municipality owns its waterworks. In 1836 the famous missionary, Marcus Whitman, established at Waiilatpu, about 5 m. W. of the present Walla Walla, a mission of the American Board (Congregational), which in 1847 was broken up by an Indian attack, Whitman, his wife and twelve others being massacred, and the other residents being carried off as prisoners. In 1857 Fort Walla Walla was built by the United States government on the site of the present city, and about it a settlement grew up in 1857–1858. Walla Walla was laid out and organized as a town, and became the county seat in 1859; in 1862 it was chartered as a city. The name "Walla Walla" is said to be a Nez Percé Indian term meaning "a rapid stream."

See W. D. Lyman, *An Illustrated History of Walla Walla County, State of Washington* (1901).

WALL-COVERINGS. The present article deals with this subject (see MURAL DECORATION for art and archaeology) from the practical point of view in connexion with house-furnishing. In selecting a wall-covering, the chief factors to be borne in mind are the conditions of the room, viz. the use to which it is to be put, and its lighting, aspect and outlook.

Marble wall-lining.

Marble is one of the most beautiful materials that can be chosen for covering a wall. The variety of its natural markings and colour gives a wide choice that enables it to be employed in practically any scheme of colouring and for rooms of any aspect and of any description. The working up of the marble is done mostly by machinery; the saws used are flat strips of steel set in the frame of a machine and worked to and fro, sand and water being constantly supplied to assist in the work of cutting. Mouldings are worked to the desired profile by rapidly revolving carborundum wheels, and are afterwards polished by hand. Marble wall-slabbing needs very careful fixing, and should be well supported by a sufficient number of cramps at a little distance from the wall, leaving a space of about half an inch at the back of the slab. Non-rusting cramps should be used, such as those made of copper or bronze. A cement made of plaster of Paris and marble dust mixed in the proportion of two parts to one should be used for fixing, as pure plaster, especially if new, is liable to swell and cause the marble to crack. *Marezzo* and *Scagliola* are imitation marbles and are described in PLASTERWORK.

Mosaic.

Well-designed and properly executed mosaic is a very beautiful decorative medium, and ranks among the most permanent as well as most pleasing wall-coverings. With *glass mosaic* great ranges both of colour and of texture of surface can be obtained, different methods of preparing the glass giving a brilliant granular or quite dull surface as desired to suit the particular position of the work. *Marble mosaic* is used more for floors and pavings than for vertical surfaces. Most mosaic is now put together in the studio and pasted upon sheets of tough paper to which the design has previously been transferred. The whole section can thus be bedded on the prepared wall-surface with the least amount of trouble and without any danger of its sagging. When the cement has properly set, the paper is washed off from the face of the work.

Tiles.

Much improvement has been effected in the design and manufacture of wall-tiles. Especially has the design of tiles reached a very high level of excellence, and as a material which combines the qualities of being hard in wear, durable, damp-resisting and easily washable, with beauty of design, colouring and surface, tiling may perhaps be placed next in order of merit as a wall-covering to mosaic. A thin, opaque glass material, manufactured under various trade names, is now much used, especially for tiling existing walls. It has all the sanitary qualities of tiles, but is perhaps somewhat more fragile and liable to be damaged under hard wear. It is made in opal and other colours and is usually fixed with a special cement or mastic which allows for slight movements of expansion and contraction. The thickness of the material varies with different makers from ¼ to ⅜ in.

Metal sheeting.

Metal sheeting, though somewhat inartistic in appearance, is useful where a durable, waterproof and sanitary wall protection is needed, and is therefore often used for sculleries, wash-houses and lavatories. Thin sheets of zinc with slightly embossed patterns and enamelled in colours can be hung upon the wall with a composition of white lead (one part) and whiting (two parts) mixed to a thick paste with varnish or gold size. Sheets of iron or steel can be more elaborately embossed and fixed to the wall with nails or screws; they are either previously enamelled or are painted after being fixed. They are used more for ceilings than for wall-coverings, but are adapted for use in either position.

Tapestry.

Tapestry of good design and workmanship is a really beautiful wall-covering. It is usually hung upon frames fitted to the wall, and may either cover the entire wall surface or be fixed in the form of panels, friezes, dados or fillings. It is not at all a sanitary covering, for it harbours a very large quantity of dust and dirt. The same remark applies, but perhaps in a less degree, to *brocades* of silk and *damask*. These materials are of a delicate nature and become easily soiled by the fumes of gas or oil lamps. Substitutes for these materials on stout paper and on cotton are made with a prepared back to facilitate pasting and hanging, and are a very good imitation of the better material.

A coarse canvas, specially prepared with a smooth back for pasting, and stained in several plain colours, can now be purchased. Having a rough surface it naturally holds the dust, but this can easily be brushed off without damaging the material. It is a pleasing wall-covering, which will stand hard wear, and it forms a good background for pictures and furniture.

Wall-papers.

The term "wall-paper" embraces a very large variety of materials of many kinds, designs and qualities, ranging from the cheapest machine-printed papers of the most flimsy description and often hideous design, to the Japanese and similar leather papers, skilfully modelled in relief and richly decorated in gold and colours. The design of the paper, of whatever description it may be, should preferably be of a conventional pattern, unobtrusive and restful to the eye, and presenting no strong contrasts of colour. The wall must be treated as a background, consisting of a plane surface, and no attempt made to introduce a pictorial element into the decoration. The wall surface, regarded from the paper-hanger's point of view, is often divided into three sections, the *dado* or *base*, the *field* or *filling*, and the *frieze* at the top immediately beneath the cornice. This subdivision is not always adhered to, and a wall may be papered uniformly all over its surface, or may consist of dado and filling without the frieze, or frieze and filling without the dado. The division between the sections is usually formed, in the case of the frieze and filling, with a wood picture rail, and between the filling and dado with a moulded dado or chair rail.

Wall-papers may be printed either in *distemper* colours or *oil* colours, and the patterns upon them are printed either by hand or by machine. There are also *self-coloured* papers which have different kinds of surface finish, and with some of these a pattern is formed by contrasting a smooth with a rough or granulated surface or vice versa. Typical of such papers are the *ingrain papers*, which have the colour penetrating through their substance. Plain filling papers are often used in conjunction with a boldly designed and strongly coloured frieze of considerable depth. The dado is either of similar plain paper or of an unobtrusive pattern. Often the filling is taken down to the skirting without the intervention of a dado rail. Papers printed in oil colours can be sized and varnished, and when treated in this way can be washed repeatedly and are very durable. This treatment gives an unpleasant glazed surface to the wall, but in spite of this it is often adopted for bathrooms, kitchens and in similar positions, because it is economical.

The best papers are printed from blocks manipulated by hand. The pattern, or as much of it as is to be printed in one colour, is carved upon a pear-wood board, small and delicate members being represented by strips and *dots of copper* inserted in the block. With large blocks a treadle and [illegible] ment gives the workman assistance in applying [illegible] tern, which is first fed [illegible] soaked in pigment [illegible] decorated. One [illegible] lowed by others [illegible] pervious colour [illegible] Designs are sometimes worked on the paper with *stencil patterns* cut out of zinc sheets. These are laid upon the paper and thick colour applied through the perforations with a stiff brush.

The cheaper wall-papers are printed by machinery. The paper is made to travel round a large drum around which are grouped the printing cylinders, each with its separate inking roller to supply the special colour for its use. On each of the wooden printing rollers is set copper "type," representing as much of the pattern as is to be printed in one colour. It is a difficult and tedious matter to get all the rollers to work together to form one perfect pattern, and when printing in several colours it may take a skilled workman a week or more to "set" his machine, a very large quantity of paper being spoilt during the process.

The colours used for hand-printed work, whether applied with blocks or stencil plates, are much thicker in consistency than those for machine work. One advantage of hand-worked paper is the comparative ease with which a paper can be matched even after it has gone out of stock. At a slight extra cost the manufacturer will print a few pieces for his customer from the blocks he has retained. With machine-printed paper this, from a practical point of view, is impossible, for it would necessitate the printer's going through the long and costly process of "setting" the machine.

Wall-papers are sold in rolls called "pieces." In England the standard size for a piece of paper is 12 yds. long and 21 in. wide. The printed surface is only 20 in. in width, as a margin of half an inch is left on each edge. One or both of these plain margins must be removed prior to hanging. French wall-papers are 9 yds. long and 18 in. wide and only contain 40½ sq. ft. compared with 63 ft. in a piece of English paper. To ascertain the number of pieces required for a room take the superficies in feet of the surface to be covered (deduction being made for the doors, windows, &c.) and divide by 60. This gives the net amount required; an allowance of about one-seventh must be added to allow for waste in matching patterns and of odd lengths. If French papers are to be used the division should be 38 instead of 60, these figures representing in feet the area of the printed surface in each roll. The surface of the wall should before papering be carefully prepared so as to be quite smooth and regular. If the wall has been previously papered it should be stripped, and any irregularities filled in with stopping. To remove varnished paper use hot water to which borax has been added in the proportions of 2 oz. to each pint of water. In selecting a paper for a newly plastered wall the colour chosen should be capable of withstanding the bleaching action of the lime in the plaster. Greens, blues and pinks especially are affected in this manner. For heavy papers glue paste should be used. Papering which has become dirty may be effectually cleaned with new bread or stiff dough; when gently rubbed over the surface in one direction this speedily removes the dirt. When the wall is damp, tinfoil, pitch-coated paper or Willesden waterproofed paper is used behind the paper to prevent the paper from becoming damaged by the wet. (J. Br.)

WALLENSTEIN (properly WALDSTEIN), **ALBRECHT WENZEL EUSEBIUS VON**, duke of Friedland, Sagan and Mecklenburg (1583–1634), German soldier and statesman, was born of a noble but by no means wealthy or influential family at Herrmanic, Bohemia, on the 15th of September 1583. His parents were Lutherans, and in early youth he attended the school of the Brothers of the Common Life at Koschumberg. After the death of his parents he was sent by his uncle, Slawata, to the Jesuit college of nobles at Olmütz, after which he professed, but hardly accepted, the Roman Catholic faith. In 1599 he went to the university of Altdorf, which he had to leave in consequence of some boyish follies. Afterwards he studied at Bologna and Padua, and visited many places in southern and western Europe. While in Padua he gave much attention to astrology, and during the rest of his life he never wavered in the conviction that he might trust to the stars for indications as to his destiny. For some time Wallenstein served in the army of the emperor Rudolph II. in Hungary, which was commanded by a methodical professional soldier, Giorgio Basta. His personal gallantry at the siege of Gran won for him a company without purchase. In 1606 he returned to Bohemia, and soon afterwards he married an elderly widow, Lucretia Nikossie von Landeck, whose great estates in Moravia he inherited after her death in 1614. His new wealth enabled him to offer two hundred horse, splendidly equipped, to the archduke Ferdinand for his war with Venice in 1617. Wallenstein commanded them in person, and from that time he enjoyed both favour at court and popularity in the army. His wealth and influence were further increased by his marriage with Isabella Katharina, daughter of Count Harrach, a confidential adviser of the emperor Matthias.

In the disturbances which broke out in Bohemia in 1618 and proved to be the beginning of the Thirty Years' War, advances were made to Wallenstein by the revolutionary party, but he preferred to associate himself with the imperial cause, and he carried off the treasure-chest of the Moravian estates to Vienna, part of its contents being given him for the equipment of a regiment of cuirassiers. At the head of this regiment Wallenstein won great distinction under Buquoy in the war against Mansfeld. He was not present at the battle of the Weisser Berg, but he did brilliant service as second-in-command of the army which opposed Gabriel Bethlen in Moravia, and recovered his estates which the nationalists had seized. The battle of the Weisser Berg placed Bohemia at the mercy of the emperor Ferdinand, and Wallenstein turned the prevailing confusion to his own advantage. He secured the great estates belonging to his mother's family, and the emperor sold to him on easy terms vast tracts of confiscated lands. His possessions he was allowed to form into a territory called Friedland, and he was raised in 1622 to the rank of an imperial count palatine, in 1623 to that of a prince. In 1625 he was made duke of Friedland. Meantime he fought with skill and success against Gabriel Bethlen, and so enhanced his reputation at the dark moment when Vienna was in peril and the emperor's general Buquoy dead on the field of battle. At this stage in his life the enigma of his personality is complicated by the fact that he was not only the cold, detached visionary with vast ambitions and dreams, but also the model ruler of his principality. In everyday matters of administration he displayed vigour and foresight. He not only placed the administration of justice on a firm basis and founded schools, but by many wise measures developed agriculture and mining and manufacturing industries. At the same time he enlisted in the service of his ambition and his authority a pomp and refinement in his court which contrasted forcibly with the way of life of the smaller established rulers.

When the war against the Bohemians had become a widespread conflagration, Ferdinand found he had no forces to oppose to the Danes and the Northern Protestants other than the Army of the League, which was not his, but the powerful and independent Maximilian's, instrument. Wallenstein saw his opportunity and early in 1626 he offered to raise not a regiment or two, but a whole army for the imperial service. After some negotiations the offer was accepted, the understanding being that the troops were to be maintained at the cost of the countries they might occupy. Wallenstein's popularity soon brought great numbers of recruits to his standard. He soon found himself at the head of 30,000 (not long afterwards of 50,000) men. The campaigns of this army in 1625, 1626 and 1627, against Mansfeld, the Northern Protestants and Gabriel Bethlen, are described under Thirty Years' War.

Having established peace in Hungary, Wallenstein proceeded, in 1627, to clear Silesia of some remnants of Mansfeld's army, and at this time he bought from the emperor the duchy of Sagan, his outlay in the conduct of the war being taken into account in the conclusion of the bargain. He then joined Tilly in the struggle with Christian IV., and afterwards took possession of the duchy of Mecklenburg, which was granted to him in reward for his services, the hereditary dukes being displaced on the ground that they had helped the Danish king. He failed to capture Stralsund, which he besieged for several months in 1628. This important reverse caused him bitter disappointment, for he had hoped that by obtaining free access to the Baltic he might be able to make the emperor as supreme at sea as he seemed to be on land. It was a part of Wallenstein's scheme of German unity that he should obtain possession of the Hanseatic towns, and through them destroy or at least defy the naval power of the Scandinavian kingdom, the Netherlands and England. This plan was completely frustrated by the resistance of Stralsund, and even more by the emperor's "Edict of Restitution" that not only rallied against him all the Protestants but brought in a great soldier and a model army, Gustavus and the Swedes.

At the same time the victory of the principles of the League involved the fall of Wallenstein's influence. By his ambitions, his high dreams of unity and the incessant exactions of his army, he had made for himself a host of enemies. He was reported to have spoken of the arrogance of the princes, and it appeared probable that he would try to bring them, Catholics and Protestants alike, into rigid subjection to the crown. Again and again the emperor was advised to dismiss him. Ferdinand was very unwilling to part with one who had served him so well; but the demand was pressed so urgently in 1630 that he had no alternative, and in September of that year envoys were sent to Wallenstein to announce his removal. Had the emperor declined to take this course, the princes would probably have combined against him, and the result would have been a civil war even more serious than that which had already brought so many disasters upon the country. Wallenstein perfectly understood this, and he therefore accepted the emperor's decision calmly, gave over his army to Tilly, and retired to Gitschin, the capital of his duchy of Friedland. There, and at his palace in Prague, he lived in an atmosphere of mysterious magnificence, the rumours of which penetrated all Germany. The enigma of his projects was intensified, and the princes who had secured his disgrace became more suspicious than ever. But ere long the emperor was forced by events to call him into the field again.

Shortly before the dismissal of Wallenstein, Gustavus Adolphus had landed in Germany, and it soon became obvious that he was far more formidable than the enemies with whom the emperor had yet had to contend. Tilly was defeated at Breitenfeld and on the Lech, where he received a mortal wound, and Gustavus advanced to Munich, while Bohemia was occupied by his allies the Saxons. The emperor entreated Wallenstein to come once more to his aid. Wallenstein at first declined; he had, indeed, been secretly negotiating with Gustavus Adolphus, in the hope of destroying the League and its projects and of building his new Germany without French assistance. However, he accepted Ferdinand's offers, and in the spring of 1632 he raised a fresh army as strong as the first within a few weeks and took the field. This army was placed absolutely under his control, so that he assumed the position of an independent prince rather than of a subject. His first aim was to drive the Saxons from Bohemia—an object which he accomplished without serious difficulty. Then he advanced against Gustavus Adolphus, whom he opposed near Nuremberg and after the battle of the Alte Veste dislodged. In November came the great battle of Lützen (*q.v.*), in which the imperialists were defeated, but Gustavus Adolphus was killed.

To the dismay of Ferdinand, Wallenstein made no use of the opportunity provided for him by the death of the Swedish king, but withdrew to winter quarters in Bohemia. In the campaign of 1633 much astonishment was caused by his apparent unwillingness to attack the enemy. He was in fact preparing to desert the emperor. In the war against the Saxons he had offered them as terms of peace the revocation of the Edict. Religious toleration and the destruction of the separatist régime, as well as not inconsiderable aggrandisements for his own power, formed his programme, so far as historians have been able to reconstruct it, and becoming convinced from Ferdinand's obstinacy that the Edict would never be rescinded, he began to prepare to "force a just peace on the emperor in the interests of united Germany." With this object he entered into negotiations with Saxony, Brandenburg, Sweden and France. He had vast and vague schemes for the reorganization of the entire constitutional system of the empire, and he himself was to have supreme authority in determining the political destinies of his country. But as the mere commander of mercenaries he was trusted by no one, and could only play the part of Cassandra to the end.

Irritated by the distrust excited by his proposals, and anxious to make his power felt, he at last assumed the offensive against the Swedes and Saxons, winning his last victory at Steinau on the Oder in October. He then resumed the negotiations. In December he retired with his army to Bohemia, fixing his headquarters at Pilsen. It had soon been suspected in Vienna that Wallenstein was playing a double part, and the emperor, encouraged by the Spaniards at his court, anxiously sought for means of getting rid of him. Wallenstein was well aware of the designs formed against him, but displayed little energy in his attempts to thwart them. This was due in part, no doubt, to ill-health, in part to the fact that he trusted to the assurances of his astrologer, Battista Seni. He also felt confident that when the time came for his army to decide between him and the emperor the decision would be in his own favour

His principal officers assembled around him at a banquet on the 12th January 1634, when he submitted to them a declaration to the effect that they would remain true to him. This declaration they signed. More than a month later a second paper was signed; but on this occasion the officers' expression of loyalty to their general was associated with an equally emphatic expression of loyalty to their emperor. By this time Wallenstein had learned that he must act warily. On the 24th of January the emperor had signed a secret patent removing him from his command, and imperial agents had been labouring to undermine Wallenstein's influence. On the 7th two of his officers, Piccolomini and Aldringer, had intended to seize him at Pilsen, but finding the troops there loyal to their general, they had kept quiet But a patent charging Wallenstein and two of his officers with high treason, and naming the generals who were to assume the supreme command of the army, was signed on the 18th of February, and published in Prague.

When Wallenstein heard of the publication of this patent and of the refusal of the garrison of Prague to take his orders, he realized the full extent of his danger, and on the 23rd of February, accompanied by his most intimate friends, and guarded by about 1000 men, he went from Pilsen to Eger, hoping to meet the Swedes under Duke Bernhard, who, at last convinced of his sincerity, were marching to join him. After the arrival of the party at Eger, Colonel Gordon, the commandant, and Colonels Butler and Leslie agreed to rid the emperor of his enemy. On the evening of the 25th of February Wallenstein's supporters Illo, Kinsky, Terzky and Neumann were received at a banquet by the three colonels, and then murdered. Butler, Captain Devereux and a number of soldiers hurried to the house where Wallenstein was staying, and broke into his room. He was instantly killed by a thrust of Devereux's partisan. Wallenstein was buried at Gitschin, but in 1732 the remains were removed to the castle chapel of Münchengrätz.

No direct orders for the murder had been issued, but it was well understood that tidings of his death would be welcome at court. The murderers were handsomely rewarded, and their deed was commended as an act of justice.

Wallenstein was tall, thin and pale, with reddish hair, and eyes of remarkable brilliancy. He was of a proud and imperious temper, and was seldom seen to laugh. He worked hard and silently. In times of supreme difficulty he listened carefully to the advice of his counsellors, but the final decision was always his own, and he rarely revealed his thoughts until the moment for action arrived. Few generals have surpassed him in the power of quickly organizing great masses of men and of inspiring them with confidence and enthusiasm. But it is as a statesman that Wallenstein is immortal. However much or little motives of personal aggrandisement influenced his schemes and his conduct, "Germany turns ever to Wallenstein as she turns to no other amongst the leaders of the Thirty Years' War. . . . Such faithfulness is not without reason. . . . Wallenstein's wildest schemes, impossible of execution by military violence, were always built upon the foundation of German unity. In the way in which he walked that unity was doubtless unobtainable. . . . But during the long dreary years of confusion which were to follow it was something to think of the last supremely able man whose life had been spent in battling against the great evils of the land, against the spirit of religious intolerance and the spirit of division."

See Förster, *Albrecht von Wallenstein* (1834); Aretin, *Wallenstein* (1846); Helbig, *Wallenstein und Arnim, 1632-1634* (1850) and *Kaiser Ferdinand und der Herzog von Friedland, 1633-1634* (1853); Hurter, *Zur Geschichte Wallensteins* (1855); Fiedler, *Zur Geschichte Wallensteins* (1860); L. von Ranke, *Geschichte* [illegible] ed., 1872); Gindely, *Geschichte des* [illegible]; J. Mitchell, *Wallenstein* (1840); S. R. [illegible] War.

WALLER, EDMUND (1606–[illegible] eldest son of [illegible] Buckingh[illegible] [illegible] at Coleshill and migrated to Beaconsfield. Of Waller's early education all we know is his own account that he "was bred under several ill, dull and ignorant schoolmasters, till he went to Mr Dobson at Wickham, who was a good schoolmaster and had been an Eton scholar" His father died in 1616, and the future poet's mother, a lady of rare force of character, sent him to Eton and to Cambridge. He was admitted a fellow-commoner of King's College on the 22nd of March 1620. He left without a degree, and it is believed that in 1621, at the age of only sixteen, he sat as member for Agmondesham (Amersham) in the last parliament of James I Clarendon says that Waller was "nursed in parliaments." In that of 1624 he represented Ilchester, and in the first of Charles I. Chipping Wycombe. The first act by which Waller distinguished himself, however, was his surreptitious marriage with a wealthy ward of the Court of Aldermen, in 1631. He was brought before the Star Chamber for this offence, and heavily fined But his own fortune was large, and all his life Waller was a wealthy man. After bearing him a son and a daughter at Beaconsfield, Mrs Waller died in 1634. It was about this time that the poet was elected into Falkland's "Club."

It is supposed that about 1635 he met Lady Dorothy Sidney, eldest daughter of the earl of Leicester, who was then eighteen years of age He formed a romantic passion for this girl, whom he celebrated under the name of Sacharissa. She rejected him, and married Lord Spencer in 1639. Disappointment, it is said, rendered Waller for a time insane, but this may well be doubted He wrote, at all events, a long, graceful and eminently sober letter on the occasion of the wedding to the bride's sister. In 1640 Waller was once more M.P. for Amersham, and made certain speeches which attracted wide attention; later, in the Long Parliament, he represented St Ives. Waller had hitherto supported the party of Pym, but he now left him for the group of Falkland and Hyde. His speeches were much admired, and were separately printed; they are academic exercises very carefully prepared. Clarendon says that Waller spoke "upon all occasions with great sharpness and freedom." An extraordinary and obscure conspiracy against Parliament, in favour of the king, which is known as "Waller's Plot," occupied the spring of 1643, but on the 30th of May he and his friends were arrested. In the terror of discovery, Waller was accused of displaying a very mean poltroonery, and of confessing "whatever he had said, heard, thought or seen, and all that he knew . . or suspected of others." He certainly cut a poor figure by the side of those of his companions who died for their opinions. Waller was called before the bar of the House in July, and made an abject speech of recantation. His life was spared and he was committed to the Tower, whence, on paying a fine of £10,000, he was released and banished the realm in November 1643. He married a second wife, Mary Bracey of Thame, and went over to Calais, afterwards taking up his residence at Rouen. In 1645 the *Poems* of Waller were first published in London, in three different editions; there has been much discussion of the order and respective authority of these issues, but nothing is decidedly known. Many of the lyrics were already set to music by Henry Lawes. In 1646 Waller travelled with Evelyn in Switzerland and Italy. During the worst period of the exile Waller managed to "keep a table" for the Royalists in Paris, although in order to do so he was obliged to sell his wife's jewels. At the close of 1651 the House of Commons revoked Waller's sentence of banishment, and he was allowed to return to Beaconsfield, where he lived very quietly until the Restoration.

In 1655 he published *A Panegyric to my Lord Protector*, and was made a Commissioner for Trade a month or two later. He followed this up, in 1660, by a poem *To the King, upon his Majesty's Happy Return*. Being challenged by Charles II. to [illegible] this latter piece was inferior to the eulogy of Crom-[illegible] smartly replied, "Sir, we poets never succeed [illegible] truth as in fiction." He entered the House of [illegible] in 1661, as M.P. for Hastings, and Burnet has [illegible] for the next quarter of a century "it was no House [illegible] not there." His sympathies were tolerant and [illegible] constantly defended the Nonconformists. One famous speech of Waller's was: "Let us look to our Government, fleet and trade, 'tis the best advice the oldest Parliament man among you can give you, and so God bless you." After the death of his second wife, in 1677, Waller retired to his house called Hall Barn at Beaconsfield, and though he returned to London, he became more and more attached to the retirement of his woods, "where," he said, "he found the trees as bare and withered as himself." In 1661 he had published his poem, *St James' Park*; in 1664 he had collected his poetical works; in 1666 appeared his *Instructions to a Painter*; and in 1685 his *Divine Poems*. The final collection of his works is dated 1686, but there were further posthumous additions made in 1690. Waller bought a cottage at Coleshill, where he was born, meaning to die there; "a stag," he said, "when he is hunted, and near spent, always returns home." He actually died, however, at Hall Barn, with his children and his grandchildren about him, on the 21st of October 1687, and was buried in woollen (in spite of his expressed wish), in the churchyard of Beaconsfield.

Waller's lyrics were at one time admired to excess, but with the exception of "Go, lovely Rose" and one or two others, they have greatly lost their charm. He was almost destitute of imaginative invention, and his fancy was plain and trite But he resolutely placed himself in the forefront of reaction against the violence and "conceit" into which the baser kind of English poetry was descending. A great deal of discussion, some of it absurdly violent in tone, has been expended on the question how far Waller was or was not the pioneer in introducing the classical couplet into English verse. It is, of course, obvious that Waller could not "introduce" what had been invented, and admirably exemplified, by Chaucer. But those who have pointed to smooth distichs employed by poets earlier than Waller have not given sufficient attention to the fact (exaggerated, doubtless, by critics arguing in the opposite camp) that it was he who earliest made writing in the serried couplet the habit and the fashion. Waller was writing in the regular heroic measure, afterwards carried to so high a perfection by Dryden and Pope, as early as 1623 (if not, as has been supposed, even in 1621).

The only critical edition of Waller's *Poetical Works* is that edited, with a careful biography, by G. Thorn-Drury, in 1893. (E. G.)

WALLER, LEWIS (1860–), English actor, was born in Spain, his father being a civil engineer. He first appeared on the London stage in 1883, at Toole's, and for some years added to his reputation as a capable actor in London and the provinces. He came more particularly to the front by a fine performance as Buckingham in *The Three Musketeers* under Mr Beerbohm Tree's management at His Majesty's in 1895, and soon afterwards organized a company of his own, first at the Haymarket and afterwards at the Shaftesbury, Imperial, Apollo and other theatres. His fine voice and vigorous acting were well suited in his memorable production of *Henry V.*, and he had a great success with *Monsieur Beaucaire* and similar plays. His wife, Mrs Lewis Waller (Florence West), also became well known as a powerful and accomplished actress.

WALLER, SIR WILLIAM (*c.* 1597–1668), English soldier, was the son of Sir Thomas Waller, lieutenant of Dover, and was born about 1597 He was educated at Magdalen Hall, Oxford, and served in the Venetian army and in the Thirty Years' War. He was knighted in 1622 after taking part in Vere's expedition to the Palatinate Little is known of his life up to 1640, when he became member of parliament for Andover Being a strict Presbyterian by religion, and a member of the opposition in politics, he naturally threw himself with the greatest ardour into the cause of the parliament when the Civil War broke out in 1642 He was at once made a colonel, and conducted to a speedy and successful issue the siege of Portsmouth in September; and later in the year captured Farnham, Winchester and other places in the south-west At the beginning of 1643 Waller was made a major-general and placed in charge of operations in the region of Gloucester and Bristol (see GREAT REBELLION), and he concluded his first campaign with a victory at Highnam and the capture of Hereford. He was then called upon to oppose the advance of Sir Ralph Hopton and the Royalist western army, and though more or less defeated in the hard-fought battle of Lansdown (near Bath) he shut up the enemy in Devizes. However, Hopton and a relieving force from Oxford inflicted a crushing defeat upon Waller's army at Roundway Down. Hopton was Waller's intimate personal friend, and some correspondence passed between the opposing generals, a quotation from which (Gardiner, *Civil War*, i. 168) is given as illustrative of "the temper in which the nobler spirits on either side had entered on the war." "That great God," wrote Waller, "who is the searcher of my heart knows with what a sad sense I go upon this service, and with what a perfect hatred I detest this war without an enemy; but I look upon it as sent from God . . . God. . . in his good time send us the blessing of peace and in the meantime assist us to receive it! We are both upon the stage and must act such parts as are assigned us in this tragedy, let us do it in a way of honour and without personal animosities."

The destruction of his army at Roundway scarcely affected Waller's military reputation, many reproaching Essex, the commander-in-chief, for allowing the Oxford royalists to turn against Waller. The Londoners, who had called him "William the Conqueror," recognized his skill and energy so far as willingly to raise a new army for him in London and the south-eastern counties. But from this point Waller's career is one of gradual disillusionment. His new forces were distinctively local, and, like other local troops on both sides, resented long marches and hard work far from their own counties. Only at moments of imminent danger could they be trusted to do their duty. At ordinary times, *e.g.* at the first siege of Basing House, they mutinied in face of the enemy, deserted and even marched home in formed bodies under their own officers, and their gallantry at critical moments, such as the surprise of Alton in December 1643 and the recapture of Arundel in January 1644, but partially redeemed their general bad conduct. Waller himself, a general of the highest skill,—"the best shifter and chooser of ground" on either side,—was, like Turenne, at his best at the head of a small and highly-disciplined regular army. Only a Condé or a Cromwell could have enforced discipline and soldierly spirit in such men, ill-clad and unpaid as they were, and the only military quality lacking to Waller was precisely this supreme personal magnetism. In these circumstances affairs went from bad to worse. Though successful in stopping Hopton's second advance at Cheriton (March 1644), he was defeated by Charles I. in the war of manœuvre which ended with the action of Cropredy Bridge (June), and in the second battle of Newbury in October his tactical success at the village of Speen led to nothing. His last expeditions were made into the west for the relief of Taunton, and in these he had Cromwell as his lieutenant-general. By this time the confusion in all the armed forces of the parliament had reached such a height that reforms were at last taken in hand. The original suggestion of the celebrated "New Model" army came from Waller, who wrote to the Committee of Both Kingdoms (July 2, 1644) to the effect that "an army compounded of these men will never go through with your service, and till you have an army merely your own that you may command, it is in a manner impossible to do anything of importance." Simultaneously with the New Model came the Self-Denying Ordinance, which required all members of parliament to lay down their military commands. Waller did so gladly—the more as he had already requested to be relieved—and his active military career came to an end. But the events of 1643–1644 had done more than embitter him. They had combined with his Presbyterianism to make him intolerant of all that he conceived to be licence in church, state or army, and after he ceased to exercise command himself he was constantly engaged, in and out of parliament, in opposing the Independents and the army politicians, and supporting the cause of his own religious system, and later that of the Presbyterian-Royalist opposition to the Commonwealth and Protectorate régime. He was several times imprisoned between 1648 and 1659. In the latter year he was active in promoting the final negotiations for the restoration of Charles II and reappeared in the House of Commons. He sat in the Convention Parliament, but soon retired from political life, and he died on the 19th of September 1668.

See Wood's *Athenae Oxonienses*, ed. Bliss, iii. 812; and two partial autobiographies, "Recollections by General Sir William Waller" (printed in *The Poetry of Anna Matilda*, 1788), and *Vindication of the Character*, &c. (1797).

Sir William Waller's cousin, Sir Hardress Waller (*c.* 1604–1666) was also a parliamentarian of note. Knighted by Charles I. in 1629, he gained military experience in serving against the rebels in Ireland; then from 1645 to the conclusion of the Civil War he was in England commanding a regiment in the new model army. He was Colonel Pride's chief assistant when the latter "purged" the House of Commons in 1648, and he was one of the king's judges and one of those who signed the death warrant. During the next few years Waller served in Ireland, finally returning to England in 1660. After the restoration he fled to France, but soon surrendered himself to the authorities as a regicide, his life being spared owing to the efforts of his friends. He was, however, kept in prison and was still a captive when he died.

See M. Noble, *Lives of the Regicides* (1798).

WALLINGFORD, a township of New Haven county, Connecticut, U.S.A., S.W. of the centre of the state, in the valley of the Quinnipiac river. It contains the villages of East Wallingford, Tracy and Yalesville, and the borough of Wallingford. Pop. of the township (1900) 9001, (1910) 11,155; of the borough (1900) 6737, of whom 1796 were foreign-born and 21 were negroes, (1910) 8690. Area of the township, about 38 sq. m. The borough is 12 m. N.E. of New Haven, on a hill about 1½ m long, and is served by the New York, New Haven & Hartford railway (which has stations also at East Wallingford and Yalesville) and by an interurban electric line connecting with Meriden and New Haven. The borough has a public library (1881), a Masonic Home, the Gaylord Farm Sanatorium of the New Haven County Anti-Tuberculosis Association, the Phelps School (for girls) and the Choate School (1896, for boys). Among the manufactures of the borough are sterling silver articles, plated and britannia ware, brass ware, rubber goods, cutlery and edge tools. The township of Wallingford was settled in 1670. At a meeting held in January 1766, in protest against the Stamp Act, it was declared, that "Whereas it appears from ancient Records and other Memorials of Incontestible Validity that our Ancestors with a great Sum Purchased said township, with great Peril possessed and Defended the Same, we are Born free (having never been in bondage to any), an inheritance of Inestimable Value," and a penalty of 20s. was imposed upon any one who should introduce or use stamped paper or parchment. During the War of Independence patriotic sentiment here was strong and Loyalists were sometimes exiled to Wallingford, where they could have no effective influence. The borough of Wallingford was incorporated in 1853 and re-incorporated in 1868. From 1851 to 1880 there was a communistic settlement, a branch of the Oneida Community, here; its property was bought by the Masonic Order and made into the Masonic Home.

See C. H. S. Davis's *History of Wallingford* (Meriden, 1870).

WALLINGFORD, a market town and municipal borough in the Abingdon parliamentary division of Berkshire, England, 51 m. W by N. of London by the Great Western railway. Pop. (1901) 2808. It is pleasantly situated in the flat valley of the Thames, on the west (right) bank. The railway station is the terminus of a branch line from Cholsey. Of the churches only St Leonard's, retaining some Norman work and rebuilt approximately on its original plan, with an eastern apse, is of interest. The ancient castle has left only its mound and earthworks, and other works may be traced surrounding the town on the landward side. The town hall raised on arches, dates from 1670. The large grammar school was founded in 1660. The trade of the town is principally agricultural, and [illegible] The [illegible] a mayor, 4 alder [illegible] Arr [illegible]

The site of W [illegible] was occupied [illegible] [illegible] the Conquest, and, though burned by Sweyn in 1006, was much the largest and most important borough in Berkshire at the time of the Domesday Survey. The new castle was so extensive that eight houses had been demolished to make room for it; the market was already in existence, and perhaps also the gild merchant, which in a charter of Henry II. is said to date back to the reign of the Confessor. In the reign of Henry I. the beginning of decay is marked by the inability of the town "through poverty" to pay its aid. It is said to have suffered greatly from the Black Death, and its decline was accelerated by the building, in the early 15th century, of two bridges near Abingdon, which diverted the main road between London and Gloucester from Wallingford. Periodical reductions in the fee farm show the gradual impoverishment of the town, and in 1636 its assessment for ship-money was only £20, while that of Reading was £220. Wallingford was a royal borough held in the reign of Henry III. by Richard, king of the Romans. Edward III. granted the fee farm to the Black Prince and his successors in the duchy of Cornwall. The earliest charters were given by Henry I. and Henry II., the latter confirming the ancient privileges of the borough, which were to be held as the citizens of Winchester held theirs, and granting to the burgesses freedom from toll throughout his dominions. These charters were confirmed and enlarged by Henry III. in 1267 and by Philip and Mary in 1557–1558. In 1648 the corporation consisted of a mayor, three aldermen, a chamberlain and sixteen burgesses. This constitution was remodelled in 1650 by a charter from Cromwell, but the governing charter until the passing of the Municipal Corporations Act of 1835 was that given by Charles II. in 1663, incorporating the town under the style of a mayor, recorder, town clerk, six aldermen, two burgesses, a chamberlain and eighteen assistants of the better sort of the inhabitants. In 1571 Elizabeth issued letters patent empowering the burgesses of Wallingford to take toll of all carts passing over their bridge, in order to provide for its repair and maintenance. Wallingford sent two members to parliament from 1295 to 1832, and one from 1832 to 1885, when its representation was merged in that of the county: before 1832 the franchise was vested in the inhabitants paying scot and lot. The empress Maud took refuge at Wallingford after her escape from Oxford Castle (1142), and here peace was made between her and Stephen (1153). Wallingford Castle was one of the last fortresses to hold out for Charles I., and during the Commonwealth it was demolished by order of the government. In 1205 the king commanded the sheriff of Oxford to cause a fair to be held at Wallingford at Whitsun for four days, to be continued for three years. In 1227 Swyncombe fair was transferred from the feast of St Botolph to the feast of St Mark in order not to interfere with Wallingford fair. Fairs on the days of St Nicholas and of St John the Baptist were granted by Henry VII. in 1500, and the charter of 1663 provided for two markets and four annual fairs. All the latter have fallen into disuse except the Michaelmas fair, which is principally for hiring servants. During the 18th century the town was fairly prosperous and had a good trade in grain and malt.

See *Victoria County History, Berks*; T. K. Hedges, *The History of Wallingford* (London, 1881).

WALLIS, JOHN (1616–1703), English mathematician, logician and grammarian, was born on the 23rd of November 1616 at Ashford, in Kent, of which parish his father, Rev. John Wallis (1567–1622), was incumbent. After being at school at Ashford, Tenterden and Felsted, and being instructed in Latin, Greek and Hebrew, he was in 1632 sent to Emmanuel College, Cambridge, and afterwards was chosen fellow of Queens' College. Having been admitted to holy orders, he left the university in 1641 to act as chaplain to Sir William Darley, and in the following year accepted a similar appointment from the widow of Sir Horatio Vere. It was about this period that he displayed surprising talents in deciphering the intercepted letters and papers of the Royalists. His adherence to the parliamentary party was in 1643 rewarded by the living of St Gabriel, Fenchurch Street, London. In 1644 he was appointed one of the scribes or secretaries of the Assembly of Divines at Westminster. During the same year he married Susanna Glyde, and thus vacated his fellowship; but the death of his mother had left him in possession of a handsome fortune. In 1645 he attended those scientific meetings which led to the establishment of the Royal Society. When the Independents obtained the superiority Wallis adhered to the Solemn League and Covenant. The living of St Gabriel he exchanged for that of St Martin, Ironmonger Lane; and, as rector of that parish, he in 1648 subscribed the Remonstrance against putting Charles I. to death. Notwithstanding this act of opposition, he was in June 1649 appointed Savilian professor of geometry at Oxford. In 1654 he there took the degree of D.D., and four years later succeeded Gerard Langbaine (1609–1658) as keeper of the archives. After the restoration he was named one of the king's chaplains in ordinary. While complying with the terms of the Act of Uniformity, Wallis seems always to have retained moderate and rational notions of ecclesiastical polity. He died at Oxford on the 28th of October 1703.

The works of Wallis are numerous, and relate to a multiplicity of subjects. His *Institutio logicae*, published in 1687, was very popular, and in his *Grammatica linguae Anglicanae* we find indications of an acute and philosophic intellect. The mathematical works are published, some of them in a small 4to volume (Oxford, 1657) and a complete collection in three thick folio volumes (Oxford, 1693–1699). The third volume includes, however, some theological treatises, and the first part of it is occupied with editions of treatises on harmonics and other works of Greek geometers, some of them first editions from the MSS., and in general with Latin versions and notes (Ptolemy, Porphyrius, Briennius, Archimedes, Eutocius, Aristarchus and Pappus). The second and third volumes include also his correspondence with his contemporaries; and there is a tract on trigonometry by Caswell. Excluding all these, the mathematical works contained in the first and second volumes occupy about 1800 pages. The titles in the order adopted, but with date of publication, are as follows: "Oratio inauguralis," on his appointment (1649) as Savilian professor (1657); "Mathesis universalis, seu opus arithmeticum philologice et mathematice traditum, arithmeticam numerosam et speciosam aliaque continens" (1657); "Adversus Meibomium, de proportionibus dialogus" (1657); "De sectionibus conicis nova methodo expositis" (1655); "Arithmetica infinitorum, sive nova methodus inquirendi in curvilineorum quadraturam aliaque difficiliora matheseos problemata" (1655); "Eclipsis solaris observatio Oxonii habita 2° Aug. 1654" (1655); "Tractatus duo, prior de cycloide, posterior de cissoide et de curvarum tum linearum εὐθύνσει tum superficierum πλατυσμῷ" (1659); "Mechanica, sive de motu tractatus geometricus" (three parts, 1669–1670–1671); "De algebra tractatus historicus et practicus, ejusdem originem et progressus varios ostendens" (English, 1685); "De combinationibus alternationibus et partibus aliquotis tractatus" (English, 1685) "De sectionibus angularibus tractatus" (English, 1685); "De angulo contactus et semicirculi tractatus" (1656); "Ejusdem tractatus defensio" (1685); "De postulato quinto, et quinta definitione, lib. VI. Euclidis, disceptatio geometrica" (? 1663); "cunocuneus, seu corpus partim conum partim cuneum representans geometrice consideratum" (English, 1685); "De gravitate et gravitatione disquisitio geometrica" (1662; English, 1674); "De aestu maris hypothesis nova" (1666–1669).

The *Arithmetica infinitorum* relates chiefly to the quadrature of curves by the so-called method of indivisibles established by Bonaventura Cavalieri in 1629 (see INFINITESIMAL CALCULUS). He extended the "law of continuity" as stated by Johannes Kepler; regarded the denominators of fractions as powers with negative exponents; and deduced from the quadrature of the parabola $y=x^m$, where m is a positive integer, the area of the curves when m is negative or fractional. He attempted the quadrature of the circle by interpolation, and arrived at the remarkable expression known as *Wallis's Theorem* (see CIRCLE, SQUARING OF). In the same work Wallis obtained an expression for the length of the element of a curve, which reduced the problem of rectification to that of quadrature.

The *Mathesis universalis*, a more elementary work, contains copious dissertations on fundamental points of algebra, arithmetic and geometry, and critical remarks.

The *De algebra tractatus* contains (chapters lxvi.-lxix.) the idea of the interpretation of imaginary quantities in geometry. This is given somewhat as follows: the distance represented by the square root of a negative quantity cannot be measured in the line backwards or forwards, but can be measured in the same plane above the line, or (as appears elsewhere) at right angles to the line either in the plane, or in the plane at right angles thereto. Considered as a history of algebra, this work is strongly objected to by Jean Etienne Montucla on the ground of its unfairness as against the early Italian algebraists and also Franciscus Vieta and René Descartes and in favour of Harriot; but Augustus De Morgan, while admitting this, attributes to it considerable merit. The symbol for infinity, ∞, was invented by him.

The two treatises on the cycloid and on the cissoid, &c., and the *Mechanica* contain many results which were then new and valuable. The latter work contains elaborate investigations in regard to the centre of gravity, and it is remarkable also for the employment of the principle of virtual velocities.

Among the letters in volume iii., we have one to the editor of the *Acta Leipsica*, giving the decipherment of two letters in secret characters. The ciphers are different, but on the same principle: the characters in each are either single digits or combinations of two or three digits, standing some of them for letters, others for syllables or words,—the number of distinct characters which had to be deciphered being thus very considerable.

For the prolonged conflict between Hobbes and Wallis, see HOBBES, THOMAS.

WALLIS ARCHIPELAGO, UVEA, or UEA, a group of islands in the Pacific Ocean, N.E. of Fiji, about 13° S., 176° W., with a land area of 40 sq. m., belonging to France. It was placed under the French protectorate on the 5th of April 1887, and connected for administrative purposes with New Caledonia by decree of the 27th of November 1888. There is a French Resident in the islands, which are connected by a regular service with Nouméa, New Caledonia. The principal islands are Uvea, of volcanic formation and surrounded with coral, and Nukuatea. The islands were discovered by Samuel Wallis in 1767, and it was a missionary, Father Bataillon, who in 1837 first brought the influence of France to bear on the natives. These, about 4500 in number, are of Polynesian race, gentle and industrious. The trade of the islands is mainly with Samoa, whence cottons and iron goods are imported, and to which copra and roots are exported. The Horne Islands (Fotuna and Alofa), S.W. of the Wallis Islands, were discovered by Jacob Lemaire and Willem Cornelis Schouten in 1616, and placed under the French protectorate by decree of the 16th of February 1888. They have 1500 inhabitants.

WALLON, HENRI ALEXANDRE (1812–1904), French historian and statesman, was born at Valenciennes on the 23rd of December 1812. Devoting himself to a literary career, he became in 1840 professor at the École Normale Supérieure under the patronage of Guizot, whom he succeeded as professor at the Faculté des Lettres in 1846. His works on slavery in the French colonies (1847) and on slavery in antiquity (1848; new edition in 3 vols., 1879) led to his being placed, after the Revolution of 1848, on a commission for the regulation of labour in the French colonial possessions, and in November 1849 he was elected to the Legislative Assembly by the department of the Nord. He resigned in 1850, disapproving of the measure for the restriction of the suffrage adopted by the majority In the same year he was elected a member of the Académie des Inscriptions, of which he became perpetual secretary in 1873. Under the empire he withdrew altogether from political life, and occupied himself entirely with his duties as a professor of history and with historical writings, the most original of which is a biography, *Richard II, épisode de la rivalité de la France et de l'Angleterre* (2 vols., 1864). Although remaining a republican, he exhibited decided clerical leanings in his *Jeanne d'Arc* (2 vols., 1860; 2nd ed., 1875); *La Vie de Notre Seigneur Jésus* (1865)—a reply to the *Vie de Jésus* of E. Renan; and *Saint Louis et son temps* (1871; 4th ed., 1892), which still ranks among hagiographical works. Returning to politics after the Franco-German War, Wallon was re-elected by the department of the Nord in 1871, took an active part in the proceedings of the Assembly, and finally immortalized himself by carrying his proposition for the establishment of the Republic with a president elected for seven years, and then eligible for re-election, which, after violent debates, was adopted by the Assembly on the 30th of January 1875. "Ma proposition," he declared, "ne proclame pas la République, elle la fait." Upon the definitive establishment of the Republic, Wallon became Minister of Public Instruction, and effected many useful reforms, but his views were too conservative for the majority of the Assembly, and he retired in May 1876. He had been chosen a life senator in December 1875. Returning to his historical studies, Wallon produced four works of great importance, though less from his part in them as author than from the documents which accompanied them: *La Terreur* (1873); *Histoire du tribunal* *révolutionnaire de Paris avec le journal de ses actes* (6 vols., 1880–1882); *La Révolution du 31 mai et le fédéralisme en 1793* (2 vols., 1886); *Les Représentants du peuple en mission et la justice révolutionnaire dans les départements* (5 vols., 1880–1890). Besides these he published a number of articles in the *Journal des savants*; for many years he wrote the history of the Académie des Inscriptions in the collection of *Memoirs* of this Academy, and he composed obituary notices of his colleagues, which were inserted in the *Bulletin*. He died at Paris on the 13th of November 1904.

WALLOONS (*Wallons*, from a common Teut. word meaning "foreign," cf. Ger. *welsch*, Du. *waalsch*, Eng. *Welsh*), a people akin to the French, but forming a separate branch of the Romance race, inhabiting the Belgian provinces of Hainaut, Namur, Liége, parts of Luxemburg and southern Brabant, parts of the French departments of Nord and Ardennes, and a few villages in the neighbourhood of Malmedy in Rhenish Prussia. The Walloons are descended from the ancient Gallic Belgi, with an admixture of Roman elements. They are in general characterized by greater vivacity and adaptability than their Flemish neighbours, while they excel their French neighbours in endurance and industry. Their numbers are reckoned in Belgium at between 2,000,000 and 3,000,000. The Walloon dialect is a distinct branch of the Romance languages, with some admixture of Flemish and Low German. It was used as a literary language until the 15th century, when it began to be assimilated to French, by which it was ultimately superseded.

Grandgagnage, *De l'origine des Wallons* (Liége, 1852), *Vocabulaire des noms wallons, &c.* (2nd ed., 1857), and *Dict. étymol. de la langue wallonne* (t. i. and ii., 1845–1851; t. iii., by Scheler, 1880); J. Dejardin, *Dict. des "spots" ou proverbes wallons* (1863); Van der Kindere, *Recherches sur l'ethnologie de la Belgique* (Brussels, 1872); Demarteau, *Le Flamand, le Wallon, &c.* (Liége, 1889); M. Wilmotte, *Le Wallon, Histoire et littérature* (Brussels, 1893); Monseur, *Le Folklore wallon* (Brussels, 1892). [X.]

Walloon Literature.—In medieval times various local documents in prose and verse were written by inhabitants of Liége and its diocese in a dialect of French which contained many Walloon words and phrases. It is supposed that as early as the 12th century the idiom of the people may have been used in songs which are now lost, unless echoes of them are preserved in the curious *Noëls*, partly in French, partly in patois, which were orally collected by M. Doutrepont and published in 1888. Several Flemish works in old French, containing Walloon expressions, and in particular the so-called *Poème moral* of the 13th century, have been claimed as precursors of a local literature, but they are really to be considered as composed in French with a certain admixture of Liégeois phrases. The earliest existing specimen of pure Walloon literature is the *Ode* in praise of Liége, dated 1620, and attributed to Mathias Navaeus; this was first printed in 1857 in the transactions of the Société Liégeoise. Except a few very flat popular songs, there is nothing more until the end of the 17th century, when we find *Lis Aiwes di Tongue* (The Waters of Tongres), an amusing lyrical satire on the pretensions of that town to be considered a Roman spa. Fifty years later the opening of a popular theatre at Liége led to the creation of a class of farces, written in Walloon; of these *Li Voëge di Chaudfontaine* (The Journey to Chaudfontaine) (1757), by Jean Noël Hamal, has considerable humour and vigour in its rhymed dialogue. Other successful comedies were *Li Fiesse di Houte s'i plou*, *Li Ligeois égagi*, and, above all, *Lis Hypocondes*, the liveliest specimen of old Walloon literature which has survived. This diverting farce describes the adventures of a party of mock-invalids, who pursue a series of intrigues [illegible]. This class of dramatic literature closed with *Li H*[illegible]. In these early songs and plays the Wall[illegible] displayed with great crudity; anything [illegible] unknown.

The [illegible] background, and it was not until the middle of the 19th century that Walloon literature began seriously to be cultivated. Its only expression, for a long time, was in lyrical poetry in the form of satires and the humorous songs, called *pasquèyes* and *crâmignons*. The earliest of the modern Walloon writers was Charles Nicolas Simonon (1774–1847), who celebrated in *Li Côparèy* the ancient clock-tower of the cathedral of St Lambert, an object of reverence to the inhabitants of Liége. His poems were collected in 1845. Henri Joseph Forir (1784–1862) was the first president of the Société Liégeoise, and one of the protagonists of Walloon literature. He published a valuable dictionary of the patois. The Curé C. E. E. Du Vivier de Streel (1799–1863) was the author of *Li Pantalon trawé* (The Torn Trowsers), a *pasquèye* which still enjoys an enormous popularity among the Walloon population. The first Walloon writer of high merit, however, was Nicolas Defrecheux (1825–1874), who is the most distinguished poet whom the patois has hitherto produced. His *Leyîs-m' plorer* (Let me cry), when it appeared in 1854, made a wide sensation, and was the earliest expression of what is serious and tender in the Walloon nature. His *Chansons wallonnes* appeared in 1860. Defrecheux stands almost alone among the Walloon poets as an artist and not merely an improvisatore. His poetical works were posthumously collected in 1877.

For many years, in spite of the efforts of such scholars as MM. Alphonse Le Roy and H. Gaidoz, a taste for Walloon literature remained strictly circumscribed, and was limited to a small circle of enthusiasts in Liége and Namur. In 1872 a literary club was formed, entitled the Caveau Liégeois, and this gave a very great stimulus to the cultivation of the Walloon letters. The national drama, which had been entirely neglected for more than a century, once more was called into existence through the exertions of the theatrical club, called Les Wallons. The comedies of A. M. J. Delchef (b. 1835) were acted with success, and led the way for the most important patois dramatist that Liége has produced, Édouard Remouchamps (b. 1836), who is the author of *Tâtî l'Perriquî* (1884), perhaps the most entertaining farce in Walloon, and certainly the most popular. Remouchamps was for thirty years a prolific writer of short pieces for the stage, sentimental and farcical. After the success of this play, according to an enthusiastic chronicler, "the writers of Wallonia became legion." Their style, however, was not greatly varied, and they have mainly confined themselves to songs, satirical lampoons and farces. The founder of the Société Liégeoise was J. F. E. Bailleux (1817–1860), to whom the revival of an interest in early Walloon literature is mainly due; in conjunction with J. V. F. J. Dehin (1809–1871) he published a translation of Lafontaine into patois. Among writers of the younger generation, special credit must be given to Henri Simon (b. 1856), for his humoristic tales and sketches; to Julien Delaite (b. 1868), for his amusing lyrics; and to Zephir Henin (b. 1866), for his prose, prose being much rarer than verse in Walloon. It would be possible to add very largely to this list, but the most notable names have been mentioned. A certain monotonous fluency is the fault of Walloon literature, which repeats its effects too constantly, and is confined within too narrow limits. A few writers, among whom Isidore Dory (b. 1833) is prominent, have endeavoured to enlarge the scope of the patois writers, but their suggestions have met with little response. When the Walloon writer desires to impart serious information or deep feeling, he resorts to the use of French. The *pasquèye*, which is the characteristic form of Walloon verse, is a kind of semi-comic and extremely familiar lyric, humorous and extravagant, a survival of the influence of Béranger on taste three-quarters of a century [illegible] the facility with which these songs are composed is [illegible] by the enormous number of them which exist in [illegible] and Namur. The difficulties of Walloon literature are [illegible] by the unfixed character of its phonetic and often [illegible] orthography.

[illegible]—H. Gaidoz, *La Société liégeoise de littérature wallonne* ([illegible] 1890); Alphonse Le Roy, *Littérature wallonne* (Brussels, [illegible]); Charles Defrecheux, Joseph Defrecheux et Charles Gothier, [illegible] *des poètes wallons* (Liége, 1895); Maurice Wilmotte, *Le* [illegible] (Brussels, 1894). (E. G.)

WALLOP, SIR HENRY (*c.* 1540–1599), English statesman, was the eldest son of Sir Oliver Wallop (d. 1566), of Farleigh Wallop, Hampshire. Having inherited the estates of his father and of his uncle, Sir John Wallop (*q.v.*), he was knighted in 1569 and was chosen member of parliament for Southampton in 1572. His connexion with Ireland, where the quarter part of his public life was passed, began in 1579, when he was appointed vice-treasurer of that country; this position was a very thankless and difficult one, and Wallop appears to have undertaken it very unwillingly. However, he reached Dublin and was soon immersed in the troubles caused by the rebellion of Gerald Fitzgerald, earl of Desmond, finding, in his own words, it was "easier to talk at home of Irish wars than to be in them." In July 1582 he and Adam Loftus, archbishop of Dublin, were appointed lords justices, and they were responsible for the government of Ireland for just two years, after which they were succeeded by Sir John Perrot. Sir Henry continued to fill the office of vice-treasurer, and at Enniscorthy, where he had secured a lease of lands, he set up a colony of Englishmen and opened up a trade with Madeira. As a member of the Irish council he quarrelled with Perrot, and then from 1589 to 1595 he was in England, entertaining the queen at Farleigh Wallop in 1591. Having returned to Ireland he was sent to Dundalk to attempt to make peace with Hugh O'Neill, earl of Tyrone, but this proved a vain errand. At length, after many entreaties, he was allowed to resign the treasurership, but before he could arrange to leave Ireland he died on the 14th of April 1599.

Wallop's eldest son, Sir Henry Wallop (1568–1642), who acted as his father's deputy in Ireland, left an only son, Robert Wallop (1601–1667). A member of parliament for nearly forty years, and a supporter of the parliamentary party, Robert was one of the judges of Charles I., although he did not sign the death warrant. He was active under the Commonwealth, being a member of nearly all the councils of state. At the restoration he was deprived of his estates and was imprisoned, and he died in the Tower of London on the 19th of November 1667. Robert's son Henry (d. 1673) was the grandfather of John Wallop, 1st earl of Portsmouth.

WALLOP, SIR JOHN (*c.* 1490–1551), English soldier and diplomatist, belonged to an old Hampshire family. Adopting the profession of arms, he commanded ships which took part in the war between England and France in 1513 and 1514; later he served the king of Portugal against the Moors, and then he fought for his own sovereign in Ireland and in France. In 1526 Wallop began his diplomatic career, being sent on an errand to Germany by Henry VIII., and from 1532 to 1541 he passed much of his time in Paris and elsewhere in France as the representative of the English king. He filled several other public positions, including that of lieutenant of Calais, before January 1541, when he was suddenly arrested on a charge of treason; his offence, however, was not serious and in the same year he was made captain of Guines. In 1543 he led a small force to help the emperor Charles V. in his invasion of France, and he remained at his post at Guines until his death there on the 13th of July 1551.

WALLQVIST, OLAF (1755–1800), Swedish statesman and ecclesiastic, was ordained in 1776, became doctor of philosophy in 1779, court preacher to Queen Louisa Ulrica in 1780, and bishop of Vexiö in 1787. He attracted the attention of Gustavus III. by his eloquent preaching at the fashionable St Clara church at Stockholm. Gustavus at once took the young priest by the hand, appointed him, at twenty-five, one of his chaplains; made him a canon before he was thirty and a bishop at thirty-two, and finally placed him at the head of the newly appointed commission for reforming the ecclesiastical administration of the country. Thus at thirty-four Wallqvist had nothing more to hope for but the primacy, which would infallibly have been his also had the archbishop died during the king's lifetime. Wallqvist was, however, much more of a politician than a churchman. His knowledge of human nature, inexhaustible energy, dauntless confidence and diplomatic finesse made him indispensable Gustavus III. His seductive manners too often won over those whom his commanding eloquence failed to convince. His political career began during the mutinous *riksdag* of 1786, when he came boldly forward as one of the royalist leaders. But it was at the stormy *riksdag* of 1789 that Wallqvist put forth all his powers. The retirement of the timid primate left him without an equal in the Estate of Clergy, and it was very largely due to his co-operation that the king was able to carry through the famous "Act of Unity and Security" which converted Sweden from a constitutional into a semi-absolute monarchy. Nevertheless, even the combative Wallqvist was appalled when on the 16th of February 1789 the king privately informed him that he meant on the following day soundly to trounce the Estate of Nobles in the presence of the three other estates and bend them to his royal will. A friend of compromise, like most of the men of his cloth, Wallqvist dissuaded all revolutionary expedients at the outset, though when the king proved immovable the bishop materially smoothed the way before him. At this memorable *riksdag* Wallqvist exhibited, moreover, financial ability of the highest order, and, as president of the ecclesiastical commission, assisted to equilibrate the budget and find the funds necessary for resuming the war with Russia. During the brief *riksdag* of 1792, as a member of the secret committee, Wallqvist was at the very centre of affairs and rendered the king essential services. Indeed it may be safely said that Gustavus III., during the last six years of his reign, mainly depended upon Wallqvist and his clerical colleague, Carl Gustaf Nordin (*q.v.*), who were patriotic enough to subordinate even their private enmity to the royal service. During the Reuterholm (*q.v.*) administration, Wallqvist, like the rest of the Gustavians, was kept remote from court. In 1800 he was recalled to the political arena. But his old rivalry with Nordin was resumed at the same time, and when the latter defeated a motion of the bishop's in the Estate of Clergy, at the diet of Norrköping, Wallqvist from sheer vexation had a stroke of apoplexy and died the same day (30th of April 1800).

As bishop of Vexiö, Wallqvist was remarkable for his extraordinary administrative ability. He did much for education and for the poorer clergy, and endowed the library of the gymnasium with 6000 volumes. As an author also he was more than distinguished. His *Ecclesiastica Samlingar* testify to his skill and diligence as a collector of MSS., while his *Minnen ock Bref*, ed: E. V. Montan (Stockholm, 1878), is one of the most trustworthy and circumstantial documents relating to the Gustavian era of Swedish history.

See R. N. Bain, *Gustavus III. and his Contemporaries* (London, 1895, vol. ii.); *O. Wallqvists Själfiografiska anteckningar* (Upsala, 1850); and J. Rosengren, *Om O. Wallqvist såsom Biskop ock Eforus* (Vexiö, 1901). (R. N. B.)

WALLSEND, a municipal borough in the Tyneside parliamentary division of Northumberland, England, on the north bank of the Tyne, 3¾ m. E.N.E. of Newcastle by a branch of the North-Eastern railway. Pop. (1891) 11,257; (1901) 20,918. The church of St Peter dates from 1809. There are remains of the church of the Holy Cross in transitional Norman style. At an early period Wallsend was famous for its coal, but the name has now a general application to coal that does not go through a sieve with meshes five-eighths of an inch in size. The colliery, which was opened in 1807, has frequently been the scene of dreadful accidents, notably on the 23rd of October 1821, when 52 lives were lost. There are ship and boat building yards, engineering works, lead and copper smelting works, cement works and brick and tile works. In the river are two pontoon docks and an immense dry dock. Wallsend was incorporated in 1901, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 1202 acres.

Wallsend derives its modern name from its position at the eastern extremity of the Roman Hadrian's Wall; and there was a Roman fort here. It had a quay, of which remains have been discovered, and possessed a magazine of corn and other provisions for the supply of the stations in the interior.

WALMER, a watering-place, and member of the Cinque Port of Sandwich, in the St Augustine's parliamentary division of

Kent, England, 2 m. S. of Deal, on the South-Eastern & Chatham railway. Pop. of urban district (1901) 5248. Lower Walmer, the portion most frequented by visitors, extends northward along the coast, so as to be contiguous with Deal. Upper Walmer is a short distance inland, and below it Walmer Castle lies close to the sea. This was a blockhouse built for coast defence by Henry VIII., but became the official residence of the Lords Warden of the Cinque Ports, and was in consequence much altered from its original condition. It ceased to be the official residence in 1905, when the prince of Wales (afterwards George V.) was appointed Lord Warden, and the public was given access to those rooms which possess historical associations with former holders of the office, such as the duke of Wellington, who died here in 1852, William Pitt and others. Kingsdown, 1 m. south, is a decayed member of the Cinque Port of Dover.

WALMISLEY, THOMAS ATTWOOD (1814–1856), English musician, was born in London, his father Thomas Forbes Walmisley (1783–1866) being a well-known organist and composer of church music and glees. Thomas Attwood (*q.v.*) was his godfather, and the boy was educated in music under their tuition. He became organist at Trinity College, Cambridge, in 1833, and there he soon became prominent by his anthems and other compositions. He not only took the degrees of Mus.Bac. and Mus.Doc., but also graduated at Jesus College as B.A. and M.A. In 1836 he was made professor of music. His *Cathedral Music* was edited after his death by his father.

WALNUT (*Juglans*), a botanical genus of about ten species (nat. ord. *Juglandaceae*), natives of the temperate regions of the northern hemisphere, extending into Mexico, the West Indies and tropical South America. They are all trees, usually of large size, with alternate stalked, unequally pinnate leaves, and abounding in an aromatic resinous juice. The scars left by the fallen leaves are unusually large and prominent. The buds are not unlike those of the ash; and it frequently happens that in the axils of the leaves, instead of one, several buds may be formed. The utility of this is seen in seasons when the shoot produced from the first bud is killed by frost; then one of the supplementary buds starts into growth, and thus replaces the injured shoot. The flowers are unisexual and monoecious, the numerous males borne in thick catkins proceeding from the side of last year's shoot. The female flowers are solitary or few in number, and borne on short terminal spikes of the present season's growth. In the male flower the receptacle is "concrescent" or inseparate from the bract in whose axil it originates. The receptacle is, in consequence, extended more or less horizontally so that the flowers appear to be placed on the upper surface of horizontally spreading stalks. The perianth consists of five or six oblong greenish lobes, within which is found a tuft, consisting of a large number of stamens, each of which has a very short filament and an oblong two-lobed anther bursting longitudinally, and surmounted by an oblong lobe, which is the projecting end of the connective. There is usually no trace of ovary in the male flowers, though by exception one may occasionally be formed.

The female flower consists of a cup-like receptacle, inseparate from the ovary, and bearing at its upper part a bract and two bracteoles. From the margin springs a perianth of four short lobes. The one-celled ovary is immersed within the receptacular tube, and is surmounted by a short style with two short ribbon-like stigmatic branches. The solitary ovule springs erect from the base of the ovarian cavity. The fruit is a kind of drupe, the fleshy husk of which is the dilated receptacular tube, while the two-valved stone represents the two carpels. The solitary seed has no perisperm or albumen, but has two large and curiously crumpled cotyledons concealing the plumule, the leaves of which, even at this early stage, show traces of pinnae.

The species best known is *J. regia*, the common walnut, a the mountains of Greece, of Armenia, of Afghanistan alayas. Traces of the former existence allied species are found in the Post- e and elsewhere, proving the former much wider extension of the species. At the present day the tree is largely cultivated in most temperate countries for the sake of its timber or for its edible nuts. The timber is specially valued for furniture and cabinet work and for gunstocks, the beauty of its markings rendering it desirable for the first-named purpose, while its strength and elasticity fit it for the second. The leaves and husk of the fruit are resinous and astringent, and are sometimes used medicinally as well as for dyeing purposes. A *Spiritus Nucis Juglandis* is given as an antispasmodic. It doubtless owes its properties to the alcohol which it contains. Sugar is also prepared from the sap in a similar manner to that obtained from the maple. The young fruits are used for pickling. When ripe the seeds are much esteemed as a delicacy, while in France much oil of fine quality is extracted from them by pressure. There are several varieties in cultivation, varying in the degree of hardihood, time of ripening, thickness of shell, size and other particulars. In the climate of Great Britain a late variety is preferable, as securing the young shoots against injury from frost, to which otherwise they are very subject. The kernel of the large-fruited variety is of very indifferent quality, but its large shells are made use of by the French as trinket cases.

The walnut is mentioned in the earliest British botanical writings, and is supposed to have been introduced by the Romans. It grows well, and ripens its fruit in the southern and midland counties of England; but large trees may be seen as far north as Ross-shire in sheltered places. The tree succeeds in deep, sandy or calcareous loams, and in stiff loams resting on a gravelly bottom. It requires free exposure to air and light. It is propagated by seeds, and occasionally by budding, grafting or inarching for the perpetuation of special varieties. Seedlings should be protected from frost during the first winter. The trees form their heads naturally, and therefore little pruning is required, it being merely necessary to cut off straggling growths, and to prevent the branches from interlacing. The best time for performing this is in the autumn, just after the fall of the leaf. Plants raised from the seed seldom become productive till they are twenty years old. The fruit is produced at the extremities of the shoots of the preceding year; and therefore, in gathering the crop, care should be taken not to injure the young wood. In some parts of England the trees are thrashed with rods or poles to obtain the nuts, but this is not a commendable mode of collecting them.

Among the American species *J. nigra*, the black walnut, is especially noteworthy as a very handsome tree, whose timber is of great value for furniture purposes, but which is now becoming scarce. In Britain it forms a magnificent tree. The white walnut or butternut, *J. cinerea*, is a smaller tree, though it sometimes reaches 100 ft. in height; its inner bark yields an extractive, *juglandin*, given as an hepatic stimulant and cathartic in doses of 2-5 grains.

Closely allied to the walnuts, and sometimes confounded with them, are the hickories.

WALPOLE, HORATIO or HORACE (1717–1797), English politician and man of letters, 4th earl of Orford—a title to which he only succeeded at the end of his life, and by which he is little known—was born in Arlington Street, London, on the 24th of September 1717. He was the youngest of the five children of the 1st earl of Orford (Sir Robert Walpole) by Catherine Shorter, but by some of the scandal-mongers of a later age, Carr, Lord Hervey, half-brother of John, Lord Hervey, afterwards second earl of Bristol, has been called his father. If this rumour be correct, no such suspicion ever entered into the mind of Horace Walpole. To his mother he erected a monument, with an inscription couched in terms of sincere affection, in the chapel of Henry VII. in Westminster Abbey, and from the beginning to the end of his public life his sarcasms never spared the Newcastles and the Hardwickes, who had shown, as he thought, lukewarmness in support of his father's ministry. On the 26th of April 1727 he was sent to Eton, where he formed what was known as the "Quadruple Alliance" with Thomas Gray, Richard West and Thomas Ashton, and became very intimate with Henry Seymour Conway, George Augustus Selwyn and the two Montagus, and in 1735 matriculated at King's College, Cambridge. Two years (1739–1741) were spent in Gray's company in the recognized grand tour of France and Italy. They stopped a few weeks in Paris, and lingered for three months at Rheims, on the pretence of learning the French language. Henry Seymour Conway, whose mother was a sister of Lady Walpole, shared their society in the French city. The other two members of this little circle next proceeded to Florence, where Walpole rested for more than a year in the villa of Horace Mann, the British envoy-extraordinary for forty-six years to the court of Tuscany. Mann's family had long been on terms of the closest intimacy with his guests, and they continued correspondents until 1786. As they never met again, their friendship, unlike most of Walpole's attachments, remained unbroken. After a short visit to Rome (March-June 1740), and after a further sojourn at Florence, Walpole and Gray parted in resentment at Reggio. Walpole in after years took the blame of this quarrel on himself, and it is generally believed that it arose from his laying too much stress on his superiority in position. In 1744 the two friends were nominally reconciled, but the breach was not cemented.

Walpole came back to England on the 12th of September 1741. He had been returned to parliament on the 14th of May 1741 for the Cornish borough of Callington, over which his elder brother, through his marriage with the heiress of the Rolles, exercised supreme influence. He represented three constituencies in succession, Callington 1741–1754, the family borough of Castle Rising from 1754 to 1757, and the more important constituency of King's Lynn, for which his father had long sat in parliament, from the latter date until 1768. In that year he retired, probably because his success in political life had not equalled his expectations, but he continued until the end of his days to follow and to chronicle the acts and the speeches of both houses of parliament. Through his father's influence he had obtained three lucrative sinecures in the exchequer, and for many years (1745–1784) he enjoyed a share, estimated at about £1500 a year, of a second family perquisite, the collectorship of customs. These resources, with a house in Arlington Street, which was left to him by his father, enabled him, a bachelor all his days, to gratify his tastes. He acquired in 1747 the lease and in the next year purchased the reversion of the charmingly situated villa of Strawberry Hill, near Twickenham, on the banks of the Thames. Six years later he began a series of alterations in the Gothic style, not completed for nearly a quarter of a century later, under which the original cottage became transformed into a building without parallel in Europe. On the 25th of June 1757 he established a printing-press there, which he called "Officina Arbuteana," and many of the first editions of his own works were struck off within its walls. Through Walpole's influence Dodsley published in 1753 the clever, if eccentric, designs of Richard Bentley (the youngest child of the great scholar, and for some time a *protégé* of Horace Walpole) for the poems of Gray. The first work printed at Strawberry Hill was two odes of Gray (8th of August 1757), and among the reprints were the *Life of Lord Herbert of Cherbury*, *Memoirs of Grammont*, Hentzner's *Journey into England*, and Lord Whitworth's *Account of Russia*. The rooms of this whimsical edifice were crowded with curiosities of every description, and the house and its contents were shown, by tickets to admit four persons, between 12 and 3 from May to October, but only one party was admitted on each day, and the owner, although enamoured of notoriety, simulated discontent at this limited intrusion into his privacy. Walpole paid several visits to Paris, where he made the acquaintance of Madame du Deffand (*q.v.*) in 1765, and they corresponded until her death in 1780. His nephew, the reckless 3rd earl, died on the 5th of December 1791, and Horace succeeded to the peerage, but he never took his place in the House of Lords, and sometimes signed his name as "the uncle of the late earl of Orford." All his life long he was a victim of the gout, but he lived to extreme old age, and died unmarried, in Berkeley Square, London, to which he had removed in October 1779, on the 2nd of March 1797. He was buried privately at Houghton. The family estate descended to the earl of Cholmondeley, whose ancestor had married Horace Walpole's younger sister. All Walpole's printed books and manuscripts were left to Robert Berry (d. 19th of May 1817) and his two daughters, Mary (1763–1852) and Agnes (1764–1852), and Mary Berry edited the five volumes of Walpole's works which were published in 1798. Their friendship had been very dear to the declining days of Walpole, who, it has even been said, wished to marry Mary Berry. By his will each of the ladies obtained a pecuniary legacy of £4000, and for their lives the house and garden, formerly the abode of his friend Kitty Clive, which adjoined Strawberry Hill. Strawberry Hill went to Mrs Anne Damer, daughter of his lifelong friend General Conway, for her life, but it was entailed on his niece the countess dowager of Waldegrave and her heirs. The collections of Strawberry Hill, which he had spent nearly fifty years in amassing, were dispersed under the hammer of George Robins in 1842. They are described in a catalogue of that date, and in a series of articles in the *Gentleman's Magazine* for that year.

The pen was ever in Horace Walpole's hands, and his entire compositions would fill many volumes. His two works of imagination, the romance of the *Castle of Otranto* (1764) and the tragedy of the *Mysterious Mother* (1768), are now all but forgotten. The *Castle of Otranto*, purporting to be a story translated by William Marshal, gent., from the original Italian of Onuphrio Muralto, canon of the church of St Nicholas at Otranto, was often reprinted in England, and was translated into both French and Italian. By Sir Walter Scott it was lauded to the skies for its power in raising the passions of fear and pity, but from Hazlitt it met with intense condemnation; its real importance, however, lies in the fact that it started the romantic revival. The *Mysterious Mother*, a tragedy too horrible for representation on any stage, was never intended for performance in public, and only fifty copies of it were printed at Strawberry Hill. By Byron, who, like Horace Walpole, affected extreme liberalism, and like him never forgot that he was born within the purple, this tragedy was pronounced "of the highest order." Several of Walpole's antiquarian works merit high praise. The volume of *Historic Doubts on the Life and Reign of King Richard the Third* (1760), one of the earliest attempts to rehabilitate a character previously stamped with infamy, showed acuteness and research. These doubts provoked several answers, which are criticized in a supplement edited by Dr E. C. Hawtrey for the Philobiblon Society (1854). A work of more lasting reputation, which has retained its vitality for more than a century, is entitled *Anecdotes of Painting in England, with some Account of the Principal Artists; collected by George Vertue, and now digested and published from his original manuscripts by Horace Walpole* (4 vols., 1762–1771). Its value to art students and to admirers of biographical literature demanded its frequent reproduction, and it was re-edited with additions by the Rev. James Dallaway in five volumes (1826–1828), and then again was revised and edited by R. N. Wornum in 1849. A cognate volume, also based on the materials of Vertue, is entitled the *Catalogue of Engravers Born and Resident in England* (1763), which, like its more famous predecessor, often passed through the press. On the *Catalogue of Royal and Noble Authors of England* (1758) Walpole spent many hours of toilsome research. The best edition is that which appeared in five volumes, in 1806, under the competent editorship of Thomas Park, who carefully verified and diligently augmented the labours of the original author. As a senator himself, or as a private person following at a distance the combats of St Stephen's, Walpole recorded in a diary the chief incidents in English politics. For twenty-seven years he studied, a silent spectator for the most part, the characters of the chief personages who trod the stage of politics, and when he quitted the scene he retained the acquaintance of many of the chief actors. If he was sometimes prejudiced, he rarely distorted the acts of those whom he disliked; and his prejudices, which lie on the surface, were mainly against those whom he considered traitors to his father These diaries extend from 1750 to 1783, and cover a period of momentous importance in the annals of the national history. The *Memoirs of the Last Ten Years of the Reign of George II.* was edited by Lord Holland (1846); its successor, *Memoirs of the Reign of King George III.*, was published under the editorial care of Sir Denis Le Marchant (4 vols., 1845), and re-edited in 1894 by Mr G. F. Russell Barker; the last volumes of the series, *Journal of the Reign of George III. from 1771 to 1783*, were edited and illustrated by John Doran (2 vols., 1859), and were edited with an introduction by A. F. Steuart (London, 1909). To these works should be added the *Reminiscences* (2 vols., 1819), which Walpole wrote in 1788 for the gratification of the Misses Berry. These labours would in themselves have rendered the name of Horace Walpole famous for all time, but his delightful *Letters* are the crowning glory of his life. His correspondents were numerous and widespread, but the chief of them were William Cole (1714–1782), the clerical antiquary of Milton; Robert Jephson, the dramatist; William Mason, the poet; Lord Hertford during his embassy in Paris; the countess of Ossory; Lord Harcourt; George Montagu, his friend at Eton; Henry Seymour Conway (1721–1795) and Sir Horace Mann. With most of these friends he quarrelled, but the friendship of the last two, in the former case through genuine liking, and in the latter through his fortunate absence from England, was never interrupted. The *Letters* were published at different dates, but the standard collection is that by Mrs Paget Toynbee (1903-1905), and to it should be added the volumes of the letters addressed to Walpole by his old friend Madame du Deffand (4 vols., 1810). Dr Doran's publication, *Mann and Manners at the Court of Florence* (1876), is founded on the epistles sent in return to Walpole by the envoy-extraordinary. Other works relating to him are *Horace Walpole and his World*, by L. B Seeley (1884); *Horace Walpole*, a memoir by Austin Dobson (1890 and 1893); *Horace Walpole and the Strawberry Hill Press*, by M. A. Havens (1901). Walpole has been called "the best letter-writer in the English language"; and few indeed are the names which can compare with his. In these compositions his very foibles are penned for our amusement, and his love of trifles—for, in the words of another Horace, he was ever "nescio quid meditans nugarum et totus in illis"—ministers to our instruction. To these friends he communicated every fashionable scandal, every social event, and the details of every political struggle in English life. The politicians and the courtiers of his day were more akin to his character than were the chief authors of his age, and the weakness of his intellectual perceptions stands out most prominently in his estimates of such writers as Johnson and Goldsmith, Gibbon and Hume. On many occasions he displayed great liberality of disposition, and he bitterly deplored for the rest of his days his neglect of the unhappy Chatterton. Chatterton wrote to Walpole in 1769, sending some prose and verse fragments and offering to place information on English art in Walpole's hands. Encouraged by a kindly reply, Chatterton appealed for help. Walpole made inquiries and came to the conclusion that he was an imposter. He finally returned the manuscripts in his possession, and took no notice of subsequent letters from Chatterton.

Abundant information about Horace Walpole will be found in the *Memoirs* of him and of his contemporaries edited by Eliot Warburton (1851), J. H. Jesse's *George Selwyn and his Contemporaries* (4 vols., 1843–1844) and the extracts from the journals and correspondence of Miss Berry (3 vols., 1866); and it would be unpardonable to omit mention of Macaulay's sketch of Walpole's life and character.

(W. P. C.)

WALPOLE, SIR SPENCER (1839–1907), English historian and civil servant, was born on the 6th of February 1839. He came of the younger branch of the family of the famous Whig prime minister, being descended from his brother, the 1st lord Walpole of Wolterton. He was the son of the latter's great-grandson, the Right Hon. Spencer Horatio Walpole (1807–1898), thrice home secretary under Lord Derby, and through his mother was grandson of Spencer Perceval, the Tory prime minister who was murdered in the House of Commons. He was educated at Eton, and from 1858 to 1867 was a clerk in the War Office, then becoming an inspector of fisheries. In 1882 he was made lieutenant-governor of the Isle of Man, and from 1893 to 1899 he was secretary to the Post Office. In 1898 he was created K.C.B. Although well known as a most efficient public servant, and in private life as the most amiable of men, Sir Spencer Walpole's real title to remembrance is as an historian. His family connexions gave him a natural bent to the study of public affairs, and their mingling of Whig and Tory in politics contributed, no doubt, [illegible] dicious balance—inclining, however, to the Whig or moderate Liberal side—which, together with his sanity and accuracy, is so characteristic of his writings. His principal work, the *History of England from 1815* (1878–1886), in six volumes, was carried down to 1858, and was continued in his *History of Twenty-Five Years* (1904). Among his other publications come his lives of Spencer Perceval (1894) and Lord John Russell (1889), and a volume of valuable *Studies in Biography* (1906); and he wrote the section of the article ENGLISH HISTORY, dealing in detail with the reign of Queen Victoria, for the *Encyclopaedia Britannica*. He died on the 7th of July 1907.

WALPOLE OF WOLTERTON, HORATIO, 1ST BARON (1678–1757), English diplomatist, was a son of Robert Walpole of Houghton, Norfolk, and a younger brother of the great Sir Robert Walpole. The Walpoles owned land in Norfolk in the 12th century and took their name from Walpole, a village in the county. An early member of the family was Ralph de Walpole, bishop of Norwich from 1288 to 1299, and bishop of Ely from 1299 until his death on the 20th of March 1302. Among its later members were three brothers, Edward (1560–1637), Richard (1564–1607) and Michael (1570–c. 1624), all members of the Society of Jesus. Another Jesuit in the family was Henry Walpole (1558–1595), who wrote *An Epitaph of the life and death of the most famous clerk and virtuous priest Edmund Campion*. After an adventurous and courageous career in the service of the order, he was arrested on landing in England, was tortured and then put to death on the 17th of April 1595.[1]

Born at Houghton on the 8th of December 1678 and educated at Eton and King's College, Cambridge, Horatio Walpole became a fellow of King's and entered parliament in 1702, remaining a member for fifty-four years. In 1715, when his brother, Sir Robert, became first lord of the treasury, he was made secretary to the treasury, and in 1716, having already had some experience of the kind, he went on a diplomatic mission to The Hague. He left office with his brother in 1717, but he was soon in harness again, becoming secretary to the lord-lieutenant of Ireland in 1720 and secretary to the treasury a second time in 1721. In 1722 he was again at The Hague, and in 1723 he went to Paris, where in the following year he was appointed envoy extraordinary and minister plenipotentiary. He got on intimate terms with Fleury and seconded his brother in his efforts to maintain friendly relations with France; he represented Great Britain at the congress of Soissons and helped to conclude the treaty of Seville (November 1729). He left Paris in 1730 and in 1734 went to represent his country at The Hague, where he remained until 1740, using all his influence in the cause of European peace. After the fall of Sir Robert Walpole in 1742 Horatio defended his conduct in the House of Commons and also in a pamphlet, *The Interest of Great Britain steadily pursued*. Later he wrote an *Apology*, dealing with his own conduct from 1715 to 1739, and an *Answer to the latter part of Lord Bolingbroke's letters on the study of history* (printed 1763). In 1756 he was created Baron Walpole of Wolterton, this being his Norfolk seat, and he died on the 5th of February 1757. His eldest son, Horatio, the 2nd baron (1723–1809), was created earl of Orford in 1806, and one of his sons was Major-General George Walpole (1758–1835), under-secretary for foreign affairs in 1806.

See W. Coxe, *Memoirs of Horatio, Lord Walpole* (2nd ed., 1808); the same writer, *Memoirs of Sir Robert Walpole* (1816); and Charles, comte de Baillon, *Lord Walpole à la cour de France* (1867).

WALPURGIS (WALPURGA or WALBURGA),[2] **ST** (d. c. 780), English missionary to Germany, was born in Sussex at the beginning of the 8th century. She was the sister of Willibald, the first bishop of Eichstätt in Bavaria, and Wunnibald, first abbot of Heidenheim. Her father, Richard, is thought to have been a son of Hlothere, 9th king of Kent; her mother, Winna or Wuna, a sister of St Boniface. At the instance of Boniface and Willibald she went about 750 with some other nuns to found religious houses in Germany. Her first settlement was at Bischofsheim in the diocese of Mainz, and two years later (754) she became abbess of the Benedictine nunnery at Heidenheim in the diocese of Eichstätt. On the death of Wunnibald in 760 she succeeded him in his charge also, retaining the superintendence of both houses until her death. Her relics were translated to Eichstätt, where she was laid in a hollow rock, from which exuded a kind of bituminous oil afterwards known as Walpurgis oil, and regarded as of miraculous efficacy against disease. It is still said to exude from the saint's bones (especially from October to February) and was chosen by Cardinal Newman as an example of a credible miracle. The cave became a place of pilgrimage, and a fine church was built over the spot. Walpurgis is commemorated at various times, but principally on the 1st of May, her day taking the place of an earlier heathen festival which was characterized by various rites marking the beginning of summer. She is regarded as the protectress against magic arts (cf. the Walpurgis-Nacht dance in Goethe's *Faust*). In art she is represented with a crozier, and bearing in her hand a flask of balsam.

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[1] The *Letters of Henry Walpole, S.J.*, from the original manuscripts at Stonyhurst College, were edited by the Rev. Augustus Jessopp for private circulation (1873). See the Rev. A. Jessopp, *One Generation of a Norfolk House* (1878).

[2] French forms of the name are Gualbourg, Falbourg, Vaubourg and Avougourg.

Her life was written by the presbyter Wolfhard and dedicated to Erkenbald, bishop of Eichstätt (884–916). See the Bollandist *Acta sanctorum*, vol. iii. February 25. On Walpurgis, Willibald and Wunnibald see G. F. Browne, *Boniface of Crediton and his Companions* (London, 1910), vii.

WALRAS, MARIE ESPRIT LÉON (1834–1910), French economist, was born at Évreux in 1834. From 1866 to 1868 he edited a journal called *Le Travail*, to which he contributed many valuable sociological articles. In 1870 he was appointed professor of political economy at Lausanne, a post which he retained until his retirement in 1892. He died on the 4th of January 1910. Walras is best known for his mathematical treatment of economics, and the extreme care he has shown in his works in distinguishing theory and practice. His most important works are *Éléments d'économie politique pure* (1874–1877) and *Théorie mathématique de la richesse sociale* (1883).

Of his many valuable papers contributed to various periodicals a good bibliography will be found in the *Dict. Pol. Econ.* iii. 654. See biographical notice in *Economic Journal* (March, 1910) by Vilfredo Pareto, his successor in the chair of political economy at Lausanne.

WALRUS, or **Morse** (*Odobaenus rosmarus*), a large marine mammal allied to the seals, representing a family by itself. The former word is a modification of the Scandinavian *vallross* or *hvalros* ("whale-horse"), the latter an adaptation of the Russian name for the animal. A full-grown male walrus measures from 10 to 11 ft. from the nose to the end of the short tail, and is a heavy, bulky animal, especially thick about the shoulders. The head is rounded, the eyes are rather small, and there are no external ears. The muzzle is short and broad, with, on each side, a group of stiff, bristly whiskers, which become stouter and shorter in old animals. The tail scarcely projects beyond the skin. The fore-limbs are free only from the elbow; the fore-flipper is broad, flat and webbed, the five digits being of nearly equal length, but the first slightly the longest. Each digit has a small flattened nail, situated on the inner surface at a considerable distance from the end. The hind-limbs are enclosed in the skin of the body, almost to the heel. The free portion when expanded is fan-shaped, the two outer toes (first and fifth) being the longest, especially the latter. Flaps of skin project considerably beyond the bones of the toes. The nails of the first and fifth toes are minute and flattened; those of the second, third and fourth elongated, sub-compressed and pointed. The soles of both fore and hind feet are bare, rough and warty. The surface of the skin generally is covered with short, adpressed hair of a light yellowish-brown colour, which, on the under parts of the body and base of the flippers, passes into dark reddish-brown or chestnut. In old animals the hair becomes more scanty, sometimes almost disappearing, and the skin shows evidence of the rough life and pugnacious habits of the animal in the scars with which it is usually covered. It is everywhere more or less wrinkled, especially over the shoulders, where it is thrown into deep and heavy folds.

One of the most striking characteristics of the walrus is the pair of tusks which descend almost directly downwards from the upper jaw, sometimes attaining a length of 20 in. or more. In the female they are as long or sometimes longer than in the male, but less massive. In the young of the first year they are not visible. These tusks correspond to the canine teeth of other mammals. All the other teeth, including the lower canines, are much alike—small, simple and one-rooted, and with crowns, rounded at first, but wearing to a flat or concave surface. Many of the teeth are lost early, or remain through life in a rudimentary state concealed beneath the gum. The tusks are formidable weapons of defence, but their principal use seems to be scraping and digging among sand and shingle for the molluscs and crustaceans on which the walrus feeds. They are said also to aid in climbing up the slippery rocks and ledges of ice on which so much of the animal's life is passed.

Walruses are more or less gregarious in their habits, being met with generally in companies or herds of various sizes. They are only found near the coast or on large masses of floating ice, and rarely far out in the open sea; and, though often moving from one part of their feeding-ground to another, have no regular migrations. Their young are born between April and June, usually but one at a time, never more than two. Their strong affection for their young, and their sympathy for each other in danger, have been noticed by all who have had the opportunity of observing them in their haunts. When one is wounded the whole herd usually join in defence. Although harmless and inoffensive when not molested, they exhibit considerable fierceness when attacked, using their tusks with tremendous effect either on human enemies who come into too close quarters or on polar bears, the only other adversary they can meet with in their own natural territory. The voice, a loud roaring, which can be heard at a great distance, is described by Dr Kane as "something between the mooing of a cow and the deepest baying of a mastiff, very round and full, with its bark or detached notes repeated rather quickly seven or nine times in succession."

The Atlantic Walrus (*Odobaenus rosmarus*).

The principal food of the walrus consists of bivalve molluscs, especially *Mya truncata* and *Saxicava rugosa*, two species very abundant in the Arctic regions, which it digs up from the mud and sand in which they lie buried at the bottom of the sea by means of its tusks. It crushes and removes the shells by the aid of its grinding teeth and tongue, and swallows only the soft parts of the animal. It also feeds on other molluscs, sand-worms, star-fishes and shrimps. Portions of various kinds of seaweed have been found in its stomach, but whether swallowed intentionally or not is doubtful.

The commercial products of the walrus are its oil, hide (used to manufacture harness and sole-leather and twisted into tiller-ropes) and tusks. The ivory of the latter is, however, inferior in quality to that of the elephant. Its flesh forms an important article of food to the Eskimo and Chukchi. Of the coast tribes of the last-named people the walrus formed the chief means of support.

Walruses are confined to the northern circumpolar regions, extending apparently as far north as explorers have penetrated. On the Atlantic coast of America the Atlantic species was met with in the 16th century as low as the southern coast of Nova Scotia, and in the last century was common in the Gulf of St Lawrence and on the shores of Labrador. It still inhabits the coast round Hudson's Bay, Davis Strait and Greenland, where, however, its numbers are decreasing. It is not found on the Arctic coast of America between the 97th and 158th meridians. In Europe, occasional stragglers have reached the British Isles; and it was formerly abundant on the coasts of Finmark. It is rare in Iceland, but Spitzbergen, Novaia Zemblia and the western part of the north coast of Siberia are constant places of resort. The North Pacific, including both sides of Bering Strait, northern Kamchatka, Alaska and the Pribyloff Islands are also the haunts of numerous walruses, which are isolated from those of the North Atlantic by long stretches of coast in Siberia and North America where they do not occur. The Pacific walrus appears to be as large as, if not larger than, that of the Atlantic; its tusks are longer and more slender, and curved inwards; and the whiskers are smaller, and the muzzle relatively deeper and broader. These and certain other differences have led to its being considered specifically distinct, under the name of *Odobaenus obesus*. Its habits appear to be similar to those of the Atlantic form. Though formerly found in immense herds, it is becoming scarce, as the methods of destruction used by American whalers are more certain than those of the Chukchi, to whom the walrus long afforded the principal means of subsistence.

Fossil remains of walruses and closely allied animals have been found in the United States, and in England, Belgium and France, in deposits of late Tertiary age. (W. H. F.; R. L.*)

WALSALL, a market town and municipal, county and parliamentary borough of Staffordshire, England, on the northern edge of the Black Country, and on a tributary stream of the Tame. Pop. (1891) 71,789; (1901) 86,430. It is 120¾ m. N.W. from London by the London & North-Western railway, on which system it is a centre of several branches, and is served by the Birmingham-Wolverhampton branch of the Midland railway and by canals. The town, though of ancient foundation, is modern in appearance. The central part stands high on a ridge at the northward termination of which is the church of St Matthew, dating in part from the 15th century, but almost wholly rebuilt. The council house and town hall was completed in 1905; there are two theatres, a free library and museum, and an institute of science and art. Recreation grounds include a picturesque arboretum, Reed's Wood and Palpey Park. Queen Mary's Schools are a foundation of 1554; here are believed to have been educated John Hough (1651–1743), the president of Magdalen College, Oxford, whom James II. sought to eject from office, afterwards bishop of Oxford, Lichfield, and Worcester; and John, Lord Somers (1651–1716), Lord Keeper and Lord Chancellor of England. There are large charities, and Walsall was the scene of the charitable work of Sister Dora (Miss Pattison) whom a statue commemorates. Coal, limestone and ironstone are mined in the neighbourhood. The most important products are saddlery and leather-work, horses' bits and all metal harness fittings; there are iron and brass foundries, and locks, keys, bolts and other hardware are made, both in Walsall and at Bloxwich, a large industrial suburb. Three annual fairs are held. The parliamentary borough returns one member. The town is governed by a mayor, 8 aldermen and 24 councillors. Area, 7480 acres.

Walsall (*Waleshales*, *Walshall*, *Walsaler*) is included in the list of lands given in 996 to the church of Wolverhampton, which, however, did not retain it long. It was granted by Henry II. to Herbert Ruffus, and Henry III. confirmed it to his grandson (1227). Later the manor passed to the Bassets and the Beauchamps, and Warwick the King-maker held it in right of his wife. Henry VIII. granted it (1538) to Dudley, afterwards duke of Northumberland. William Ruffus in the reign of John granted to the burgesses in consideration of a fine of 12 marks silver and of a rent of [illegible]gage, all services, customs and secular demands belonging to him and his heirs, except tallage. Henry IV. confirmed to the burgesses a grant of freedom from toll on the ground that Walsall was ancient demesne of the Crown. A mayor and twenty-four brethren who formed the council of the borough are mentioned in 1440, but the earliest charter of incorporation is that of Charles I. (1627), confirmed in 1661, incorporating it under the title of "the Mayor and Commonalty of the Borough and Foreign of Walsall": under the act of 1835 the town was governed by a mayor, six aldermen and eighteen town councillors. It was not represented in parliament till 1832. Walsall had a merchant gild in 1390; in the 17th century it was already known for its manufacture of iron goods and nail-making. In the 18th century the staple industry was the making of chapes and shoe-buckles, and the town suffered when the latter went out of fashion. Two fairs, on Michaelmas day and September 21, were granted in 1399. The Tuesday market, which is still held, and two fairs on October 28 and May 6, were granted in 1417 to Richard Beauchamp, earl of Warwick.

See *Victoria County History, Stafford*; E. L. Glew, *History of the Borough and Foreign of Walsall* (1856).

WALSH, JOHN HENRY (1810–1888), English writer on sport under the pseudonym of "Stonehenge," was born at Hackney, London, on the 21st of October 1810. He was educated at private schools, and became a fellow of the Royal College of Surgeons in 1844. For several years he followed his profession of surgeon, but gradually abandoned it on account of the success of his works on the subject of sport. He removed from the country to London in 1852, and the following year brought out his first important book, *The Greyhound* (3rd ed. 1875), a collection of papers originally contributed to "Bell's Life." In 1856 appeared his *Manual of British Rural Sports*, which enjoyed many editions. During the same year he joined the staff of *The Field*, and became its editor at the close of 1857. Among his numerous books published under the name of "Stonehenge" are *The Shot-Gun and Sporting Rifle* (1859), *The Dog in Health and Disease* (1859; 4th ed. 1887), *The Horse in the Stable and in the Field* (1861; 13th ed. 1890), *Dogs of the British Isles* (1867; 3rd ed. 1885), *The Modern Sportsman's Gun and Rifle* (1882–1884). While editor of *The Field* Walsh instituted a series of trials of guns, rifles and sporting powders extending over a period of many years, which greatly tended to the development of sporting firearms; and his influence upon all branches of sport was stimulating and beneficial. He died at Putney on the 12th of February 1888.

WALSH, PETER [Valesius] (*c.* 1618–1688), Irish politician and controversialist, was born at Mooretown, co. Kildare, and studied at Louvain, where he joined the Franciscans and acquired Jansenist sympathies. In 1646 he went to Kilkenny, then in the hands of the rebel "confederate Catholics," and, in opposition to the papal nuncio Rinuccini, urged, and in 1649 helped to secure, peace with the viceroy Ormonde. Persecuted from this time by the irreconcilable supporters of the papal claims, and even in danger of death, after Cromwell's conquest of Ireland he lived obscurely in London and abroad. On the restoration he urged his patron Ormonde to support the Irish Roman Catholics as the natural friends of royalty against the sectaries, and endeavoured to mitigate their lot and efface the impression made by their successive rebellions by a loyal remonstrance to Charles II., boldly repudiating papal infallibility and interference in public affairs, and affirming undivided allegiance to the crown. For eight years he canvassed for signatures to this address, but in spite of considerable support the strenuous opposition of the Jesuits and Dominicans deterred the clergy and nearly wrecked the scheme. From 1669 until his death he lived in London, much respected for his honesty, loyalty and learning. Excommunicated by the Franciscan chapter-general in 1670, he remained a devout adherent of his church, although he maintained friendly relations with the Anglicans, accepting their orders and attending their churches. He made a full submission to Rome before his death, though the fact has been questioned. He wrote (1672–1684) a series of controversial letters against Pope Gregory VII.'s doctrine of papal supremacy over princes;

a voluminous *History of the Remonstrance* (1674); *Hibernica* (1682), a worthless history of Ireland; in 1686 a reply to the *Popery* of Thomas Barlow (1607–1691), bishop of Lincoln; and other works. In these writings he consistently upheld the doctrine of civil liberty against the pretensions of the papacy.

See S. R. Gardiner, *History of the Great Civil War*; G. Burnet, *History of his own Times*, i. 195; T. Carte, *Life of Ormonde* (new ed. 1851); *Dict. Nat. Biog.* lix.

WALSH, WILLIAM (1663–1708), English poet and critic, son of Joseph Walsh of Abberley, Worcestershire, was born in 1663. He entered Wadham College, Oxford, as a gentleman commoner in 1678. Leaving the university without a degree, he settled in his native county, and was returned M.P. for Worcester in 1698, 1701 and 1702. In 1705 he sat for Richmond, Yorkshire. On the accession of Queen Anne he was made "gentleman of the horse," a post which he held till his death, noted by Narcissus Luttrell on the 18th of March 1708. He wrote a *Dialogue concerning Women, being a Defence of the Sex* (1691), addressed to "Eugenia"; and *Letters and Poems, Amorous and Gallant* (preface dated 1692, printed in Jonson's *Miscellany*, 1716, and separately. 1736); love lyrics designed, says the author, to impart to the world "the faithful image of an amorous heart." It is not as a poet, however, but as the friend and correspondent of Pope that Walsh is remembered. Pope's *Pastorals* were submitted for his criticism by Wycherley in 1705, and Walsh then entered on a direct correspondence with the young poet. The letters are printed in Pope's *Works* (ed. Elwin and Courthope, vi. 49-60). Pope, who visited him at Abberley in 1707, set great value upon his opinion. "Mr Walsh used to tell me," he says, "that there was one way left of excelling; for though we had several great poets, we never had any one great poet that was correct, and he desired me to make that my study and my aim." The excessive eulogy accorded both by Dryden and Pope to Walsh must be accounted for partly on the ground of personal friendship. The life of Virgil prefixed to Dryden's translation, and a "Preface to the Pastorals with a short defence of Virgil, against some of the reflections of Monsieur Fontenella," both ascribed at one time to Walsh, were the work of Dr Knightly Chetwood (1650–1720). In 1704 Walsh collaborated with Sir John Vanbrugh and William Congreve in *Monsieur de Pourceaugnac, or Squire Trelooby*, an adaptation of Molière's farce.

Walsh's Poems are included in Anderson's and other collections of the British poets. See *The Lives of the Poets*, vol. iii. pp. 151 et seq., published 1753 as by Theophilus Cibber.

WALSINGHAM, SIR FRANCIS (*c.* 1530–1590), English statesman, was the only son of William Walsingham, common sergeant of London (d. March 1534), by his wife Joyce, daughter of Sir Edmund Denny of Cheshunt. The family is assumed to have sprung from Walsingham in Norfolk, but the earliest authentic traces of it are found in London in the first half of the 15th century; and it was one of the numerous families which, having accumulated wealth in the city, planted themselves out as landed gentry and provided the Tudor monarchy with its justices of the peace and main support. To this connexion may also be attributed much of the influence which London exerted over English policy in the 16th century Sir Francis's great-great-great-grandfather, Alan, was a cordwainer of Gracechurch Street; Alan's son Thomas, a vintner, purchased Scadbury in Chislehurst, and Thomas's great-grandson William bought Foot's Cray, where Francis may have been born. His uncle Sir Edmund was lieutenant of the Tower, and his mother was related to Sir Anthony Denny, a member of Henry VIII.'s privy council who attended him on his death-bed.

Francis matriculated as a fellow-commoner of King's College, Cambridge, of which Sir John Cheke was provost, in November 1548; and he continued studying there amid strongly Protestant influences until Michaelmas 1550, when he appears, after the fashion of the time, to have gone abroad to complete his education (Stählin, p. 79). Returning in 1552 he was admitted at Gray's Inn on January 28, 1553, but Edward VI.'s death six months later induced him to resume his foreign travels. In 1555–1556 he was at Padua, where he was admitted a "consiliarius" in the faculty of laws. Returning to England after Elizabeth's accession he was elected M.P. for Banbury to her first parliament, which sat from January to May 1559. He married in January 1562 Anne, daughter of George Barnes, Lord Mayor of London and widow of Alexander Carleill, whose son-in-law Christopher Hoddesdon was closely associated with maritime and commercial enterprise. He was elected to represent Lyme Regis in Elizabeth's second parliament of 1563 as well as for Banbury, and preferred to sit for the former borough. He may have owed his election to Cecil's influence, for to Cecil he subsequently attributed his rise to power; but his brother-in-law Sir Walter Mildmay was well known at court and in 1566 became chancellor of the exchequer. In that year Walsingham married a second time, his first wife having died in 1564; his second was also a widow, Ursula, daughter of Henry St Barbe and widow of Sir Richard Worsley of Appuldurcombe, captain of the Isle of Wight. Her sister Edith married Robert Beale, afterwards the chief of Walsingham's henchmen. By his second wife Walsingham had a daughter who married firstly Sir Philip Sidney, secondly Robert Devereux, second earl of Essex, and thirdly Richard de Burgh, earl of Clanricarde.

Walsingham's earliest extant communications with the government date from 1567; and in that and the following two years he was supplying Cecil with information about the movements of foreign spies in London. The Spanish ambassador in Paris declared in 1570 that he had been for two years engaged in collecting contributions from English churches for the assistance of the Huguenots in France; and he drew up a memorial depicting the dangers of Mary Stuart's presence in England and of the project for her marriage with Norfolk. Ridolfi, the conspirator, was committed to his custody in October 1569, and seems to have deluded Walsingham as to his intentions; but there is inadequate evidence for the statement (*Dict. Nat. Biog.*) that Walsingham was already organizing the secret police of London. In the summer of 1570 he was, in spite of his protestations, designated to succeed Norris as ambassador at Paris. La Mothe Fénelon, the French ambassador in England, wrote that he was thought a very able man, devoted to the new religion, and very much in Cecil's secrets. Cecil had in 1569 triumphed over the conservative and aristocratic party in the council; and Walsingham was the ablest of the new men whom he brought to the front to give play to the new forces which were to carve out England's career.

An essential element in the new policy was the substitution of an alliance with France for the old Burgundian friendship. The affair of San Juan de Ulua and the seizure of the Spanish treasure-ships in 1568 had been omens of the inevitable conflict with Spain; Ridolfi's plot and Philip II.'s approaches to Mary Stuart indicated the lines upon which the struggle would be fought; and it was Walsingham's business to reconcile the Huguenots with the French government, and upon this reconciliation to base an Anglo-French alliance which might lead to a grand attack on Spain, to the liberation of the Netherlands, to the destruction of Spain's monopoly in the New World, and to making Protestantism the dominant force in Europe. Walsingham threw himself heart and soul into the movement. He was the anxious fanatic of Elizabeth's advisers; he lacked the patience of Burghley and the cynical coolness of Elizabeth. His devotion to Protestantism made him feverishly alive to the perils which threatened the Reformation; and he took an alarmist view of every situation. Ever dreading a blow, he was always eager to strike the first; and alive to the perils of peace, he was blind to the dangers of war. He supplied the momentum which was necessary to counteract the caution of Burghley and Elizabeth; but it was probably fortunate that his headstrong counsels were generally overruled by the circumspection of his sovereign. He would have plunged England into war with Spain in 1572, when the risks would have been infinitely greater than in 1588, and when the Huguenot influence over the French government, on which he relied for support, would probably have broken in his hands. His clear-cut, strenuous policy of open hostilities has always had its admirers; but it is difficult to see how England could have secured from it more than she actually did from Elizabeth's more Fabian tactics. War, declared before England had gained the naval experience and wealth of the next fifteen years, and before Spain had been weakened by the struggle in the Netherlands and the depredations of the sea-rovers, would have been a desperate expedient; and the ideas that any action on Elizabeth's part could have made France Huguenot, or prevented the disruption of the Netherlands, may be dismissed as the idle dreams of Protestant enthusiasts.

Walsingham, however, was an accomplished diplomatist, and he reserved these truculent opinions for the ears of his own government, incurring frequent rebukes from Elizabeth. In his professional capacity, his attitude was correct enough; and, indeed, his anxiety for the French alliance and for the marriage between Elizabeth and Anjou led him to suggest concessions to Anjou's Catholic susceptibilities which came strangely from so staunch a Puritan. Elizabeth did not mean to marry, and although a defensive alliance was concluded between England and France in April 1572, the French government perceived that public opinion in France would not tolerate an open breach with Spain in Protestant interests. Coligny's success in captivating the mind of Charles IX. infuriated Catherine de Médicis, and the prospect of France being dragged at the heels of the Huguenots infuriated the Catholics. The result was Catherine's attempt on Coligny's life and then the massacre of St Bartholomew, which placed Walsingham's person in jeopardy and ruined for the time all hopes of the realization of his policy of active French and English co-operation.

He was recalled in April 1573, but the queen recognized that the failure had been due to no fault of his, and eight months later he was admitted to the privy council and made joint secretary of state with Sir Thomas Smith. He held this office jointly or solely until his death; in 1577 when Smith died, Dr Thomas Wilson was associated with Walsingham; after Wilson's death in 1581 Walsingham was sole secretary until July 1586, when Davison began his brief and ill-fated seven months' tenure of the office. After Davison's disgrace in February 1587 Walsingham remained sole secretary, though Wolley assisted him as Latin secretary from 1588 to 1590. He was also returned to parliament at a by-election in 1576 as knight of the shire for Surrey in succession to Charles Howard, who had become Lord Howard of Effingham, and he was re-elected for Surrey in 1584, 1586 and 1588. He was knighted on December 1, 1577, and made chancellor of the order of the Garter on April 22, 1578.

As secretary, Walsingham could pursue no independent policy; he was rather in the position of permanent under-secretary of the combined home and foreign departments, and he had to work under the direction of the council, and particularly of Burghley and the queen. He continued to urge the necessity of more vigorous intervention on behalf of the Protestants abroad, though now his clients were the Dutch rather than the Huguenots. In June 1578 he was sent with Lord Cobham to the Netherlands, mainly to glean reliable information on the complicated situation. He had interviews with the prince of Orange, with Casimir who was there in the interests of Protestant Germany, with Anjou who came in his own interests or in those of France, and with Don John, who nominally governed the country in Philip's name; the story that he instigated a plot to kidnap or murder Don John is without foundation. His letters betray discontent with Elizabeth's reluctance to assist the States; he could not understand her antipathy to rebellious subjects, and he returned in October, having accomplished little.

In August 1581 he was sent on a second and briefer mission to Paris. Its object was to secure a solid Anglo-French alliance against Spain without the condition upon which Henry III. insisted, namely a marriage between Elizabeth and Anjou. The French government would not yield, and Walsingham came back, to be followed by Anjou who sought in personal interviews to overcome Elizabeth's objections to matrimony. He, too, was unsuccessful; and a few months later he was dismissed with some English money and ostensible assurances of support. But [illegible] Elizabeth countermined his plans; unlike Walsingham, she would sooner have seen Philip remain master of the Netherlands than see them fall into the hands of France. His final embassy was to the court of James VI. in 1583, and here his vehement and suspicious Protestantism led him astray and provoked him into counterworking the designs of his own government. He was convinced that James was as hostile to Elizabeth as Mary herself, and failed to perceive that he was as inimical to popery as he was to presbyterianism. Elizabeth and Burghley were inclined to try an alliance with the Scottish king, and the event justified their policy, which Walsingham did his best to frustrate, although deserted on this occasion by his chief regular supporter, Leicester.

For the rest of his life Walsingham was mainly occupied in detecting and frustrating the various plots formed against Elizabeth's life; and herein he achieved a success denied him in his foreign policy. He raised the English system of secret intelligence to a high degree of efficiency At one time he is said to have had in his pay fifty-three agents at foreign courts, besides eighteen persons whose functions were even more obscure. Some of them were double spies, sold to both parties, whose real sentiments are still conjectural; but Walsingham was more successful in seducing Catholic spies than his antagonists were in seducing Protestant spies, and most of his information came from Catholics who betrayed one another In his office in London men were trained in the arts of deciphering correspondence, feigning handwriting, and of breaking and repairing seals in such a way as to avoid detection. His spies were naturally doubtful characters, because the profession does not attract honest men; morality of methods can no more be expected from counter-plotters than from plotters; and the prevalence of political or religious assassination made counterplot a necessity in the interests of the state.

The most famous of the plots frustrated by Walsingham was Anthony Babington's, which he detected in 1586. Of the guilt of the main conspirators there is no doubt, but the complicity of Mary Stuart has been hotly disputed. Walsingham had long been convinced, like parliament and the majority of Englishmen, of the necessity of removing Mary; but it was only the discovery of Babington's plot that enabled him to bring pressure enough to bear upon Elizabeth to ensure Mary's execution. This circumstance has naturally led to the theory that he concocted, if not the plot, at least the proofs of Mary's connivance. Undoubtedly he facilitated her self-incrimination, but of her active encouragement of the plot there can be little doubt after the publication of her letters to Mendoza, in which she excuses her complicity on the plea that no other means were left to secure her liberation. Considering the part he played in this transaction, Walsingham was fortunate to escape the fate which the queen with calculated indignation inflicted upon Davison.

Walsingham died deeply in debt on April 6, 1590. Since 1579 he had lived mainly at Barn Elms, Barnes, maintaining an adequate establishment; but his salary did not cover his expenses, he was burdened with his son-in-law Sir Philip Sidney's debts, and he obtained few of those perquisites which Elizabeth lavished on her favourites. He had little of the courtier about him; his sombre temperament and directness of speech irritated the queen, and it says something for both of them that he retained her confidence and his office until the end of his life.

Dr Karl Stählin's elaborate and scholarly *Sir Francis Walsingham und seine Zeit* (Heidelberg, vol. i., 1908) supersedes all previous accounts of Walsingham so far as it goes (1573); Dr Stählin has also dealt with the early history of the family in his *Die Walsingham bis zur Mitte des 16. Jahrhunderts* (Heidelberg, 1905). Vast masses of Walsingham's correspondence are preserved in the Record Office and the British Museum; some have been epitomized in the *Foreign Calendar* (as far as 1582); and his correspondence during his two embassies to France was published *in extenso* by Sir Dudley Digges in 1655 under the title *The Compleat Ambassador*, possibly, as has been suggested by Dr Stählin, to give a fillip to the similar policy then being pursued by Oliver Cromwell. The ascription to Sir Francis of *Arcana Aulica: or Walsingham's Manual of Prudential Maxims for the Statesman and the Courtier* is erroneous; the book is really the translation of a French treatise by one Edward Walsingham who flourished *c.* 1643–1659. See also Webb, Miller and Beckwith's *History of Chislehurst* (1899) and *Dict. Nat. Biog.* lix. 231-240.

Mr Conyers Read, who edited the *Bardon Papers* ("Camden" ser. 1909), relating to Mary's trial, was in 1910 engaged on an elaborate life of Walsingham, part of which the present writer was able to see in MS. (A. F. P.)

WALSINGHAM, THOMAS (d. *c.* 1422), English chronicler, was probably educated at the abbey of St Albans and at Oxford. He became a monk at St Albans, where he appears to have passed the whole of his monastic life except the six years between 1394 and 1400 during which he was prior of another Benedictine house at Wymondham, Norfolk. At St Albans he was in charge of the scriptorium, or writing room, and he died about 1422. Walsingham's most important work is his *Historia Anglicana*, a valuable piece of work covering the period between 1272 and 1422.. Some authorities hold that Walsingham himself only wrote the section between 1377 and 1392, but this view is controverted by James Gairdner in his *Early chroniclers of Europe* (1879).

The *Historia*, which from the beginning to 1377 is largely a compilation from earlier chroniclers, was published by Matthew Parker in 1574 as *Historia Angliae brevis*. For the "Rolls" series it has been edited in two volumes by H. T. Riley (1863–1864). Covering some of the same ground Walsingham wrote a *Chronicon Angliae*; this deals with English history from 1328 to 1388 and has been edited by Sir E. M. Thompson for the "Rolls" series (1874). His other writings include the *Gesta abbatum monasterii S. Albani* and the *Ypodigma Neustriae*. The *Gesta* is a history of the abbots of St Albans from the foundation of the abbey to 1381. The original work of Walsingham is the period between 1308 and 1381, the earlier part being merely a compilation; it has been edited for the "Rolls" series by H T Riley (1867–1869). The *Ypodigma* purports to be a history of the dukes of Normandy, but it also contains some English history and its value is not great. Compiled about 1419, it was dedicated to Henry V. and was written to justify this king's invasion of France. It was first published by Matthew Parker in 1574, and has been edited for the "Rolls" series by H. T. Riley (1876). Another history of England by Walsingham dealing with the period between 1272 and 1393 is in manuscript in the British Museum. This agrees in many particulars with the *Chronicon Angliae*, but it is much less hostile to John of Gaunt, duke of Lancaster. Walsingham is the main authority for the history of England during the reigns of Richard II., Henry IV. and Henry V., including the rising under Wat Tyler in 1381. He shows considerable animus against John Wycliffe and the Lollards.

WALTER, HUBERT (d. 1205), chief justiciar of England and archbishop of Canterbury, was a relative of Ranulf de Glanvill, the great justiciar of Henry II., and rose under the eye of his kinsman to an important position in the Curia Regis. In 1184 and in 1185 he appears as a baron of the exchequer He was employed, sometimes as a negotiator, sometimes as a justice, sometimes as a royal secretary. He received no clerical promotion from Henry II., but Richard I. appointed him bishop of Salisbury, and by Richard's command he went with the third crusade to the Holy Land. He gained the respect of all the crusaders, and acted as Richard's principal agent in all negotiations with Saladin, being given a place in the first band of pilgrims that entered Jerusalem. He led the English army back to England after Richard's departure from Palestine, but in Sicily he heard of the king's captivity, and hurried to join him in Germany. In 1193 he returned to England to raise the king's ransom. Soon afterwards he was elected archbishop of Canterbury and made justiciar. He was very successful in the government of the kingdom, and after Richard's last visit he was practically the ruler of England. He had no light task to keep pace with the king's constant demand for money. He was compelled to work the administrative machinery to its utmost, and indeed to invent new methods of extortion. To pay for Richard's ransom, he had already been compelled to tax personal property, the first instance of such taxation for secular purposes. The main feature of all his measures was the novel and extended use of representation and election for all the purposes of government. His chief measures are contained in his instruction to the itinerant justices of 1194 and 1198, in his ordinance of 1195 for the conservation of the peace, and in his scheme of 1198 for the assessment of the carucage. The justices of 1194 were to order the election of four coroners by the suitors of each county court. These new officers were to "keep," *i.e.* to register, the pleas of the crown, an important duty hitherto left to the sheriff. The juries, both for answering the questions asked by the judges and for trying cases under the grand assize, were to be chosen by a committee of four knights, also elected by the suitors of each county court for that purpose. In 1195 Hubert issued an ordinance by which four knights were to be appointed in every hundred to act as guardians of the peace, and from this humble beginning eventually was evolved the office of justice of the peace. His reliance upon the knights, or middle-class landowners, who now for the first time appear in the political foreground, is all the more interesting because it is this class who, either as members of parliament or justices of the peace, were to have the effective rule of England in their hands for so many centuries. In 1198, to satisfy the king's demand for money, Hubert demanded a carucage or plough-tax of five shillings on every plough-land (carucate) under cultivation. This was the old tax, the Danegeld, in a new and heavier form and there was great difficulty in levying it. To make it easier, the justiciar ordered the assessment to be made by a sworn jury in every hundred, and one may reasonably conjecture that these jurors were also elected. Besides these important constitutional changes Hubert negotiated a peace with Scotland in 1195, and in 1197 another with the Welsh. But Richard had grown dissatisfied with him, for the carucage had not been a success, and Hubert had failed to overcome the resistance of the Great Council when its members refused to equip a force of knights to serve abroad. In 1198 Hubert, who had inherited from his predecessors in the primacy a fierce quarrel with the Canterbury monks, gave these enemies an opportunity of complaining to the pope, for in arresting the London demagogue, William Fitz Osbert, he had committed an act of sacrilege in Bow Church, which belonged to the monks. The pope asked Richard to free Hubert from all secular duties, and he did so, thus making the demand an excuse for dismissing Hubert from the justiciarship. On the 27th of May 1199 Hubert crowned John, making a speech in which the old theory of election by the people was enunciated for the last time. He also took the office of chancellor and cheerfully worked under Geoffrey Fitz Peter, one of his former subordinates. In 1201 he went on a diplomatic mission to Philip Augustus of France, and in 1202 he returned to England to keep the kingdom in peace while John was losing his continental possessions. In 1205 he died. Hubert was an ingenious, original and industrious public servant, but he was grasping and perhaps dishonest.

See W. Stubbs, *Constitutional History*, vol. i. (1897); Miss K. Norgate's *England under the Angevin Kings*, vol. ii. (1887); W. Stubbs, preface to vol. iv. of Roger of Hoveden's *Chronicle* ("Rolls" series, 1868–1871).

WALTER, JOHN (1738/9–1812), founder of *The Times* newspaper, London, was born in 1738/9, probably in London, and from the death of his father, Richard Walter (about 1755/6), until 1781 was engaged in a prosperous business as a coal merchant. He played a leading part in establishing a Coal Exchange in London; but shortly after 1781, when he began to occupy himself solely as an underwriter and became a member of Lloyd's, he over-speculated and failed. In 1782 he bought from one Henry Johnson a patent for a new method of printing from "logotypes" (*i.e.* founts of words or portions of words, instead of letters), and made some improvements in it. In 1784 he acquired an old printing office in Blackfriars, which formed the nucleus of the Printing-house Square of a later date, and established there his "Logographic Office." At first he only undertook the printing of books, but on 1st January 1785 he started a small newspaper called *The Daily Universal Register*, which on reaching its 940th number on 1st January 1788 was renamed *The Times*. The printing business developed and prospered, but the newspaper at first had a somewhat chequered career. In 1789 Mr Walter was tried for a libel in it on the duke of York, and was sentenced to a fine of £50, a year's imprisonment in Newgate, to stand in the pillory for an hour and to give surety for good behaviour for seven years; and for further libels the fine was increased by £100, and the imprisonment by a second year. On 9th March 1791, however, he was liberated and pardoned. In 1799 he was again convicted for a technical libel, this time on Lord Cowper. He had then given erected in 1556 and restored in 1798. On the south side of the church is a lady chapel dating from the end of the reign of Edward II. or the beginning of that of Edward III., containing some good Decorated work, with a crypt below. Of the monastic buildings there remain only a bridge and gateway and other slight fragments. Bishop Hall became curate of Waltham in 1612, and Thomas Fuller was curate from 1648 to 1658. At Waltham Cross, about 1 m. W. of Waltham in Hertfordshire, is the beautiful cross erected (1291–1294) by Edward I. at one of the resting-places of the corpse of Queen Eleanor on its way to burial in Westminster Abbey. It is of Caen stone and is supposed to have been designed by Pietro Cavallini, a Roman sculptor. It is hexagonal in plan and consists of three stages, decreasing towards the top, which is finished by a crocketed spirelet and cross. The lower stage is divided into compartments enclosing the arms of England, Castile and Leon, and Ponthieu. Its restoration has not been wholly satisfactory. The royal gunpowder factory is in the immediate vicinity; government works were built in 1890 at Quinton Hill, ½ m. W. of the town, for the manufacture of cordite; and the town possesses gun-cotton and percussion-cap factories, flour-mills, malt kilns and breweries. Watercresses are largely grown in the neighbourhood, and there are extensive market gardens and nurseries.

The town probably grew up round the church, which was built early in the 11th century to contain a portion of the true cross. The manor was held by the abbot and convent of the Holy Cross from the reign of Henry I. to that of Henry VIII. The town was never more than a market town until 1894. In 1845 a local board of twelve members was formed to govern it; in 1894, under the Local Government Act, it was brought under an urban district council. The market of Waltham was granted to the abbey by Richard I. and confirmed in 1227 by Henry III., who also conceded two fairs in 1251: one for ten days following the Invention of the Holy Cross, the other on the vigil of the Exaltation of the Cross and for seven days after. The charter from which the present market appears to be derived was granted by Queen Elizabeth in 1560, and gave a Tuesday market for miscellaneous stock. The fairs have died out, although as late as 1792 they were held on the 14th of May and the 25th and 26th of September. The fisheries in the river Lea appear in records from 1086 onwards. At the end of the 17th century a fulling mill is mentioned, and by the year 1721 three powder mills were in existence.

WALTHAMSTOW, a suburb of London in the Walthamstow parliamentary division of Essex, England, a short distance E. of the river Lea, with several stations on a branch of the Great Eastern railway, 6 m. N. of Liverpool Street station. Pop. of urban district (1891) 46,346; (1901) 95,131. It is sheltered on the north and east by low hills formerly included in Epping Forest. The church of St Mary existed at a very early period, but the present building, chiefly of brick, was erected in 1535 by Robert Thorne, a merchant, and Sir George Monoux, lord mayor of London, and has undergone frequent alteration. Besides other old brasses it contains in the north aisle the effigies in brass of Sir George Monoux (d. 1543) and Anne his wife. There are a number of educational institutions, including a school of art; Forest School, founded in 1834 in connexion with King's College, now ranks as one of the well-known English public schools. Brewing is extensively carried on.

In the reign of Edward the Confessor Walthamstow belonged to Waltheof, son of Siward, earl of Northumberland, who married Judith, niece of William the Conqueror, who betrayed him to his death in 1075. The estate subsequently passed in 1309 to Guy de Beauchamp, earl of Warwick, and on the attainder of Earl Thomas in 1396 reverted to the crown. Afterwards it came into the possession of Edmund Beaufort, duke of Somerset; from the Somersets it passed to Sir George Rodney, and in 1639 came to the Maynard family. It is supposed to have been the birthplace of George Gas [illegible] (d. 1577). Sir William Batten, commissione [illegible] 7), the friend of Pepys, had his seat at W [illegible] frequently visited here by [illegible]

WALTHARIUS, a Latin poem founded on German popular tradition, relates the exploits of the west Gothic hero Walter of Aquitaine. Our knowledge of the author, Ekkehard, a monk of St Gall, is due to a later Ekkehard, known as Ekkehard IV. (d. 1060), who gives some account of him in the *Casus Sancti Galli* (cap. 80). The poem was written by Ekkehard, generally distinguished as Ekkehard I., for his master Geraldus in his schooldays, probably therefore not later than 920, since he was probably no longer young when he became deacon (in charge of ten monks) in 957. He died in 973. *Waltharius* was dedicated by Geraldus to Erchanbald, bishop of Strassburg (fl. 965–991), but MSS. of it were in circulation before that time. Ekkehard IV. stated that he corrected the Latin of the poem, the Germanisms of which offended his patron Aribo, archbishop of Mainz. The poem was probably based on epic songs now lost, so that if the author was still in his teens when he wrote it he must have possessed considerable and precocious powers.

Walter was the son of Alphere, ruler of Aquitaine, which in the 5th century, when the legend developed, was a province of the west Gothic Spanish kingdom. When Attila invaded the west the western princes are represented as making no resistance. They purchased peace by offering tribute and hostages. King Gibich, here described as a Frankish king, gave Hagen as a hostage (of Trojan race, but not, as in the *Nibelungenlied*, a kinsman of the royal house) in place of his infant son Gunther; the Burgundian king Heririh, his daughter Hiltegund; and Alphere, his son Walter. Hagen and Walter became brothers in arms, fighting at the head of Attila's armies, while Hiltegund was put in charge of the queen's treasure. Presently Gunther succeeded his father and refused to pay tribute to the Huns, whereupon Hagen fled from Attila's court. Walter and Hiltegund, who had been betrothed in childhood, also made good their escape during a drunken feast of the Huns, taking with them a great treasure. The story of their flight forms one of the most charming pictures of old German story. They were recognized at Worms, however, where the treasure excited the cupidity of Gunther. Taking with him twelve knights, among them the reluctant Hagen, he pursued them, and overtook them at the Wasgenstein in the Vosges mountains. Walter engaged the Nibelungen knights one at a time, until all were slain but Hagen, who held aloof from the battle, and was only persuaded by Gunther to attack his comrade in arms on the second day. He lured Walter from the strong position of the day before, and both Gunther and Hagen attacked at once. All three were incapacitated, but their wounds were bound up by Hiltegund and they separated friends

The essential part of this story is the series of single combats. The occasional incoherences of the tale make it probable that many changes have been introduced in the legend. The *Thidreks Saga* (chaps. 241–244) makes the story more probable by representing the pursuers as Huns. There is reason to believe that Hagen was originally the father of Hiltegund, and that the tale was a variant of the saga of Hild as told in the *Skaldskaparmál*. Hild, daughter of King Högni, was carried off by Hedinn, son of Hjarrandi (A.S. Heorrenda). The fight between the forces of father and lover only ceased at sundown, to be renewed on the morrow, since each evening Hild raised the dead by her incantations. This is obviously a form of the old myth of the daily recurring struggle between light and darkness. The songs sung by Hiltegund in *Waltharius* during her night watches were probably incantations, a view strengthened by the fact that in a Polish version the glance of Helgunda is said to have inspired the combatants with new strength. Hiltegund has retained nothing of Hild's fierceness, but the fragment of the Anglo-Saxon *Waldere* shows more of the original spirit. In *Waltharius* Hiltegund advises Walter to fly; in *Waldere* she urges him to the combat.

BIBLIOGRAPHY.—*Waltharius* was first edited by Fischer (Leipzig, 1780). Later and more critical editions are by Jacob Grimm (*Lat. Gedichte des Mittelalters* (Göttingen, 1838); R. Peiper (Berlin, 1873); V. Scheffel and A. Holder (Stuttgart, 1874); there are German translations by F. Linnig (Paderborn, 1885), and H. Althof (Leipzig, 1896). See also Scheffel's novel of *Eckehard* (Stuttgart, 1887). The A.S. fragments of *Waldere* were first edited by G. Stephens (1860), afterwards by R. Wülker in *Bibl. der angel-sächs. Poesie* (vol. i., Cassel, 1881); by F. Holthausen in *Göteborgs Högskolas Årsskrift* (vol. v., 1899), with autotype reproductions of the two leaves which have been preserved. See also A. Ebert, *Allg. Gesch. der Lit des Mittelalters im Abendlande* (Leipzig, 1874–1887); R. Koegel, *Gesch. der deutschen Literatur bis zum Ausgange des Mittelalters* (vol. i., pt. ii., Strassburg, 1897); M. D. Larned, *The Saga of Walter of Aquitaine* (Baltimore, 1892); B. Symons, *Deutsche Heldensage* (Strassburg, 1905). With *Waltharius* compare the Scottish ballads of "Earl Brand" and "Erlinton" (F. J. Child's *English and Scottish Popular Ballads*, i. 88 seq.).

WALTHEOF (d. 1076), earl of Northumbria, was a son of Earl Siward of Northumbria, and, although he was probably educated for a monastic life, became earl of Huntingdon and Northampton about 1065. After the battle of Hastings he submitted to William the Conqueror; but when the Danes invaded the north of England in 1069 he joined them and took part in the attack on York, only, however, to make a fresh submission after their departure in 1070. Then, restored to his earldom, he married William's niece, Judith, and in 1072 was appointed earl of Northumbria. In 1075 Waltheof joined the conspiracy against the king arranged by the earls of Norfolk and Hereford; but soon repenting of his action he confessed his guilt to Archbishop Lanfranc, and then to William, who was in Normandy. Returning to England with William he was arrested, and after being brought twice before the king's court was sentenced to death. On the 31st of May 1076 he was beheaded on St Giles's Hill, near Winchester. Weak and unreliable in character, Waltheof, like his father, is said to have been a man of immense bodily strength. Devout and charitable, he was regarded by the English as a martyr, and miracles were said to have been worked at his tomb at Crowland. The earl left three daughters, the eldest of whom, Matilda, brought the earldom of Huntingdon to her second husband, David I., king of Scotland. One of Waltheof's grandsons was Waltheof (d. 1159), abbot of Melrose.

See E. A. Freeman, *The Norman Conquest*, vols. ii., iii. and iv. (1870–1876).

WALTHER, BERNHARD (1430–1504), German astronomer, was born at Nuremberg in 1430. He was a man of large means, which he devoted to scientific pursuits. When Regiomontanus (*q.v.*) settled at Nuremberg in 1471, Walther built for their common use an observatory at which in 1484 clocks driven by weights were first used in astronomical determinations. He further brought into prominence the effects of refraction in altering the apparent places of the heavenly bodies, and substituted Venus for the moon as a connecting-link between observations of the sun and stars. Walther established a printing-press, from which some of the earliest editions of astronomical works were issued. His observations, begun in 1475 and continued until his death in May 1504, were published by J. Schöner in 1544, and by W. Snell in 1618, as an appendix to his *Observationes Hassiaceae*.

See J. G. Doppelmayr, *Hist. Nachricht von den nürnbergischen Mathematicis*, p. 23 (1730); G. A. Will, *Nürnbergisches Gelehrten-Lexikon*, vii. 381 (1806); J. F. Montucla, *Hist. des mathématiques*, i. 546; J. S. Bailly, *Hist. de l'astr. moderne*, i. 319; E. F. Apelt, *Die Reformation der Sternkunde*, p. 54; J. P. von Wurzelbaur, *Uranies Noricae basis astronomica* (1719); J. F. Weidler, *Hist. astronomiae*, p. 322; A. G. Kästner, *Geschichte der Mathematik*, ii. 324; *Mitteilungen des Vereins für Gesch. der Stadt Nürnberg*, vii. 237 (1888) (H. Petz); R. Wolf, *Gesch. der Astr.* p. 92, &c.

WALTHER VON DER VOGELWEIDE (*c.* 1170–*c.* 1230), the most celebrated of medieval German lyric poets. For all his fame, Walther's name is not found in contemporary records, with the exception of a solitary mention in the travelling accounts of Bishop Wolfger of Passau—"Walthero cantori de Vogelweide pro pellicio V. solidos longos"—"To Walther the singer of the Vogelweide five shillings to buy a fur coat," and the main sources of information about him are his own poems and occasional references by contemporary Minnesingers. It is clear from the title *hêr* (Herr, Sir) these give him, that he was of noble birth; but it is equally clear from his name Vogelweide (Lat. *aviarium*, a gathering place or preserve of birds) that he belonged not to the higher nobility, who took their titles from castles or villages, but to the nobility of service (*Dienstadel*), humble retainers of the great lords, who in wealth and position were little removed from non-noble free cultivators. For a long time the place of his birth was a matter of dispute, until Professor Franz Pfeiffer established beyond reasonable doubt that he was born in the Wipthal in Tirol, where, not far from the little town of Sterzing on the Eisak, a wood—called the Vorder- und Hintervogelweide—preserves at least the name of his vanished home. This origin would account for what is known of Walther's early life. Tirol was at this time the home of several noted Minnesingers; and the court of Vienna, under the enlightened duke Frederick I. of the house of Babenberg, had become a centre of poetry and art. Here it was that the young poet learned his craft under the renowned master Reinmar the Old, whose death he afterwards lamented in two of his most beautiful lyrics; and in the open handed duke he found his first patron. This happy period of his life, during which he produced the most charming and spontaneous of his love-lyrics, came to an end with the death of Duke Frederick in 1198. Henceforward Walther was a wanderer from court to court, singing for his lodging and his bread, and ever hoping that some patron would arise to save him from this "juggler's life" (*gougelfuore*) and the shame of ever playing the guest. For material success in this profession he was hardly calculated. His criticism of men and manners was scathing; and even when this did not touch his princely patrons, their underlings often took measures to rid themselves of so uncomfortable a censor. Thus he was forced to leave the court of the generous duke Bernhard of Carinthia (1202–1256); after an experience of the tumultuous household of the landgrave of Thuringia he warns those who have weak ears to give it a wide berth; and after three years at the court of Dietrich I. of Meissen (reigned 1195–1221) he complains that he had received for his services neither money nor praise. Walther was, in fact, a man of strong views; and it is this which gives him his main significance in history, as distinguished from his place in literature. From the moment when the death of the emperor Henry VI. (1197) opened the fateful struggle between empire and papacy, Walther threw himself ardently into the fray on the side of German independence and unity. Though his religious poems sufficiently prove the sincerity of his catholicism, he remained to the end of his days opposed to the extreme claims of the popes, whom he attacks with a bitterness which can only be justified by the strength of his patriotic feelings. His political poems begin with an appeal to Germany, written in 1198 at Vienna, against the disruptive ambitions of the princes:—

"Crown Philip with the Kaiser's crown
And bid them vex thy peace no more."

He was present, on the 8th of September, at Philip's coronation at Mainz, and supported him till his victory was assured. After Philip's murder in 1209, he "said and sang" in support of Otto of Brunswick against the papal candidate Frederick of Staufen; and only when Otto's usefulness to Germany had been shattered by the battle of Bouvines (1212) did he turn to the rising star of Frederick II., now the sole representative of German majesty against pope and princes. From the new emperor his genius and his zeal for the empire at last received recognition; and a small fief in Franconia was bestowed upon him, which, though he complained that its value was little, gave him the home and the fixed position he had so long desired. That Frederick gave him an even more signal mark of his favour by making him the tutor of his son Henry VII., is more than doubtful. The fact, in itself highly improbable, rests only upon the evidence of a single poem, which is capable of another interpretation. Walther's restless spirit did not suffer him to remain long on his new property. In 1217 we find him once more at Vienna, and again in 1219 after the return of Duke Leopold VI. from the crusade. About 1224 he seems to have settled on his fief near Würzburg. He was active in urging the German princes to take part in the crusade of 1228, and may have accompanied the crusading army at least as far as his native Tirol. In a beautiful and pathetic poem he paints the change that had come over the scenes of his childhood and made his life seem a thing dreamed. He died about 1230, and was buried at Würzburg, after leaving directions, according to the story, that the birds were to be fed at his tomb daily. The original gravestone with its Latin inscription has disappeared; but in 1843 a new monument was erected over the spot. There is also a fine statue of the poet at Bozen, unveiled in 1877.

Historically interesting as Walther's political verses are, their merit has been not a little exaggerated by modern German critics, who saw their own imperial aspirations and anti-papal prejudices reflected in this patriotic poet of the middle ages. Of more lasting value are the beautiful lyrics, mainly dealing with love, which led his contemporaries to hail him as their master in song (*unsers sanges meister*). He is of course unequal. At his worst he does not rise above the tiresome conventionalities of his school. At his best he shows a spontaneity, a charm and a facility which his rivals sought in vain to emulate. His earlier lyrics are full of the joy of life, of feeling for nature and of the glory of love. Greatly daring, he even rescues love from the convention which had made it the prerogative of the nobly born, contrasts the titles "woman" (*wîp*) and "lady" (*frowe*) to the disadvantage of the latter, and puts the most beautiful of his lyrics—*Unter der linden*—into the mouth of a simple girl. A certain seriousness, which is apparent under the joyousness of his earlier work, grew on him with years. Religious and didactic poems become more frequent; and his verses in praise of love turn at times to a protest against the laxer standards of an age demoralized by political unrest. Throughout his attitude is healthy and sane. He preaches the crusade; but at the same time he suggests the virtue of toleration, pointing out that in the worship of God

"Christians, Jews and heathen all agree."

He fulminates against "false love"; but pours scorn on those who maintain that "love is sin." In an age of monastic ideals and loose morality there was nothing commonplace in the simple lines in which he sums up the inspiring principle of chivalry at its best:—

"Swer guotes wîbes liebe hât
Der schamt sich ieder missetât."[1]

Altogether Walther's poems give us the picture not only of a great artistic genius, but of a strenuous, passionate, very human and very lovable character.

The *Gedichte* were edited by Karl Lachmann (1827). This edition of the great scholar was re-edited by M. Haupt (3rd ed., 1853). *Walther v. d. Vogelweide*, edited by Franz Pfeiffer, with introduction and notes (4th edition, by Karl Bartsch, Leipzig, 1873). *Glossarium zu d. Gedichten Walther's, nebst e. Reimverzeichnis*, by C. A. Hornig (Quedlinburg, 1844). There are translations into modern German by B. Obermann (1886), and into English verse *Selected poems of Walter von der Vogelweide* by W. Alison Phillips, with introduction and notes (London, 1896). The poem *Unter der Linden*, not included in the latter, was freely translated by T. L. Beddoes (*Works*, 1890), more closely by W. A. Phillips in the *Nineteenth Century* for July 1896 (ccxxxiii. p. 70). *Leben u. Dichten Walther's von der Vogelweide*, by Wilhelm Wilmanns (Bonn, 1882), is a valuable critical study of the poet's life and works. (W. A. P.)

WALTON, BRIAN (1600–1661), English divine and scholar, was born at Seymour, in the district of Cleveland, Yorkshire, in 1600. He went to Cambridge as a sizar of Magdalene College in 1616, migrated to Peterhouse in 1618, was bachelor in 1619 and master of arts in 1623. After holding a school mastership and two curacies, he was made rector of St Martin's Orgar in London in 1628, where he took a leading part in the contest between the London clergy and the citizens about the city tithes, and compiled a treatise on the subject, which is printed in Brewster's *Collectanea* (1752). His conduct in this matter displayed his ability, but his zeal for the exaction of ecclesiastical dues was remembered in 1641 in the articles brought against him in parliament, which appear to have led to the sequestration of his very considerable preferments.[2] He was also charged with Popish practices, but on frivolous grounds, and with aspersing the members of parliament for the city. In 1642 he was ordered into custody as a delinquent; thereafter he took refuge in Oxford, and ultimately returned to London to the house of William Fuller (1580?–1659), dean of Ely, whose daughter Jane was his second wife. In this retirement he gave himself to Oriental studies and carried through his great work, a Polyglot Bible which should be completer, cheaper and provided with a better critical apparatus than any previous work of the kind (see POLYGLOT). The proposals for the Polyglot appeared in 1652, and the book itself came out in six great folios in 1657, having been printing for five years. Nine languages are used: Hebrew, Chaldee, Samaritan, Syriac, Arabic, Persian, Ethiopic, Greek and Latin. Among his collaborators were James Ussher, John Lightfoot and Edward Pococke, Edmund Castell, Abraham Wheelocke and Patrick Young, Thomas Hyde and Thomas Greaves. The great undertaking was supported by liberal subscriptions, and Walton's political opinions did not deprive him of the help of the Commonwealth; the paper used was freed from duty, and the interest of Cromwell in the work was acknowledged in the original preface, part of which was afterwards cancelled to make way for more loyal expressions towards that restored monarchy under which Oriental studies in England immediately began to languish. To Walton himself, however, the Reformation brought no disappointment. He was consecrated bishop of Chester in December 1660. In the following spring he was one of the commissioners at the Savoy Conference, but took little part in the business. In the autumn of 1661 he paid a short visit to his diocese, and returning to London he died on the 29th of November.

However much Walton was indebted to his helpers, the Polyglot Bible is a great monument of industry and of capacity for directing a vast undertaking, and the *Prolegomena* (separately reprinted by Dathe, 1777, and by Francis Wrangham, 1825) show judgment as well as learning. The same qualities appear in Walton's *Considerator Considered* (1659), a reply to the *Considerations* of John Owen, who thought that the accumulation of material for the revision of the received text tended to atheism. Among Walton's works must also be mentioned an *Introductio ad lectionem linguarum orientalium* (1654; 2nd ed., 1655), meant to prepare the way for the Polyglot.

See Henry J. Todd, *Memoirs of the Life and Writings of Walton* (London, 1821), in 2 vols., of which the second contains a reprint of Walton's answer to Owen.

WALTON, IZAAK (1593–1683), English writer, author of *The Compleat Angler*, was born at Stafford on the 9th of August 1593; the register of his baptism gives his father's name as Jervis, and nothing more is known of his parentage. He settled in London as an ironmonger, and at first had one of the small shops, 7½ ft. by 5 ft., in the upper storey of Gresham's Royal Burse or Exchange in Cornhill. In 1614 he had a shop in Fleet Street, two doors west of Chancery Lane. Here, in the parish of St Dunstan's, he gained the friendship of Dr John Donne, then vicar of that church. His first wife, married in December 1626, was Rachel Floud, a great-great-niece of Archbishop Cranmer. She died in 1640. He married again soon after, his second wife being Anne Ken—the pastoral "Kenna" of *The Angler's Wish*—step-sister of Thomas Ken, afterwards bishop of Bath and Wells. After the Royalist defeat at Marston Moor, he retired from business. He had bought some land near his birthplace, Stafford, and he went to live there; but, according to Wood, spent most of his time "in the families of the eminent clergymen of England, of whom he was much beloved"; and in 1650 he was again living in Clerkenwell. In 1653 came out the first edition of his famous book, *The Compleat Angler*. His second wife died in 1662, and was buried in Worcester cathedral church, where there is a monument to her memory. One of his daughters married Dr Hawkins, a prebendary of Winchester. The last forty years of his long life seem to have been spent in ideal leisure and occupation, the old man travelling here and there, visiting his "eminent clergymen" and other brethren of the angle, compiling the biographies of congenial spirits, and collecting here a little and there a little for the enlargement of his famous treatise. After 1662 he found a home at Farnham Castle with George Morley, bishop of Winchester, to whom he dedicated his *Life* of George Herbert and also that of Richard Hooker; and from time to time he visited Charles Cotton in his fishing house on the Dove. He died in his daughter's house at Winchester on the 15th of December 1683, and was buried in the cathedral. It is characteristic of his kindly nature that he left his property at Shalford for the benefit of the poor of his native town.

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[1] "He who has the love of a good woman
Is ashamed of every misdeed."

[2] He was from January 1635–1636 rector of Sandon, in Essex, where his first [illegible] ...ton, is buried. He appears to have [illegible] ..., and for a very short time he had [illegible] Fields.

Walton hooked a much bigger fish than he angled for when he offered his quaint treatise, *The Compleat Angler*, to the public. There is hardly a name in English literature, even of the first rank, whose immortality is more secure, or whose personality is the subject of a more devoted cult. Not only is he the *sacer vates* of a considerable sect in the religion of recreation, but multitudes who have never put a worm on a hook—even on a fly-hook—have been caught and securely held by his picture of the delights of the gentle craft and his easy leisurely transcript of his own simple, peaceable, lovable and amusing character. *The Compleat Angler* was published in 1653, but Walton continued to add to its completeness in his leisurely way for a quarter of a century. It was dedicated to John Offley, his most honoured friend. There was a second edition in 1655, a third in 1661 (identical with that of 1664), a fourth in 1668 and a fifth in 1676. In this last edition the thirteen chapters of the original have grown to twenty-one, and a second part was added by his loving friend and brother angler Charles Cotton, who took up "Venator" where Walton had left him and completed his instruction in fly-fishing and the making of flies. Walton did not profess to be an expert with the fly; the fly-fishing in his first edition was contributed by Thomas Barker, a retired cook and humorist, who produced a treatise of his own in 1659; but in the use of the live worm, the grasshopper and the frog "Piscator" himself could speak as a master. The famous passage about the frog—often misquoted about the worm—"use him as though you loved him, that is, harm him as little as you may possibly, that he may live the longer"—appears in the original edition. The additions made as the work grew were not merely to the technical part; happy quotations, new turns of phrase, songs, poems and anecdotes were introduced as if the leisurely author, who wrote it as a recreation, had kept it constantly in his mind and talked it over point by point with his numerous brethren. There were originally only two interlocutors in the opening scene, "Piscator" and "Viator"; but in the second edition, as if in answer to an objection that "Piscator" had it too much in his own way in praise of angling, he introduced the falconer, "Auceps," changed "Viator" into "Venator" and made the new companions each dilate on the joys of his favourite sport.

Although *The Compleat Angler* was not Walton's first literary work, his leisurely labours as a biographer seem to have grown out of his devotion to angling. It was probably as an angler that he made the acquaintance of Sir Henry Wotton, but it is clear that Walton had more than a love of fishing and a humorous temper to recommend him to the friendship of the accomplished ambassador. At any rate, Wotton, who had intended to write the life of John Donne, and had already corresponded with Walton on the subject, left the task to him. Walton had already contributed an *Elegy* to the 1633 edition of Donne's poems, and he completed and published the life, much to the satisfaction of the most learned critics, in 1640. Sir Henry Wotton dying in 1639, Walton undertook his life also; it was finished in 1642 and published in 1651. His life of Hooker was published in 1662, that of George Herbert in 1670 and that of Bishop Sanderson in 1678. All these subjects were endeared to the biographer by a certain gentleness of disposition and cheerful piety; three of them at least—Donne, Wotton and Herbert—were anglers. Their lives were evidently written with loving pains, in the same leisurely fashion as his *Angler*, and like it are of value less as exact knowledge than as harmonious and complete pictures of character. Walton also rendered affectionate service to the memory of his friends Sir John Skeffington and John Chalkhill, editing with prefatory notices Skeffington's *Hero of Lorenzo* in 1652 and Chalkhill's *Thealma and Clearchus* a few months before his own death in 1683. His poems and prose fragments were collected in 1878 under the title of *Waltoniana*.

The best-known old edition of the *Angler* is J. Major's (2nd ed., 1824). The book was edited by Andrew Lang in 1896, and various modern editions have appeared. The standard biography is that by Sir Harris Nicolas, prefixed to an edition of the *Angler* (1836). There are notices also, with additional scraps of fact, annexed to two American editions, Bethune's (1847) and Dowling's (1857). An edition of Walton's *Lives*, by G. Sampson, appeared in 1903. See also *Izaak Walton and his Friends*, by S. Martin (1903).

WALTON-LE-DALE, an urban district in the Darwen parliamentary division of Lancashire, England, on the S. bank of the Ribble, immediately above Preston. Pop. (1901) 11,271. The church of St Leonard, situated on an eminence to the east of the town, was originally erected in the 11th century. The earliest portions of the present building are the Perpendicular chancel and tower, the nave having been rebuilt in 1798, while the transepts were erected in 1816. There are a number of interesting old brasses and monuments. Cotton-spinning is carried on, and there are market-gardens in the vicinity. Roman remains have been found here, and there was perhaps a roadside post on the site. The manor of Walton was granted by Henry de Lacy about 1130 to Robert Banastre. It afterwards passed by marriage to the Langtons, and about 1592 to the Hoghtons of Hoghton. Walton was the principal scene of the great battle of Preston, fought on the 17th of August 1648 between Cromwell and the duke of Hamilton. In 1701 the duke of Norfolk, the earl of Derwentwater and other Jacobites incorporated the town by the style of the "mayor and corporation of the ancient borough of Walton." In 1715 the passage of the Ribble was bravely defended against the Jacobites by Parson Woods and his parishioners of Atherton (*q.v.*).

WALTON-ON-THAMES, an urban district in the Epsom parliamentary division of Surrey, England, pleasantly situated on the right bank of the Thames, 17 m. W.S.W. from London by the London & South-Western railway. Pop. (1901) 10,329. The church of St Mary has late Norman portions, and contains numerous memorials, including examples of the work of Chantrey and Roubiliac. A verse inscribed upon a pillar is reputed to be Queen Elizabeth's profession of faith as regards transubstantiation. The queen was a frequent resident at Henry VIII.'s palace of Oatlands Park, which was destroyed during the civil wars of the 17th century. The property subsequently passed through various hands, and the park is reduced in extent by the modern growth of villas surrounding it. It contains, however, a remarkable grotto built of mineral and stalactitic rock, shells and other similar materials, by one of the earls of Lincoln when owner. Ashley Park, a Tudor mansion (in the main modernized), attributed to Cardinal Wolsey, was at times the residence of Cromwell; while John Bradshaw, who, as lord president of the court, sentenced Charles I. to death, occupied the old manor-house of Walton. Walton is a favourite resort of anglers and boating parties.

WALTON-ON-THE-NAZE (or WALTON-LE-SOKEN), a watering-place in the Harwich parliamentary division of Essex, England, the terminus of a branch of the Great Eastern railway from Colchester, 71½ m. E.N.E. from London. Pop. of urban district (1901) 2014. This portion of the coast has suffered from encroachment of the sea, and a part of the old village of Walton, with the church, was engulfed towards the end of the 18th century. A prebendary stall at St Paul's Cathedral, London, was endowed with the lands thus consumed (*praebenda consumpta per mare*). On the E. side of the town is the open North Sea, with a fine stretch of sand and shingle, affording good bathing. To the west is an irregular inlet studded with low islands, known as Hanford Water. The Naze is a promontory 2 m. N. by E. of the town, and in the vicinity of Walton are low cliffs exhibiting the fossiliferous red crag formation. The church of All Saints is a brick building dating mainly from 1804. Walton has a public hall, several hotels and a small theatre; and iron foundries and brick works. Services of passenger steamers in connexion with Harwich, Clacton-on-Sea, and London are maintained in the summer.

WALTZING MOUSE (or JAPANESE WALTZING MOUSE), a pied race of the house mouse (*Mus musculus*), or one of its allies, originally bred in China, and known in Japan as the Nankin mouse. The habit of these mice of spinning round and round after their tails is highly developed, and continually exercised. In Japan, where there were originally two breeds, a grey and a white, these mice are kept in cages on account of their dancing propensities. The dancing was at one time supposed to be due to a disease of the labyrinth of the ear; but Dr K. Kishi, in a paper in the *Zeitschrift für wissenschaftliche Zoologie* (vol. xxi. pt. 3), concludes that it is the effect of confinement for untold centuries in small cages.

WALWORTH, SIR WILLIAM (d. 1385), lord mayor of London, belonged to a good Durham family. He was apprenticed to John Lovekyn, a member of the Fishmongers' Gild, and succeeded his master as alderman of Bridge ward in 1368, becoming sheriff in 1370 and lord mayor in 1374. He is said to have suppressed usury in the city during his term of office as mayor. His name frequently figures as advancing loans to the king, and he supported John of Gaunt, duke of Lancaster, in the city, where there was a strong opposition to the king's uncle. His most famous exploit was his encounter with Wat Tyler in 1381, during his second term of office as lord mayor. In June of that year, when Tyler and his followers entered south London, Walworth defended London Bridge against them; he was with Richard II. when he met the insurgents at Smithfield, and assisted in slaying their leader (see Tyler, Wat), afterwards raising the city bodyguard in the king's defence; for which service he was rewarded by knighthood and a pension. He subsequently served on two commissions to restore the peace in the county of Kent. He died in 1385, and was buried in the church of St Michael, Crooked Lane, of which he was a considerable benefactor. Sir William Walworth was the most distinguished member of the Fishmongers' Gild, and he invariably figured in the pageants prepared by them when one of their members attained the mayoralty. He became a favourite hero in popular tales, and appeared in Richard Johnson's *Nine Worthies of London* in 1592.

See William Herbert, *The History . . . of St Michael, Crooked Lane, London* . . . (1831); W. and R. Woodcock, *Lives of Illustrious Lord Mayors* (1846); an account of Wat Tyler's rebellion in a fragmentary chronicle printed by G. H. Trevelyan in the *English Historical Review* (July 1898).

WAMPUM, or Wampum-Peage (Amer. Ind. *wampam*, "white"; *peag*, "bead"), the shell-money of the North American Indians. It consisted of beads made from shells, and, unlike the cowry-money of India and Africa (which was the shell in its natural state), required a considerable measure of skill in its manufacture. Wampum was of two colours, dark purple and white, of cylindrical form, averaging a quarter of an inch in length, and about half that in diameter. Its colour determined its value. The term wampum or wampum-peage was apparently applied to the beads only when strung or woven together. They were ground as smooth as glass and were strung together by a hole drilled through the centre. Dark wampum, which was made from a "hard shell" clam (*Venus mercenaria*), popularly called quahaug or quahog, a corruption of the Indian name, was the most valuable. White wampum was made from the shell of whelks, either from the common whelk (*Buccinum undatum*), or from that of *Pyrula canaliculata* and *Pyrula carica*. Wampum was employed most in New England, but it was common elsewhere. By the Dutch settlers of New York it was called *seawan* or *sewand*, and *roenoke* in Virginia, and perhaps farther south, for shell-money was also known in the Carolinas, but whether the *roenoke* of the Virginian Indians was made from the same species of shell as wampum is not clear. Cylindrical shell-beads similar to the wampum of the Atlantic coast Indians were made to some extent by the Indians of the west coast. This was manufactured from the *Mytilus californianus*, a mussel which abounds there.

In the trading between whites and Indians, wampum so completely took the place of ordinary coin that its value was fixed by legal enactment; three to a penny and five shillings a fathom. [illegible] name for a count, and the number of shells [illegible] accepted standard of exchange. Thus where six wampum went to the penny, the fathom consisted of 360 beads; but where four made a penny, as under the Massachusetts standard of 1640, then the fathom counted 240. The beads were at first worth more than five shillings per fathom, the price at which they passed current in 1643. A few years before the fathom had been worth nine or ten shillings. Connecticut received wampum for taxes in 1637 at four a penny. In 1640 Massachusetts adopted the Connecticut standard, "white to pass at four and bleuse at two a penny." There was no restriction on the manufacture of wampum, and it was made by the whites as well as the Indians. The market was soon flooded with carelessly made and inferior wampum, but it continued to be circulated in the remote districts of New England through the 17th century, and even into the beginning of the 18th. It was current with silver in Connecticut in 1704.

Wampum was also used for personal adornment, and belts were made by embroidering wampum upon strips of deerskin. These belts or scarves were symbols of authority and power and were surrendered on defeat in battle. Wampum also served a mnemonic use as a tribal history or record. "The belts that pass from one nation to another in all treaties, declarations and important transactions are very carefully preserved in the chiefs' cabins, and serve not only as a kind of record or history but as a public treasury. According to the Indian conception, these belts could tell by means of an interpreter the exact rule, provision or transaction talked into them at the time and of which they were the exclusive record. A strand of wampum, consisting of purple and white shell-beads or a belt woven with figures formed by beads of different colours, operated on the principle of associating a particular fact with a particular string or figure, thus giving a serial arrangement to the facts as well as fidelity to the memory. These strands and belts were the only visible records of the Iroquois, but they required the trained interpreters who could draw from their strings and figures the acts and intentions locked up in their remembrance" (Major Rogers, *Account of North America*, London, 1765).

See Holmes, "Art in Shell of the Ancient Americans" in *Annual Report of Bureau of Ethnology, Washington, for 1880–1881*; W. B. Weeden, *Indian Money as a Factor in New England Civilization* (Baltimore, 1884); E. Ingersoll, "Wampum and its History," in *American Naturalist*, vol. xvii. (1883); Horatio Hale, "On the Origin and Nature of Wampum," in *American Naturalist*, vol. xviii. (1884); C. L. Norton, "The Last Wampum Coinage," in *American Magazine* for March 1888.

WANA, a valley and frontier outpost of Waziristan in the North-West Frontier Province of India. It lies to the west of the Mahsud country, and to the north of the Gomal river, and is inhabited by the Waziri tribe. Lying on the border of Afghanistan, it is conveniently placed for dominating Waziristan on the north and the Gomal Pass on the south, and occupies very much the same strategic position as the Zhob valley holds in Baluchistan. It forms the end of the chain of outposts extending from Quetta to Waziristan, and can be supported either from India by the Gomal Pass or from Quetta by the Zhob valley. In 1894, when the Indo-Afghan boundary commission was delimiting the Waziri border, the Mahsud Waziris, thinking their independence to be threatened, made a night attack on the camp of the commission at Wana. The result was the Waziristan Expedition of the same year, and the occupation of Wana by British troops. On the formation of the North-West Frontier Province in 1901 it was decided to replace the troops by militia, and Wana was handed over to them in 1904. It is now the headquarters of the political agency of Southern Waziristan.

WANAMAKER, JOHN (1838–   ), American merchant, was born, of Palatine-Huguenot stock, in Philadelphia, Pennsylvania, on the 11th of July 1838. He attended a public school in that city until he was fourteen, then became an errand boy for a book store, and was a retail clothing salesman from 1856 until 1861, when he established with Nathan Brown (who afterward became his brother-in-law) the clothing house of Wanamaker & Brown, in Philadelphia, the partnership continuing until the death of Brown in 1868. In 1869 Wanamaker founded the house of John Wanamaker & Company; and in 1875 bought the

Pennsylvania Railroad Company's freight depot at Thirteenth and Market streets, and in the following year opened it as a dry goods and clothing store, subsequently much enlarged. In September 1896 he acquired from Hilton, Hughes & Company the former New York store of A. T. Stewart, and thereafter greatly enlarged it and added a new building; this, and the Philadelphia store, are among the largest department stores in the United States. Mr Wanamaker was postmaster-general in President Benjamin Harrison's cabinet in 1889–1893, and brought about the establishment of post-offices on ocean-going vessels. He early identified himself with religious work in Philadelphia; was the first paid secretary, in 1857–1861, of that city's Young Men's Christian Association, of which he was president in 1870–1883, and in 1858 founded, and thereafter served as superintendent of, the Bethany (Presbyterian) Sunday School, one of the largest in the world. He took an active part in the movement which resulted in the formation of the United States Christian Commission in 1861.

WANDERU (WANDEROO), the native name for the species of langur monkeys (*Semnopithecus*) inhabiting the island of Ceylon; but in India commonly misapplied to the lion-tailed macaque, *Macacus silenus* (see PRIMATES).

WANDESFORD, CHRISTOPHER (1592–1640), lord deputy of Ireland, was the son of Sir George Wandesford (1573–1612) of Kirklington, Yorkshire, and was born on the 24th of September 1592. Educated at Clare College, Cambridge, he entered parliament in 1621, and his rise to importance was due primarily to his friendship with Sir Thomas Wentworth, afterwards earl of Strafford. Although at first hostile to Charles I., this being evidenced by the active part he took in the impeachment of Buckingham, Wandesford soon became a royalist partisan, and in 1633 he accompanied Wentworth to Ireland, where he was already master of the rolls. His services to his chief were fully recognized by the latter, whom in 1640 he succeeded as lord deputy, but he had only just begun to struggle with the difficulties of his new position when he died on the 3rd of December 1640.

His son Christopher (1628–1687), created a baronet in 1662, was the father of Sir Christopher Wandesford (d. 1707), who was created an Irish peer as Viscount Castlecomer in 1707, Castlecomer in Kilkenny having been acquired by his grandfather when in Ireland. Christopher, the 2nd viscount (d. 1719), was secretary-at-war in 1717–1718. In 1758 John, 5th viscount, was created Earl Wandesford, but his titles became extinct when he died in January 1784.

For Wandesford's life see Thomas Comber, *Memoirs of the Life and Death of the Lord Deputy Wandesford* (Cambridge, 1778); T. D. Whitaker, *History of Richmondshire*, vol. ii. (1823); and the *Autobiography* of his daughter, Alice Thornton, edited by Charles Jackson for the Surtees Society (Durham, 1875).

WANDIWASH, a town in the North Arcot district of Madras, India. Pop. (1901) 5971. It is notable as the scene of the victory of Sir Eyre Coote in 1760, the most important ever won by the British over the French in India.

WANDSBEK, a town of Germany, in the Prussian province of Schleswig-Holstein, practically forming a populous suburb of Hamburg, with which it is connected by a railway and an electric tramway. Pop. (1905) 31,563. It is best known as the place of residence of the poet Johann Heinrich Voss and of Matthias Claudius, who here issued (1771–1775) the *Wandsbecker Boten*. There is a monument to Claudius in the town. Its leading manufactures are spirits, tobacco, beer, leather and confectionery; other industries are machine building and gardening.

WANDSWORTH, a south-western metropolitan borough of London, England, bounded N. by the river Thames and Battersea, and E. by Lambeth, and extending S. and W. to the boundary of the county of London. Pop. (1901) 232,034. The name, which occurs in Domesday, indicates the position of the village on the river Wandle, a small tributary of the Thames. Wandsworth is the largest in area of the metropolitan boroughs, including the districts of Putney by the river, part of Clapham in the north-east, Streatham in the south-east, Balham and Upper and Lower Tooting in the centre and south. These are mainly residential districts, and the borough is not thickly populated. Towards the west, along the Upper Richmond and Kingston roads, there is considerable open country, undulating and well wooded. It is to a great extent preserved in the public grounds of Putney Heath, which adjoins Wimbledon Common, outside the borough, on the north; and Richmond Park and Barnes Common, parts of which are in the borough. Other public grounds are parts of Wandsworth Common (193 acres) and Clapham Common, both extending into Battersea, Tooting Bec (147 acres) and Streatham Common (66 acres), and Wandsworth Park bordering the Thames. The borough is connected with Fulham across the Thames by Wandsworth and Putney bridges. The annual Oxford and Cambridge boat-race starts from above Putney Bridge, finishing at Mortlake; and the club-houses of the principal rowing clubs of London are situated on the Putney shore. Putney Heath was formerly notorious as a resort of highwaymen and duellists. Among the institutions of Wandsworth are the Royal Hospital for Incurables, Putney; the Fountain and the Grove fever hospitals, Lower Tooting; the Clapham School of Art, Wandsworth Technical Institute; the Roman Catholic Training College for Women, West Hill; and Wandsworth Prison, Heathfield Road. The parliamentary borough of Wandsworth returns one member, but the municipal borough also includes part of the Clapham division of the parliamentary borough of Battersea and Clapham, and part of the Wimbledon division of Surrey. The borough council consists of a mayor, 10 aldermen and 60 councillors. Area, 9129·7 acres.

WANGANUI, the principal port on the west coast of North Island, New Zealand, in the Waitotara county, at the mouth of the Wanganui river, 134 m. by rail N. of Wellington. Pop. (1906) 8175. The town is laid out in rectangular blocks at the foot of low hills, from the summit of which (as in Queen's Gardens) a splendid panorama is seen, including the snow-clad Mount Ruapehu to the north-east. The river bar obstructs navigation, the depth not exceeding 14 ft., so that large vessels must lie outside. The district is agricultural and pastoral, and wool and grain are exported, as well as meat and dairy produce, for which there are large refrigerating works. The Wanganui Collegiate School (Church of England) is one of the largest boarding schools in Australasia. The district was the scene of conflicts with the natives in 1847, 1864 and 1868, and in the beautiful Moutoa gardens a monument commemorates the battle of that name (May 14th, 1864). The settlement was founded in 1842.

WANGARA, the Hausa name for the Mandingo (*q.v.*), a people of West Africa; used also as the name of districts in the western and central Sudan. The Wangara are also known as Wangarawa, Wongara, Ungara, Wankoré and Wakore. According to Idrisi (writing in the 12th century), the Wangara country was renowned for the quantity and the quality of the gold which it produces. The country formed an island about 300 m. long by 150 in breadth, which the Nile (*i.e.* Niger) surrounded on all sides and at all seasons. This description corresponds fairly accurately with the tract of country between the Niger and its tributary the Bani. Idrisi's account of the annual inundation of the land by the rising of the Niger agrees with the facts. He states that on the fall of the waters natives from all parts of the Sudan assembled to gather the gold which the subsiding waters left behind. In the closing years of the 18th and the opening years of the 19th century the discoveries of Hornemann, Mungo Park and others revived the stories of Wangara and its richness in gold. Geographers of that period (*e.g.* Major Rennell) shifted the Wangara country far to the east and confused Idrisi's description with accounts which probably referred to Lake Chad. Gradually, however, as knowledge increased, the Wangara territory was again moved westward, and was located within the Niger bend. The name has now practically disappeared from the maps save that a town in the hinterland of Dahomey is named Wangara (French spelling Ouangara). Idrisi's account as to the richness in gold of the upper Niger regions has basis in fact; though the gold brought in considerable quantities to the European trading stations on the Gambia and Senegal in the 16th, 17th and 18th centuries appears to have come largely from Bambuk.

WANGARATTA, a town of Victoria, Australia, in the counties of Moira, Delatite and Bogong, at the junction of the Ovens and King rivers, 145½ m. by rail N.E. of Melbourne. Pop. (1901) 2621. It is a prosperous little town in an agricultural district and is the see of an Anglican bishop. It has numerous industries, including flour-milling, tanning, fellmongery, brewing, coach-building, bacon-curing, and bicycle and butter making. Important stock sales are held fortnightly, and there is an annual agricultural exhibition.

WANSTEAD, an urban district in the Romford parliamentary division of Essex, England, forming a residential suburb of London, on a branch of the Great Eastern railway, 8 m. N.E. of Liverpool Street station. Pop. (1901) 9179. Wanstead Park, 184 acres in extent, was opened in 1882. Northward extend the broken fragments of Epping Forest. Wanstead Flats, adjoining the Park, form another open ground. At Lake House Thomas Hood wrote the novel *Tylney Hall.* At Snaresbrook in the parish of Wanstead are the Infant Orphan Asylum, founded in 1827, and the Royal Merchant Seamen's Orphan Asylum, established in London in 1817 and refounded here in 1861. In Snaresbrook is Eagle Pond or Lake, 10½ acres in extent.

Wanstead is mentioned in Domesday, and the name is considered by some to be derived from Woden's stead or place, indicating a spot dedicated to the worship of Woden. It belonged before the time of Edward the Confessor to the monks of St Peter's, Westminster, and afterwards to the bishop of London, of whom it was held at the time of the Domesday Survey by Ralph Fitz Brien. In the reign of Henry VIII. it came into the possession of the crown, and in 1549 it was bestowed by Edward VI. on Lord Rich, whose son sold it in 1577 to Robert Dudley, earl of Leicester. The original manor house was rebuilt by Lord Chancellor Rich, who was here visited by Queen Elizabeth in 1561, and for her entertainment Sir Philip Sidney wrote a dramatic interlude which was played before the queen at Wanstead garden, and is printed at the end of the *Arcadia.* Sir Richard Child, afterwards earl of Tylney, built the splendid mansion of Wanstead House in 1715 (demolished in 1822), in which the prince of Condé and others of the Bourbon family resided during the reign of the first Napoleon.

WANTAGE, a market town in the Abingdon parliamentary division of Berkshire, England. Pop. of urban district (1901), 3766. It lies in the richly wooded Vale of White Horse, in a hollow at the foot of the steep hills which border the Vale on the south, 2 m. S. of Wantage Road station on the Great Western railway, with which a steam tramway connects it. The church of St Peter and St Paul is cruciform, and as a whole Perpendicular in appearance, but retains a nave arcade and ornate tower-arches of the Early English period. The font is a fine specimen of the same style; and there is beautiful woodwork in the chancel. An altar-tomb in alabaster of 1361, and a fine brass of 1414, commemorate members of the family of Fitzwarren. There are other brasses of the 15th and 16th centuries. The neighbouring building of the grammar school preserves a Norman door from another church, which formerly stood in the same churchyard with St Peter's. In the broad market-place is a great statue of King Alfred, executed by Count Gleichen and unveiled in 1877; for Wantage is famous as the birthplace of the king in 849. The town has a large agricultural trade and ironworks.

The title of Baron Wantage of Lockinge was taken in 1885 by Sir Robert Loyd-Lindsay (b. 1832) on his elevation to the peerage. He was the son of General James Lindsay of Balcarres, but took the additional surname of Loyd in 1858 on marrying the heiress of Lord Overstone, the banker; he fought with his regiment the Scots Fusilier Guards in the Crimea and won the V.C., retiring   . He was M.P. for Berks from 1865 to 188   retary to the War Office in 1877–1880.   ct at his death in 1900.

WAPENSHAW (M.E. for "weapon-show"), a periodical muster or review of troops formerly held in every district in Scotland, the object having been to satisfy the military chiefs that the arms of their retainers were in good condition. Scott's *Old Mortality* gives a description of one. The name is still given to rifle meetings held annually at Aberdeen and other places in Scotland.

WAPENTAKE, anciently the principal administrative division of the counties of York, Lincoln, Leicester, Nottingham, Derby and Rutland, corresponding to the hundred in the southern counties of England. In many cases, however, ancient wapentakes are now called hundreds. North of the Tees, Sadberg in Durham is the only district which was called a wapentake, and the rest of the ancient administrative divisions of the three northern counties were called wards. The word wapentake seems to have been first applied to the periodical meetings of the magnates of a district; and, if we may believe the 12th century compilation known as the *Leges Edwardi*, it took its name from the custom in accordance with which they touched the spear of their newly-appointed magistrate with their own spears and so confirmed his appointment. Probably it was also usual for them to signify their approval of a proposal by the clash of their arms, as was the practice among the Scandinavian peoples. Wapentakes are not found outside the parts of England which were settled by the Danes. They varied in size in different counties; those of Yorkshire, for instance, being very much larger than those of Lincolnshire. As a general rule each wapentake had its own court, which had the same jurisdiction as the hundred courts of the southern counties. In some cases, however, a group of wapentakes had a single court. It should be noticed that the court was styled *wapentagium* simply, and not *curia wapentagii.*

See Sir Henry Ellis, *General Introduction to Domesday Book*; W. W. Skeat. *Etymological English Dictionary*; W. Stubbs, *Constitutional History*; and H. M. Chadwick, *Studies on Anglo-Saxon Institutions* (1905). (G. J. T.)

WAPPERS, EGIDE CHARLES GUSTAVE, Baron (1803–1874), Belgian painter, was born at Antwerp on the 23rd of August 1803. After studying at the Antwerp Academy he went to Paris in 1826. The Romantic movement was then astir in France, and in that vehement struggle towards a new ideal artists and political men were thrown together. Wappers was the first Belgian artist to take advantage of this state of affairs, and his first exhibited picture, "The Devotion of the Burgomaster of Leiden," appearing at the appropriate moment, had a marvellous success in the Brussels Salon of 1830. The picture, although political, was in fact a remarkable work, which revolutionized the taste of Flemish painters. Wappers was invited to the court of Brussels, and was favoured with commissions. In 1832 the city of Antwerp appointed him professor of painting, and his triumph was complete when he exhibited at the Antwerp Salon of 1834 his masterpiece, "An Episode of the Belgian Revolution of 1830" (Brussels Gallery). He was subsequently appointed painter to the king of the Belgians, and at the death of Matthieu van Brée he was made director of the Antwerp Academy. Of his very numerous works we may name "Christ Entombed," "Charles I. taking leave of his Children," "Charles IX.," "Camöens," "Peter the Great at Saardam," and "Boccaccio at the Court of Joanna of Naples." Louis Philippe gave him a commission to paint a large picture for the gallery at Versailles, "The Defence of Rhodes by the Knights of St John of Jerusalem," a work finished in 1844, when he received from the king of the Belgians the title of baron. After retiring from the post of director of the Antwerp Academy, he settled in 1853 in Paris, where he died on the 6th of December 1874.

See J. du Jardin, *L'Art flamand*; Camille Lemonnier, *Histoire des beaux arts en Belgique*; E. Fétis, "Notice sur Gustave Wappers," *Annuaire de l'académie royale de Belgique* (1884).

WĀQIDĪ [Abū 'Abdallah Mahommed ibn 'Umar ul-Wāqidī] (747–823), Arabian historian, was born at Medina, where he became a corn-dealer but was compelled to flee from his creditors (owing largely to his generosity) to Bagdad. Here the Barmecide vizier Yaḥyā b. Khālid (see Barmecides) gave him means and made him cadi in the western district of the city. In 819 he was transferred to Rosafa (Ruṣāfa) on the east side. His greatest work is the *Kitāb ul-Maghāzī*, or history of Mahomet's campaigns.

The first third of the *Kitab ul-Maghāzī* (one leaf missing) was published by A. von Kremer from a Damascus MS. (Calcutta, 1856). Sprenger in his *Leben Muhammad's* used a British Museum MS. containing the first half, all but one leaf J Wellhausen published an abridged German translation from another British Museum MS. under the title *Muhammad in Medina* (Berlin, 1882)

Ascribed to Wāqidī, but probably written at the time of the Crusades to incite the Moslems against the Christians, are several works on the conquests of Islam One of the best known is the *Futūḥ ush-Shām*, edited by W Nassau Lees (Calcutta, 1854–1862, Cairo, 1865). M. J. de Goeje, in his *Mémoires sur la conquête de la Syrie* (Leiden, 1900), holds that this work is founded on that of Abu Hudhaifa ul-Bukhāri, which in turn is an edition of the real Wāqidī.

See Arabia, *Literature*, section "History." (G. W T.)

WAR (O Eng. *werre*, Fr *guerre*, of Teutonic origin; cf. O H G. *werran*, to confound), the armed conflict of states, in which each seeks to impose its will upon the other by force. War is the opposite of Peace (*q.v.*), and is the subject of the military art. In separate sections below the general principles of the art of war are discussed, and the laws which have gradually become accepted among civilized peoples for the regulation of its conditions. The details concerning the history of individual wars, and the various weapons and instruments of war, are given in separate articles.

See Army, Navy, Conscription, Strategy, Tactics, Infantry, Cavalry, Artillery, Engineers, Fortification, Coast Defence, Officers, Staff, Guards, Supply and Transport, Uniforms, Arms and Armour, Gun, Rifle, Pistol, Sword, Lance, Ordnance, Machine Guns, Submarine Mines, Torpedo, &c. The important wars are dealt with under the names commonly given to them; *e.g.* American Civil War, American War of Independence, American War of 1812, Crimean War, Dutch Wars, Franco-German War, French Revolutionary Wars, Great Rebellion, Greek War of Independence, Italian Wars, Napoleonic Campaigns, Peloponnesian War, Peninsular War, Punic Wars, Russo Japanese War, Russo-Turkish Wars, Servo-Bulgarian War, Seven Weeks' War, Seven Years' War, Spanish-American War, Spanish Succession War, Thirty Years' War. Important campaigns and battles are also separately treated (*e.g.* Waterloo, Trafalgar, Shenandoah Valley, Wilderness, Metz, &c.).

I General Principles

Modern conditions.

It is not easy to determine whether industrial progress, improved organization, the spread of education or mechanical inventions have wrought the greater change in the military art. War is first and foremost a matter of movement; and as such it has been considerably affected by the multiplication of good roads, the introduction of steam transport, and by the ease with which draught animals can be collected. In the second place, war is a matter of supply; and the large area of cultivation, the increase of live-stock, the vast trade in provisions, pouring the food-stuffs of one continent into another, have done much to lighten the inevitable difficulties of a campaign. In the third place, war is a matter of destruction; and while the weapons of armies have become more perfect and more durable, the modern substitutes for gunpowder have added largely to their destructive capacity. Fourthly, war is not merely a blind struggle between mobs of individuals, without guidance or coherence, but a conflict of well-organized masses, moving with a view to intelligent co-operation, acting under the impulse of a single will and directed against a definite objective. These masses, however, are seldom so closely concentrated that the impulse which sets them in motion can be promptly and easily communicated to each, nor can the right objective be selected without some knowledge of the enemy's strength and dispositions. Means of intercommunication, therefore, as well as methods of observation, are of great importance; and with the telegraph, the telephone, visual signalling, balloons, airships and improved field-glasses, the armies of to-day, so far as regards the maintenance of connexion between different bodies of troops, and the diffusion, if not the acquiring, of information, are at a great advantage compared with those of the middle of the 19th century.

War, then, in some respects has been made much simpler. Armies are easier to move, to feed and to manœuvre. But in other respects this very simplicity has made the conduct of a campaign more difficult. Not only is the weapon wielded by the general less clumsy and more deadly than heretofore, less fragile and better balanced, but it acts with greater rapidity and has a far wider scope. In a strong and skilful hand it may be irresistible; in the grasp of a novice it is worse than useless. In former times, when war was a much slower process, and armies were less highly trained, mistakes at the outset were not necessarily fatal. Under modern conditions, the inexperienced commander will not be granted time in which to correct his deficiencies and give himself and his troops the needful practice. The idea of forging generals and soldiers under the hammer of war disappeared with the advent of "the nation in arms." Military organization has become a science, studied both by statesmen and soldiers. The lessons of history have not been neglected. Previous to 1870, in one kingdom only was it recognized that intellect and education play a more prominent part in war than stamina and courage. Taught by the disasters of 1806, Prussia set herself to discover the surest means of escaping humiliation for the future. The shrewdest of her sons undertook the task The nature of war was analysed until the secrets of success and failure were laid bare; and on these investigations a system of organization and of training was built up which, not only from a military, but from a political, and even an economical point of view, is the most striking product of the 19th century. The keynote of this system is that the best brains in the state shall be at the service of the war lord. None, therefore, but thoroughly competent soldiers are entrusted with the responsibility of command; and the education of the officer is as thorough, as systematic and as uniform as the education of the lawyer, the diplomatist and the doctor. In all ages the power of intellect has asserted itself in war. It was not courage and experience only that made Hannibal, Alexander and Caesar the greatest names of antiquity. Napoleon, Wellington and the Archduke Charles were certainly the best-educated soldiers of their time; while Lee, Jackson and Sherman probably knew more of war, before they made it, than any one else in the United States. But it was not until 1866 and 1870 that the preponderating influence of the trained mind was made manifest. Other wars had shown the value of an educated general, these showed the value of an educated army. It is true that Moltke, in mental power and in knowledge, was in no wise inferior to the great captains who preceded him, but the remarkable point of his campaigns is that so many capable generals had never before been gathered together under one flag. No campaigns have been submitted to such searching criticism. Never have mistakes been more sedulously sought for or more frankly exposed. And yet, compared with the mistakes of other campaigns, even with that of 1815, where hardly a superior officer on either side had not seen more battles than Moltke and his comrades had seen field-days, they were astonishingly few. It is not to be denied that the foes of Prussia were hardly worthy of her steel. Yet it may be doubted whether either Austria or France ever put two finer armies into the field than the army of Bohemia in 1866 and the army of the Rhine in 1870. Even their generals of divisions and brigades had more actual experience than those who led the German army corps. Compared with the German rank and file, a great part of their non-commissioned officers and men were veterans, and veterans who had seen much service. Their chief officers were practically familiar with the methods of moving, supplying and manœuvring large masses of troops; their marshals were valiant and successful soldiers. And yet the history of modern warfare records no defeats so swift and so complete as those of Königgrätz and Sedan. The great host of Austria was shattered to fragments in seven weeks; the French Imperial army was destroyed in seven weeks and three days; and to all intent and purpose the resistance they had offered was not much more effective than that of a respectable militia. But both the Austrian and the French armies were organized and trained under the old system. Courage, experience and professional pride they possessed in abundance. Man for man, in all virile qualities, neither officers nor men were inferior to their foes. But one thing their generals lacked, and that was education for war. Strategy was almost a sealed book to them; organization a matter of secondary importance. It was no part of their duty, they declared, to train the judgment of their subordinates; they were soldiers, and not pedagogues. Knowledge of foreign armies and their methods they considered useless; and of war prepared and conducted on "business principles" they had never even dreamt.

Statesmen and war.

The popular idea that war is a mere matter of brute force, redeemed only by valour and discipline, is responsible for a greater evil than the complacency of the amateur. It blinds both the people and its representatives to their bounden duties. War is something more than a mere outgrowth of politics. It is a political act, initiated and controlled by the government, and it is an act of which the issues are far more momentous than any other. No branch of political science requires more careful study. It is not pretended that if military history were thoroughly studied all statesmen would become Moltkes, or that every citizen would be competent to set squadrons in the field. War is above all a practical art, and the application of theory to practice is not to be taught at a university or to be learned by those who have never rubbed shoulders with the men in the ranks. But if war were more generally and more thoroughly studied, the importance of organization, of training, of education and of readiness would be more generally appreciated; abuses would no longer be regarded with lazy tolerance; efficiency would be something more than a political catchword, and soldiers would be given ample opportunities of becoming masters of every detail of their profession. Nor is this all. A nation that understood something about war would hardly suffer the fantastic tricks which have been played so often by the best-meaning statesmen. And statesmen themselves would realize that when war is afoot their interference is worse than useless; that preparation for defence, whether by the multiplication of roads, the construction of railways, of arsenals, dockyards, fortresses, is not the smallest of their duties; and lastly, that so far as possible diplomacy and strategy should keep step. Each one of these is of far greater importance than in the past. In the wars of the 18th century, English cabinets and Dutch deputies could direct strategical operations without bringing ruin on their respective countries. The armies of Austria in 1792–1795, controlled as they were by the Aulic Councils, were more formidable in the field than those of the French Republic. In the campaigns of 1854 and 1859 the plans of Newcastle and Napoleon III. worked out to a successful issue; and if Lincoln and Stanton, his Secretary of War, imperilled the Union in 1862, they saw the downfall of the Southern Confederacy in 1865. But in every case amateur was pitted against amateur. The Dutch deputies were hardly less incapable of planning or approving a sound plan of campaign than Louis XIV. The Aulic Council was not more of a marplot than the Committee of Public Safety. Newcastle was not a worse strategist than the tsar Nicholas I. Napoleon III. and his advisers were quite a match for the courtier generals at Vienna; while Lincoln and Stanton were not much more ignorant than Jefferson Davis. The amateur, however, can no longer expect the good fortune to be pitted against foes of a capacity no higher than his own. The operations of Continental armies will be directed by soldiers of experience whose training for war has been incessant, and who will have at their command troops in the highest state of efficiency and preparation. It is not difficult to imagine, under such conditions, with what condign punishment mistakes will be visited. Napoleon III. in 1859 committed as many blunders as he did in 1870. But the Austrians had no Moltke to direct them; their army corps were commanded by men who knew less of generalship than a Prussian major, and their armament was inferior. Had they been the Austrians of to-day, it is probable that the French and the allies would have been utterly defeated. And to come to more recent campaigns, while [illegible] have not hesitated to declare that if the [illegible] had been Germans or French, the invasion [illegible] failure, it is impossible to doubt that had the Boers of 1899 possessed a staff of trained strategists, they would have shaken the British Empire to its foundations. The true test of direction of war is the number of mistakes. If they were numerous, although the enemy may not have been skilful enough to take advantage of them, the outlook for the future under the same direction, but against a more practised enemy, is anything but bright.

Preparation for defence.

As regards preparation for defence, history supplies us with numerous illustrations. The most conspicuous, perhaps, is the elaborate series of fortifications which were constructed by Vauban for the defence of France; and there can be no question that Louis XIV., in erecting this mighty barrier against invasion, gave proof of statesmanlike foresight of no mean order. An instance less familiar, perhaps, but even more creditable to the brain which conceived it, was Wellington's preparation of Portugal in 1809–1811. Not only did the impregnable stronghold of Torres Vedras, covering Lisbon, and securing for the sea-power an open door to the continent of Europe, rise as if by magic from the earth, but the whole theatre of war was so dealt with that the defending army could operate wherever opportunity might offer. No less than twenty supply depots were established on different lines of the advance. Fortifications protected the principal magazines. Bridges were restored and roads improved. Waterways were opened up, and flotillas organized; and three auxiliary bases were formed on the shores of the Atlantic. Again, the famous "quadrilaterals" of Lombardy and Rumelia have more than fulfilled the purpose for which they were constructed; and both Austria and Turkey owe much to the fortresses which so long protected their vulnerable points. Nor has the neglect of preparation failed to exert a powerful effect. Moltke has told us that the railway system of Germany before 1870 had been developed without regard to strategical considerations. Yet the fact remains that it was far better adapted both for offence and defence than those of Austria and France; and, at the same time, it can hardly be denied that the unprovided state of the great French fortresses exercised an evil influence on French strategy. Both Metz and Strassburg were so far from forming strong pivots of manœuvres, and thus aiding the operations of the field armies, that they required those armies for their protection; and the retreat on Metz, which removed Bazaine's army from the direct road to Paris and placed it out of touch with its supports, was mainly due to the unfinished outworks and deficient armament of the virgin city. Since 1870 it has been recognized that preparation of the theatre of war is one of the first duties of a government. Every frontier of continental Europe is covered by a chain of entrenched camps. The great arsenals are amply fortified and strongly garrisoned. Strategy has as much to say to new railways as trade; and the lines of communication, whether by water or by land, are adequately protected from all hostile enterprises.

Concert between diplomacy and strategy.

We now come to the importance of close concert between strategy and diplomacy. On the continent of Europe they can easily keep pace, for the theatre of war is always within easy reach. But when the ocean intervenes between two hostile states it is undoubtedly difficult to time an ultimatum so that a sufficient armed force shall be at hand to enforce it, and it has been said in high places that it is practically impossible. The expedition to Copenhagen in 1807, when the British ultimatum was presented by an army of 27,000 men carried on 300 transports, would appear to traverse this statement. But at the beginning of the 20th century an army and a fleet of such magnitude could neither be assembled nor despatched without the whole world being cognizant. It is thus perfectly true that an appreciable period of time must elapse between the breaking off of negotiations and the appearance on the scene of an invading army. Events may march so fast that the statesman's hand may be forced before the army has embarked. But because a powerful blow cannot at once be struck, it by no means follows that the delivery or the receipt of an ultimatum should at once produce a dangerous situation. Dewey's brilliant victory at Manila lost the greater part of its effect because the United States Government was unable to follow up the blow by landing a sufficient force. Exactly the same thing occurred in Egypt in 1882. The only results of the bombardment of Alexandria were the destruction of the city, the massacre of the Christian inhabitants, the encouragement of the rebels, who, when the ships drew off, came to the natural conclusion that Great Britain was powerless on land. Again, in 1899 the invading Boers found the frontiers unfortified and their march opposed by an inadequate force. It is essential, then, that when hostilities across the sea are to be apprehended, the most careful precautions should be taken to ward off the chance of an initial disaster. And such precautions are always possible. It is hardly conceivable, for instance, that a great maritime power, with Cyprus as a *place d'armes*, could not have placed enough transports behind the fleet to hold a sufficient garrison for Alexandria, and thus have saved the city from destruction. Nor in the case of a distant province being threatened is there the smallest reason that the garrison of the province should be exposed to the risk of a reverse before it is reinforced. It may even be necessary to abandon territory. It will certainly be necessary to construct strong places, to secure the lines of communication, to establish ample magazines, to organize local forces, to assemble a fleet of transports, and to keep a large body of troops ready to embark at a moment's notice. But there is no reason, except expense, that all this should not be done directly it becomes clear that war is probable, and that it should not be done without attracting public attention. In this way strategy may easily keep pace with diplomacy; and all that is wanted is the exercise of ordinary foresight, a careful study of the theatre of war, a knowledge of the enemy's resources and a resolute determination, despite some temporary inconvenience and the outcry of a thoughtless public, to give the enemy no chance of claiming first blood. The Franco-German War supplies a striking example. Moltke's original intention was to assemble the German armies on the western frontier. The French, he thought, inferior in numbers and but half prepared, would probably assemble as far back as the Moselle. But, as so often happens in war, the enemy did what he was least expected to do. Hastily leaving their garrisons, the French regiments rushed forward to the Saar. The excitement in Germany was great; and even soldiers of repute, although the mobilization of the army was still unfinished, demanded that such troops as were available should be hurried forward to protect the rich provinces which lie between the Saar and Rhine. But the chief of the staff became as deaf as he was silent. Not a single company was despatched to reinforce the slender garrisons of the frontier towns; and those garrisons were ordered to retire, destroying railways and removing rolling-stock, directly the enemy should cross the boundary. Moltke's foresight had embraced every possible contingency. The action of the French, improbable as it was deemed, had still been provided against; and, in accordance with time-tables drawn up long beforehand, the German army was disentrained on the Rhine instead of on the Saar. Ninety miles of German territory were thus laid open to the enemy; but the temporary surrender of the border provinces, in the opinion of the great strategist, was a very minor evil compared with the disasters, military and political, that would have resulted from an attempt to hold them.

Duties of the War Minister.

It is hardly necessary to observe that no civilian minister, however deeply he might have studied the art of war, could be expected to solve for himself the strategic problems which come before him. In default of practical knowledge, it would be as impossible for him to decide where garrisons should be stationed, what fortifications were necessary, what roads should be constructed, or how the lines of communication should be protected, as to frame a plan of campaign for the invasion of a hostile state. His foresight, his prevision of the accidents inevitable in war, would necessarily be far inferior to those of men who had spent their lives in applying strategical principles to concrete cases; and it is exceedingly unlikely that he would be as prolific of strategical expedients as those familiar with their employment. Nevertheless, a minister of war cannot divest himself of his responsibility for the conduct of military operations. In the first place, he is directly responsible that plans of campaign to meet every possible contingency are worked out in time of peace. In the second place, he is directly responsible that the advice on which he acts should be the best procurable. It is essential, therefore, that he should be capable of forming an independent opinion on the merits of the military projects which may be submitted to him, and also on the merits of those who have to execute them. Pitt knew enough of war and men to select Wolfe for the command in Canada. Canning and Castlereagh, in spite of the opposition of the king, sent Wellington, one of the youngest of the lieutenant-generals, to hold Portugal against the French. The French Directory had sufficient sense to accept Napoleon's project for the campaign of Italy in 1796. In the third place, strategy cannot move altogether untrammelled by politics and finance. But political and financial considerations may not present themselves in quite the same light to the soldier as to the statesman, and the latter is bound to make certain that they have received due attention. If, however, modifications are necessary, they should be made before the plan of campaign is finally approved; and in any case the purely military considerations should be most carefully weighed. It should be remembered that an unfavourable political situation is best redeemed by a decisive victory, while a reverse will do more to shake confidence in the Government than even the temporary surrender of some portion of the national domains. "Be sure before striking" and *Reculer pour mieux sauter* are both admirable maxims; but their practical application requires a thorough appreciation of the true principles of war, and a very large degree of moral courage, both in the soldier who suggests and in the statesman who approves. If, however, the soldier and the statesman are supported by an enlightened public, sufficiently acquainted with war to realize that patience is to be preferred to precipitation, that retreat, though inglorious, is not necessarily humiliating, their task is very considerably lightened. Nothing is more significant than a comparison between the Paris press in 1870 and the American Confederate press in 1864. In the one case, even after the disastrous results of the first encounters had proved the superior strength and readiness of the enemy, the French people, with all the heat of presumptuous ignorance, cried out for more battles, for an immediate offensive, for a desperate defence of the frontier provinces. So fierce was their clamour that both the generals and the government hesitated, until it was too late, to advise the retreat of Bazaine's army; and when that army had been cut off at Metz, the pressure of public opinion was so great that the last reserve of France was despatched to Sedan on one of the maddest enterprises ever undertaken by a civilized state. In 1864, on the other hand, while Lee in Virginia and Johnston in the west were retreating from position to position, and the huge hosts of the Union were gradually converging on the very heart of the Confederacy, the Southern press, aware that every backward step made the Federal task more difficult, had nothing but praise for the caution which controlled the movements of their armies. But the Southern press, in three crowded years of conflict, had learned something of war. In 1866 and 1870 the German press was so carefully muzzled that even had there been occasion it could have done nothing to prejudice public opinion. Thus both the sovereign and the generals were backed by the popular support that they so richly merited; but it may be remarked that the relations between the army and the government were characterized by a harmony which has been seldom seen. The old king, in his dual capacity as head of the state and commander-in-chief, had the last word to say, not only in the selection of the superior officers, but in approving every important operation. With an adviser like Moltke at his elbow, it might appear that these were mere matters of form. Moltke, however, assures us that the king was by no means a figurehead. Although most careful not to assert his authority in a way that would embarrass his chief of staff, and always ready to yield his own judgment to sound reasons, he expressed, nevertheless, a perfectly independent opinion on every proposal placed before him, and on very many occasions made most useful suggestions. And at the same time, while systematically refraining from all interference after military operations had once begun, he never permitted military considerations to override the demands of policy. In 1866, when it was manifestly of the first importance, from a military point of view, that the Prussian army should be concentrated in a position which would enable it to cross the border immediately war was declared, the political situation was so strained that it was even more important to prevent the enemy from setting foot at any single point on Prussian territory. The army, in consequence, was dispersed instead of being concentrated, and the ultimate offensive became a difficult and hazardous operation. It is true that the king was an able and experienced soldier. Nevertheless, the wise restraint he displayed in the course of two great campaigns, as well as the skill with which he adjusted conflicting factors, are an admirable example of judicious statesmanship.

Moral effect of fire.

The duration of a campaign is largely affected by the deadly properties of modern firearms. It is true that the losses in battle are relatively less that in the days of Brown Bess and the smooth-bore cannon, and almost insignificant when compared with the fearful carnage wrought by sword and spear. The reason is simple. A battlefield in the old days, except at close quarters, was a comparatively safe locality, and the greater part of the troops engaged were seldom exposed for a long time together to a hot and continuous fire. To-day death has a far wider range, and the strain on the nerves is consequently far more severe. Demoralization, therefore, sets in at an earlier period, and it is more complete. When troops once realize their inferiority, they can no longer be depended on. It is not the losses they have actually suffered, but those that they expect to suffer, that affect them. Unless discipline and national spirit are of superior quality, unless the soldier is animated by something higher than the mere habit of mechanical obedience, panic, shirking and wholesale surrender will be the ordinary features of a campaign. These phenomena made themselves apparent, though in a less degree, as long ago as the American Civil War, when the weapon of the infantry was the muzzle-loading rifle, firing at most two rounds a minute, and when the projectiles of the artillery were hardly more destructive than the stone shot of Mons Meg. With the magazine rifle, machine guns, shrapnel and high explosives they have become more pronounced than even at Vionville or Plevna. "The retreat of the 38th (Prussian) Brigade," writes Captain Hoenig, an eye-witness of the former battle, "forms the most awful drama of the great war. It had lost 53% of its strength, and the proportion of killed to wounded was as 3 to 4. Strong men collapsed inanimate. . . . I saw men cry like children, others fell prone without a sound; in most the need of water thrust forth all other instincts; the body demanded its rights. 'Water, water,' was the only intelligible cry that broke from those moving phantoms. The enemy's lead poured like hail upon the wretched remnant of the brigade; yet they moved only slowly to the rear, their heads bent in utter weariness; their features distorted under the thick dust that had gathered on faces dripping with sweat. The strain was beyond endurance. The soldier was no longer a receptive being, he was oblivious of everything, great or small. His comrades or his superiors he no longer recognised; and yet he was the same man who but a short time before had marched across the battlefield shouting his marching chorus. A few active squadrons, and not a man would have escaped! Only he who had seen men in such circumstances, and observed their bearing, knows the dreadful imprint that their features leave upon the memory. M[illegible] that arises from bodily exhaustion [illegible] . . . . I do not shrink," [illegible] of Mars-la-Tour affected [illegible] a whole army might [illegible] Brigade in the first month of the campaign, and it is thus perfectly clear that some small mistake in conduct, some trifling deficiency in preparation, an ill-conceived order or a few hours' delay in bringing up a reinforcement may have the most terrible consequences.

Naval and military force.

The importance, nay the necessity, that the people, as a governing body, should keep as watchful an eye on its armed forces and the national defences as on diplomacy or legislation is fully realized naturally enough, only by those nations whose instincts of self-preservation, by reason of the configuration of their frontiers or their political situation, are strongly developed. Yet even to maritime empires, to Great Britain or indeed to the United States, an efficient army is of the first necessity. Their land frontiers are vulnerable. They may have to deal with rebellion, and a navy is not all-powerful, even for the defence of coasts and commerce. It can protect, but it cannot destroy. Without the help of an army, it can neither complete the ruin of the enemy's fleet nor prevent its resuscitation. Without the help of an army it can hardly force a hostile power to ask for terms. Exhaustion is the object of its warfare; but exhaustion, unless accelerated by crushing blows, is an exceedingly slow process. In the spring of 1861 the blockade was established in American waters along the coasts of the Southern Confederacy, and maintained with increasing stringency from month to month. Yet it was not till the spring of 1865 that the colours of the Union floated from the capitol of Richmond, and it was the army which placed them there. A state, then, which should rely on naval strength alone, could look forward to no other than a protracted war, and a protracted war between two great powers is antagonistic to the interests of the civilized world. With the nations armed to the teeth, and dominated to a greater or smaller extent by a militant spirit; with commerce and finance dependent for health and security on universal peace, foreign intervention is a mere question of time. Nor would public opinion, either in Great Britain or America, be content with a purely defensive policy, even if such policy were practicable. Putting aside the tedium and the dangers of an interminable campaign, the national pride would never be brought to confess that it was incapable of the same resolute effort as much smaller communities. "An army, and a strong army," would be the general cry. Nor would such an army be difficult to create. Enormous numbers would not be needed. An army supported by an invincible navy possesses a strength which is out of all proportion to its size. Even to those who rely on the big battalions and huge fortresses, the amphibious power of a great maritime state, if intelligently directed, may be a most formidable menace; while to the state itself it is an extraordinary security. The history of Great Britain is one long illustration. Captain Mahan points out that there are always dominant positions, outside the frontiers of a maritime state, which, in the interests of commerce, as well as of supremacy at sea, should never be allowed to pass into the possession of a powerful neighbour. Great Britain, always dependent for her prosperity on narrow seas, has long been familiar with the importance of the positions that command these waterways. In one respect at least her policy has been consistent. She has spared no effort to secure such positions for herself, or, if that has been impracticable, at least to draw their teeth. Gibraltar, Malta, St Lucia, Aden, Egypt, Cyprus are conspicuous instances; but above all stands Antwerp. In perhaps the most original passage of Alison's monumental work the constant influence of Antwerp on the destinies of the United Kingdom is vividly portrayed. "Nature has framed the Scheldt to be the rival of the Thames. Flowing through a country excelling even the midland counties of England in wealth and resources, adjoining cities equal to any in Europe in arts and commerce; the artery at once of Flanders and Holland, of Brabant and Luxemburg, it is fitted to be the great organ of communication between the fertile fields and rich manufacturing towns of the Low Countries and other maritime states of the world." Antwerp, moreover, the key of the great estuary, is eminently adapted for the establishment of a vast naval arsenal, such as it became under Philip II. of

Spain and again under the first Napoleon. "It is the point," continues the historian, "from which in every age the independence of these kingdoms has been seriously menaced. Sensible of her danger, it had been the fixed policy of Great Britain for centuries to prevent this formidable outwork from falling into the hands of her enemies, and the best days of her history are chiefly occupied with the struggle to ward off such a disaster." In ascribing, however, every great war in which Great Britain has been engaged to this cause alone he has gone too far. The security of India has been a motive of equal strength. Nevertheless, it was to protect Antwerp from the French that Charles II. sided with the Dutch in 1670; that Anne declared war on Louis XIV. in 1704; that Chatham supported Prussia in 1742; that Pitt, fifty years later, took up arms against the Revolution.

Inter-actions of naval and military operations.

The trophies of the British army in the great war with France were characteristic of the amphibious power. The troops took more battleships than colours, and almost as many naval arsenals as land fortresses. Many were the blows they struck at the maritime strength of France and her allies; but had the expedition which landed on the Isle of Walcheren in 1809 been as vigorously conducted as it was wisely conceived, it would have hit Napoleon far harder than even the seizure of the Danish fleet at Copenhagen. The great dockyard that the emperor had constructed on the Scheldt held the nucleus of a powerful fleet. Eight line-of-battle ships and ten frigates lay in mid-channel. Twenty vessels of different classes were on the slips, and in the magazines and storehouses had been accumulated sufficient material to equip all these and twenty more. The destruction of Antwerp—and for a full week it was at Lord Chatham's mercy—would have freed scores of British frigates to protect British commerce; Wellington, in his great campaign of 1813, could not have had to complain that, for the first time, the communication by sea of a British army was insecure; the Americans, in the war which broke out in 1812, would have been more vigorously opposed; and Napoleon, who, while Antwerp was his, never altogether abandoned hope of overmastering Great Britain on her own element, might, on his own confession, have relinquished the useless struggle with the great sea power. The expedition failed, and failed disastrously. But for all that, fulfilling as it did the great maxim that the naval strength of the enemy should be the first objective of the forces of the maritime power, both by land and sea, it was a strategical stroke of the highest order.

The predominant part played by the army under Wellington in Spain and Belgium has tended to obscure the principle that governed its employment in the war of 1793–1815. The army, in the opinion of the country, was first and foremost the auxiliary of the fleet; and only when the naval strength of the enemy had been destroyed was it used in the ordinary manner, *i.e.* in the invasion of the hostile territory and in lending aid to the forces of confederate powers. Events proved that these principles were absolutely sound. It was not in the narrow seas alone that the army rendered good service to the navy. Depriving France of her colonies, occupying her ports in foreign waters, ousting her from commanding posts along the trade routes, it contributed not only to her exhaustion, but to the protection of British commerce and to the permanent establishment of maritime supremacy. Few of these operations are of sufficient magnitude to attract much notice from the ordinary historian, yet it is impossible to overrate their effect. To the possession of the dominant positions that were captured by the army, Great Britain, in no small degree, is indebted for the present security of her vast dominions. The keynote of the fierce struggle with the French Empire was the possession of India. Before he became First Consul, Napoleon had realized that India was the throne of Asia; that whoever should sit on that throne, master of the commerce of the East, of the richest and most natural market for the products of the West, and of the hardiest and most enlightened nations of the golden hemisphere, would be master of more than half the globe. But his prescience was not surer than the instinct of the British people. Vague and shadowy indeed were their dreams of empire, yet the presentiment of future greatness, based on the foothold they had already gained in Hindustan, seems always to have controlled the national policy. They knew as well as Napoleon that Malta and Egypt, to use his own phrase, were merely the outworks of their stronghold in the East; and that if those outworks fell into the hands of France, a great army of warlike Mahommedans, led by French generals, stiffened by a French army corps, and gathering impetus from the accession of every tribe it passed through, might march unopposed across the Indus. So, from first to last, the least threat against Egypt and Malta sufficed to awaken their apprehensions; and in their knowledge that India was the ultimate objective of all his schemes is to be found the explanation of the stubbornness with which they fought Napoleon. It is not to be denied that in thwarting the ambition of their mighty rival, or perhaps in furthering their own, the navy was the chief instrument; but in thrusting the French from Egypt, in adding Ceylon, Mauritius and Cape Colony to the outworks, the army, small as it was then, compared with the great hosts of the Continent, did much both for the making and the security of the British Empire.

But the scope of the military operations of a maritime state is by no means limited to the capture of colonies, naval arsenals and coaling-stations. Timely diversions, by attracting a large portion of the enemy's fighting strength on the mainland, may give valuable aid to the armies of an ally. The Peninsular War is a conspicuous example. According to Napoleon, the necessity of maintaining his grip on Spain deprived him of 180,000 good soldiers during the disastrous campaign of 1813; and those soldiers, who would have made Dresden a decisive instead of a barren victory, were held fast by Wellington. Again, it was the news of Vittoria that made it useless for the emperor to propose terms of peace, and so escape from the coils that strangled him at Leipzig.

Nor is the reinforcement supplied by a small army based upon the sea to be despised. In 1793 a British contingent under the duke of York formed part of the allied forces which, had the British government forborne to interfere, would in all probability have captured Paris. Twenty-two years later, under wiser auspices, another contingent, although numbering no more than 30,000 men, took a decisive part in the war of nations, and the blunders of the older generation were more than repaired at Waterloo. Nevertheless, the strength of the amphibious power has been more effectively displayed than in the campaign of 1815. Intervention at the most critical period of a war has produced greater results than the provision of a contingent at the outset. In 1781 the disembarkation of a French army at Yorktown, Virginia, rendered certain the independence of the United States; and in 1878, when the Russian invaders were already in sight of Constantinople, the arrival of the British fleet in the Dardanelles, following the mobilization of an expeditionary force, at once arrested their further progress. Had the British Cabinet of 1807 realized the preponderating strength which even a small army, if rightly used, draws from the command of the sea, the campaign of Eylau would in all probability have been as disastrous to Napoleon as that of Leipzig. The presence of 20,000 men at the great battle would have surely turned the scale in favour of the allies. Yet, although the men were available, although a few months later 27,000 were assembled in the Baltic for the coercion of Denmark, his Majesty's ministers, forgetful of Marlborough's glories, were so imbued with the idea that the British army was too insignificant to take part in a Continental war, that the opportunity was let slip. It is a sufficiently remarkable fact that the successive governments of that era, although they realized very clearly that the first duty of the army was to support the operations and complete the triumph of the navy, never seemed to have grasped the principles which should have controlled its use when the command of the sea had been attained. The march of the Allies on Paris in 1793 was brought to a standstill because the British Cabinet considered that the contingent would be better employed in besieging Dunkirk. After the failure of the expedition under Sir John Moore to achieve the impossible, and in conjunction with the Spaniards drive the French from the Peninsula, the ministry abandoned all idea of intervention on the main theatre, although, as we have seen, had such intervention been well timed, it might easily have changed the current of events. It is true that when the main theatre is occupied by huge armies, as was the case during the whole of the Napoleonic conflict, the value of a comparatively small force, however sudden its appearance, is by no means easily realized. For instance, it would seem at first sight that a British contingent of 100,000 men would be almost lost amid the millions that would take part in the decisive conflicts of a European war. It is remembered, however, that with enormous masses of men the difficulties of supply are very great. Steam has done much to lighten them, and the numbers at the point of collision will be far greater than it was possible to assemble in the days of Napoleon. Nevertheless, the lines of communication, especially railways, will require more men to guard them than heretofore, for they are far more vulnerable. The longer, therefore, the lines of communication, the smaller the numbers on the field of battle. Moreover, the great hosts of the Continent, not only for convenience of supply, but for convenience of manœuvre, will deploy several armies on a broad front. At some one point, then, a reinforcement of even one or two army corps might turn the scale.

Weakness of allied armies.

The objections, however, to intervention of this character are numerous. Between allied armies, especially if one is far larger than the other, there is certain to be friction, as was the case in the Crimea; and the question of supply is not easily settled. If, however, the decisive point is near the coast, as in the campaign of Eylau, the army of the maritime power, possessing its own base, can render effective aid without embarrassment either to itself or its ally. But, under all other conditions, independent operations of a secondary nature are distinctly to be preferred. Such was clearly the opinion of the British ministries during the war with France. They recognized that by giving vitality and backbone to popular risings even a small army might create useful diversions. But their idea of a diversion was a series of isolated efforts, made at far-distant points; and even so late as 1813 they were oblivious of the self-evident facts that for a diversion to be really effective it must be made in such strength as to constitute a serious threat, and that it should be directed against some vital point. Fortunately for Europe, Wellington foresaw that the permanent occupation of Portugal, and the presence of a British army in close proximity to the southern frontier of France, would be a menace which it would be impossible for Napoleon to disregard. Yet with what difficulty he induced the government to adopt his views, and how lukewarm was their support, is exposed in the many volumes of his despatches. In all history there are few more glaring instances of incompetent statesmanship than the proposal of the cabinet of 1813, at the moment Wellington was contemplating the campaign that was to expel the French from Spain, and was asking for more men, more money and more material, to detach a large force in the vague hope of exciting a revolution in southern Italy. Whether the improvement in communications, as well as the increase in the size of armies, have not greatly weakened the value of diversions on the mainland, it is difficult to say. Railways may enable the defender to concentrate his forces so rapidly that even the landing may be opposed, and with the enormous numbers at his command he may well be able to spare a considerable force from the main theatre. It is possible to conceive that a small army, even if it completed its embarkation, might find itself [illegible] entrenched position by a force little larger than [illegible], the diversion were made at a crisis of the [illegible] sudden appearance of a new army might be [illegible] would probably [illegible]

upon some prosperous port or important arsenal, would compel him to maintain large garrisons along the whole seaboard. The strength of these garrisons, in all probability, would be much larger in the aggregate than the force which menaced them, and the latter would thus exercise a far greater disintegrating effect on the enemy's armed strength than by adding a few thousand men to the hosts of its ally. On theatres of war which are only thinly populated or half civilized, a descent from the sea might easily produce a complete change in the situation. The occupation of Plevna, in close proximity to the Russian line of communications and to the single bridge across the Danube, brought the Russian advance through Bulgaria to a sudden stop, and relieved all pressure on Turkey proper. The deadlock which ensued is suggestive. Let us suppose that the invaders' line of communications had been a railway, and Plevna situated near the coast. Supplied from the sea, with unlimited facilities for reinforcement, Osman's ring of earthworks would have been absolutely impregnable; and had the ring been pushed so far inland as to secure scope for offensive action, the Russians, in all human probability, would never have crossed the Balkans. It is perfectly possible, then, that if an army lands within reach of a precarious line of communications it may compel the enemy, although far superior in numbers, to renounce all enterprises against distant points.

Railways.

Railways in war are good servants, but bad masters. In some respects they are far superior to a network of highroads. Two trains will supply the daily needs of 100,000 men several hundred miles distant from their base. But the road-bed is easily destroyed; the convoy system is impracticable, and the regular course of traffic is susceptible to the slightest threat. So, when railways become the principal factors, as when an army finds itself dependent on a long and exposed line, a powerful aggressive combination becomes a matter of the utmost difficulty. The whole attention of the commander will be given to the security of his supplies, and even if he is not thrown on the defensive by the enemy's activity, his liberty of action will be exceedingly circumscribed. The relative values of the different kinds of communications have a most important bearing on the art of war. A great waterway, such as the Nile, the Mississippi, the Danube or the Ganges, is safer and surer than a railway. But railways are far more numerous than navigable rivers, and a series of parallel lines is thus a better means of supplying a large army. But neither railways nor waterways as lines of supply or of operation are to be compared with the sea. Before the war of 1870, for instance, a study of the French railway system enabled Moltke to forecast, with absolute accuracy, the direction of Napoleon's advance, the distribution of his forces, and the extent of front that they would occupy. In a war, therefore, between two Continental powers, the staff on either side would have no difficulty in determining the line of attack; the locality for concentration would be at once made clear; and as the carrying capacity of all railways is well known, the numbers that would be encountered at any one point along the front might be easily calculated. But if the enemy's army, supported by a powerful fleet, were to advance across blue water, the case would be very different. Its movements would be veiled in the most complete secrecy. It would be impossible to do more than guess at its objective. It might strike at any point along hundreds of miles of coast, or it might shift from one point to another, perhaps far distant, in absolute security; it could bewilder the enemy with feints, and cause him to disperse his forces over the whole seaboard. Surprise and freedom of movement are pre-eminently the weapons of the power that commands the sea. Witness the War of Secession. McClellan, in 1862, by the adroit transfer of 120,000 men down the reaches of Chesapeake to the Virginia Peninsula, had Richmond at his mercy. Grant in 1864, by continually changing his line of communication from one river to another, made more progress in a month than his predecessors had done in two years. Sherman's great march across Georgia would have been impossible had not a Federal fleet been ready to receive him when he reached

The sea as a line of operation.

the Atlantic; and, throughout the war, the knowledge that at any moment a vast fleet of transports might appear off any one of the ports on their enormous seaboard prevented the Confederates, notwithstanding that the garrisons were reduced to a most dangerous extent, from massing their full strength for a decisive effort.

Amphibious power.

Importance of strategy.

The power of striking like "a bolt from the blue" is of the very greatest value in war. Surprise was the foundation of almost all the grand strategical combinations of the past, as it will be of those to come. The first thought and the last of the great general is to outwit his adversary, and to strike where he is least expected. And the measures he adopts to accomplish his purpose are not easily divined. What soldier in Europe anticipated Marlborough's march to the Danube and Blenheim field? What other brain besides Napoleon's dreamt of the passage of the Alps before Marengo? Was there a single general of Prussia before Jena who foresaw that the French would march north from the Bavarian frontier, uncovering the roads to the Rhine, and risking utter destruction in case of defeat? Who believed, in the early June of 1815, that an army 130,000 strong would dare to invade a country defended by two armies that mustered together over 200,000 unbeaten soldiers? To what Federal soldier did it occur, on the morning of Chancellorsville, that Lee, confronted by 90,000 Northerners, would detach the half of his own small force of 50,000 to attack his enemy in flank and rear? The very course which appeared to ordinary minds so beset by difficulties and dangers as to be outside the pale of practical strategy has, over and over again, been that which led to decisive victory; and if there is one lesson more valuable than another as regards national defence, it is that preparation cannot be too careful or precautions overdone. Overwhelming numbers, adequately trained, commanded and equipped, are the only means of ensuring absolute security. But a numerical preponderance, either by land or sea, over all possible hostile combinations, is unattainable, and in default the only sound policy is to take timely and ample precautions against all enterprises which are even remotely possible. There is nothing more to be dreaded in war than the combined labours of a thoroughly well-trained general staff, except the intellect and audacity of a great strategist. The ordinary mind, even if it does not shrink from great danger, sees no way of surmounting great difficulties; and any operation which involves both vast dangers and vast difficulties it scoffs at as chimerical. The heaven-born strategist, on the other hand, "takes no counsel of his fears." Knowing that success is seldom to be won without incurring risks, he is always greatly daring; and by the skill with which he overcomes all obstacles, and even uses them, as Hannibal and Napoleon did the Alps, and as some great captain of the future may use the sea, to further his purpose and surprise his adversary, he shows his superiority to the common herd. It is repeated *ad nauseam* that in consequence of the vastly improved means of transmitting information, surprise on a large scale is no longer to be feared. It is to be remembered, however, that the means of concentrating troops and ships are far speedier than of old; that false information can be far more readily distributed; and also, that if there is one thing more certain than another, it is that the great strategist, surprise being still the most deadly of all weapons, will devote the whole force of his intellect to the problem of bringing it about.

Nor is it to be disguised that amphibious power is a far more terrible weapon than even in the days when it crushed Napoleon. Commerce has increased by leaps and bounds, and it is no longer confined within territorial limits. The arteries vital to the existence of civilized communities stretch over every ocean. States which in 1800 rated their maritime traffic at a few hundred thousand pounds sterling, value it now at many millions. Others, whose flags, fifty years ago, were almost unknown on the high seas, possess to-day great fleets of merchantmen; and those who fifty years ago were self-dependent, rely in great part, for the maintenance of their prosperity, on their intercourse with distant continents. There is no great power, and few small ones, to whom the loss of its sea-borne trade would be other than a most deadly blow; and there is no great power that is not far more vulnerable than when Great Britain, single-handed, held her own against a European coalition. Colonies, commercial ports, dockyards, coaling-stations are so many hostages to fortune. Year by year they become more numerous. Year by year, as commercial rivalry grows more acute, they become more intimately bound up with the prosperity and prestige of their mother-countries. And to what end? To exist as pledges of peace, *auspicia melioris aevi*, or to fall an easy prey to the power that is supreme at sea and can strike hard on land?

Value of unprofessional troops.

Even the baldest and briefest discussion of the vast subject of war would be incomplete without some reference to the relative merits of professional and unprofessional soldiers. Voluntary service still holds its ground in the Anglo-Saxon states; and both the United Kingdom and America will have to a great extent to rely, in case of conflicts which tax all their resources, on troops who have neither the practice nor the discipline of their standing armies. What will be the value of these amateurs when pitted against regulars? Putting the question of *moral* aside, as leading us too far afield, it is clear that the individual amateur must depend upon his training. If, like the majority of the Boers, he is a good shot, a good scout, a good skirmisher and, if mounted, a good horseman and horsemaster, he is undeniably a most useful soldier. But whether amateurs *en masse*, that is, when organized into battalions and brigades, are thoroughly trustworthy, depends on the quality of their officers. With good officers, and a certain amount of previous training, there is no reason why bodies of infantry, artillery or mounted infantry, composed entirely of unprofessional soldiers, should not do excellent service in the field. Where they are likely to fail is in discipline; and it would appear that at the beginning of a campaign they are more liable to panic, less resolute in attack, less enduring under heavy losses and great hardships, and much slower in manœuvre than the professionals. To a certain extent this is inevitable; and it has a most important bearing on the value of the citizen soldier, for the beginning of a campaign is a most critical phase. In short, troops who are only half-trained or have been hastily raised may be a positive danger to the army to which they belong; and the shelter of stout earthworks is the only place for them. Yet the presence of a certain number of experienced fighting men in the ranks may make all the difference; and, in any case, it is probable that battalions composed of unprofessional soldiers, the free citizens of a free and prosperous state, are little if at all inferior, as fighting units, to battalions composed of conscripts. But it is to be understood that the men possess the qualifications referred to above, that the officers are accustomed to command and have a good practical knowledge of their duties in the field. A mob, however patriotic, carrying small-bore rifles is no more likely to hold its own to-day against well-led regulars than did the mob carrying pikes and flint-locks in the past. A small body of resolute civilians, well-armed and skilful marksmen, might easily on their own ground defeat the same number of trained soldiers, especially if the latter were badly led. But in a war of masses, the power of combination, of rapid and orderly movement, and of tactical manœuvring is bound to tell. (G.F.R.H.)

LITERATURE.—On the general principles of War, see C. v. Clausewitz, *Vom Kriege* (Eng. trans. *On War*, new ed. 1906); C. v. B(inder)-K(rieglstein); *Geist und Stoff im Kriege* (1895); Ardant du Picq, *Études sur le combat*; W. Bagehot, *Physics and Politics*; G. le Bon, *Psychologie des foules* and *Psychologie de l'éducation*; F. N. Maude, *War and the World's Life* (1907); Berndt, *Zahl im Kriege* (statistical tables); Biottot, *Les Grands Inspirés—Jeanne d'Arc*; C. W. C. Oman, *Art of War*; M. Jähns, *Gesch. der Kriegswissenschaften*; v. der Goltz, *Volk in Waffen* (Eng. trans., *Nation in Arms*); A. T. Mahan, *Influence of Sea Power on History*; C. E. Callwell, *Military Operations and Maritime Preponderance*; P.H. Colomb, *Naval Warfare*; Stewart Murray, *Future Peace of the Anglo-Saxons*; H. Spenser Wilkinson, *The Brain of an Army*, *War and Policy*, &c.; and works mentioned in the bibliography to the article ARMY.

existing exemptions. The considerations which have led mankind to systematize the practice of war in regard to private property on land do not arise in the same form in connexion with private property at sea. Here there is no question of seizing the live stock, or the bedding, or the food, or the utensils of the private citizen. If ship and cargo are captured, it may be hard upon the merchant, but such captures do not directly deprive him of the necessaries of life. Yet, as in the case of war on land, its hardships have been attenuated, and progress has been made by developing a more systematic procedure of capture of private property at sea. Thus exemption from capture is now allowed by belligerents to enemy merchant ships which, at the outbreak of war, are on the way to one of their ports, and they also allow enemy merchantmen in their ports at its outbreak a certain time to leave them. This is confirmed by the Hague Convention of 1907 on the status of enemy ships on the outbreak of hostilities. A somewhat similar practice exists as regards pursuit of merchant ships which happen to be in a neutral port at the same time with an enemy cruiser. Under the Hague Convention of 1907 respecting the rights and duties of neutral powers in naval war (Art. 16), this, too, is confirmed. Lastly, there has grown up, on grounds similar to those which have led to the indulgence shown to private property on land, a now generally recognized immunity from capture of small vessels engaged in the coast fisheries, provided they are in no wise made to serve the purposes of war, which also has been duly confirmed in the Hague Conventions of 1907 by Art. 3 of the convention relative to certain restrictions on the exercise of the right of capture in maritime war. This has all been done with the object of making the operations of war systematic, and enabling the private citizen to estimate his risks and take the necessary precautions to avoid capture, and of restricting acts of war to the purpose of bringing it to a speedy conclusion.

We have seen that the only immunity of private property yet known to the laws of war is a limited one at sea. War, by its very nature, seems to prevent the growth of any such immunity. The tendency in war on land has been to spread its effects over the whole community, to keep a faithful record on both sides of all confiscations, appropriations and services enforced against private citizens; beyond this, protection has not yet been extended. There is good reason for this. The object of each belligerent being to break the enemy's power and force him to sue for peace, it may not be enough to defeat him in the open field; it may be necessary to prevent him from repairing his loss both in men and in the munitions of war. This may imply crippling his material resources, trade and manufactures. It has been contended that "to capture at sea raw materials used in the manufacturing industry of a belligerent state, or products on the sale of which its prosperity, and therefore its taxable sources depend, is necessarily one of the objects, and one of the least cruel, which the belligerents pursue. To capture the merchant vessels which carry these goods, and even to keep the seamen navigating them prisoners, is to prevent the employment of the ships by the enemy as transports or cruisers, and the repairing from among the seamen of the mercantile marine of losses of men in the official navy."[1]

The question of reform of the existing practice would naturally be viewed in different countries according to their respective interests. The United States has obviously an interest in the exemption of its merchant vessels and cargoes from capture, a small official navy being sufficient for the assertion of its ascendancy on the American continent. It may also be presumed to be in the interest of Italy, who, in a treaty with the United States in 1871, provided for mutual recognition of the exemption.

In the Austro-Prussian war of 1866 the principle of inviolability was adhered to by both parties. Germany proclaimed the same principle in 1870, but afterwards abandoned it.

There is a strong movement in Great Britain in favour of the general adoption of immunity. Whether it may now be expedient for her to agree to such immunity is an open question. It is quite conceivable, however, that different considerations would weigh with her in a war with the United States from those which would arise in a war with France or Germany. In the case of the United States it might be in the interest of both parties to localize the operations of war, and to interfere as little as possible, perhaps for the joint exclusion of neutral vessels, with the traffic across the Atlantic. In the case of a war with France or Germany, Great Britain might consider that the closing of the high sea to all traffic by the merchantmen of the enemy would be very much in her own interest.

Enemy subjects—their property on hostile territory.

The converse subject of the treatment of subjects of the one belligerent who remain in the country of the other belligerent also was not dealt with at the Hague. British practice in this matter has always been indulgent, the protection to the persons and property of non-combatant enemies on British soil dating back to Magna Carta (s. 48), and this is still the law of England. The practice on the continent of Europe varies according to circumstances, to which no doubt, in the event of the invasion of Great Britain British practice would also have to adapt itself.

Prisoners of war.

The Hague War-Regulations deal fully with the treatment of prisoners, and though they add nothing to existing practice, such treatment is no longer in the discretion of the signatory Powers, but is binding on them. They provide as follows:—

Prisoners of war are in the power of the hostile government, but not in that of the individuals or corps who captured them. They must be humanely treated. All their personal belongings, except arms, horses and military papers, remain their property (Article 4). Prisoners of war may be interned in a town, fortress, camp or any other locality, and bound not to go beyond certain fixed limits; but they can only be confined as an indispensable measure of safety, and only so long as circumstances necessitating this measure shall endure (Article 5). The state may utilize the labour of prisoners of war according to their rank and aptitude, with the exception of officers. Their tasks shall not be excessive, and shall have nothing to do with the military operations. Prisoners may be authorized to work for the public service, for private persons, or on their own account. Work done for the state shall be paid for according to the tariffs in force for soldiers of the national army employed on similar tasks, or if there are none in force, then according to a tariff suitable to the work executed. When the work is for other branches of the public service or for private persons, the conditions shall be settled in agreement with the military authorities. The wages of the prisoners shall go towards improving their position, and the balance shall be paid them at the time of their release, after deducting the cost of their maintenance (Article 6). The government into whose hands prisoners of war have fallen is bound to maintain them. Failing a special agreement between the belligerents, prisoners of war shall be treated, as regards food, quarters and clothing, on the same footing as the troops of the government which has captured them (Article 7). Prisoners of war shall be subject to the laws, regulations and orders in force in the army of the state into whose hands they have fallen. Any act of insubordination warrants the adoption, as regards them, of such measures of severity as may be necessary. Escaped prisoners, recaptured before they have succeeded in rejoining their army, or before quitting the territory occupied by the army that captured them, are liable to disciplinary punishment. Prisoners who, after succeeding in escaping, are again taken prisoners, are not liable to any punishment for the previous flight (Article 8). Every prisoner of war, if questioned, is bound to declare his true name and rank, and if he disregards this rule, he is liable to a curtailment of the advantages accorded to the prisoners of war of his class (Article 9). Prisoners of war may be set at liberty on parole if the laws of their country authorize it, and, in such a case, they are bound, on their personal honour, scrupulously to fulfil, both as regards their own government and the government by whom they were made prisoners, the engagements they have contracted. In such cases, their own government shall not require of nor accept from them any service incompatible with the parole given (Article 10). A prisoner of war cannot be forced to accept his liberty on parole; similarly the hostile government is not obliged to assent to the prisoner's request to be set at liberty on parole (Article 11). Any prisoner of war who is liberated on parole and recaptured, bearing arms against the government to whom he had pledged his honour or against the allies of that government, forfeits his right to be treated as a prisoner of war, and can be brought before the courts (Article 12).

Journalists.

An interesting provision in the Regulations assimilates individuals who, following an army without directly belonging to it, such as newspaper correspondents and reporters, sutlers, contractors, fall into the enemy's hands, to prisoners of war, provided they can produce a certificate from the military authorities of the army they were accompanying.

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[1] Barclay, "Proposed Immunity of Private Property at Sea from Capture by Enemy," *Law Quarterly Review* (January 1900).

Information office as to prisoners.

A new departure is made by clauses providing for the institution of a bureau for information relative to prisoners of war. This is to be created at the commencement of hostilities, in each of the belligerent states and, when necessary, in the neutral countries on whose territory belligerents have been received. It is intended to answer all inquiries about prisoners of war, and is to be furnished by the various services concerned with all the necessary information to enable it to keep an individual return for each prisoner of war. It is to be kept informed of internments and changes, liberations on parole, evasions, admissions into hospital, deaths, &c. It is also the duty of the bureau to receive and collect all objects of personal use, valuables, letters, &c., found on the battlefields or left by prisoners who have died in hospital or ambulance, and to transmit them to those interested. Letters, money orders and valuables, as well as postal parcels destined for the prisoners of war or despatched by them, are to be free of all postal duties both in the countries of origin and destination, as well as in those they pass through. Gifts and relief in kind for prisoners of war are to be admitted free of all duties of entry, as well as of payments for carriage by the government railways.

Relief societies.

Furthermore, relief societies for prisoners of war, regularly constituted with the object of charity, are to receive every facility, within the bounds of military requirements and administrative regulations, for the effective accomplishment of their task. Delegates of these societies are to be admitted to the places of internment for the distribution of relief, as also to the halting-places of repatriated prisoners, "if furnished with a personal permit by the military authorities, and on giving an engagement in writing to comply with all their regulations for order and police."

Sick and wounded.

The obligations of belligerents with regard to sick and wounded in war on land are now governed by the Geneva Convention of July 6th, 1906. By this Convention ambulances and military hospitals, their medical and administrative staff and chaplains are "respected and protected under all circumstances," and the use of a uniform flag and arm-badge bearing a red cross are required as a distinguishing mark of their character. A Convention, accepted at the Peace Conferences, has now adapted the principles of the Geneva Convention to maritime warfare. This new Convention provides that—

Military hospital-ships, that is to say, ships constructed or assigned by states specially and solely for the purpose of assisting the wounded, sick or shipwrecked, and the names of which have been communicated to the belligerent powers at the commencement or during the course of hostilities, and in any case before they are employed, are to be respected and cannot be captured while hostilities last.

As regards hospital-ships equipped wholly or in part at the cost of private individuals or officially recognized relief societies, they likewise are to be respected and exempt from capture, provided the belligerent or neutral power to which they belong shall have given them an official commission and notified their names to the hostile power at the commencement of or during hostilities, and in any case before they are employed.

The belligerents have the right to control and visit them; they can refuse to help them, order them off, make them take a certain course, and put a commissioner on board; they can even detain them, if important circumstances require it.

The religious, medical or hospital staff of any captured ship is inviolable, and its members cannot be made prisoners of war.

Lastly, neutral merchantmen, yachts or vessels, having, or taking on board, sick, wounded or shipwrecked of the belligerents, cannot be captured for so doing.

The following prohibitions are also placed by the Hague Regulations on the means of injuring the enemy:—

Injuring enemy, sieges, bombardments.

To employ poison or poisoned arms.

To kill or wound treacherously individuals belonging to the hostile nation or army.

To kill or wound an enemy who, having laid down arms or having no longer means of defence, has surrendered at discretion.

To declare that no quarter will be given.

To employ arms, projectiles or material of a nature to cause superfluous injury.

To make improper use of a flag of truce, the national flag or military ensigns and the enemy's uniform, as well as the distinctive badges of the Geneva Convention.

To destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war; to attack or bombard towns, villages, habitations or buildings which are not defended.

To pillage a town or place, even when taken by assault.

Ruses of war.

Ruses of war and the employment of methods necessary to obtain information about the enemy and the country, on the contrary, are considered allowable.

Spies.

A spy is one who, acting clandestinely, or on false pretences, obtains, or seeks to obtain, information in the zone of operations of a belligerent, with the intention of communicating it to the hostile party (the Hague War-Regulations, Art. 29). Thus, soldiers not in disguise who have penetrated into the zone of operations of a hostile army to obtain information are not considered spies. Similarly, the following are not considered spies: soldiers or civilians, carrying out their mission openly, charged with the delivery of despatches destined either for their own army or for that of the enemy. To this class belong likewise individuals sent in balloons to deliver despatches, and generally to maintain communication between the various parts of an army or a territory (*ib.*). A spy taken in the act cannot be punished without previous trial, and a spy who, after rejoining the army to which he belongs, is subsequently captured by the enemy, is a prisoner of war, and not punishable for his previous acts of espionage.[1]

In sieges and bombardments all necessary steps are to be taken to spare as far as possible buildings devoted to religion, art, science and charity, hospitals and places where the sick and wounded are collected, provided they are not used at the same time for military purposes; but the besieged are to indicate these buildings or places by some particular and visible signs and notify them to the assailants.

A new Convention respecting bombardments by naval forces was adopted by the Hague Conference of 1907, forbidding the bombardment of undefended "ports, towns, villages, dwellings or buildings," unless after a formal summons the local authorities decline to comply with requisitions for provisions or supplies necessary for the immediate use of the naval force before the place in question. But they may not be bombarded on account of failure to pay money contributions. On the other hand, the prohibition does not apply to military works, depots of arms, &c., or ships of war in a harbour.

Another new Convention adopted at the Hague in 1907 dealt with the laying of automatic submarine contact mines. Its main provisions are as follows:—

It is forbidden:

1. To lay unanchored automatic contact mines, except when they are so constructed as to become harmless one hour at most after the person who laid them ceases to control them;

2. To lay anchored automatic contact mines which do not become harmless as soon as they have broken loose from their moorings;

3. To use torpedoes which do not become harmless when they have missed their mark (Art. 1).

It is forbidden to lay automatic contact mines off the coast and ports of the enemy, with the sole object of intercepting commercial shipping (Art. 2).

When anchored automatic contact mines are employed, every possible precaution must be taken for the security of peaceful shipping.

The belligerents undertake to do their utmost to render these mines harmless within a limited time, and, should they cease to be under surveillance, to notify the danger zones as soon as military exigencies permit, by a notice addressed to shipowners, which must also be communicated to the Governments through the diplomatic channel. (Art. 3.)

Neutral Powers which lay automatic contact mines off their coasts must observe the same rules and take the same precautions as are imposed on belligerents.

The neutral Power must inform shipowners, by a notice issued in advance, where automatic contact mines have been laid. This notice must be communicated at once to the Governments through the diplomatic channel. (Art. 4.)

At the close of the war the Contracting Powers undertake to do their utmost to remove the mines which they have laid, each Power removing its own mines.

As regards anchored automatic contact mines laid by one of the belligerents off the coast of the other, their position must be notified to the other party by the Power which laid them, and each Power must proceed with the least possible delay to remove the mines in its own waters. (Art. 5.)

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[1] See, as to *Flags of Truce*, Art. 32 of the Hague Regulations.

The Contracting Powers which do not at present own perfected mines of the pattern contemplated in the present Convention, and which, consequently, could not at present carry out the rules laid down in Articles 1 and 3, undertake to convert the *matériel* of their mines as soon as possible so as to bring it into conformity with the foregoing requirements. (Art. 6.)

Occupation of hostile territory.

Territory is considered as occupied when it is actually under the authority of the hostile army. The authority having passed into the hands of the occupant, the latter takes all possible steps to re-establish public order and safety. Compulsion of the population of occupied territory to take part in military operations against their own country, or even give information respecting the army of the other belligerent and pressure to take the oath to the hostile power are prohibited. Private property must be respected, save in case of military necessity (Arts. 46 and 52). The property of religious, charitable and educational institutions, and of art and science, even when state property, are assimilated to private property, and all seizure of, and destruction or intentional damage done to such institutions, to historical monuments, works of art or science is prohibited (Art. 56).

Declaration of war.

Modern practice.

Practice as regards declarations of war has hitherto varied. The Franco-Prussian War of 1870 was preceded by a deliberate declaration. In the war between Japan and China there was no declaration. (See Ariga, *La Guerre sino-japonaise*, Paris, 1896). The delivery of an ultimatum specifying those terms, the compliance with which is demanded within a specified time, is practically a conditional declaration of war which becomes absolute in case of non-compliance. Thus the note communicated by the United States to Spain on 20th April 1898 demanded the "immediate withdrawal of all the land and sea forces from Cuba," and gave Spain three days to accept these terms. On the evening of 22nd April the United States seized several Spanish vessels, and hostilities were thus opened. In the case of the Transvaal War, the declaration also took the form of an ultimatum. A special Hague convention adopted at the Conference of 1907 now provides that hostilities "must not commence without previous and explicit warning in the form of a reasoned declaration of war or of an ultimatum with conditional declaration of war." It also provides that the existence of a state of war must be notified to the neutral powers and shall not take effect in regard to them until after the receipt of the notification which may be given by telegraph. Most of the good effect of the provision, however, is negatived by the qualification that neutral powers cannot rely on the absence of notification if it is clearly established that they were in fact aware of the existence of a state of war.

Future of law of war.

Too much confidence must not be placed in regulations concerning the conduct of war. Military necessity, the heat of action, the violence of the feelings which come into play will always at times defeat the most skilfully-combined rules diplomacy can devise. Still, such rules are a sign of conditions of public opinion which serve as a restraint upon the commission of barbarities among civilized peoples. The European operations in China consequent on the "Boxer" rising showed how distance from European criticism tends to loosen that restraint. On the other hand, it was significant that both the United States and Spain, who were not parties to the Declaration of Paris, found themselves, in a war confined to them, under the necessity of observing provisions which the majority of civilized states have agreed to respect. (T. Ba.)

WARANGAL, an ancient town of India, in the Nizam's Dominions or Hyderabad state, 86 m. N.E. of Hyderabad city. It was the capital of a Hindu kingdom in the 12th century, but little remains to denote its former grandeur except a fort and four gateways of a temple of Siva. Warangal has given its name to a district and a division of the state.

WARASDIN (Hungarian, *Varasd*; Croatian, *Varaždin*), a royal free town of Hungary, and capital of the county of Warasdin, in Croatia-Slavonia; on the right bank of the Drave, 62 m. by rail N.N.E. of Agrar [illegible] 30. Warasdin is the seat of a district co[illegible] ld castle, a cathedral and several churches, monasteries and schools. It carries on a brisk trade in timber, wine, fruit, tobacco, spirits, stoneware and silk. Coal is also mined in the Warasdin Mountains. The celebrated sulphur baths of Constantins-Bad or Töplitz, known to the Romans as *Thermae Constantianae*, lie about 10 m. S.

WARBECK, PERKIN (*c.* 1474–1499), pretender to the throne of England, was the son of Jehan de Werbecque, a poor burgess of Tournay in Flanders and of his wife Katherine de Faro. The exact date of his birth is unknown, but as he represented himself as having been nine years old in 1483, it must have taken place in, or close on, 1474. His confession made at the end of his life was an account of his early years which is to some extent supported by other testimony. The names of his father and other relations whom he mentions have been found in the municipal records of Tournay, and the official description of them agrees with his statements. According to this version, which may be accepted as substantially true, he was brought up at Antwerp by a cousin Jehan Stienbecks, and served a succession of employers as a boy servant. He was for a time with an Englishman John Strewe at Middleburg, and then accompanied Lady Brampton, the wife of an exiled partisan of the house of York, to Portugal. He was for a year employed by a Portuguese knight whom he described as having only one eye, and whom he names Vacz de Cogna (Vaz da Cunha ?). In 1491 he was at Cork as the servant of a Breton silk merchant Pregent (Pierre Jean) Meno. Ireland was strongly attached to the house of York, and was full of intrigue against King Henry VII. Perkin says that the people seeing him dressed in the silks of his master took him for a person of distinction, and insisted that he must be either the son of George, duke of Clarence, or a bastard of Richard III. He was more or less encouraged by the earls of Desmond and Kildare. The facts are ill recorded, but it is safe to presume that intriguers who wished to disturb the government of Henry VII. took advantage of a popular delusion, and made use of the lad as a tool. At this time he spoke English badly. By 1492 he had become sufficiently notorious to attract the attention of King Henry's government and of foreign sovereigns. He was in that year summoned to Flanders by Margaret, the widowed duchess of Burgundy, and sister of Edward IV., who was the main support of the Yorkist exiles, and who was the enemy of Henry VII. for family reasons and for personal reasons also, for she wished to extort from him the payment of the balance of her dowry. She found the impostor useful as a means of injuring the king of England. Several European sovereigns were moved to help him by the same kind of reason. The suppositions that he was the son of Clarence or of Richard III. were discarded in favour of the more useful hypothesis that he was Richard, duke of York, the younger of the two sons of Edward IV., murdered in the Tower. Charles VIII., king of France, the counsellors of the youthful duke of Burgundy, the duke's father Maximilian, king of the Romans, and James IV. of Scotland, none of whom can have been really deceived, took up his cause more or less actively. He was entertained in France, and was taken by Maximilian to attend the funeral of the emperor Frederick III. in 1493. At Vienna he was treated as the lawful king of England. He was naturally the cause of considerable anxiety to the English government, which was well acquainted with his real history, and made attempts to get him seized. His protectors entered into negotiations which in fact turned on the question whether more was to be gained by supporting him, or by giving him up. An appeal to Isabella, queen of Castile, met with no response. In July 1495 he was provided with a few ships and men by Maximilian, now emperor, and he appeared on the coast of Kent. No movement in his favour took place. A few of his followers who landed were cut off, and he went on to Ireland to join the earl of Desmond in Munster. After an unsuccessful attack on Waterford in August, he fled to Scotland. Here King James IV. showed him favour, and arranged a marriage for him with Catherine Gordon, daughter of the earl of Huntly. He was helped to make a short inroad into Northumberland, but the intervention of the Spanish government brought about a peace between England and Scotland. In 1497 Perkin was sent on his travels again with two or three small vessels, and accompanied by his wife, who had borne him one or two children. After some obscure adventures in Ireland, he landed at Whitesand Bay, near the Land's End, on the 7th of September, and was joined by a crowd of the country people, who had been recently in revolt against excessive taxation. He advanced to Exeter, but was unable to master the town. On the approach of the royal troops he deserted his followers, and ran for refuge to the sanctuary of Beaulieu in Hampshire. He then surrendered. His wife was kindly treated and placed in the household of Henry's queen Elizabeth. Perkin was compelled to make two ignominious public confessions at Westminster, and in Cheapside on the 15th and 19th of June 1498. On the 23rd of November 1499 he was hanged on a charge of endeavouring to escape from the Tower with the imprisoned earl of Warwick.

See James Gairdner, *Richard the Third, and the Story of Perkin Warbeck* (Cambridge, 1898).

WARBLER, in ornithology, the name bestowed in 1773 by T. Pennant (*Genera of Birds*, p. 35) on the birds removed, in 1769, by J. A. Scopoli from the Linnaean genus *Motacilla* (cf. WAGTAIL) to one founded and called by him *Sylvia*—the last being a word employed by several of the older writers in an indefinite way—that is to say, on all the species of *Motacilla* which were not wagtails. "Warbler" has long been used by English technical writers as the equivalent of *Sylvia*, and is now applied to all members of the sub-family Sylviinae of the thrushes (*q.v.*), and in the combination "American warblers" to the distinct passerine family Mniotiltidae. The true warblers (*Sylviinae*) are generally smaller than the true thrushes *Turdinae* (see THRUSHES), with, for the most part, a weak and slender bill. They seldom fly far, except when migrating, but frequent undergrowth and herbage, living on insects, larvae and fruit. The song is unusually clear and very sweet, with frequently a metallic sound, as in the grasshopper warbler. The nest is usually cup-shaped and well lined, and from three to six eggs (twelve in *Regulus*), usually spotted, are laid.

The true warblers are chiefly Old World, visiting the southern Old World in winter, but members of the sub-family occur in New Zealand, Polynesia and Panama. Amongst the commonest in England is the well-known sedge-bird or sedge-warbler, *Acrocephalus schoenobaenus*, whose chattering song resounds in summer-time from almost every wet ditch in most parts of Britain. As is the case with so many of its allies, the skulking habits of the bird cause it to be far more often heard than seen; but, with a little patience, it may be generally observed flitting about the uppermost twigs of the bushes it frequents, and its mottled back and the yellowish-white streak over its eye serve to distinguish it from its ally the reed-wren or reed-warbler, *A. streperus*, which is clad in a wholly mouse-coloured suit. But this last can also be recognized by its different song, and comparatively seldom does it stray from the reed-beds which are its favourite haunts. In them generally it builds one of the most beautiful of nests, made of the seed-branches of the reed and long grass, wound horizontally round and round so as to include in its substance the living stems of three or four reeds, between which it is suspended at a convenient height above the water, and the structure is so deep that the eggs do not roll out when its props are shaken by the wind. Of very similar habits is the reed-thrush or great reed-warbler, *A. arundinaceus*, a loud-voiced species, abundant on the Continent but very rarely straying to England. Much interest also attaches to the species known as Savi's warbler, *Locustella luscinioides*, which was only recognized as a constant inhabitant of the Fen district of England a few years before its haunts were destroyed by drainage. The last example known to have been obtained in this country was killed in 1856. The nest of this species is peculiar, placed on the ground and formed of the blades of a species of *Glyceria* so skilfully entwined as to be a very permanent structure, and it is a curious fact that its nests were well known to the sedge-cutters of the district which it most frequented, as those of a bird with which they were unacquainted, long before the builder was recognized by naturalists. In coloration the bird somewhat resembles a nightingale (whence its specific name), and its song differs from that of any of those before mentioned, being a long smooth trill pitched higher but possessing more tone than that of the grasshopper-warbler *Locustella naevia*—which is a widely-distributed species throughout the British Isles, not only limited to marshy sites, but affecting also dry soils, inhabiting indifferently many kinds of places where there is tangled and thick herbage, heather or brushwood. In those parts of England where it was formerly most abundant it was known as the reeler or reel-bird, from its song resembling the whirring noise of the reel at one time used by the spinners of wool. The precise determination of this bird—the grasshopper lark, as it was long called in books, though its notes if once heard can never be mistaken for those of a grasshopper or cricket, and it has no affinity to the larks—as an English species is due to the discernment of Gilbert White in 1768. In its habits it is one of the most retiring of birds, keeping in the closest shelter, so that it may be within a very short distance of an eager naturalist without his being able to see it—the olive-colour, streaked with dark brown, of its upper plumage helping to make it invisible. The nest is very artfully concealed in the thickest herbage. The foreign forms of aquatic warblers are far too numerous to be here mentioned.

The members of the typical genus *Sylvia*, which includes some of the sweetest singers, are treated of under WHITETHROAT; and the willow- and wood-wrens under WREN. The Australian genus *Malurus*, to which belong the birds known as "superb warblers," not inaptly so named, since in beauty they surpass any others of their presumed allies, is now placed in with the Old World fly-catchers in the family Musicapidae. Part of the plumage of the cocks in breeding-dress is generally some shade of intense blue, and is so glossy as to resemble enamel, while black, white, chestnut or scarlet, as well as green and lilac, are also present in one species or another, so as to heighten the effect. But, as already stated, there are systematists who would raise this genus, which contains some 15 species, to the rank of a distinct family, though on what grounds it is hard to say.

The birds known as "American warblers," forming what is now recognized as a distinct family, Mniotiltidae, remain for consideration. They possess but nine instead of ten primaries, and are peculiar to the New World. More than 130 species have been described, and these have been grouped in 20 genera or more, of which members of all but three are at least summer-visitants to North America. As a whole they are much more brightly coloured than the Sylviinae, for, though the particular genus *Mniotilta* (from which the family takes its name) is one of the most abnormal—its colours being plain black and white, and its habits rather resembling those of a Tree-creeper (*q.v.*)—in other groups chestnut, bluish-grey and green appear, the last varying from an olive to a saffron tint, and in some groups the yellow predominates to an extent that has gained for its wearers, belonging to the genus *Dendroeca*, the name of "golden" warblers. In the genus *Setophaga*, the members of which deserve to be called "fly-catching" warblers, the plumage of the males at least presents yellow, orange, scarlet or crimson.

The Mniotiltidae contain forms exhibiting quite as many diverse modes of life as do the Sylviinae. Some are exclusively aquatic in their predilections, others affect dry soils, brushwood, forests and so on. Almost all the genera are essentially migratory, but a large proportion of the species of *Dendroeca*, *Setophaga*, and especially *Basileuterus*, seem never to leave their Neotropical home; while the genera *Leucopeza*, *Teretristis* and *Microligia*, comprising in all but 5 species, are peculiar to the Antilles. The rest are for the most part natives of North America, where a few attain a very high latitude,[1] penetrating in summer even beyond the Arctic Circle, and thence migrate southward at the end of summer or in the fall of the year, some reaching Peru and Brazil, but a few, as, for instance, *Parula pitiayumi* and *Geothlypis velata*, seem to be resident in the country last named. (A. N.)

WARBURTON, BARTHOLOMEW ELLIOTT GEORGE (1810–1852), usually known as Eliot Warburton, British traveller and novelist, was born in 1810 near Tullamore, Ireland. He was educated at Trinity College, Cambridge, and was called to the Irish bar in 1837. He contracted lasting friendships with Monckton Milnes (Lord Houghton) and A. W. Kinglake, and gave up his practice as a barrister for travel and literature. He made a hit with his first book, *The Crescent and the Cross*. It was an account of his travels in 1843 in Turkey, Syria, Palestine and Egypt, and fairly divided public attention with Kinglake's *Eothen*, which appeared in the same year, 1844. Interest was centred in the East at the time, and Warburton had popular sympathy with him in his eloquent advocacy of the annexation of Egypt; but, apart from this consideration, the spirited narrative of his adventures and the picturesque sketches of Eastern life and character were more than sufficient to justify the success of the book. His most substantial work was a *Memoir of Prince Rupert and the Cavaliers* (1849), enriched with original documents, and written with eloquent partiality for the subject. This was followed in 1850 by *Reginald Hastings*, a novel, the scenes of which were laid in the same period of civil war, and, in 1851, by another historical novel, *Darien, or The Merchant Prince*. He was sent by the Atlantic and Pacific Junction Company to explore the isthmus of Darien and to negotiate a treaty with the Indian tribes. He sailed on this mission in the "Amazon," which perished by fire with nearly all on board on the 4th of January 1852.

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[1] Seven species have been recorded as wandering to Greenland, and one, *Dendroeca virens*, is said to have occurred in Europe (*Naumannia*, 1858, p. 425).

His brother, Major George Warburton (1816–1857), wrote *Hochelaga, or England in the New World* (1846), and *The Conquest of Canada* (1849).

WARBURTON, COLONEL SIR ROBERT (1842–1899), Anglo-Indian soldier and administrator, was the son of an artillery officer who had been taken prisoner at Kabul in 1842, and escaped through the good offices of an Afghan princess. He married this lady, and she transmitted to their son that power of exercising influence over the tribes of the north-west frontier which stood him in good stead during his long service in India. Warburton entered the Royal Artillery in 1861, took part in the Abyssinian War of 1867–68, and then joined the Bengal Staff Corps. He served with distinction in the expedition against the Utman Khel in 1878 and in the Afghan War of 1878–80. Very soon after the British government had made permanent arrangements for keeping open the Khyber Pass, Warburton was appointed to take charge of it as political officer. This post he held, discharging its duties with conspicuous ability, between 1879 and 1882 with intervals of other duty, and continuously from 1882 until 1890. He turned the rude levies which formed the Khyber Rifles into a fine corps, ready to serve the Indian government wherever they might be required. He made the road safe, kept the Afridis friendly, and won the thanks of the Punjab government, expressed in a special order upon his retirement, for his good work. When the Afridis began to cause anxiety in 1897, Colonel Warburton was asked by the government of India if he would assist in quieting the excitement amongst them. He declared himself ready to do so, but in the meantime the trouble had come to a head. Colonel Warburton took part in the campaign which followed; at its close his active career ended. He occupied his leisure in retirement by writing his memoirs, *Eighteen Years in the Khyber* (1900). He died at Kensington on the 22nd of April 1899.

WARBURTON, WILLIAM (1698–1779), English critic and divine, bishop of Gloucester, was born at Newark on the 24th of December 1698. His father belonged to an old Cheshire family and was town clerk of Newark. William was educated at Oakham and Newark grammar schools, and in 1714 he was articled to Mr Kirke, attorney at East Markham, in Nottinghamshire. After serving his time he returned to Newark with the intention of practising as a solicitor; but, having given some time to the study of Latin and Greek, he left the law and was ordained deacon by the archbishop of York in 1723, and in 1727 received priest's orders from the bishop of London. He had occupied the interval in various literary labours, the most important being the notes he contributed to Theobald's edition of Shakespeare, and an anonymous share in a pamphlet on the jurisdiction of the Court of Chancery, *The Legal Judicature in Chancery stated* (1727). This was an answer to another anonymous pamphlet, written by Philip Yorke, afterwards Lord Chancellor Hardwicke, who replied in an enlarged edition (1728) of his original *Discourse of the Judicial Authority . . . of Master of the Rolls*. Warburton now received from Sir Robert Sutton the small living of Greasley, in Nottinghamshire, exchanged next year for that of Brant Broughton, Lincolnshire. He held in addition, from 1730, the living of Frisby in Lincolnshire. In 1728 he was made an honorary M.A. of Cambridge. At Brant Broughton for eighteen years he spent his time in study, the first result of which was his treatise on the *Alliance between Church and State* (1736). The book brought Warburton into favour at court, and he probably only missed immediate preferment by the death of Queen Caroline. His next and best-known work, *Divine Legation of Moses demonstrated on the Principles of a Religious Deist* (2 vols., 1737–1741), preserves his name as the author of the most daring and ingenious of theological paradoxes. The deists had made the absence of any inculcation of the doctrine of a future life an objection to the divine authority of the Mosaic legislation. Warburton boldly admitted the fact and turned [illegible] taining that no merely human [illegible] sanction of morality. The author's extraordinary power, learning and originality were acknowledged on all hands, though he excited censure and suspicion by his tenderness to the alleged heresies of Conyers Middleton. The book aroused much controversy. In a pamphlet of "Remarks" (1742), he replied to John Tillard, and *Remarks on Several Occasional Reflections* (1744–1745) was an answer to Akenside, Conyers Middleton (who had up to this time been his friend), Richard Pococke, Nicholas Mann, Richard Grey, Henry Stebbing and other of his critics. As he characterized his opponents in general as the "pestilent herd of libertine scribblers with which the island is overrun," it is no matter of surprise that the book made him many bitter enemies.

Either in quest of paradox, or actually unable to recognize the real tendencies of Pope's *Essay on Man*, he entered upon its defence against the *Examen* of Jean Pierre de Crousaz, in a series of articles (1738–1739) contributed to *The Works of the Learned*. Whether Pope had really understood the tendency of his own work has always been doubtful, but there is no question that he was glad of an apologist, and that Warburton's *jeu d'esprit* in the long run did more for his fortunes than all his erudition. It occasioned a sincere friendship between him and Pope, whom he persuaded to add a fourth book to the *Dunciad*, and encouraged to substitute Cibber for Theobald as the hero of the poem in the edition of 1743 published under the editorship of Warburton. Pope bequeathed him the copyright and the editorship of his works, and contributed even more to his advancement by introducing him to Murray, afterwards Lord Mansfield, who obtained for him in 1746 the preachership of Lincoln's Inn, and to Ralph Allen, who, says Johnson, "gave him his niece and his estate, and, by consequence, a bishopric." The marriage took place in 1745, and from that time Warburton resided principally at his father-in-law's estate at Prior Park, in Gloucestershire, which he inherited on Allen's death in 1764. In 1747 appeared his edition of Shakespeare, into which, as he expressed it, Pope's earlier edition was melted down. He had previously entrusted notes and emendations on Shakespeare to Sir Thomas Hanmer, whose unauthorized use of them led to a heated controversy. As early as 1727 Warburton had corresponded with Theobald on Shakespearean subjects. He now accused him of stealing his ideas and denied his critical ability. Theobald's superiority to Warburton as a Shakespearean critic has long since been acknowledged. Warburton was further kept busy by the attacks on his *Divine Legation* from all quarters, by a dispute with Bolingbroke respecting Pope's behaviour in the affair of Bolingbroke's *Patriot King*, by his edition of Pope's works (1751) and by a vindication in 1750 of the alleged miraculous interruption of the rebuilding of the temple of Jerusalem undertaken by Julian, in answer to Conyers Middleton. Warburton's manner of dealing with opponents was both insolent and rancorous, but it did him no disservice. He became prebendary of Gloucester in 1753, chaplain to the king in 1754, prebendary of Durham in 1755, dean of Bristol in 1757, and in 1759 bishop of Gloucester. He continued to write so long as the infirmities of age allowed, collecting and publishing his sermons, and toiling to complete the *Divine Legation*, further fragments of which were published with his posthumous *Works*. He wrote a defence of revealed religion in his *View of Lord Bolingbroke's Philosophy* (1754), and Hume's *Natural History of Religion* called forth some *Remarks* . . . "by a gentleman of Cambridge" from Warburton, in which his friend and biographer, Richard Hurd, had a share (1757). He made in 1762 a vigorous attack on Methodism under the title of *The Doctrine of Grace*. He also engaged in a keen controversy with Robert Lowth, afterwards bishop of London, on the book of Job, in which Lowth brought home charges of lack of scholarship and of insolence that admitted of no denial. His last important act was to found in 1768 the Warburtonian lecture at Lincoln's Inn, "to prove the truth of revealed religion . . . from the completion of the prophecies of the Old and New Testament which relate to the Christian Church, especially to the apostacy of Papal Rome." He died at Gloucester on the 7th of June 1779. Warburton was undoubtedly a great man, but his intellect, marred by wilfulness and the passion for paradox, effected no result in any degree adequate to its power. He was a warm and constant friend, and gave many proofs of gratitude to his benefactors.

Warburton's works were edited (7 vols., 1788) by Bishop Hurd with a biographical preface, and the correspondence between the two friends—an important contribution to the literary history of the period—was edited by Dr Parr in 1808. Warburton's life was also written by John Selby Watson in 1863, and Mark Pattison made him the subject of an essay in 1889. See also I. D'Israeli, *Quarrels of Authors* (1814); and especially John Nichols, *Literary Anecdotes* (1812–1815), vol. v., and *Illustrations* (1817–1858), vol. ii., for his correspondence with William Stukeley, Peter des Maizeaux, Thomas Birch, John Jortin and Lewis Theobald.

WARD, ADOLPHUS WILLIAM (1837–), English historian and man of letters, was born at Hampstead, London, on the 2nd of December 1837, and was educated in Germany and at the university of Cambridge. In 1866 he was appointed professor of history and English literature in Owens College, Manchester, and was principal from 1890 to 1897, when he retired. He took an active part in the foundation of Victoria University, of which he was vice-chancellor from 1886 to 1890 and from 1894 to 1896. In 1897 the freedom of the city of Manchester was conferred upon him, and in 1900 he was elected master of Peterhouse, Cambridge. His most important work is his standard *History of English Dramatic Literature to the Age of Queen Anne* (1875), re-edited after a thorough revision in three volumes in 1899. He also wrote *The House of Austria in the Thirty Years' War* (1869), *Great Britain and Hanover* (1899), *The Electress Sophia and the Hanoverian Succession* (1903); he edited Crabbe's *Poems* (2 vols., 1905–1906) and Pope's *Poetical Works* (1869); he wrote the volumes on Chaucer and Dickens in the "English Men of Letters" series, translated Curtius's *History of Greece* (5 vols., 1868–1873); he was one of the editors of the *Cambridge Modern History*, and with A. R. Waller edited the *Cambridge History of English Literature* (1907, &c.). For the 9th edition of the *Ency. Brit.* he wrote the article DRAMA, and biographies of Ben Jonson and other dramatists; and he became an important contributor to the present work.

WARD, ARTEMUS, the pen-name of Charles Farrar Browne (1834–1867), American humorous writer, was born in Waterford, Maine. He began life as a compositor and became an occasional contributor to the daily and weekly journals. In 1858 he published in the Cleveland *Plain Dealer* the first of the "Artemus Ward" series, which attained great popularity both in America and England. His separate publications were: *Artemus Ward: his Book* (New York, 1862); *Artemus Ward: his Travels* (New York, 1865); *Artemus Ward among the Fenians* (1865); *Betsey Jane Ward: her Book of Goaks* (New York, 1866), generally attributed to him; *Artemus Ward in London, and other Papers* (New York, 1867). *Artemus Ward's Lecture at the Egyptian Hall . . . and other Relics of the Humourist* (London, 1869), edited by T. W. Robertson and J. C. Hotten, was published posthumously (New York, 1869). His wit largely relied on the drollery of strange spelling. In 1860 he became editor of *Vanity Fair*, a humorous New York weekly, which proved a failure. About the same time he began to appear as a lecturer, and his eccentric humour attracted large audiences. In 1866 he visited England, where he became exceedingly popular both as a lecturer and as a contributor to *Punch*. In the spring of the following year his health gave way, and he died of consumption at Southampton on the 6th of March 1867.

His *Complete Works*, with memoir by E. P. Hingston, were published in London in the same year, and *Sandwiches* at New York in 1870.

WARD, EDWARD MATTHEW (1816–1879), English historical and *genre* painter, was born at Pimlico, London, in 1816. Among his early boyish efforts in art was a series of clever illustrations to the *Rejected Addresses* of his uncles Horace and James Smith, which was followed soon afterwards by designs to some of the papers of Washington Irving. In 1830 he gained the silver palette of the Society of Arts; and in 1835, aided by Wilkie and Chantrey, he entered the schools of the Royal Academy, having in the previous year contributed to its exhibition his portrait of Mr O. Smith, the comedian, in his character of Don Quixote. In 1836 he went to Rome, where in 1838 he gained a silver medal from the Academy of St Luke for his "Cimabue and Giotto," which in the following year was exhibited at the Royal Academy. The young artist now turned his thoughts to fresco-painting, which he studied under Cornelius at Munich. In 1843 he forwarded his "Boadicea Animating the Britons previous to the Last Battle against the Romans" to the competition for the decoration of the Houses of Parliament—a work upon which he was afterwards engaged, having in 1853 been directed by the fine art commissioners to execute eight subjects in the corridor of the House of Commons. The success of his "Dr Johnson in Lord Chesterfield's Ante-Room"—now in the National Gallery, along with the "Disgrace of Lord Clarendon" (the smaller picture) (1846), the "South Sea Bubble" (1847), and "James II. Receiving the News of the Landing of the Prince of Orange" (1850)—secured his election as an associate of the Royal Academy in 1847, and in 1855 he gained full academic honours. Among the more important of his other works may be named "Charlotte Corday Led to Execution" (1852), the "Last Sleep of Argyll" (1854), the "Emperor of the French Receiving the Order of the Garter" (1859), painted for the queen, the "Ante-Chamber at Whitehall during the Dying Moments of Charles II." (1861), "Dr Johnson's First Interview with John Wilkes" (1865), and the "Royal Family of France in the Temple," painted in 1851, and usually considered the artist's masterpiece. He died at Windsor, on the 15th of January 1879. In 1848 he had married Henrietta Ward (b. 1832), who, herself an admirable artist, was a granddaughter of James Ward, R.A. (1769–1859), the distinguished animal painter. Their son, Leslie Ward (b. 1851), became well known as "Spy" of *Vanity Fair* (from 1873 to 1909), and later of the *World*, with his character portraits of contemporary celebrities.

WARD, ELIZABETH STUART PHELPS (1844–1911), American author and philanthropist, was born in Boston, Massachusetts, on the 31st of August 1844. She was the granddaughter of the Rev. Moses Stuart, and the daughter of the Rev. Austin Phelps (1820–1890) who became a professor in the Andover Theological Seminary in 1848, and Elizabeth Stuart Phelps (1815–1852), who wrote *Sunnyside* (1851), a popular book in its day, and other works. In 1848 she removed with her parents to Andover, where she attended private schools. When she was in her teens she wrote short stories for the *Youth's Companion*, *The Atlantic Monthly* and *Harper's Magazine*. She wrote many juveniles, especially Sunday-School books, such as the Tiny and the Gypsy series. In 1868 appeared in *The Atlantic Monthly* her short story, *The Tenth of January*, a narrative of the falling and burning of a cotton-mill at Lawrence, Mass., in 1860. In the same year appeared *The Gates Ajar* (1868), her first novel, a realistic study of life after death, which was widely read and was translated into several European languages. Her *Beyond the Gates* (1883), *The Gates Between* (1887) and *Within the Gates* (1901) are in the same vein. She was actively interested in charitable work, in the advancement of women and in temperance reform. In 1888 she married Herbert Dickinson Ward (b. 1861), son of the Rev. William Hayes Ward.

Among Mrs Ward's books, in addition to those already mentioned, are: *Men, Women and Ghosts* (1869); *The Trotty Book* (1869), juvenile; *Hedged in* (1870); *The Silent Partner* (1871); *Trotty's Wedding Tour and Story Book* (1873), juvenile; *What to Wear* (1873), essays; *Poetic Studies* (1875), poems; *The Story of Avis* (1877), *Sealed Orders, and Other Stories* (1879); *Friends: a Duet* (1881); *Doctor Zay* (1882); *Songs of the Silent World, and Other Poems* (1884); *Old Maids, and Burglars in Paradise* (1885); *The Madonna of the Tubs* (1886), a short story; *Jack the Fisherman* (1887), a Gloucester tragedy; *The Struggle for Immortality* (1889), essays; *Fourteen to One, and Other Stories* (1891); *Austin Phelps: a Memoir* (1891); *Donald Marcy* (1893); *A Singular Life* (1894), one of her best-known novels; *The Supply at Saint Agatha's* (1896); *Chapters from a Life* (1896); *The Story of Jesus Christ: an Interpretation* (1897); *The Successors of Mary the First* (1901); *Avery* (1902), first issued serially in *Harper's Magazine* as *His Wife*; *Trixy* (1904); *The Man in the Case* (1906); *Walled In* (1907); and *Though Life Do Us Part* (1908). In collaboration with her husband, she wrote two novels founded on Biblical scenes and characters, *The Master of the Magicians* (1890), and *Come Forth* (1890). Among Mr Ward's books are *The New Senior at Andover* (1890); *The Republic without a President, and Other Short Stories* (1891); *The Captain of the*

(1892); *A Dash to the Pole* (1893); *The White Crown, and Other Stories* (1894); *The Burglar who moved Paradise* (1897): and *The Light of the World* (1901).

WARD, JAMES (1769–1859), English animal painter and engraver, was born in Thames Street, London, on the 23rd of October 1769. At the age of twelve he was bound apprentice with J. Raphael Smith, but he received little attention and learnt nothing from this engraver. He was afterwards instructed for over seven years by his elder brother, William Ward, and he engraved many admirable plates, among which his "Mrs Billington," after Reynolds, occupies a very high place. He presented a complete set of his engravings, in their various states, numbering three hundred impressions, to the British Museum. While still a youth he made the acquaintance of George Morland, who afterwards married his sister; and the example of this artist's works induced him to attempt painting. His early productions were rustic subjects in the manner of Morland, which were frequently sold as the work of the more celebrated painter. His "Bull-Bait," an animated composition, introducing many figures, attracted much attention in the Royal Academy of 1797. A commission from Sir John Sinclair, president of the new agricultural society, to paint an Alderney cow, led to much similar work, and turned Ward's attention to animal-painting, a department in which he achieved his highest artistic successes. His "Landscape with Cattle," acquired for the National Gallery at a cost of £1500, was painted in 1820–1822 at the suggestion of West, in emulation of the "Bull of Paul Potter" at the Hague. His "Boa Serpent Seizing a Horse" was executed in 1822, and his admirable "Grey Horse," shown in the Old Masters' Exhibition of 1879, dates from 1828. Ward also produced portraits, and many landscapes like the "Gordale Scar" and the "Harlech Castle" in the National Gallery. Sometimes he turned aside into the less fruitful paths of allegory, as in his unsuccessful "Pool of Bethesda" (1818), and "Triumph of the Duke of Wellington" (1818). He was a frequent contributor to the Royal Academy and the British Institution, and in 1841 he collected one hundred and forty examples of his art, and exhibited them in his house in Newman Street. He was elected an associate of the Royal Academy in 1807, and a full member in 1811, and died at Cheshunt on the 23rd of November 1859.

Ward compiled an autobiography, of which an abstract was published in the *Art Journal* in 1849.

WARD, JAMES (1843–   ), English psychologist and metaphysician, was born at Hull on the 27th of January 1843. He was educated at the Liverpool Institute, at Berlin and Göttingen, and at Trinity College, Cambridge; he also worked in the physiological laboratory at Leipzig. He studied originally for the Congregational ministry, and for a year was minister of Emmanuel Church, Cambridge. Subsequently he devoted himself to psychological research, became fellow of his college in 1875 and university professor of mental philosophy in 1897. He was Gifford lecturer at Aberdeen in 1895–1897, and at St Andrews in 1908–1910. His work shows the influence of Leibnitz and Lotze, as well as of the biological theory of evolution. His psychology marks the definite break with the sensationalism of the English school; experience is interpreted as a *continuum* into which distinctions are gradually introduced by the action of selective attention; the implication of the subject in experience is emphasized; and the operation in development of subjective, as well as natural, selection is maintained. In his metaphysical work the analysis of scientific concepts leads to a criticism of naturalism and of dualism, and to a view of reality as a unity which implies both subjective and objective factors. This view is further worked out, through criticism of pluralism and as a theistic interpretation of the world, in his St Andrews Gifford Lectures (the *Realm of Ends*).

Beside the article "Psychology" in the *Ency. Brit.* (9th, 10th and 11th ed.) he has published *Naturalism and Agnosticism* (1899, 3rd ed. 1907), besides numerous articles in the *Journal of Physiology*, *Mind*, and the *British Journal of Psychology*.

WARD, JOHN QUINCY ADAMS (1830–1910), American [illegible] Urbana, Ohio, on the 29th of June 1830. His education was received in the village schools. He studied under Henry K. Brown, of New York, in 1850–1857, and by 1861, when he opened a studio in New York, he had executed busts of Joshua R. Giddings, Alexander H. Stephens, and Hannibal Hamlin, prepared the first sketch for the "Indian Hunter," and made studies among the Indians themselves for the work. In 1863 he became a member of the National Academy of Design (New York), and he was its president in 1872–1873. Among his best-known statues are the "Indian Hunter," finished in 1864 (Central Park, New York); Washington, heroic size (on the steps of the U.S. Sub-Treasury, Wall Street, New York); Henry Ward Beecher (Brooklyn); an equestrian statue of General George H. Thomas (Washington); Israel Putnam (Hartford); and the seated statue of Horace Greeley, the founder of the New York *Tribune*, in front of the office of that newspaper. In 1896 he was elected president of the newly organized National Sculpture Society (New York). Unlike his fellow-countryman, W. W. Story, he acquired his training, his inspiration and his themes from his own country. He died in New York on the 1st of May 1910.

WARD, LESTER FRANK (1841–   ), American geologist and sociologist, was born in Joliet, Illinois, on the 18th of June 1841. He graduated at Columbian (now George Washington) University in 1869 and from the law school of the same university in 1871, his education having been delayed by his service in the Union army during the Civil War. In 1865–1872 he was employed in the United States Treasury Department, and became assistant geologist in 1881 and geologist in 1888 to the U.S. Geological Survey. In 1884–1886 he was professor of botany in Columbian University. He wrote much on paleobotany, including *A Sketch of Paleobotany* (1885), *The Geographical Distribution of Fossil Plants* (1888) and *The Status of the Mesozoic Floras of the United States* (1905). He is better known, however, for his work in sociology, in which, modifying Herbert Spencer and refuting the Spencerian individualism, he paralleled social with psychological and physical phenomena. His more important works are: *Dynamic Sociology* (1883, 2nd ed. 1897), *Psychic Factors of Civilization* (1897), *Outlines of Sociology* (1898), *Sociology and Economics* (1899), *Pure Sociology* (1903), and, with J. Q. Dealy, *Text-Book of Sociology* (1905).

See an appreciation by L. Gumplowicz, in *Die Zeit* (Vienna, 20th Aug. 1904); reprinted in English in vol. x. of *The American Journal of Sociology*.

WARD, MARY AUGUSTA [Mrs Humphry Ward] (1851–   ), British novelist, was born on the 11th of June 1851 at Hobart, Tasmania, where her father, Thomas Arnold (1824–1900), was then an inspector of schools. Thomas Arnold was a son of Arnold of Rugby, and a brother of the poet Matthew Arnold. As a scholar of University College, Oxford, at the crisis of the Oxford Movement, he had begun life as a Liberal of the school of Jowett, Stanley and Clough. In 1856 he became a Roman Catholic, relinquished his inspectorship of schools in Tasmania, and was appointed professor of English literature at Dublin, thence following Newman to Birmingham, where he published his *Manual of English Literature*. After a brief period of unrest he reverted to the English Church, and went to Oxford, where he lived twenty years, editing *The Select Works of Wyclif* and *Beowulf* for the Clarendon Press, *Henry of Huntingdon* and *Symeon of Durham* for the "Rolls" series, and, with W. E. Addis, the *Catholic Dictionary*. In 1877 he reverted once more to the Roman Catholic Church, and was appointed fellow of the new Royal University of Ireland, dying in Dublin on the 12th of November 1900. His daughter was brought up mainly at Oxford, and her early associations with a life of scholarship and religious conflict are deeply marked in her own later literary career. She was brought into close connexion during this period with Edward Hartopp Cradock, who was principal of Brasenose College from 1853 till his death in 1886, and some of whose characteristics went to the portrait of the "Squire" in *Robert Elsmere*. In 1872 she married Thomas Humphry Ward (b. 1845), then fellow and tutor of Brasenose, and one of the authors of the *Oxford Spectator*. Mr Humphry Ward, a son of the

Rev. Henry Ward, Vicar of St Barnabas, King's Square, London, E.C., remained at Oxford till 1880, and then went to London to take up literary work; with the help of the chief critics of the day he brought out the important selections of English verse called *The English Poets* (4 vols., 1880–1881). He joined the staff of *The Times* and wrote much for that paper, becoming its principal art critic. He also published *Humphry Sandwith, a Memoir* (1884); and he edited *Men of the Reign* (1885), *English Art in the Public Galleries of London* (1886), *Men of the Time* (1887), and, with the help of Matthew Arnold, Huxley, Lord Wolseley, H. S. Maine and others, *The Reign of Queen Victoria: a Survey of Fifty Years of Progress* (1887).

Mrs Humphry Ward at first devoted herself to Spanish literature, and contributed articles on Spanish subjects to the *Dictionary of Christian Biography*, edited by Dr William Smith and Dr Henry Wace. She wrote also for *Macmillan's Magazine*. In 1881 she published her first book, *Milly and Olly*, a child's story illustrated by Lady (then Mrs) Alma-Tadema. This was followed in 1884 by a more ambitious, though slight, study of modern life, *Miss Bretherton*, the story of an actress. In 1885 Mrs Ward published an admirable translation of the *Journal* of the Swiss philosopher Amiel, with a critical introduction, which showed her delicate appreciation of the subtleties of speculative thought. It was no bad preparation for her next book, which was to make her famous. In February 1888 appeared *Robert Elsmere*, a powerful novel, tracing the mental evolution of an English clergyman, of high character and conscience and of intellectual leanings, constrained to surrender his own orthodoxy to the influence of the "higher criticism." The character of Elsmere owed much to reminiscences both of T. H. Green, the philosopher, and of J. R. Green, the historian. Largely in consequence of a review by W. E. Gladstone in the *Nineteenth Century* (May 1888, "Robert Elsmere and the Battle of Belief"), the book became the talk of the civilized world. It ran in five months through seven editions in three-volume form, and the cheap American editions had an enormous sale. It was translated into several European languages, and was the subject of articles in learned foreign reviews. *Robert Elsmere* is in itself a fine story, notably in its picture of the emotional conflict between Elsmere and his wife, whose over-narrow orthodoxy brings her religious faith and their mutual love to a terrible *impasse*; but it was the detailed discussion of the "higher criticism" of the day, and its influence on Christian belief, rather than its power as a piece of dramatic fiction, that gave the book its exceptional vogue. It started, as no academic work could have done, a popular discussion on historic and essential Christianity. In 1890 Mrs Ward took a prominent part in founding University Hall, an "Elsmerian" settlement for working and teaching among the poor. Her next novel, *David Grieve*, was published in 1892. In *Marcella* (1894), and its sequel *Sir George Tressady* (1896), she broke new ground in the novel of modern politics and socialism, the fruit of observation and reflection at University Hall. In 1895 had appeared the short tragedy, the *Story of Bessie Costrell*. Mrs Ward's next long novel, *Helbeck of Bannisdale* (1898), treated of the clash between the ascetic ideal of Roman Catholicism and modern life. The element of Catholic and humanistic ideals entered also into *Eleanor* (1900), in which, however, the author relied less on the interest of a thesis and more on the ordinary arts of the novelist. *Eleanor* was dramatized and played at the Court Theatre in 1902. In *Lady Rose's Daughter* (1903)—dramatized as *Agatha* in 1905—and *The Marriage of William Ashe* (1905), modern tales founded on the stories respectively of Mlle de Lespinasse and Lady Caroline Lamb, she relied entirely and with success upon social portraiture. Later novels were *Fenwick's Career* (1906), *Diana Mallory* (1908), *Daphne* (1909) and *Canadian Born* (1910).

Mrs Ward's eminence among latter-day women-novelists arises from her high conception of the art of fiction and her strong grasp of intellectual and social problems, her descriptive power (finely shown in the first part of *Robert Elsmere*) and her command of a broad and vigorous prose style. But her activities were not confined to literature. She was the originator in England of the Vacation Schools, which have done much to educate the poorest children of the community upon rational lines. She also took a leading part in the movement for opposing the grant of the parliamentary suffrage to women, whilst encouraging their active participation in the work of local government. She was one of the founders of the Women's National Anti-Suffrage League in 1908, and both spoke and wrote repeatedly in support of its tenets.

See for bibliography up to June 1904, *English Illustrated Magazine*, vol. xxxi. (N.S.) pp. 294 and 299. (H. Ch.)

WARD, SETH (1617–1689), English bishop, was born in Hertfordshire, and educated at Sidney Sussex College, Cambridge, where he became fellow in 1640. In 1643 he was chosen university mathematical lecturer, but he was deprived of his fellowship next year for opposing the Solemn League and Covenant. In 1649 he became Savilian professor of astronomy at Oxford, and gained a high reputation by his theory of planetary motion, propounded in the works entitled *In Ismaelis Bullialdi astronomiae philolaicae fundamenta inquisitio brevis* (Oxford, 1653), and *Astronomia geometrica* (London, 1656). About this time he was engaged in a philosophical controversy with Thomas Hobbes. He was one of the original members of the Royal Society. In 1659 he was appointed master of Trinity College, Oxford, but not having the statutory qualifications he resigned in 1660. Charles II. appointed him to the livings of St Lawrence Jewry in London, and Uplowman, Devonshire, in 1661. He also became dean of Exeter (1661) and rector of Breock, Cornwall (1662). In the latter year he was consecrated bishop of Exeter, and in 1667 he was translated to the see of Salisbury. The office of chancellor of the Order of the Garter was conferred on him in 1671. In his diocese he showed great severity to nonconformists, and rigidly enforced the act prohibiting conventicles. He spent a great deal of money on the restoration of the cathedrals of Worcester and Salisbury. He died at Knightsbridge on the 6th of January 1688/1689.

WARD, WILLIAM (1766–1826), English mezzotint-engraver, an elder brother of James Ward (*q.v.*), was born in London in 1766. He was the most distinguished pupil of J. Raphael Smith, and executed a great part of many of the plates which bear the name of that excellent engraver. In 1795 he began to exhibit in the Royal Academy, of which in 1814 he was elected an associate engraver. He also held the appointment of mezzotint-engraver to the prince regent and the duke of York. He executed six plates after Reynolds, engraved many of the works of his brother-in-law, George Morland, and his mezzotints after Andrew Geddes, which include the full-lengths of Sir David Wilkie and of Patrick Brydone, are of great merit. His engravings are full of artistic spirit, and show fine feeling for colour; and they are excellently tender and expressive in their rendering of flesh. He died in London on the 1st of December 1826.

WARD, WILLIAM GEORGE (1812–1882), English Roman Catholic theologian, was born on the 21st of March 1812. His career is extremely interesting as illustrating the development of religious opinion at a remarkable crisis in the history of English religious thought. Ward is described by his son and biographer as somewhat unequally gifted by nature. For pure mathematics he had a special gift—almost a passion. For history, applied mathematics—for anything, in fact, outside the exact sciences—he felt something approaching to contempt. He was endowed with a strong sense of humour and a love of paradox carried to an extreme. He went up to Christ Church, Oxford, in 1830, but his father's subsequent pecuniary embarrassments compelled him in 1833 to try for a scholarship at Lincoln College, which he succeeded in obtaining. His examination for mathematical honours exhibited some of the peculiarities of his character and mental powers. Four out of his five papers on applied mathematics were sent up absolutely blank. Honours, however, were not refused him, and in 1834 he obtained an open fellowship at Balliol. In the previous year the Tractarian movement had commenced, and Ward's relations with that movement were as original as the rest of his life. He was attracted to it by his hatred of moderation and what he called "respectability" in any shape—a characteristic of which some amusing instances have been handed down. He was repelled from it by the conception he had formed of the character of Newman, whom he regarded as a mere antiquary. When, however, he was at length persuaded by a friend to go and hear Newman preach, he at once became a disciple. But he had, as Newman afterwards said of him, "struck into the movement at an angle." He had no taste for historical investigations. He treated the question at issue as one of pure logic, and disliking the Reformers, the right of private judgment which Protestants claimed, and the somewhat prosaic uniformity of the English Church, he flung himself into a general campaign against Protestantism in general and the Anglican form of it in particular. He nevertheless took deacon's orders in 1838 and priest's orders in 1840.

In 1839 Ward became the editor of the *British Critic*, the organ of the Tractarian party, and he excited suspicion among the adherents of the Tractarians themselves by his violent denunciations of the Church to which he still belonged. In 1841 he urged the publication of the celebrated "Tract XC.," and wrote in defence of it. From that period Ward and his associates worked undisguisedly for union with the Church of Rome, and in 1844 he published his *Ideal of a Christian Church*, in which he openly contended that the only hope for the Church of England lay in submission to the Church of Rome. This publication brought to a height the storm which had long been gathering. The university of Oxford was invited, on the 13th of February 1845, to condemn "Tract XC.," to censure the *Ideal*, and to degrade Ward from his degrees. The two latter propositions were carried and "Tract XC." only escaped censure by the *non placet* of the proctors, Guillemard and Church. The condemnation precipitated an exodus to Rome. Ward left the Church of England in September 1845, and was followed by many others, including Newman himself. After his reception into the Church of Rome, Ward gave himself up to ethics, metaphysics and moral philosophy. He wrote articles on free will, the philosophy of theism, on science, prayer and miracles for the *Dublin Review*. He also dealt with the condemnation of Pope Honorius, carried on a controversial correspondence with John Stuart Mill, and took a leading part in the discussions of the Metaphysical Society, founded by Mr James Knowles, of which Tennyson, Huxley and Martineau were also prominent members. He was a vehement opponent of Liberal Catholicism. In 1851 he was made professor of moral philosophy at St Edmund's College, Ware, and was advanced to the chair of dogmatic theology in 1852. In 1868 he became editor of the *Dublin Review*. He gave a vigorous support to the promulgation of the dogma of Papal Infallibility in 1870. After his admission into the Roman Catholic Church he had, rather to the dismay of his friends, entered the married state, and for a time had to struggle with poverty. But his circumstances afterwards improved. He died on the 6th of July 1882. (J. J. L.*)

See *William George Ward and the Oxford Movement* (1889); and *William George Ward and the Catholic Revival* (1893), by his son, Wilfrid Philip Ward (b. 1856), who has also written the *Life and Times of Cardinal Wiseman*; and *Ten Personal Studies* (1908).

WARD, that which guards or watches and that which is guarded or watched. The word is a doublet of "guard," which was adapted from the French comparatively late into English. Both are to be referred to the Teutonic root *war-*, to protect, defend, cf. "wary," "warn," "beware," O. Eng. *weard*, Ger. *warten*, &c., and the English "guardian," "garrison," &c. The principal applications of the term are, in architecture, to the inner courts of a fortified place; at Windsor Castle they are called the upper and lower wards (see BAILEY, CASTLE); to a [illegible] inside a lock blocking the passage of any key [illegible] corresponding slot into which the ridge fits, [illegible] being also called "ward" (see LOCKS). [illegible] is to be found in the use of the word [illegible] is divided for the purpose [illegible] election of guardians. [illegible] to "hundred" in Northumberland and Cumberland. To this branch belongs the use for the various large or small separate rooms in a hospital, asylum, &c., where patients are received and treated. The most general meaning of the word is for a minor or person who is under a guardianship (see INFANT, MARRIAGE and ROMAN LAW).

WARDEN, a custodian, defender, guardian (see GUARDIAN, a word with which it is etymologically identical). The word is frequently employed in the ordinary sense of a watchman or guardian, but more usually in England in the sense of a chief or head official. The lords wardens of the marches, for example, were powerful nobles appointed to guard the borders of Scotland and of Wales; they held their lands *per baroniam*, the king's writ not running against them, and they had extensive rights of administrating justice. The chief officer of the ancient stannaries of Cornwall has the title of lord warden (see STANNARIES), as has also the governor of Dover Castle (see CINQUE PORTS). Warden was until 1870 the alternative title of the master of the mint, and "warden of the standards" the title of the head of the Standards office (see STANDARDS). The principal or head of several of the colleges of Oxford University is also termed warden.

WARDHA, a town and district of British India, in the Nagpur division of the Central Provinces, which take their name from the Wardha river. The town is situated 49 m. S.W. of Nagpur by rail. Pop. (1901) 9872. It was laid out in 1866, shortly after the district was first constituted. It is an important centre of the cotton trade.

The DISTRICT OF WARDHA has an area of 2428 sq. m. It is hilly in the north, and intersected by spurs from the Satpura range. The central portion includes the three peaks of Malegaon (1726 ft.), Nandgaon (1874 ft.), and Jaitgarh (2086 ft.). From this cluster of hills numerous small streams lead to the Wardha river on the one side, while on the other the Dham, Bor, and Asoda flow down the length of the district in a south-easterly direction. The Wardha, and its affluent the Wanna, are the only rivers of any importance. To the south the country spreads out in an undulating plain, intersected by watercourses, and broken here and there by isolated hills rising abruptly from the surface. In general the lowlands are well wooded. Leopards, hyenas, wolves, jackals and wild hog abound in the district; other animals found are the spotted deer, *nilgai* and antelope. The district is subject to great variations of climate, and the rainfall at Wardha town averages 41 in. In 1901 the population was 385,103, showing a decrease of 4% in the decade. The principal crops are cotton, millet, wheat and oil-seeds. This region supplies the cotton known in the market as Hinganghat. There are cotton-mills at Hinganghat and Palgaon, and many factories for ginning and pressing cotton. The district is traversed by the Nagpur line of the Great Indian Peninsula railway. A branch runs from Wardha town past Hinganghat to the Warora coal-field in the district of Chanda. The history of Wardha forms part of that of Nagpur district, from which it was separated in 1862 for administrative purposes.

See *Wardha District Gazetteer* (Allahabad, 1906).

WARDLAW, ELIZABETH, LADY (1677–1727), reputed author of *Hardyknute*, second daughter of Sir Charles Halket, was born in April 1677. She married in 1696 Sir Henry Wardlaw, Bart., of Pitreavie. The ballad of *Hardyknute*, published in 1719 as an old poem, was supposed to have been discovered by her in a vault at Dunfermline, but no MS. was ever produced; and in the 1767 edition of Percy's *Reliques* the poem was ascribed to her. The beautiful ballad of *Sir Patrick Spens* (F. J. Child, *English and Scottish Popular Ballads*, ii. 17) has been also asserted to be her work, one of the supporters of the theory being Robert Chambers (*Remarks on Scottish Ballads*, 1859). The level of accomplishment in *Hardyknute*, however, gives no reason for supposing that Lady Wardlaw was capable of producing *Sir Patrick Spens*.

See Norval Clyne, *The Romantic Scottish Ballads and the Lady Wardlaw Heresy* (1859), and J. H. Watkins, *Early Scottish Ballads* (Glasgow, 1867).

WARDLAW, HENRY (d. 1440), Scottish prelate, was a son of Sir Andrew Wardlaw and a nephew of Walter Wardlaw (d. 1390), bishop of Glasgow, who is said to have been made a cardinal by the anti-pope Clement VII. in 1381. Educated at the universities of Oxford and of Paris, Henry Wardlaw returned to Scotland about 1385, and owing to his influential connexions received many benefices in the Church. He passed some time at Avignon, and it was whilst he was residing at the papal court that he was chosen bishop of St Andrews, being consecrated in 1403. Returning to Scotland he acted as tutor to the future king, James I., and finished the work of restoring his cathedral. Then having helped to bring about the release of James from his captivity in England, he crowned this king in May 1424, and afterwards acted as one of his principal advisers. He appears to have been an excellent bishop, although he tried to suppress the teaching of John Wycliffe by burning its advocates. He died on the 6th of April 1440. Wardlaw's chief title to fame is the fact that he was the founder of the university of St Andrews, the first Scottish university. He issued the charter of foundation in February 1411, and the privileges of the new seat of learning were confirmed by a bull of Pope Benedict XIII., dated the 28th of August 1413. The university was to be "an impregnable rampart of doctors and masters to resist heresy."

WARDROBE, a portable upright cupboard for storing clothes. The earliest wardrobe was a chest, and it was not until some degree of luxury was attained in regal palaces and the castles of powerful nobles that separate accommodation was provided for the sumptuous apparel of the great. The name of wardrobe was then given to a room in which the wall-space was filled with cupboards and lockers—the drawer is a comparatively modern invention. From these cupboards and lockers the modern wardrobe, with its hanging spaces, sliding shelves and drawers, was slowly evolved. In its movable form as an oak "hanging cupboard" it dates back to the early 17th century. For probably a hundred years such pieces, massive and cumbrous in form, but often with well-carved fronts, were made in fair numbers; then the gradual diminution in the use of oak for cabinet-making produced a change of fashion. Walnut succeeded oak as the favourite material for furniture, but hanging wardrobes in walnut appear to have been made very rarely, although clothes presses, with drawers and sliding trays, were frequent. During a large portion of the 18th century the tallboy (*q.v.*) was much used for storing clothes. Towards its end, however, the wardrobe began to develop into its modern form, with a hanging cupboard at each side, a press in the upper part of the central portion and drawers below. As a rule it was of mahogany, but so soon as satinwood and other hitherto scarce finely grained foreign woods began to be obtainable in considerable quantities, many elaborately and even magnificently inlaid wardrobes were made. Where Chippendale and his school had carved, Sheraton and Hepplewhite and their contemporaries obtained their effects by the artistic employment of deftly contrasted and highly polished woods. The first step in the evolution of the wardrobe was taken when the central doors, which had hitherto enclosed merely the upper part, were carried to the floor, covering the drawers as well as the sliding shelves, and were fitted with mirrors.

WARD-ROOM (*i.e.* the room of the guard), the cabin occupied by the commissioned officers, except the captain, in a man-of-war. In the wooden line-of-battle ships it was above the gun-room.

WARE, a market town in the Hertford parliamentary division of Hertfordshire, England, on the river Lea, 22 m. N. of London by a branch of the Great Eastern railway. Pop. of urban district (1901) 5573. The church of St Mary is a cruciform Decorated and Perpendicular building of flint and stone, consisting of chancel (built, it is supposed, by Lady Margaret Beaufort, countess of Richmond, and mother of Henry VII.), lady chapel to the south (*c.* 1380), nave of five bays of the time of Richard II., transepts, aisles, south porch and embattled tower of the time of Edward III. There is an elaborate Perpendicular font. The modern mansion of The Priory, to the west of the town, occupies the site of a priory of the order of St Francis, founded, according to Dugdale, by Hugh de Grantmaisnil, lord of Ware. A portion of the original building is incorporated in the modern one. Among public buildings are the corn exchange and the town-hall, which includes a literary institute and library. The famous "Great Bed of Ware," referred to in Shakespeare's *Twelfth Night*, which formerly was at the Saracen's Head in Ware, has been removed to Rye House, 2 m. distant, the scene of the Rye House plot of 1683 against Charles II. The town possesses breweries and brick-fields, and there is a large trade in malt, assisted by the navigation of the Lea to London. Near the village of Great Amwell (1 m. S.E.) are the sources of the New River, formed in 1606–1612 to supply London with water; and on a small island in the stream stands a monument to Sir Hugh Myddleton, through whose exertions this work was carried out.

WARE, a township of Hampshire county, Massachusetts, U.S.A., traversed by the Ware river, and about 25 m. E.N.E. of Springfield. Pop. (1880) 4817, (1890) 7329, (1900) 8263, of whom 3263 were foreign-born, (1910 census) 8774. Area 29·3 sq. m. The township is served by the Boston & Albany and Boston & Maine railways, and by two interurban electric lines. Its average elevation is about 550 ft. above sea-level. There is a public library (14,225 volumes in 1910). In 1905 the value of the factory products was $3,783,696, 23·2% more than in 1900. Among the manufactures are cotton and woollen goods, and boots and shoes. The township owns and operates its waterworks. Because of its hard and rough soil, Ware was not settled as early as the surrounding townships, the first permanent settlement being made in 1730. It was incorporated in 1742 as a precinct, in 1761 as a district (formed from parts of Brookfield, Palmer and Western, now Warren, and certain common lands), and in 1775 as a separate township. In 1823 additions were made from Brookfield and Western.

WAREHAM, a market town and municipal borough in the eastern parliamentary division of Dorsetshire, England, 121¾ m. S.W. by W. from London by the London & South-Western railway. Pop. (1901) 2003. It lies between the rivers Frome and Piddle, 1½ m. above their outflow into Poole harbour. The town is of high antiquity, and is partially surrounded by earthworks probably of British construction. The church of St Mary contains a chapel dedicated to St Edward, commemorating that Edward who was murdered at Corfe Castle in this neighbourhood, whose body lay here before its removal to Shaftesbury. It also possesses a remarkable Norman font of lead. Two other ancient churches remain, but are not used for worship. There are ruins of a priory dedicated to SS. Mary, Peter and Ethelwold, and the site of the old castle may be traced. The town and neighbourhood have been long noted for their lime and cement, and large quantities of potters', pipe, fire and other kinds of clay are sent to Staffordshire and to foreign countries. The borough is under a mayor, 4 aldermen, and 12 councillors, Area 251 acres.

Owing to its situation as a key of Purbeck, the site of Wareham (*Werham, Warham*) has been occupied from early times. The earthworks, of British origin, were modified in almost every successive age. That Wareham was a pre-Saxon town is evident from Asser's statement that its British name was *Durngueir*. The early chroniclers declare that St Aldhelm founded a church near Wareham about 701, and perhaps the priory, which is mentioned as existing in 876, when the Danes retired from Cambridge to a strong position in this fort. Their occupation was not lengthy. Having made terms with Alfred, they broke the conditions and returned to Cambridge. In the following year they were again at Wareham, which they made their headquarters. Beorhtric, the immediate predecessor of Ecgbert, was buried here. Further incursions made by the Danes in 998 and in 1015 under Canute probably resulted in the destruction of the priory, on the site of which a later house was founded in the 12th century as a cell of the Norman abbey of Lysa, and in the decayed condition of Wareham in 1086, when 203 houses were ruined or waste, the result of misfortune, poverty and fire. The early castle, which existed before 1086, was important during the civil wars of Stephen's reign; in 1142 Robert, earl of Gloucester, on his departure for France, committed it to his son's charge. Stephen, however, surprised and took it, but it surrendered to the earl in the same year on the king's refusal to send it aid. John fortified it against Louis of France in 1216, and during the civil wars it was the scene of much fighting, being stormed by the parliamentary forces in 1644. Wareham was accounted a borough in Domesday Book, and the burgesses in 1176 paid 20 marks for a default. In 1180–1181 they rendered account of 5 marks for erecting a gild without licence. The fee-farm of the borough was obtained in 1211, on a fine of 100 marks. The constitution of Wareham underwent a change during the years 1326–1338, when the governing body of the bailiffs and commonalty were replaced by the mayor and bailiffs. In 1587 Elizabeth granted certain privileges to Wareham, but it was not incorporated until 1703, when the existing fairs for April 6 and August 23 were granted. The port was important throughout the middle ages, and was required to furnish four ships for the French war in 1334. Considerable trade was carried on with France and Spain, cloth, Purbeck stone and, later, clay being largely exported.

WARENNE, EARLS. The Warennes derived their surname from the river of Guarenne or Varenne and the little town of the same name near Arques in Normandy. William de Warenne, who crossed with William I. in 1066, was a distant cousin of the Conqueror, his grandmother having been the sister of Gunnora, wife of Richard I. of Normandy. De Warenne received as his share of English spoil some 300 manors in Yorkshire, Norfolk, Surrey and Sussex, including Lewes Castle. He was wounded at the siege of Pevensey and died in 1089, a year after he had received the title of earl of Surrey. Both he and his successors were more commonly styled Earl Warenne than earl of Surrey. His wife Gundrada, described on her monument as *stirps ducum*,[1] appears to have been a sister of Gharbod, earl of Chester.

Their son William, 2nd earl (*c.* 1071–1138), was a suitor for the hand of Matilda of Scotland, afterwards queen of Henry I. He was temporarily deprived of his earldom in 1101 for his support of Robert, duke of Normandy, but he commanded at the battle of Tenchebrai (1106), and was governor of Rouen in 1135. He carried off Elizabeth of Vermandois, granddaughter of Henry I. of France, and wife of Robert, count of Meulan, and married her in 1118 after her husband's death.

William de Warenne, 3rd earl (d. 1148), was, with his half-brother, Robert de Beaumont, early of Leicester, present at the battle of Lincoln, where his flight early in the day contributed to Stephen's defeat. He remained faithful to the queen during Stephen's imprisonment, and in 1146 he took the cross, and was killed near Laodicea in January 1148.

His daughter and heiress, Isabel, married in 1153 William de Blois, second son of King Stephen and Matilda of Boulogne, and in 1163 Hamelin Plantagenet, natural son of Geoffrey, count of Anjou. Both Isabel's husbands appear to have borne the title of Earl Warenne. Earl Hamelin was one of those who at the council of Northampton denounced Becket as a traitor; he remained faithful to his half-brother, Henry II., during the trouble with the king's sons, and in Richard I.'s absence on the crusade he supported the government against the intrigues of Prince John.

William de Warenne (d. 1240), son of Isabel and Hamelin, who succeeded to the earldom in 1202, enjoyed the special confidence of King John. In 1212, when a general rebellion was apprehended, John committed to him the custody of the northern shires; and he remained faithful to his master throughout the troubles which preceded the signing of the Charter. In 1216, as the king's situation became desperate, the earl repented of his loyalty, and, shortly before the death of John, [illegible] Prince Louis. He returned, however, to his [illegible] mediately upon the accession of Henry [illegible] minority, a loyal supporter of the [illegible] the royal favourites who came into power after 1227, and used his influence to protect Hubert de Burgh when the latter had been removed from office by their efforts (1232). Warenne's relations with the king became strained in course of time. In 1238 he was evidently regarded as a leader of the baronial opposition, for the great council appointed him as one of the treasurers who were to prevent the king from squandering the subsidy voted in that year. His son John de Warenne (*c.* 1231–1304) succeeded in 1240, and at a later date bore the style of earl of Surrey and Sussex. In the battle of Lewes (1264) he fought under Prince Edward, and on the defeat of the royal army fled with the queen to France. His estates were confiscated but were subsequently restored. He served in Edward I.'s Welsh campaigns, and took a still more prominent part in Scottish affairs, being the king's lieutenant in Scotland in 1296–1297. In September 1297 he advanced to Stirling, and, giving way to the clamour of his soldiers, was defeated by William Wallace on the 11th. He invaded Scotland early the next year with a fresh army, and, joining Edward in the second expedition ot that year, commanded the rear at Falkirk

By his first wife, Alice of Lusignan, half-sister of Henry III., Earl Warenne had three children—Alice, who married Henry Percy, father of the 1st baron Percy; Isabella, who married John Baliol, afterwards king of Scots; and William, who predeceased his father, leaving a son John.

John de Warenne (1286–1347) succeeded his grandfather in 1304, and was knighted along with the prince of Wales in 1306, two days after his marriage with the prince's niece, Joanna, daughter of Eleanor of England, countess of Bar. From that time onwards he was much engaged in the Scottish wars, in which he had a personal interest, since John Baliol was his cousin and at one time his ward. As there were no children of his marriage, his nephew, Richard Fitzalan II., earl of Arundel (*c.* 1307–1376), became heir to his estates and the earldom of Surrey. His northern estates reverted to the crown, and the southern estates held by Joanna of Bar during her lifetime passed to Fitzalan. The Warrens of Poynton, barons of Stockport, descended from one of Earl Warenne's illegitimate sons by Isabella de Holland. Earl Warenne had received from Edward Baliol the Scottish earldom of Strathearn, but seems never to have established effective possession.

See G. E. C(okayne), *Complete Peerage*, vol. vii. (1896); and John Watson, *Memoirs of the Ancient Earls of Warren or Surrey* (2 vols., Warrington, 1782).

WAR GAME, or (in its German form) Kriegspiel, a scientific game, played by representing the positions and movements of troops on a map. Kriegspiel is, as the name indicates, of German origin. A form of it, invented by Marshal Keith, and called Kriegs-schachsspiel (War Chess), was in vogue in the 18th century. In its present form it was invented by von Reisswitz (1794–1827), a Prussian officer, in 1824. As a game it quickly became fashionable at the German courts, and as a means of instruction it was promptly introduced into the Prussian army, whence it has spread to all the armies of the world. The idea of it has been applied also to naval warfare in recent times, the most usual form of naval war game being that designed by F. T. Jane about 1898.

In the military game the positions of troops are marked on maps, movements are made under regulations and the whole or portions of past campaigns can be reproduced in outline of fair accuracy, or more usually hypothetical manœuvres may be formulated for study and instruction. The materials required are at least three copies of the same map, drawn to such scale as may be suitable to the magnitude of the operations to be represented. If the scheme is one for small numbers of troops, maps of large scale are essential, as small features of the ground largely influence the action of small bodies, and it is only [illegible] the real influence of small features can [illegible] Conversely, with large bodies, maps [illegible] convenient. A great amount of detail [illegible] drawn for military purposes; heights, [illegible] courses, fences and the nature of the ground, all enter into the question of the feasibility or the reverse of military operations; and where the map is the actual field of manœuvre, the features of the natural field must be adequately supplied. Blocks, cut or moulded to scale, represent the different units of the combatants; and are coloured (generally red and blue) to distinguish the opposing forces. Some pairs of dividers and a few measures of the same scale as the maps employed complete the material outfit. Printed regulations for the conduct of kriegspiel are of small value; and although rules have been drafted at various times and in many languages, they have generally been allowed to lapse, practice having proved that the decision of a competent umpire is of more value, as to the soundness or unsoundness of a military manœuvre, than a code of regulations which inevitably lack elasticity.

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[1] See R. E. Ch[illegible] *Inst.*, xli. p. 10[illegible]

The usual course of procedure varies but little in the different countries in which the system has been employed. The central map screened from the view of the combatants is used by the umpire, who places on it the forces of both sides; copies are on either hand behind screens or in adjoining rooms, and on them representative blocks are placed in positions which agree with the information possessed by each respective commander. A scheme is formulated such as may occur in war, and a "General Idea" or "Narrative" is the common property of both sides, This contains those items of common knowledge which would be in the possession of either commander in the field. The General Idea is supplemented by "special ideas," issued one to each of the combatants, supplying the information which a commander might reasonably be expected to have of the details of his own force. A third series of instructions is issued, entitled "Orders," which define to each commander the object to be attained; and on receipt of these he is required to draft specific orders, such as, in manœuvre or in war, would be considered necessary for issue to field units in the assumed circumstances. Then the game begins. The units of artillery, cavalry, infantry or train-wagons advance or retreat at a rate approximately regulated to their normal pace. Information gained by advancing patrols is brought at realistic speed to its destination, and no alteration in the ordered movements of a unit is allowed, till expiration of the calculated time for the transmission of the intelligence and for the issue of fresh orders. So the exercise progresses, each movement is marked, and periodically the blocks on the three maps are placed as they would be at a simultaneous moment. Smaller units yield to larger ones of the enemy; equal forces, if unassisted by superiority of position, "contain" one another, and are practically neutralized till reinforcements arrive and equilibrium is overthrown.

The decisions of the umpire are all-important, and it is he who makes or mars the value of the instruction. Some axioms must be universally accepted for the guidance both of himself and of the players. A force arrayed within effective range on the flank of an equal and hostile force has the better position of the two. Artillery in position with an unimpeded glacis is a terrible task for a frontal attack. Cavalry, as such, is ineffective in woodlands, marshes or a country broken up by cross hedges or wire fencing. Infantry in masses is an ideal target for efficient artillery, and in scattered bodies affords opportunities for attack by well-handled cavalry. The just application of the ideas contained in these few sentences to the varying stages of a combat is no mean task for a cultured soldier.

One of many difficulties encountered in war is the lack of accurate information. Any one man's view of details spread over large areas of country is extremely limited; and even with the greatest precautions against unreality, a commander's information is vastly more accurate over the extended units of his mimic force at kriegspiel than when the forces so represented are men, horses and machines, wrapped in dust or in smoke, and partially obscured by accidents of the ground too insignificant for reproduction on the map. Yet whilst accepting a certain unreality in kriegspiel, and to a less degree in field manœuvres, both by one and the other military training and education are furthered. The framing of orders follows identical lines at kriegspiel, at manœuvres or in war The movement of troops in mimic warfare should be brought to harmonize as far as possible with reality. Up to a point this is relatively easy, and depends chiefly on the quality of the umpiring. But directly the close contact of important bodies of troops is represented on paper, imagination, not realism, governs the results. Even this, however, can be tempered, as regards the larger problems of the tactical grouping of forces, by the wisdom and experience of the umpire It is true that military history teems with tactical events that no map can reproduce and no seer could have prophesied But the [illegible] an officer's familiarity with military history, the more likely [illegible] provide the margin of safety against such incidents in his [illegible], and thus kriegspiel, even in the domain of general [illegible] of invaluable assistance as a means of applying sound [illegible] learned in other ways, to concrete cases.

[illegible]LA, a town in the Algerian Sahara, 175 m. S W of [illegible] on the caravan route to the Niger countries, and a starting-point for the exploration of the southern part of the Sahara. Pop. (1906) 3579, the majority of mixed Berber and negro blood. The town is walled and is entered by six gateways, which are fortified. The French fort, barracks, hospital and other buildings are south of the native town. Wargla lies in an oasis containing many palm trees. It claims to be the oldest town in the Sahara, and was for a long time self-governing, but eventually placed itself under the protection of the sultan of Morocco. The sultan, however, had ceased to have any power in the town some time previous to the French occupation. Wargla was first occupied for the French in 1853 by native allies, but it was not until 1872 that the authority of France was definitely established. The importance of the town as a trans-Saharan trade centre has greatly declined since the suppression of slave-trading by the French. The oasis in which Wargla is situated contains two or three other small fortified *ksurs* or villages, the largest and most picturesque being Ruissat. The total population of the oasis is about 12,000.

WARHAM, WILLIAM (*c.* 1450-1532), archbishop of Canterbury, belonged to a Hampshire family, and was educated at Winchester and New College, Oxford, afterwards practising and teaching law both in London and Oxford. Later he took holy orders, held two livings, and became master of the rolls in 1494, while Henry VII. found him a useful and clever diplomatist. He helped to arrange the marriage between Henry's son, Arthur, and Catherine of Aragon; he went to Scotland with Richard Foxe, then bishop of Durham, in 1497; and he was partly responsible for several commercial and other treaties with Flanders, Burgundy and the German king, Maximilian I. In 1502 Warham was consecrated bishop of London and became keeper of the great seal, but his tenure of both these offices was short, as in 1504 he became lord chancellor and archbishop of Canterbury In 1509 the archbishop married and then crowned Henry VIII. and Catherine of Aragon, but gradually withdrawing into the background he resigned the office of lord chancellor in 1515, and was succeeded by Wolsey, whom he had consecrated as bishop of Lincoln in the previous year. This resignation was possibly due to his dislike of Henry's foreign policy. He was present at the Field of the Cloth of Gold in 1520, and assisted Wolsey as assessor during the secret inquiry into the validity of Henry's marriage with Catherine in 1527. Throughout the divorce proceedings Warham's position was essentially that of an old and weary man. He was named as one of the counsellors to assist the queen, but, fearing to incur the king's displeasure and using his favourite phrase *ira principis mors est*, he gave her very little help; and he signed the letter to Clement VII. which urged the pope to assent to Henry's wish. Afterwards it was proposed that the archbishop himself should try the case, but this suggestion came to nothing. He presided over the Convocation of 1531 when the clergy of the province of Canterbury voted £100,000 to the king in order to avoid the penalties of *praemunire*, and accepted Henry as supreme head of the church with the saving clause "so far as the law of Christ allows." In his concluding years, however, the archbishop showed rather more independence. In February 1532 he protested against all acts concerning the church passed by the parliament which met in 1529, but this did not prevent the important proceedings which secured the complete submission of the church to the state later in the same year. Against this further compliance with Henry's wishes Warham drew up a protest; he likened the action of Henry VIII. to that of Henry II., and urged Magna Carta in defence of the liberties of the church. He died on the 22nd of August 1532 and was buried in Canterbury cathedral Warham, who was chancellor of Oxford University from 1506 until his death, was munificent in his public, and moderate in his private life As archbishop he seems to have been somewhat arbitrary, and his action led to a serious quarrel with Bishop Foxe of Winchester and others in 1512.

See W F Hook, *Lives of the Archbishops of Canterbury* (1860-1876); J Gairdner in *Dict Nat. Biog.*, vol. lix. (1899), and *The English Church in the 16th Century* (1902). J S. Brewer, *Reign of Henry VIII.* (1884), and A. F. Pollard, *Henry VIII.* (1905).

WARKWORTH, a small town in the Wansbeck parliamentary division of Northumberland, England, 32 m. N. of Newcastle-upon-Tyne by the North-Eastern railway. Pop. (1901) 712. It is beautifully situated in a hollow of the river Coquet, 1½ m. above its mouth, where on the S. bank is AMBLE, an urban district (pop. 4428), with a harbour. An ancient bridge of two arches crosses the river, with a fortified gateway on the road mounting to the castle, the site of which is surrounded on three sides by the river. Of this Norman stronghold there are fine remains, including walls, a gateway and hall, while the remainder, including the Lion tower and the keep, is of the 13th and 14th centuries. Roger Fitz-Richard held the manor and probably built the earliest parts of the castle in the reign of Henry II. The lordship came to the Percies in Edward III.'s reign and is still held by their descendants the dukes of Northumberland, though it passed from them temporarily after the capture of the castle by Henry IV. in 1405, and again on the fall of the house of Lancaster. The foundation of Warkworth church is attributed to Ceolwulf, king of Northumbria (*c.* 736), who subsequently became a monk. It was the scene of a massacre by a Scottish force sent by William the Lion in 1174. The church is principally of Norman and Perpendicular work, but remains of the Saxon building have been discovered. In the vicinity are remains of a Benedictine priory of the 13th century. By the side of the Coquet above the castle is the Hermitage of Warkworth. This remarkable relic consists of an outer portion built of stone, and an inner portion hewn from the steep rock above the river. This inner part comprises a chapel and a smaller chamber, both having altars. There is an altar-tomb with a female effigy in the chapel. From the window between the inner chamber and the chapel, and from other details, the date of the work may be placed in the latter part of the 14th century, the characteristics being late Decorated. The traditional story of the origin of the hermitage, attributing it to one of the Bertrams of Bothal Castle in this county, is told in Bishop Percy's ballad *The Hermit of Warkworth* (1771). At Amble are ruins of a monastic toll-house, where a tax was levied on shipping; and Coquet Island, 1 m. off the mouth of the river, was a monastic resort from the earliest times, like the Farne and Holy Islands farther north. The harbour at Amble has an export trade in coal and bricks, coal and fireclay being extensively worked in the neighbourhood, and an import trade in timber.

WARLOCK, a wizard, sorcerer or magician (see MAGIC). The word in O. Eng. is *wǽrloga*, literally "a liar against the truth," from *wǽr*, truth, cognate with Lat. *verum* (cf. Ger. *wahr*), and *loga*, liar, from *léogan*, to lie (cf. Ger. *lügen*). It was thus used with the meaning of a traitor, deceiver, a breaker of a truce. In M. Eng. it is found as a name for the devil (*warloghe*), the arch liar and deceiver. The use of the word for a sorcerer or wizard, one whose magic powers are gained by his league with the devil, seems to be a northern English or Scottish use.

WARMINSTER, a market town in the Westbury parliamentary division of Wiltshire, England, 100¾ m. W. by S. of London by the Great Western railway. Pop. of urban district (1901) 5547. Its white stone houses form a long curve between the uplands of Salisbury Plain, which sweep away towards the north and east, and the tract of park and meadow land lying south and west. The cruciform church of St Denys has a 14th-century south porch and tower. St Lawrence's chapel, a chantry built under Edward I., was bought by the townsfolk at the Reformation. Warminster has also a free school established in 1707, a missionary college, a training home for lady missionaries and a reformatory for boys. Besides a silk mill, malthouses and engineering and agricultural implement works, there is a brisk trade in farm produce.

Warminster appears in Domesday, and was a ro[illegible] whose tenant was bound to provide, when [illegible] lodging for the king and his retinue. Th[illegible] by George III. when he [illegible] from Bath, Frome [illegible] a busy coaching [illegible] great Brit[illegible] on the north, where its entrenchments are double; and Scratchbury, a line of outworks encircling an area of some 40 acres, with three entrances and a citadel in the midst. Barrows are numerous. Longleat, a seat of the marquesses of Bath, lies 5 m. S.E., surrounded by its deer park, crossed from N. to S. by a long and narrow mere. The house is one of the largest and most beautiful examples in the county, dating from the close of the 16th century. Its name is derived from the "leat" or conduit which conveyed water from Horningsham, about 1 m. south, to supply the mill and Austin priory founded here late in the 13th century. The monastic estates passed at the Dissolution to the Thynne family, who built Longleat. Sir Christopher Wren added certain staircases and a doorway. In 1670 the owner was the celebrated Thomas Thynne satirized in Dryden's *Absalom and Achitophel*, and Bishop Ken found a home at Longleat for twenty years after the loss of his bishopric.

WARNER, CHARLES DUDLEY (1829–1900), American essayist and novelist, was born of Puritan ancestry, in Plainfield, Massachusetts, on the 12th of September 1829. From his sixth to his fourteenth year he lived in Charlemont, Mass., the scene of the experiences pictured in his delightful study of childhood, *Being a Boy* (1877). He removed thence to Cazenovia, New York, and in 1851 graduated from Hamilton College, Clinton, N.Y. He worked with a surveying party in Missouri; studied law at the university of Pennsylvania; practised in Chicago (1856–1860); was assistant editor (1860) and editor (1861–1867) of *The Hartford Press*, and after *The Press* was merged into *The Hartford Courant*, was co-editor with Joseph R. Hawley; in 1884 he joined the editorial staff of *Harper's Magazine*, for which he conducted "The Editor's Drawer" until 1892, when he took charge of "The Editor's Study." He died in Hartford on the 20th of October 1900. He travelled widely, lectured frequently, and was actively interested in prison reform, city park supervision and other movements for the public good. He was the first president of the National Institute of Arts and Letters, and, at the time of his death, was president of the American Social Science Association. He first attracted attention by the reflective sketches entitled *My Summer in a Garden* (1870, first published in *The Hartford Courant*), popular for their abounding and refined humour and mellow personal charm, their wholesome love of out-door things, their suggestive comment on life and affairs, and their delicately finished style, qualities that suggest the work of Washington Irving. Among his other works are *Saunterings* (descriptions of travel in eastern Europe, 1872) and *Back-Log Studies* (1872); *Baddeck, and That Sort of Thing* (1874), travels in Nova Scotia and elsewhere; *My Winter on the Nile* (1876); *In the Levant* (1876); *In the Wilderness* (1878), *A Roundabout Journey*, in Europe (1883); *On Horseback*, in the Southern States (1888); *Studies in the South and West, with Comments on Canada* (1889); *Our Italy*, southern California (1891), *The Relation of Literature to Life* (1896); *The People for Whom Shakespeare Wrote* (1897); and *Fashions in Literature* (1902). He also edited "The American Men of Letters" series, to which he contributed an excellent biography of *Washington Irving* (1881), and edited a large "Library of the World's Best Literature." His other works include his graceful essays, *As We Were Saying* (1891) and *As We Go* (1893); and his novels, *The Gilded Age* (in collaboration with Mark Twain, 1873); *Their Pilgrimage* (1886); *A Little Journey in the World* (1889); *The Golden House* (1894); and *That Fortune* (1889).

See the biographical sketch by T. R. Lounsbury in the *Complete Writings* (15 vols., Hartford, 1904) of Warner.

WARNER, OLIN LEVI (1844–1896), American sculptor, was born at West Suffield, Connecticut, on the 9th of April 1844. In turn an artisan and a telegraph operator, by 1869 he had [illegible] support him through a course of study [illegible] Carpeaux. He was in France when [illegible] in 1870 and enlisted in the Foreign [illegible] at the termination of the siege. [illegible] York, where, however, he met with [illegible] to his father's farm in Vermont, [illegible] of silver and plated ware as well as makers of mantel ornaments. He attracted the attention of Daniel Cottier, of the Cottier Art Galleries of New York, where Warner's work was exhibited, and some commissions gradually secured for him recognition. They were followed by busts of Alden Weir, the artist, and of Maud Morgan, the musician; some decorations for the Long Island Historical Society; statues of Governor Buckingham at the State Capitol, Hartford, Conn., William Lloyd Garrison and General Charles Devens, at Boston; reliefs of several striking North American Indian types, a fountain for Portland, Oregon, and the designs for the bronze doors, "Tradition" and "Writing," of the Congressional Library at Washington, of which he lived to complete only the former, which contains the beautiful figures of "Imagination" and "Memory." Warner died in New York City on the 14th of August 1896. He was one of the five charter members of the Society of American Artists (1877), and in 1889 became an academician, National Academy of Design, New York. One of his best-known works is a "Diana." He designed the souvenir silver half-dollar piece for the Columbia Fair at Chicago, in 1893, making also some colossal heads of great artists for the art palace, and busts of Governors Clinton and Flower, of New York State

WARNER, SETH (1743–1784), American Revolutionary soldier, was born in Roxbury, Connecticut, on the 17th of May 1743. He removed with his father to the "New Hampshire Grants" in 1763, and became prominent among the young men who forcibly resisted New York's claim to the territory (see VERMONT). At the outbreak of the War of Independence, he led the detachment of "Green Mountain Boys" which captured Crown Point (*q.v.*) on the 11th of May 1775, and took part in the unsuccessful expedition against Quebec later in the year In July 1776 he became colonel in the Continental Army, and served throughout the war. He retired in 1782, and returned to Roxbury, where he died in 1784.

See Daniel Chipman, *Life* (Burlington, Vt., 1858).

WARNER, WILLIAM (1558?–1609), English poet, was born in London about 1558 He was educated at Magdalen Hall, Oxford, but left the university without taking a degree He practised in London as an attorney, and gained a great reputation among his contemporaries as a poet. His chief work is a long poem in fourteen-syllabled verse, entitled *Albion's England* (1586), and dedicated to Henry Carey, 1st Baron Hunsdon. His history of his country begins with Noah, and is brought down to Warner's own time. The chronicle is by no means continuous, and is varied by fictitious episodes, the best known of which is the idyll in the fourth book of the loves of Argentille, the daughter of the king of Deira, and the Danish prince, Curan. Here Warner's simple art shows itself at its best. His book, perhaps on account of its patriotic subject, was very popular, but it is difficult to understand how Francis Meres came to rank him with Spenser as the chief heroical poets of the day, and to institute a comparison between him and Euripides. Warner died suddenly at Amwell in Hertfordshire on the 9th of March 1609.

His other works are *Pan his Syrinx, or Pipe, Compact of Seven Reedes* (1585), a collection of prose tales; and a translation of the *Menaechmi* of Plautus (1595). *Albion's England* consisted originally of four "books," but the number was increased in successive issues, and a posthumous edition (1612) contains sixteen books. It was reprinted (1810) in Alexander Chalmers's *English Poets*.

WARNSDORF, a town of Bohemia, Austria, 124 m. N.E. of Prague by rail. Pop. (1900) 21,150. Warnsdorf was formed in 1870 by uniting seven separate village communities, and is now one of the largest towns in Bohemia. It is a great industrial centre, especially for textiles.

WARORA, a town of British India, in Chanda district of the Central Provinces, on a branch of the Great Indian Peninsula railway. Pop. (1901) 10,626. Warora gives its name to a coalfield, which was worked by the government from 1871 to 1906; a fire-clay industry under the same management also used fire-clay for bricks and tiles. The ginning and pressing of cotton is an important industry.

WARRANT (Med. Lat. *warantum*; O. Fr. *garant*, *warant*, rived from O.H.G. root represented in modern German by *gewähren*), in English law, an authority in writing empowering a person to do an act or to execute an office. The procedure known as *quo warranto* (*q.v.*) is used to determine the right to hold certain kinds of public office. The term "warrant" occurs very early in constitutional documents. it is found in the Assize of Clarendon and the Assize of the Forest, both in the reign of Henry II., but in neither case in its modern meaning. The original meaning seems to have been more akin to guarantee (*q.v.*), warranty or security; and to some extent the term implies something in the nature of a guarantee or representation by the person issuing the warrant that the person who acts on it can do so without incurring any legal penalty The term is applied to a great variety of documents of very different kinds, which may be classified as (1) executive or administrative, (2) judicial or quasi-judicial and (3) financial or commercial.

1 *Executive and Administrative.*—While the royal prerogative was insufficiently defined and limited, a great many executive acts were authorized by royal warrant (*per speciale mandatum regis*), which now either depend on statute or are dealt with by departments of state without the need of recourse to the personal authority of the sovereign. Under present constitutional practice royal warrants are as a general rule countersigned by a member of the cabinet or other responsible officer of state. By an act of 1435 (18 Hen. VI. c. 1) letters patent under the great seal must bear the date of the royal warrant delivered to the chancellor for their issue This act still applies to all patents, except for inventions. The form and countersignature of warrants for affixing the great seal is regulated by the Great Seal Act 1884. Pardon, which was granted for centuries only by letters patent under the great seal, has since 1827 in England and 1828 in Ireland been granted in case of felony by warrant under the royal sign manual countersigned by a secretary of state (7 & 8 Geo IV c. 28, s. 13, 9 Geo. IV. c. 54, s. 33) The prerogative of the crown with reference to the control of the navy and army is largely exercised by the issue of warrants. In 1871 the purchase of commissions in the army was abolished by royal warrant, said to have been authorized by statute (49 Geo. III. c. 126), but afterwards confirmed by parliament (34 & 35 Vict. c. 86). Under existing legislation for the government of the military forces of the crown royal warrants are used to form army corps, to deal with certain details as to pay and regimental debts, and with the militia and reserve forces. The convocation of naval courts-martial and the appointment of judge-advocate and provost-marshal at such court is by warrant of the Admiralty or of the officer on foreign or detached service who by his commission is entitled to convene such a court (see Naval Discipline Act 1866, s. 58; Army Act 1881, s. 179). A general court-martial for the army is constituted by royal warrant or convened by an officer authorized to convene such court, or his lawful delegate (Army Act 1881, s. 48). Appointments to certain offices under the crown are made by warrant of the king or of the appropriate department of state. In the navy and army the officers called warrant officers are so styled because they are appointed by warrant and do not hold commissions. In 1602 the censorship of the stage was committed to the poet Daniel by royal warrant (see THEATRE), and certain tradesmen to the court are described as "warrant holders," because of the mode of their appointment. Abuses of claims to this distinction are punishable (Merchandise Marks Act 1887, s. 20; Patents Act 1883, s. 107). Warrants under the royal sign manual are subject to a ten-shilling stamp duty (Stamp Act 1891). The issue of warrants under the hand of a secretary of state, so far as they affect personal liberty, depends in every case on statute, *e.g.* as to the surrender of fugitive criminals (EXTRADITION), or the deportation of undesirable aliens (see ALIEN), or the bringing up prisoners as witnesses in courts of justice. The right of a secretary of state or the lord-lieutenant in Ireland by express warrant in writing to detain or open letters in the post office was recognized by orders in council and proclamations in the 17th century and by various post office acts, and is retained in the Post Office Act 1836 (s. 25). The right was challenged, but was finally established by the reports of committees of both Houses appointed in 1844 on a complaint by Mazzini and others that Sir James Graham, then home secretary, had opened their letters. It was exercised as recently as 1881 over the letters of persons suspected of treasonable correspondence in Ireland. The warrant of a law officer of the crown for sealing letters patent for inventions (necessary under the old patent law) has been superseded by other procedure since the Patents Act 1883.

2 *Judicial and Quasi-Judicial Warrants.*—Unless a statute otherwise provides a judicial warrant must be in writing under the seal, if any, of the court, or under the hand and (or) seal of the functionary who grants it. Committal for breach of privilege of the House of Commons is by warrant of the Speaker. During the Tudor and Stuart reigns frequent attempts were made by the crown and great officers of state to interfere with personal liberty, especially as to offences of state. The legality of these proceedings was challenged by the judges in Elizabeth's reign. On the abolition of the Star Chamber it was enacted (16 Car I. c. 10) that if any person

be imprisoned by warrant of the king in person, of the council board, or any of the privy council, he is entitled to a writ of *habeas corpus*, and the courts may examine into the legality of the cause of detention. This enactment, and the Habeas Corpus Act 1679, put an end to the interference of the executive with matters belonging to the judicature; but until 1763 there survived a practice by which a secretary of state issued warrants to arrest individuals for state offences, and to search or seize the books and papers of the accused. The latter practice was examined and declared illegal in the famous case of *Entick* v. *Carrington* (19 How. St. Tr. 1030). All privy councillors are included in the commission of the peace for every county. The council itself is said to have power to issue warrants of arrest for high treason, but the power, if it exists, is in abeyance in England. The special powers given to the lord-lieutenant of Ireland in 1881 (44 & 45 Vict. c. 5) expired in 1906. As a result of the gradual restriction of the royal prerogative, the term warrant has come in modern times oftenest to be used of documents issuing from courts of justice. Few documents issuing from the superior courts are called warrants. In these courts writs and orders are more generally used. In courts of record which try indictments a "bench warrant" is sometimes used for the arrest of an absent defendant, but the word warrant has for judicial purposes become most closely associated with the jurisdiction of justices of the peace. As a general rule no one can be arrested without warrant. To this rule there are certain exceptions either at common law or by statute. At common law a justice of the peace, a sheriff, a coroner, a constable and even a private person, may arrest any one without warrant for a treason, felony or breach of the peace committed, or attempted to be committed, in his presence. A constable (whether a constable at common law or a police constable appointed under the Police Acts) may arrest a person indicted for felony; a constable or a private person may arrest on reasonable suspicion that he who is arrested has committed a felony. But in the latter case he does so at his peril, for he must prove (what the constable need not) that there has been an actual commission of the crime by some one, as well as a reasonable ground for suspecting the particular person. What is a reasonable ground it is of course impossible to define, but, in the case of a constable, a charge by a person not manifestly unworthy of credit is generally regarded as sufficient. An accused person who has been bailed may be arrested by his bail, and the police may assist in the arrest. In neither case is a warrant necessary. Nor is it necessary for the apprehension of one against whom the hue and cry is raised. The king cannot arrest in person or by verbal command, as no action would lie against him for wrongful arrest. Statutory powers of arrest without warrant are given to both constables and private persons by many statutes, *e.g.* the Night Poaching Act 1828, certain of the Criminal Law Consolidation Acts of 1861, the Prevention of Crime Act 1871 and Police Acts. In those cases in which arrest without warrant is illegal or is found inexpedient, information in writing or on oath is laid before a justice of the peace setting forth the nature of the offence charged and to some extent the nature of the evidence implicating the accused; and upon this information, if sufficient in the opinion of the justice applied to, he issues his warrant for the arrest of the person incriminated. The warrant, if issued by a competent court as to a matter over which it has jurisdiction, becomes a judicial authority to the person who executes it, and resistance to such a warrant is a criminal offence. The possession of a legal warrant by a peace officer on arrest is of great importance in determining whether a person resisting apprehension is justified or not in his resistance. Should the officer attempt to apprehend him on a warrant manifestly illegal on its face, or without a warrant in a case where a warrant is necessary, and be killed in the attempt, the killing would probably be held to be manslaughter and not murder. Before bringing an action against constables for alleged illegal arrest under a justice's warrant the complainant must apply for the perusal and a copy of the warrant (24 Geo. II. c. 44, s. 6; Pollock, *Torts*, 6th ed., 117). Entry upon the land or seizure of property cannot as a rule be justified except under judicial warrant. The only common law warrant of this kind is the search warrant, which may be granted for the purpose of searching for stolen goods. Special powers for issuing such warrants are given by the Army, Merchant Shipping, Customs, Pawnbrokers and Stamp Acts, and for the discovery of explosives or appliances for coining and forgery. The Criminal Law Amendment Act 1885 allows the issue of search warrants where it is suspected that a female is unlawfully detained for immoral purposes. Execution of the decisions of a court of summary jurisdiction is secured by warrants, part of the process of the court, such as warrants of distress or commitment. A warrant may also issue for the apprehension of a witness whose attendance cannot be otherwise assured. The forms of warrants used by justices in indictable cases are scheduled to the Indictable Offences Act 1848. Those used for summary jurisdiction are contained in the Summary Jurisdiction Rules of 1886.

As a general rule, warrants must be executed within the local jurisdiction of the officer who issued them. Warrants, &c., issued the High Court run through England, in criminal as es: and the same rule applies as to courts having tion. The warrants of justices of the peace can h pursuit within 7 m. of the boundary of the roperly backed by a local justice or officer in any other part of the British islands (see SUMMARY JURISDICTION). There is also a special provision as to executing warrants in the border counties of England and Scotland. Under the Extradition Acts and Fugitive Offenders Act 1881 provision is made for the issue of warrants in aid of foreign and colonial justice; but the foreign and colonial warrants have no force in the United Kingdom.

The word "warrant" is used as to a few judicial or quasi-judicial matters of civil concern, *e.g.* warrant to arrest a ship in an admiralty action *in rem*; and in the county courts warrants to the bailiffs of the court are used where in the High Court a writ to the sheriff would be issued, *e.g.* for attachment, execution, possession and delivery (see County Court Rules, 1903, scheduled forms). A warrant of distress for rent issued by a landlord to a bailiff is sometimes described as a private warrant, but it is in reality a peculiar quasi-judicial remedy derived from feudal relations between lord and vassal. Arrest in civil or quasi-civil proceedings is in certain cases effected under warrant, *e.g.* where a bankrupt fails to obey orders of the court for his attendance (Bankruptcy Act 1883, s. 25), and in certain cases where justices have summary jurisdiction.

Financial and Commercial.—Payment out of the treasury is generally made upon warrant. Treasury warrants are regulated by many of the acts dealing with the national debt.

Payment of dividends by trading corporations and companies is generally made by means of dividend warrants. Mercantile warrants are instruments giving a right to the delivery of goods, generally those deposited at a dock or warehouse, and by mercantile custom regarded as documents of title to the goods to which they relate. They have been recognized by the legislature, especially in the Factors Acts. Thus the interpretation clause of the Factors Act 1889 includes under the head of documents of title, dock warrants and warrants for the delivery of goods, and a fuller definition is given by s. 111 of the Stamp Act 1891, which imposes on such documents a stamp duty of 3d. Warrants of attorney are instruments authorizing an attorney to appear for the principal in an action and to consent to judgment. They must now be attested by a solicitor and registered in the Bill of Sale Office under the Debtors Act 1869. They are now little used. The forgery of any warrant of this kind or of any endorsement or assignment thereof is punishable under the Forgery Act 1861.

Scotland.—By art. xxiv. of the Articles of Union royal warrants were to continue to be kept as before the union. The Secretary for Scotland Act 1885 enabled the crown by royal warrant to appoint the secretary to be vice-president of the Scotch Education Department. The lord advocate's warrant runs throughout the whole of Scotland. Warrants issued by courts of summary jurisdiction agree in the main with those in use in England, though their names are not the same (see SUMMARY JURISDICTION). There are numerous statutory provisions as to warrants of other kinds. By the Debtors (Scotland) Act 1838 (1 & 2 Vict. c. 114) warrants for diligence, and to charge the debtor under pain of imprisonment, may be inserted in an extract of decree; and in a summons concluding for payment of money a warrant to arrest the movables, debts and money of the defender may be included. By the Court of Session Act 1868 (31 & 32 Vict. c. 100) a warrant of inhibition may be inserted in the will of a summons. A crown writ is a warrant for infeftment (31 & 32 Vict. c. 101). The same act gives forms of warrants of registration. The procedure of the sheriff court in its civil jurisdiction as to warrants of citation is regulated by the Sheriff Courts (Scotland) Act 1907 (7 Edw. VII. c. 51). The practice as to warrants of citation and commitment in the High Court of Justiciary and the sheriff court in its criminal jurisdiction now depends chiefly on the Criminal Procedure Act 1887 (50 & 51 Vict. c. 35). The *meditatio fugae* warrant is a judicial warrant on which imprisonment may follow until the debtor give *cautio judicio sisti*. It corresponds to some extent to the writ *ne exeat regno* of English practice, but it may be issued by a sheriff (1 & 2 Vict. c. 119, s. 25). Another kind of judicial warrant is a border warrant for arresting a debtor on the English side of the border. The warrant of attorney is not known in Scotland, its place being taken by the clause of registration, which is not avoided by the death of the person giving it.

United States.—By the constitutions of the United States and of almost all the states, warrants are not to issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched and the persons or thing to be seized. These provisions have been held not to mean that there shall be no arrest without warrant, but to confine the right of arrest to circumstances similar to those which justify it in English law. The constitutions of some states forbid general warrants. A warrant is generally necessary for the payment of money out of the United States or a state treasury. (W. F. C.)

WARRANT OF ATTORNEY. A warrant of attorney to confess judgment is a security for money (now practically obsolete) in the form of an authority to a solicitor named by a creditor, empowering him to sign judgment in an action against the debtor for the sum due, with a defeasance, or clause that the warrant shall not be put into force in case of due payment of the money secured. It was often used as a collateral security, either for the payment of an annuity or with mortgages, in order that the mortgagee, by entering up judgment, might obtain priority in the administration of the assets of the mortgagor. The Debtors Act 1869 contained various provisions for making known to the debtor the extent of the liability incurred by him, among others that the warrant must be executed in the presence of a solicitor named by the debtor, and that it and the defeasance must be written on the same paper. A warrant of attorney must be duly stamped, generally as a mortgage (*q.v.*), and must be registered as a judgment in the central office of the Supreme Court.

WARRANT-OFFICER, in the British navy, the name given to officers who rank next to those who hold commissions, being appointed by warrant. They include the master, purser, surgeon, gunner, boatswain and carpenter, the first three being of "ward-room rank," *i.e.* messing with the lieutenants. In the military forces a warrant-officer is appointed by a secretary of state's warrant, and ranks below the commissioned officers and above the non-commissioned officers. A warrant-officer often holds an honorary commission.

WARRANTY, etymologically, another form of Guarantee (*q.v.*). It is used, however, in a rather different sense. The sense common to both words is that of a collateral contract, under which responsibility for an act is incurred, and for the breach of which an action for damages lies. Warranty generally expresses the responsibility of the person doing the act, guarantee the responsibility of some other person on his behalf. A warranty may be defined, in the words of Lord Abinger, as "an express or implied statement of something which the party undertakes shall be part of the contract, and, though part of the contract, collateral to the express object of it" (*Chanter* v. *Hopkins*, 1838, 4 M. & W. 404). It differs from a condition in that a condition forms the basis of the contract and a breach of it discharges from the contract, and from a representation in that the latter does not affect the contract unless made a part of it expressly, or by implication as in contracts of insurance and other contracts *uberrimae fidei*, or unless it be fraudulent. These distinctions are not always accurately maintained. Thus in the Real Property Act 1845, § 4, condition seems to be used for warranty.

Warranty as it affected the law of real property was, before the passing of the Real Property Limitation Act 1833 and the Fines and Recoveries Act 1833, a matter of the highest importance. A warranty in a conveyance was a covenant real annexed to an estate of freehold, and either expressed in a clause of warranty or implied in cases where a feudal relation might exist between feoffor and feoffee. The warranty, as described by Littleton, § 697, was an outgrowth of feudalism, and something very like it is to be found in the *Liber Feudorum*. At the time of Glanvill the heir was bound to warrant the reasonable donations of his ancestor. Warranty was one of the elements in Bracton's definition of homage, 78*b*, "juris vinculum quo quis astringitur ad warrantizandum defendendum et acquietandum tenentem suum in seisina versus omnes." For an express warranty the word *warrantizo* or warrant was necessary. The word "give" implied a warranty, as did an exchange and certain kinds of partition. In order to bind heirs a clause of warranty was required. This was either lineal, collateral or commencing by disseisin. The differences between the three kinds were very technical, and depended on abstruse and obsolete learning. They are treated at great length in old works on real property, especially Coke upon Littleton by Butler, 364*b*. The feoffor or his heirs were bound by voucher to warranty or judgment in a writ of *warrantia chartae* to yield other lands to the feoffee in case of the eviction of the latter. Vouching to warranty was a part of the old fictitious proceedings in a common recovery in use for the purpose of barring an entail before the Fines and Recoveries Act. Warranty of this nature, as far as it relates to the conveyance of real estate, though not actually abolished in all possible cases, is now superseded by covenants for title. The more usual of these are now by the Conveyancing Act 1881 deemed to be implied in conveyances. For the implied warranties of title and quality see Sale of Goods. Vouching to warranty was at one time important in the law of personality as well as of reality. The procedure is fully described in Glanvill. The right of calling on the holder of lost or stolen goods to vouch to warranty (*interciare*), *i.e.* to give up the name of the person from whom he received them, under pain of forfeiture, was often granted under the name of *theam* as a local franchise. Warranty, as it exists at present in the law of personality, is either express or implied. There is no general rule as to what constitutes a warranty. It is not necessary that an express warranty should be in writing, the law being that every affirmation at the time of sale of personal chattels is a warranty, provided that it appears to have been so intended. The principal cases of implied warranty occur in the contracts of sale and insurance. There is also an implied warranty in other kinds of contract, *e.g.* of seaworthiness by the shipowner in a contract between him and a charterer for the hire of a ship. In all cases of implied warranty the warranty may be excluded by the special terms of the contract. For breach of warranty an action may be brought directly, or the breach may be used as ground for a counter claim or for reduction of damages, but the breach will not in the case of a warranty proper entitle the person suffering by it to a rescission of the contract. Thus in a sale the property passes although the warranty be broken. In some cases warranties on sale are the subject of statutory enactments, as the Merchandise Marks Acts and the Sale of Food and Drugs Acts. In some other acts, such as the Bills of Exchange Act 1882, the term warranty does not occur, but the practical effect is the same.

Scotland.—The term corresponding to warranty in the law of heritable property is "warrandice." Warranty, strictly speaking, seems confined to movables. Warrandice appears early in Scots law, the heir by *Regiam Majestatem* being bound to warrant the reasonable donations of his ancestor. Warrandice in the existing law is either real or personal. Real warrandice is that whereby warrandice lands are made over, as indemnity for those conveyed, to assure the person to whom they were conveyed from loss by the appearance of a superior title. Real warrandice is implied in excambion. Its effect is that the excamber, in case of eviction, may recover possession of his original lands. This is not in accordance with the English law in exchange. Personal warrandice is either express or implied. There is an implied warrandice in every onerous deed, and an absolute warrandice presumes an onerous consideration. Express warrandice is either simple, against the future acts of the vendor, from fact and deed, against acts whether past or future, or absolute, or against all deadly, that is, on any ground existing before the sale. A clause of warrandice is the Scottish equivalent of the English covenants for title. By the Titles to Land Consolidation (Scotland) Amendment Act 1869 a clause of warrandice in the form given in the schedule to the act imports absolute warrandice as regards the lands and the title-deeds thereof, and warrandice from fact and deed as regards the rents.

United States.—Warranty in conveyances of real estate is expressly abolished by statute in many states. In some states warranty is implied on the transfer and indorsement of negotiable instruments. (J. W.)

WARREN, GOUVERNEUR KEMBLE (1830–1882), American soldier, was born at Coldspring, New York, on the 8th of January 1830, and entered West Point in 1846, graduating in 1850. He was assigned to the engineers, and for several years was employed in survey work in the West, where he took part in some expeditions against the Indians. In 1859 he was made assistant instructor in mathematics at West Point. But two years later, at the outbreak of the Civil War, the scientific subaltern was made lieutenant-colonel of volunteers and posted to the newly raised 5th New York Volunteer Infantry. He was fully equal to the task, for his regiment was very soon brought into a state of marked efficiency. In August he was promoted colonel. He commanded a brigade of the V. corps at Gaines's Mill, Second Bull Run and Antietam, and was shortly afterwards promoted brigadier-general of Volunteers. During the Fredericksburg campaign he was on the engineer staff of the Army of the Potomac, but after Chancellorsville he was appointed chief of engineers in that army, and in that capacity rendered brilliant services at Gettysburg (*q.v.*), his reward being promotion to major-general U.S.V. and the brevet of colonel in the regular army. When the Army of the Potomac was reorganized in the spring of 1864 Warren returned to the V. corps as its commander.

His services in the Wilderness (*q.v.*) and Petersburg (*q.v.*) campaigns proved his fitness for this large and responsible command, but his naturally lively imagination and the engineer's inbred habit of caution combined to make him a brilliant but somewhat unsafe subordinate. He would have become one of the great chiefs of staff of history, or even a successful army commander, but he sometimes failed where a less highly gifted man would have succeeded. He was at his best when the military situation depended on his exercising his initiative, as on the first day in the Wilderness, in which his action saved the army, at his worst when, as on the 10th of May before Spottsylvania, he was ordered to attempt the impossible. On the latter occasion both Grant and Meade threatened to relieve him of his command, and Humphreys, the chief of staff of the army, was actually sent to control the movements of the V. corps. Similar incidents took place in the later stages of the campaign, and at last, at the critical moment preceding the battle of Five Forks, Sheridan, who was in charge of the operations, was authorized by Grant to relieve Warren of his command if he thought fit. The thoughtful Warren and the eager, violent Sheridan were ill-matched. At the outset the V. corps, being no longer composed of the solid troops of 1862 and 1863, fell into confusion, which Warren exerted himself to remedy, and in the event the battle was an important Union victory. But after it had ended Sheridan sent for Warren and, with no attempt to soften the blow, relieved him of his command. A court of inquiry was subsequently held, which entirely exonerated Warren from the reckless charges of apathy, almost of cowardice, which Sheridan brought against him. Shortly after Five Forks Warren resigned his volunteer commission, and received the brevet of brigadier-general in the regular army. After the war he was employed, in the substantive rank of major (1879 lieutenant-colonel) of engineers, in survey work and harbour improvements. General Warren died on the 8th of August 1882 at Newport, R.I. A statue to his memory was erected at Round Top, on the field of Gettysburg, on the sixth anniversary of his death.

WARREN, SIR JOHN BORLASE, Bart. (1753–1822), English admiral, was born at Stapleford, Nottinghamshire, on the 2nd of September 1753, being the son and heir of John Borlase Warren (d. 1775) of Stapleford and Little Marlow. He was educated at Emmanuel College, Cambridge, and in 1771 entered the navy as an able seaman; in 1774 he became member of parliament for Marlow; and in 1775 he was created a baronet, the baronetcy held by his ancestors, the Borlases, having become extinct in 1689. His career as a seaman really began in 1777, and two years later he obtained command of a ship. In April 1794, in charge of a squadron of frigates, Warren captured three French frigates, and in similar ways he did excellent service for some time in protecting British trade. In 1796 he is said to have captured or destroyed 220 vessels. Perhaps his best deed in the service was the defeat in October 1798 of a French fleet, carrying 5000 men, which it was intended to land in Ireland, a plan which he completely frustrated. In 1802 he was sent to St Petersburg as ambassador extraordinary, but he did not forsake the sea, and in 1806 he captured a large French warship, the "Marengo." He became an admiral in 1810, and was commander-in-chief on the North American station in 1813–1814. He died on the 27th of February 1822. His two sons predeceased their father, and his daughter and heiress, Frances Maria (1784–1837), married George Charles Venables-Vernon, 4th Lord Vernon (1779–1835). Their son was George John Warren Vernon, 5th Lord Vernon (1803–1866).

WARREN, JOSEPH (1741–1775), American politician, was born at Roxbury, Massachusetts, on the 11th of June 1741. He graduated from Harvard College in 1759, taught in a school at Roxbury in 1760–1761, studied medicine, and began to practise in Boston in 1764. The Stamp Act agitation aroused his interest in public questions. He soon became associated with Samuel Adams, John Adams and Josiah Quincy, Jr., as a leader of the popular party, and contributed articles and letters to the Boston *Gazette* over the signature "True Patriot." The efforts of Samuel Adams to secure the appointment of committees of correspondence met with his hearty support, and he and Adams were the two leading members of the first Boston committee of correspondence, chosen in 1772. As chairman of a committee appointed for the purpose, he drafted the famous "Suffolk Resolves," which were unanimously adopted by a convention at Milton (*q.v.*) on the 9th of September 1774. These "resolves" urged forcible opposition to Great Britain if it should prove to be necessary, pledged submission to such measures as the Continental Congress might recommend, and favoured the calling of a provincial congress. Warren was a member of the first three provincial congresses (1774–1775), president of the third, and an active member of the committee of public safety. He took an active part in the fighting on the 19th of April, was appointed major-general of the Massachusetts [illegible] nk to Artemas Ward, on the 14th of June 1775; and three days later, before his commission was made out, he took part as a volunteer, under the orders of Putnam and Prescott, in the battle of Bunker Hill (Breed's Hill), where he was killed. Next to the Adamses, Warren was the most influential leader of the extreme Whig faction in Massachusetts. His tragic death strengthened their zeal for the popular cause and helped to prepare the way for the acceptance of the Declaration of Independence. Warren's speeches are typical examples of the old style of American political eloquence. His best-known orations were those delivered in Old South Church on the second and fifth anniversaries (1772 and 1775) of the "Boston Massacre."

The standard biography is Richard Frothingham's *Life and Times of Joseph Warren* (Boston, 1865).

WARREN, MERCY (1728–1814), American writer, sister of James Otis (*q.v.*), was born at Barnstable, Mass., and in 1754 married James Warren (1726–1808) of Plymouth Mass., a college friend of her brother. Her literary inclinations were fostered by both these men, and she began early to write poems and prose essays. As member of the Massachusetts House of Representatives (1766–1774) and its speaker (1776–1777 and 1787–1788), member (1774 and 1775) and president (1775) of the Provincial Congress, and paymaster-general in 1775, James Warren took a leading part in the events of the American revolutionary period, and his wife followed its progress with keen interest. Her gifts of satire were utilized in her political dramas, *The Adulator* (1773) and *The Group* (1775); and John Adams, whose wife Abigail was Mercy Warren's close friend, encouraged her to further efforts. Her tragedies, "The Sack of Rome" and "The Ladies of Castile," were included in her *Poems, Dramatic and Miscellaneous* (1790), dedicated to General Washington. Apart from their historical interest among the beginnings of American literature, Mercy Warren's poems have no permanent value. In 1805 she published a *History of the American Revolution*, which was coloured by somewhat outspoken personal criticism and was bitterly resented by John Adams (see his correspondence, published by the Massachusetts Historical Society, 1878). James Warren died in 1808, and his wife followed him on the 19th of October 1814.

See Elizabeth F. Ellet, *Women of the Revolution* (1856; new ed., 1900); an article by Annie Russell Marble in the *New England Magazine* (April 1903); Alice Brown, *Mercy Warren* (New York, 1896).

WARREN, MINTON (1850–1907), American classical scholar, was born at Pawtucket, Rhode Island, on the 29th of January 1850, a descendant of Richard Warren, who sailed in the "Mayflower" in 1620. He was educated at Tufts College and subsequently at Yale. After three years as a schoolmaster, he went to Germany to complete his studies in comparative philology and especially in Latin language and literature. Having taken the degree of doctor of philosophy at Strassburg in 1879, he returned to the United States as Latin professor at Johns Hopkins University. In 1899 he was appointed Latin professor at Harvard. His life-work was a new edition of Terence, which, however, he left unfinished at his death. He was director of the American School of Classical Studies in Rome (1897–1899), and president of the American Philological Association (1898). Among his publications are: "Enclitic *Ne* in Early Latin" (Strassburg dissert., reprinted in *Amer. Journ. of Philol.*, 1881); *On Latin Glossaries, with especial reference to the Codex Sangallensis* (St Gall Glossary) (Cambridge, U.S.A., 1885); *The Stele Inscription in the Roman Forum* (*Amer. Journ. of Philol.*, vol. xxviii. No. 3, and separately in 1908). He died on the 26th of November 1907.

See *Harvard Magazine* (Jan. 1908) and W. M. Lindsay in *Classical Review* (Feb. 1908).

WARREN, SAMUEL (1807–1877), English lawyer and author, son of Dr Samuel Warren, rector of All Souls', Ancoats, Manchester, was born near Wrexham in Denbighshire on the 23rd of May 1807. The elder Samuel Warren (1781–1862) became a Wesleyan minister, but was expelled by Conference in 1835 on account of his attitude towards proposals for the establishment of a theological training college at Manchester. He formed a new association, the members of which were nicknamed Warrenites, and this developed into the United Methodist Free Churches. Warren himself took orders in the Church of England. His son, the younger Samuel Warren, studied medicine at the University of Edinburgh, but abandoned this to study for the English bar. He entered the Inner Temple in 1828, and was successful in his profession. He took silk in 1851, was made recorder of Hull in 1852, represented Midhurst in parliament for three years (1856–1859) and was rewarded in 1859 with a mastership in lunacy. He had already written a good deal on the subject of insanity in its legal aspects, and he was always a determined opponent of the rising school of medical alienists who were more and more in favour of reducing certain forms of crime to a state of mental aberration which should not be punished outside of asylums. Meantime he had made much more brilliant success in fiction. Very early in his career he had begun to write for *Blackwood*. His *Passages from the Diary of a Late Physician* were published in that magazine between August 1830 and August 1837, and appeared in collected form in 1838. These realistic short stories, with a somewhat morbid interest shielded under a moral purpose, were extremely popular. Warren's brief experience as a medical student thus stood him in good stead. But his great success was *Ten Thousand a Year*, which ran in *Blackwood* from October 1839 to August 1841, and was published separately immediately on its conclusion. Critics complained of the coarse workmanship, the banality of the moralizing, the crudeness of the pathos, the farcical extravagance of the humour; but meantime the work proved one of the most popular novels of the century. Of the higher qualities of imagination and passion Warren was destitute, but his sketches of character, especially farcical character—Tittlebat Titmouse, Oily Gammon, Mr Quicksilver (an open caricature of Lord Brougham)—are bold and strong, forcibly imprinted on the memory, and the interest of the story is made to run with a powerful current. For several years Warren was known as the author of *Ten Thousand a Year*, and many tales were told of his open pride in the achievement. In 1847 he made another venture, but *Now and Then* was not a success. *The Lily and the Bee*, a squib on the Crystal Palace, published in 1851, though it had the honour of translation into Italian, was a signal failure. A pessimistic dissertation on *The Intellectual and Moral Development of the Age*, published in 1853, also fell flat, and thenceforth Warren, after publishing his *Works: Critical and Imaginative*, in four volumes in 1854, retired on his laurels. He died in London on the 29th of July 1877.

Warren also wrote several legal works of repute—*Introduction to Law Studies* (1835), *Extracts from Blackstone* (1837), *Manual of Parliamentary Law* (1852).

WARREN, WILLIAM (1812–1888), American actor, was born in Philadelphia on the 17th of November 1812, the son of an English actor (1767–1832) of the same name. His first stage appearance was made there as Young Norval in Home's *Douglas* in 1832. A dozen years of wandering theatrical life followed, giving him a wide experience in every kind of part, the last few in comedy in a company headed by his brother-in-law, J B Rice. In 1846 he made his first appearance in Boston as Sir Lucius O'Trigger in *The Rivals* at the Howard Athenaeum, and in the next season he became a member of the Boston Museum, in which stock company he remained for thirty-five years. Here he held his "Golden Jubilee" on the 28th of October 1882. He died on the 21st of September 1888.

WARREN, a city and the county-seat of Trumbull county, Ohio, U.S.A., in the N.E. part of the state, on the Mahoning river, about 50 m. S.E. of Cleveland, and 14 m. N W. of Youngstown. Pop. (1890) 5973, (1900) 8529 (1161 foreign-born); (1910) 11,081. Warren is served by the Erie, the Pennsylvania, and the Baltimore & Ohio railways. The city has a public library and a hospital. The surrounding country is devoted to farming, dairying and coal and iron mining. The total value of the factory products in 1905 was $2,414,379. The first permanent white settlement on the site of Warren (then owned by Connecticut) was made in 1799 by settlers from Washington county, Pennsylvania. Warren was named in honour of a surveyor—Moses Warren, of New Lyme, Connecticut—employed by the Connecticut Land Company, which sold the land to the first settlers. The county was named in honour of Governor Jonathan Trumbull of Connecticut. Warren was chartered as a city in 1834. For several years before September 1909 Warren was the national headquarters of the National American Woman's Suffrage Association.

See *History of Trumbull and Mahoning Counties* (2 vols., Cleveland, Ohio, 1882), and H. T. Upton, *History of Trumbull County* (Chicago, 1909).

WARREN, a borough and the county-seat of Warren county, Pennsylvania, U.S.A., on the N. side of the Allegheny river at the mouth of the Conewango river, about 35 m. N.E. of Titusville. Pop. (1880) 2810; (1890) 4332; (1900) 8043, of whom 1529 were foreign-born; (1910 census) 11,080. The foreign element is largely Swedish, Danish and Slavish. Warren is served by the Pennsylvania and the Dunkirk, Allegheny Valley & Pittsburg railways, and by electric railway to Jamestown, New York. Among the public buildings and institutions are the county court house, a state hospital for the insane (established 1873), a Y.M.C.A. building and a state armoury. Warren is situated at the southern foot of a high sheer ridge, in a region rich in oil and natural gas; the borough ships and refines oil, and has various manufactures. The total value of its factory product in 1905 was $5,976,905 (62·4% more than in 1900), of which $3,038,894 was the value of refined oil and $1,220,165 the value of foundry and machine-shop products. The borough owns and operates the water-works and the electric lighting plant. The town site of Warren was laid out by commissioners appointed by Governor Thomas Mifflin in 1795, and Warren was incorporated as a borough in 1832; it was named in honour of Joseph Warren, the American patriot. In 1895 part of Glade township was annexed.

See J. S. Schenck and W. S. Rann, *History of Warren County, Pennsylvania* (Syracuse, N.Y., 1887).

WARREN, properly an old term of the English forest law, derived from the O. Fr. *warenne*, *varenne*, *garenne* (med. Lat. *warenna*, *warir*, to guard, cf. "ward"), and applied to one of the three lesser franchises, together with "chase" and "park," included under the highest franchise, the "forest," and ranking last in order of importance. The "beasts of warren" were the hare, the coney (*i.e.* rabbit), the pheasant and the partridge. The word thus became used of a piece of ground preserved for these beasts of warren. It is now applied loosely to any piece of ground, whether preserved or not, where rabbits breed (see FOREST LAWS).

WARRENPOINT, a seaport and watering-place of county Down, Ireland, the terminus of a branch of the Great Northern railway, by which it is 50¾ m. S.S.W. of Belfast. Pop. (1901) 1817. It lies on the northern shore of the beautiful Carlingford Lough; behind it rise the Mourne Mountains, while across the lough are the Carlingford Hills, with Slieve Gullion. These hills afford shelter from inclement winds, and give Warrenpoint and other neighbouring watering-places on the lough a climate which renders them as popular in winter as in summer. There is a quay here where large vessels can discharge, and agricultural produce is exported. The shores of the lough are studded with country seats lying picturesquely on the well-wooded hill slopes; and nearly 3 m. E. of Warrenpoint (connected by tramway) is Rosstrevor, one of the most noted watering-places in Ireland, charmingly situated in a position open to the sea, but enclosed on the north and east.

WARRENSBURG, a city and the county-seat of Johnson county, Missouri, U.S.A., on a hilly site near the Blackwater Fork of the La Mine river, in the west central part of the state, about 65 m. S.E. of Kansas City. Pop. (1890) 4706; (1900) 4724, including 556 negroes and 127 foreign-born; (1910) 4689. It is served by the Missouri Pacific railway. The city is the seat of a state normal school (opened in 1872), and among the prominent buildings are the court house and the railway station, both built of local sandstone. Pertle Springs, about 1½m. S., is a summer resort. Warrensburg is a shipping and supply point for a rich farming region. In the immediate vicinity there are extensive quarries of a blue sandstone, one of the best building stones of the state. Warrensburg was made the county-seat in 1836. Its settlement dates from a little earlier. The present city is not on the site of the original settlement, but is near it; the old town was abandoned in 1857, when the railway passed by it. During the Civil War Warrensburg was a Union post.

WARRINGTON, a market town and municipal, county and parliamentary borough of Lancashire, England, on the river Mersey, midway between Manchester and Liverpool, and 182 m. N.W. by N. from London by the London & North-Western railway. Pop. (1891) 52,288; (1901) 64,242. It has extensive local connexions by way of the Cheshire lines. The church of St Elphin is a fine cruciform building with lofty central tower and spire. The style is Decorated, but restoration has been heavy. A much earlier church formerly occupied the site, and of this the crypt remains beneath the existing chancel. The town hall, a classical building of the 18th century, was formerly a residence, and was purchased by the corporation in 1872, while the park in which it stands was devoted to public use. The other chief buildings are the museum and free library, with technical institute and the market hall. The educational institutions include a free grammar school, founded by one of the Boteler family in 1526, and a blue-coat school (1665). A few half-timbered houses of the 17th century remain in the streets. A wide system of electric tramways and district light railways is maintained by the borough. Warrington and the neighbourhood are an important centre of the tanning industry. There are also iron bar, hoop and wire works, tool, soap, glass and chemical works, foundries and cotton mills. Considerable agricultural markets and fairs are held. The parliamentary borough (1832), returning one member, extends into Cheshire. The town was incorporated in 1847, and the corporation consists of a mayor, 9 aldermen and 27 councillors. Area 3058 acres.

Warrington (otherwise Walintune, Werinton, Werington) is supposed to be of British origin, and the great Roman road from Chester to the north passed through it. There was a Romano-British village—perhaps also a military post—at Wilderspool. It is mentioned in Domesday Book as the head of a hundred. After the Conquest it became one of the possessions of Roger de Poictou. In Henry I.'s reign a barony was formed for Pain de Vilars, of which Warrington was the head and to which it gave the name, and from that family both manor and barony passed to the Botelers or Butlers, who first established their residence on the mote hill and before 1280 built Bewsey in Burton wood. The Butlers held both barony and manor till 1586, when the barony lapsed and the manor passed after some vicissitudes to the Irelands of Bewsey, then to the Booths and in 1769 to the Blackburns. In 1255 William le Boteler obtained a charter from Henry III. for an annual fair to last three days from the eve of St Thomas the Martyr (18th July). In 1277 Edward I. granted a charter for a weekly market on Friday and an annual fair of eight days beginning on the eve of St Andrew (30th Nov.), and in 1285 another charter changing the market day from Friday to Wednesday and extending the summer fair to eight days. The market and fairs had, however, existed before the granting of these charters. Blome in 1673 speaks of Warrington market as an important one "for linen cloth, corn, cattle, provisions and fish, being much resorted to by the Welshmen," and in 1730 Defoe says the market was especially famous for "a sort of table linen called Huk-a-back or Huk-a-buk." The fairs are still held, as well as the Wednesday chartered market, besides a Saturday market which is probably customary. In the 18th and early 19th centuries the chief industries were huckabacks and coarse cloths, canvas, fustians, pins, glass, sugar-refining and copper. During the Civil War the inhabitants embraced the royalist cause and the earl of Derby occupied the town [illegible] his headquarters in order to secure the [illegible] April 1643 the parliamentary [illegible] the siege, as Lord Derby began to set the town on fire. Lord Derby left Colonel Edward Norris in command and in May the parliamentarians again attacked the town, which was forced to surrender after a six days' siege owing to lack of provisions. In 1648, after the royalist defeat at Winwick by Cromwell, part of the royal forces under General Baillie rallied at Warrington, hoping to effect the passage of the bridge, but failed, and the general with 4000 men capitulated. In August 1659 Sir George Booth, lord of the manor, was defeated at Winnington, and part of his forces surrendered at Warrington to the parliamentary garrison. During the Rebellion of 1745, on the approach of Prince Charles Edward from Manchester, the bridge was cut down and the few stragglers who ventured that way seized. A borough was created by William le Boteler about 1230 by a charter which has not been preserved; but its growing strength alarmed the lord who contrived to repress it before 1300, and for over 500 years Warrington was governed by the lord's manor court. A charter of incorporation was granted in 1847. By the Reform Act of 1832 the town returns one member to parliament. The church dedicated to St Elphin is mentioned in Domesday Book, and was in early times head of the ancient deanery of Warrington. There was a friary of Augustine or Hermit Friars here founded apparently about 1280.

WARRISTON, ARCHIBALD JOHNSTON, LORD (1611–1663), Scottish judge and statesman, son of James Johnstone (d. 1617), a merchant burgess of Edinburgh, was baptized on the 28th of March 1611, educated at Glasgow, and passed advocate at the Scottish bar in 1633. He first came into public notice in 1637, during the attempt of Charles I. to force the English liturgy upon Scotland, when as the chief adviser of the Covenanting leaders he drew up their remonstrances. On the 28th of February 1638, in reply to a royal proclamation, he read to an enormous multitude assembled in Greyfriars churchyard at Edinburgh and in presence of the heralds, a strong protestation, and together with Alexander Henderson was a principal author of the National Covenant of 1638, drawing up himself the second part, which consisted in a recapitulation of all the acts of parliament condemning "popery" and asserting the liberties of the Scottish church. He was appointed clerk to the tables, and also clerk and afterwards procurator or counsel to the general assembly held at Glasgow the same year, when he was the means of restoring several missing volumes of records. In June 1639 he took part in the negotiations leading to the treaty of Berwick, when his firm attitude was extremely displeasing to the king. He urged Charles to refrain from annulling the acts of the assembly since this would restrict all future assemblies, to which Charles replied "that the devil himself could not make a more uncharitable construction or give a more bitter expression," and on Johnston's continuing his speech ordered him to be silent and declared he would speak to more reasonable men.[1] In August he read a paper before the Scottish parliament, strongly condemning its prorogation. In the following year he was appointed to attend the general of the army and the committee, and on the 23rd of June, when the Scottish forces were preparing to invade England, he wrote to Lord Savile asking for definite support from the leading opposition peers in England and their acceptance of the National Covenant, which drew from the other side at first nothing but vague assurances and subsequently the engagement forged by Lord Savile with the signatures of the peers. In October he was a commissioner for negotiating the treaty of Ripon and went to London. He continued after the peace to urge the punishment of the incendiaries, and especially of Traquair, and in a private interview with the king strongly opposed the proposed act of general oblivion. On the king's arrival in Scotland in 1641 he led the opposition on the important constitutional point of the control of state appointments, supporting the claims of the parliament by an appeal to the state records, which he had succeeded in recovering.

In September Johnston received public thanks for his services from the Scottish parliament, and, in accordance with the policy of conciliation then pursued for a short time by the king, was appointed on the 13th of November 1641 a lord of session, with the title of Lord Warriston (a name derived from an estate purchased by him near Edinburgh in 1636), was knighted, and was given a pension of £200 a year. The same month he was appointed a commissioner at Westminster by the parliament for settling the affairs of Scotland. He was a chief agent in concluding the treaty with the English parliament in the autumn of 1643, and was appointed a member of the committee of both kingdoms in London which directed the military operations, and in this capacity went on several missions to the parliamentary generals. He took his seat early in 1644 in the Assembly of Divines, to which he had been nominated, and vehemently opposed measures tolerating independency or giving powers to laymen in ecclesiastical affairs. The articles of the unsuccessful treaty of Uxbridge were, for the most part, drawn up by him the same year. Besides his public duties in England he sat in the Scottish parliament for the county of Edinburgh from 1643 till 1647, was speaker of the barons, and served on various committees. After the final defeat of Charles, when he had surrendered himself to the Scots, Johnston was made in October 1646 king's advocate, and the same year was voted £3000 by the estates for his services. He continued to oppose unwise concessions to Charles, and strongly disapproved of the "engagement" concluded in 1648 by the predominant party with Charles at Carisbrooke, which, while securing little for Presbyterianism, committed the Scots to hostilities with the followers of Cromwell. He now became the leader of the "remonstrants," the party opposed to the "engagement," and during the ascendancy of the engagers retired to Cantyre as the guest of Argyll. He returned again after the Whiggamore Raid,[1] met Cromwell at Edinburgh in October after the defeat of the engagers at Preston, and in conjunction with Argyll promoted the act of Classes, passed on the 23rd of January 1649, disqualifying the royalists. The good relations now formed with Cromwell, however, were soon broken off by the king's execution, and Johnston was present officially at the proclamation of Charles II. as king at Edinburgh, on the 5th of February 1649. On the 10th of March he was appointed lord clerk register. In May he pronounced the vindictive sentence on Montrose, and he is said to have witnessed with Argyll the victim being drawn to the place of execution. He was present at the battle of Dunbar (3rd of September 1650) as a member of the committee of estates, to which body is ascribed the responsibility for Leslie's fatal abandonment of his position on Doon Hill. After the defeat he urged the removal of David Leslie, afterwards Lord Newark, from the command, and on the 21st of September delivered a violent speech in Charles's presence, attributing all the late misfortunes to the Stuarts and to their opposition to the Reformation.

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[1] Johnston's "Diary" in *Scottish Hist. Soc. Publ.*, xxvi. 84.

His first object in life being the defence of Presbyterianism, Johnston could join neither of the two great parties, and now committed himself to the faction of the remonstrants who desired to exclude the king, in opposition to the resolutioners who accepted Charles. The latter for some time maintained their superiority in the kingdom, Johnston being reduced to poverty and neglect. In the autumn of 1656 Johnston went to London as representative of the remonstrants; and soon afterwards, on the 9th of July 1657, he was restored by Cromwell to his office of lord clerk register, and on the 3rd of November was appointed a commissioner for the administration of justice in Scotland, henceforth remaining a member of the government till the Restoration. In January 1658 he was included by Cromwell in his new House of Lords, and sat also in the upper chamber in Richard Cromwell's parliament. On the latter's abdication and the restoration of the Rump, he was chosen a member of the council of state, and continued in the administration as a member of the committee of public safety, maintaining consistently his attitude against religious toleration. At the Restoration he was singled out for punishment. He avoided capture, escaping to Holland and thence to Germany, and was condemned to death in his absence on the 13th of May 1661. In 1663, having ventured into France, he was discovered at Rouen, and with the consent of Louis XIV. was brought over and imprisoned in the Tower of London. In June he was taken to Edinburgh and confined in the Tolbooth. He was hanged on the 22nd of July at the Market Cross, Edinburgh, the scene of many of his triumphs, and a few yards from his own house in High Street, which stood on the east side of what is now known as Warriston's Close. His head was exposed on the Netherbow and afterwards buried with his body in Greyfriars churchyard.

Johnston was a man of great energy, industry and ability, and the successful defence of their religion by the Scots was probably owing to him more than to any other man. He is described by his contemporary Robert Baillie as "one of the most faithful and diligent and able servants that our church and kingdom has had all the tymes of our troubles."[2] He was learned in the Scottish law, eloquent and deeply religious. His passionate devotion to the cause of the Scottish church amounted almost to fanaticism. According to the *History* by his nephew Bishop Burnet, "he looked on the Covenant as the setting Christ on his throne." He had by nature no republican leanings; "all the Royalists in Scotland," writes Baillie as late as 1646, "could not have pleaded so much for the crown and the king's just power as the chancellor and Warriston did for many days together." When, however, Presbyterianism was attacked and menaced by the sovereign, he desired, like Pym, to restrict the royal prerogative by a parliamentary constitution, and endeavoured to found his arguments on law and ancient precedents. His acceptance of office under Cromwell hardly deserves the severe censure it has received. He stood nearer both in politics and religion to Cromwell than to the royalists, and was able in office to serve usefully the state and the church, but his own scrupulous conscience caused him to condemn in his dying speech, as a betrayal of the cause of Presbyterianism, an act which he regarded as a moral fault committed in order to provide for his numerous family, and the remembrance of which disturbed his last hours. Johnston was wanting in tact and in consideration for his opponents, confessing himself that his "natural temper (or rather distemper) hath been hasty and passionate." He was hated by Charles I., whose statecraft was vanquished by his inflexible purpose, and by Charles II., whom he rebuked for his dissolute conduct; but he was beloved by Baillie, associated in private friendship and public life with Argyll, and lamented by the nation whose cause he had championed.

He had a large family, the most famous of his sons being James Johnston (1655-1737), called "secretary Johnston." Having taken refuge in Holland after his father's execution, Johnston crossed over to England in the interests of William of Orange just before the revolution of 1688. In 1692 he was appointed one of the secretaries for Scotland, but he was dismissed from office in 1696. Under Anne, however, he began again to take part in public affairs, and was made lord clerk register. Johnston's later years were passed mainly at his residence, Orleans House, Twickenham, and he died at Bath in May 1737.

See W. Morison, *Johnston of Warriston* (1901).

WARRNAMBOOL, a seaport of Villiers county, Victoria, Australia, 166 m. by rail W.S.W. of Melbourne. Pop. (1901) 6410. The town lies on an eminence, on the shores of Warrnambool Bay, in a rich pastoral and agricultural district. Race meetings are held here, and the steeplechase course is considered the finest in the colony. Warrnambool has a fine port with a viaduct and breakwater pier 2400 ft. in length, and a jetty 860 ft. in length, on to which the railway runs. Large quantities of dairy produce, wool and live stock are exported; and there are a number of flourishing industries in the town, including brewing, flour-milling, tanning and boot and biscuit manufacturing. Sandstone abounds in the district and is extensively quarried. The summer climate is the coolest in the Australian states.

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[1] This was the name given to a successful raid on Edinburgh by a band of Argyll's partisans gathered mainly from the west of Scotland. It took place in September 1648, just after the defeat of Hamilton at Preston. The term Whiggamore is said to be derived from *Whiggam*, a word used by the ploughmen in the west of Scotland to encourage their horses. See S. R. Gardiner, *Great Civil War*, vol. iii. (1891).

[2] Baillie, *Letters and Journals* (Bannatyne Club, 1841).

WARSAW, a government of Russian Poland, occupying a narrow strip of land west of the lower Bug and west of the Vistula from its confluence with the Bug to the Prussian frontier. It is bounded by the Polish governments of Plock and Lomza on the N., Siedlce on the E., and Radom, Piotrkow and Kalisz on the S. Area 5605 sq. m.; estimated pop. (1906) 2,269,000. It occupies the great plain of central Poland, and is low and flat, with only a few hills in the south, and along the course of the Vistula in the north-west, where the terraces on the left bank descend by steep slopes to the river. Terrible inundations often devastate the region adjacent to the confluence of the Vistula with the Narew and Bug, and marshes gather in the low-lying grounds. The soil, which consists chiefly of boulder clay, lacustrine clays, and sandy fluviatile deposits, is not particularly fertile. The government is divided into thirteen districts, the chief towns of which are Warsaw, Blonie, Gostynin, Grojec, Kutno, Lowicz, Neszawa, Novo-Minsk, Plonsk, Radzymin, Skiemiewice, Sochaczew and Wloclawek. In spite of the unfertile soil, agriculture is prosecuted with considerable success. Manufacturing industries have also greatly developed.

WARSAW (Polish *Warszawa*, Ger. *Warschau*, Fr. *Varsovie*), the capital of Poland and chief town of the government of Warsaw. It is beautifully situated on the left bank of the Vistula, 387 m. by rail E. of Berlin, and 695 m. S.W. of St Petersburg. It stands on a terrace 120 to 130 ft. above the river, to which it descends by steep slopes, leaving a broad bench at its base. The suburb of Praga on the right bank of the Vistula, here 450 to 660 yds. broad, is connected with Warsaw by two bridges—the railway bridge which passes close under the guns of the Alexander citadel to the north, and the Alexander bridge (1666 ft. long; built in 1865 at a cost of £634,000) in the centre of the town. With its large population, its beautiful river, its ample communications and its commerce, its university and scientific societies, its palaces and numerous places of amusement, Warsaw is one of the most pleasant as well as one of the most animated cities of eastern Europe. From a military point of view Warsaw is the chief stronghold for the defence of Poland; the Alexander citadel has been much improved, and the bridge across the Vistula is defended by a strong fort, Sliwicki.

Situated in a fertile plain, on a great navigable river, below its confluence with the Pilica and Wieprz, which drain southern Poland, and above its confluence with the Narew and Bug, which tap a wide region in the east, Warsaw became in medieval times the chief entrepôt for the trade of those fertile and populous valleys with western Europe. Owing to its position in the territory of Mazovia, which was neither Polish nor Lithuanian, and, so to say, remained neutral between the two rival powers which constituted the united kingdom, it became the capital of both, and secured advantages over the purely Polish Cracow and the Lithuanian Vilna. And now, connected as it is by six trunk lines with Vienna, Kiev and south-western Russia, Moscow, St Petersburg, Danzig and Berlin, it is one of the most important commercial cities of eastern Europe. The south-western railway connects it with Lodz, the Manchester of Poland, and with the productive mineral region of Piotrkow and Kielce, which supply its steadily growing manufactures with coal and iron, so that Warsaw and its neighbourhood have become a centre for all kinds of manufactures. The iron and steel industry has greatly developed, and produces large quantities of rails. The machinery works have suffered to some extent from competition with those of southern Russia, and find the high price of land a great obstacle in the way of extension. But the manufactures of plated silver, carriages, boots and shoes (annual turnover £8,457,000), [illegible] gloves, tobacco, sugar, and all sorts of small [illegible] are of considerable importance, [illegible] of the workers. Trade is principally in [illegible] but the city is also a centre for [illegible] and its two fairs (wool and hops) [illegible] western Russia. The [illegible] artisans after the Polish insurrections of 1794, 1831 and 1863 considerably checked, but by no means stopped, the industrial progress of the town. The barrier of custom-houses all round Poland, and the Russian rule, which militates against the progress of Polish science, technology and art, are so many obstacles to the development of its natural resources. The population has nevertheless grown rapidly, from 161,008 in 1860, 276,000 in 1872 and 436,750 in 1887, to 756,426 in 1901; of these more than 25,000 are Germans, and one-third are Jews. The Russian garrison numbers over 30,000 men. Warsaw is an archiepiscopal see of the Greek Orthodox and Roman Catholic churches, and the headquarters of the V., VI. and XV. Army Corps.

The streets of Warsaw are adorned with many fine buildings, partly palaces exhibiting the Polish nobility's love of display, partly churches and cathedrals, and partly public buildings erected by the municipality or by private bodies. Fine public gardens and several monuments further embellish the city. The university (with 1500 students), founded in 1816 but closed in 1832, was again opened in 1869 as a Russian institution, the teaching being in Russian; it has a remarkable library of more than 500,000 volumes, rich natural history collections, a fine botanic garden and an astronomical observatory. The medical school enjoys high repute in the scientific world. The school of arts, the academy of agriculture and forestry, and the conservatory of music are all high-class institutions. The association of the friends of science and the historical and agricultural societies of Warsaw were once well known, but were suppressed after the insurrections, though they were subsequently revived.

The theatre for Polish drama and the ballet is a fine building, which includes two theatres under the same roof; but the pride of Warsaw is its theatre in the Lazienki gardens, which were laid out (1767–1788) in an old bed of the Vistula by King Stanislaus Poniatowski, and have beautiful shady alleys, artificial ponds, an elegant little palace with ceilings painted by Bacciarelli, several imperial villas and a monument (1788) to John Sobieski, king of Poland, who delivered Vienna from the Turks in 1683. Here an artificial ruin on an island makes an open-air theatre. Two other public gardens, with alleys of old chestnut trees, are situated in the centre of the city. One of these, the Saski Ogrod, or Saxon garden (17 acres), which has a summer theatre and fine old trees, is one of the most beautiful in Europe; it is the resort of the Warsaw aristocracy. The Krasinski garden is the favourite promenade of the Jews.

The central point of the life of Warsaw is the former royal castle (Zamek Krolewski) on Sigismund Square. It was built by the dukes of Mazovia, enlarged by Sigismund III. (whose memorial stands opposite) and Ladislaus IV., and embellished by John Sobieski and Stanislaus Poniatowski. At present it is inhabited by the "governor-general of the provinces on the Vistula" (*i.e.* Poland), and by the military authorities. Most of its pictures and other art treasures have been removed to St Petersburg and Moscow. Four main thoroughfares radiate from it; one, the Krakowskie Przedmiescie, the best street in Warsaw, runs southward. It is continued by the Nowy Swiat and the Ujazdowska Aleja avenue, which leads to the Lazienki gardens. Many fine buildings are found in and near these two streets: the church of St Anne (1454), which belonged formerly to a Bernardine monastery; the agricultural and industrial museum, with an ethnographical collection; the monument (1898) to the national poet Adam Mickiewicz (1798–1855); the Alexander Nevski cathedral of the Orthodox Greek Church, built in 1894 and following years on the Saxon Square in the Byzantine style, with five gilded cupolas and a detached campanile, 238 ft. high; close beside it the former Saxon palace, once the residence of the Polish kings but now used as military administrative offices; the Lutheran church, finished in 1799, one of the most conspicuous in Warsaw; a monument (1841) to the Polish generals who held with Russia in 1830 and were therefore shot by their compatriots, removed to the Zielony Square in 1898; the buildings of the Art Association, erected in 1898–1900; the university (see above); the church of the Holy Ghost (1682–1696), with the heart and monument of the musician F. F. Chopin; a monument (1830) to the astronomer N. Kopernicus (1473–1543); the palaces of the families Zamoyski and Ordynacki (now the conservatory of music); the building of the Philharmonic Society (1899–1901); and the church of St Alexander, built in 1826 and splendidly restored in 1891. The Ujazdowska Aleja avenue, planted with lime-trees and bordered with cafés and places of amusement, is the Champs Elysées of Warsaw. It leads to the Lazienki park and to the Belvedere palace (1822), now the summer residence of the governor-general, and farther west to the Mokotowski parade ground, which is surrounded on the south and west by the manufacturing district. Another principal street, the Marszalkowska, runs parallel to the Ujazdowska from the Saxon garden to this parade ground, on the south-east of which are the Russian barracks. The above-mentioned streets are crossed by another series running west and east, the chief of them being the Senators, which begins at Sigismund Square and contains the best shops. The palace of the archbishop of Warsaw, the Imperial (Russian) Bank, formerly the Bank of Poland; the town hall (1725), burned in 1863, but rebuilt in 1870; the small Pod Blacha palace, now occupied by a chancery; the theatre (1833); the old mint; the beautiful Reformed church (1882); the Orthodox Greek cathedral of the Trinity, rebuilt in 1837; the Krasinski palace (1692), burned in 1782 but rebuilt; the place of meeting of the Polish diets, now the Supreme Court; the church of the Transfiguration, a thank-offering by John Sobieski for his victory of 1683, and containing his heart and that of Stanislaus Poniatowski; and several palaces are grouped in or near Senators' Street and Miodowa Street.

To the west Senators' Street is continued by Electors' Street, where is the very elegant church (1849) of St Charles Borromeo, and the Chlodna Street leading to the suburb of Wola, with a large field where the kings of Poland used to be elected. In Leshno Street, which branches off from Senators' Street, are the Zelazna Brama, or Iron Gate; in the market-place the bazaar, the arsenal and the Wielopolski barracks.

To the north of Sigismund Square is the old town—Stare Miasto—the Jewish quarter, and farther north still the Alexander citadel. The old town very much recalls old Germany by its narrow streets and antique buildings, the cathedral of St John, the most ancient church in Warsaw, having been built in the 13th century and restored in the 17th. The citadel, erected in 1832–1835 as a punishment for the insurrection of 1831, is of the old type, with six forts too close to the walls of the fortress to be useful in modern warfare.

The suburb of Praga, on the right bank of the Vistula, is poorly built and often flooded; but the bloody assaults which led to its capture in 1794 by the Russians under Suvarov, and in 1831 by Paskevich, give it a name in history.

In the outskirts of Warsaw are various more or less noteworthy villas, palaces and battlefields. Willanow, the palace of John Sobieski, afterwards belonging to Count X. Branicki, was partly built in 1678–1694 by Turkish prisoners in a fine Italian style, and is now renowned for its historical relics, portraits and pictures. It is situated to the south of Warsaw, together with the pretty pilgrimage church of Czerniakow, built by Prince Stanislaus Lubomirski in 1691, and many other fine villas (Morysinek, Natolin, Krolikarnia, which also has a picture gallery, Wierzbno and Mokotow). Marymont, an old country residence of the wife of John Sobieski, and the Kaskada, much visited by the inhabitants of Warsaw, in the north, the Saska Kempa on the right bank of the Vistula, and the castle of Jablona down the Vistula are among others that deserve mention. The castle and forest of Bielany (4½ m. N.), on the bank of the Vistula, are a popular holiday resort in the spring.

Among the battlefields in the neighbourhood is that of Grochow where the Polish troops were defeated in 1831, and Wawer in the same quarter (E. of Praga), where Prince Joseph Poniatowski defeated the Austrians in the war of 1809; at Maciejowice, 50 m. up the Vistula, Kosciuszko was wounded and taken by the Russians in 1794; and 20 m. down the river stands the fortress of Modlin, now Novogeorgievsk.

History.—The history of Warsaw from the 16th century onwards is intimately connected with that of Poland. The precise date of the foundation of the town is not known; but it is supposed that Conrad, duke of Mazovia, erected a castle on the present site of Warsaw as early as the 9th century. Casimir the Just is supposed to have fortified it in the 11th century, but Warsaw is not mentioned in annals before 1224. Until 1526 it was the residence of the dukes of Mazovia, but when their dynasty became extinct it was annexed to Poland. When Poland and Lithuania were united, Warsaw was chosen as the royal residence. Sigismund Augustus (Wasa) made it (1550) the real capital of Poland, and from 1572 onwards the election of the kings of Poland took place on the field of Wola, on the W. outskirts of the city. From the 17th century possession of it was continually disputed between the Swedes, the Russians, the Brandenburgers and the Austrians. Charles Gustavus of Sweden took it in 1655 and kept it for a year; the Poles retook it in July 1656, but lost it again almost immediately. Augustus II. and Augustus III. did much for its embellishment, but it had much to suffer during the war with Charles XII. of Sweden, who captured it in 1702; but in the following year peace was made, and it became free again. The disorders which followed upon the death of Augustus III. in 1763 opened a field for Russian intrigue, and in 1764 the Russians took possession of the town and secured the election of Stanislaus Poniatowski, which led in 1773 to the first partition of Poland. In November 1794 the Russians took it again, after the bloody assault on Praga, but next year, in the third partition of Poland, Warsaw was given to Prussia. In November 1806 the town was occupied by the troops of Napoleon, and after the peace of Tilsit (1807) was made the capital of the independent duchy of Warsaw; but the Austrians seized it on the 21st of April 1809, and kept possession of it till the 2nd of June, when it once more became independent. The Russians finally took it on the 8th of February 1813. On the 29th of November 1830, Warsaw gave the signal for the unsuccessful insurrection which lasted nearly one year; the city was captured after great bloodshed by Paskevich, on the 7th of September 1831. Deportations on a large scale, executions, and confiscation of the domains of the nobility followed, and until 1856 Warsaw remained under severe military rule. In 1862 a series of demonstrations began to be made in Warsaw in favour of the independence of Poland, and after a bloody repression a general insurrection followed in January 1863, the Russians remaining, however, masters of the situation. Executions, banishment to the convict prisons of Siberia, and confiscation of estates followed. Deportation to Siberia and the interior of Russia was carried out on an unheard-of scale. Scientific societies and high schools were closed; monasteries and nunneries were emptied. Hundreds of Russian officials were called in to fill the administrative posts, and to teach in the schools and the university; the Russian language was made obligatory in all official acts, in all legal proceedings, and even, to a great extent, in trade. The very name of Poland was expunged from official writings, and, while the old institutions were abolished, the Russian tribunals and administrative institutions were introduced. The serfs were liberated. Much rioting and lawless bloodshed took place in the city in 1905–1906. (P. A. K.; J. T. Bɴ.)

WARSAW, a city and the county-seat of Kosciusko county, Indiana, U.S.A., on the Tippecanoe river, about 110 m. E. of Chicago. Pop. (1890) 3547; (1900) 3987, including 102 foreign-born; (1910) 4430. Warsaw is served by the Pittsburg, Fort Wayne & Chicago (Pennsylvania system) and the Cleveland, Cincinnati, Chicago & St Louis railways, and by interurban electric lines. It is picturesquely situated in the lake country of Indiana on Center, Pike and Winona lakes. Immediately E. of the city, on Winona (formerly Eagle) Lake, which is about 2 by 3 m. and has an average depth of 30 ft., is Winona (formerly Spring Fountain) Park (incorporated 1895 largely by Presbyterians), which primarily aims to combine the advantages of Northfield, Massachusetts, and Chautauqua, New York. There is excellent boating and bathing here, and there are mineral springs in the Park, where in the summer there are a Chautauqua course lasting for six weeks, a normal school, a Bible school, a Bible conference, a school of missions, an International Training School for Sunday School Workers, a conference of temperance workers and nature study and other regular summer school courses; and in other months of the year courses are given here by the Winona Normal School and Agricultural Institute, Winona Academy (for boys) and Winona Conservatory of Music, and the Winona Park School for Young Women. The control of the Park is inter-denominational—the Winona Federated Church was organized in 1905. Under practically the same control is the Winona Technical Institute in Indianapolis. The surrounding country is devoted to farming and stock raising. Warsaw was first platted in 1836, and became a city in 1875.

WART (Lat. *verruca*), a papillary excrescence of the skin, or mucous membrane. The ordinary flat warts of the skin occur mostly upon the hands of children and young persons; a long pendulous variety occurs about the chin or neck of delicate children, and on the scalp in adults. Warts are apt to come out in numbers at a time; a crop of them suddenly appears, to disappear after a time with equal suddenness. Hence the supposed efficacy of charms. A single wart will sometimes remain when the general eruption has vanished. The liability of crops of warts runs in families. In after life a wart on the hands or fingers is usually brought on by some irritation, often repeated, even if it be slight. Warts often occur on the wrists and knuckles of slaughter-house men and of those much occupied with anatomical dissection; they are often of tuberculous origin (butchers' warts). Chimney-sweeps and workers in coal-tar, petroleum, &c., are subject to warts, which often become cancerous. Warts occur singly in later life on the nose or lips or other parts of the conspiracy of the Norman nobles in 1101. By his wife Margaret, daughter of Geoffrey II., count of Perche, he had five sons and two daughters. He died on the 20th of June 1123, and was buried in the Norman abbey of Préaux, near Pont-Audemer, a family foundation of which he and his brother were patrons. At Warwick he founded the priory of the Austin Canons, and endowed the church of St Mary.

Of his sons Roger de Newburgh became 2nd earl of Warwick and died in 1153; Rotrou (d. 1139) became archbishop of Rouen; and Robert, seneschal and justiciar of Normandy, died in 1185 in the abbey of Bec, of which he was a benefactor. The 2nd earl was followed by his two sons in succession, William (d. 1184) and Waleran (d. 1204). Henry de Newburgh, 5th earl of Warwick (1192–1229), took the royal side in the civil wars of the reigns of John and Henry III. The 6th earl, Thomas de Newburgh (*c.* 1213–1297), left no heirs, and was succeeded by his sister Margaret, countess of Warwick in her own right, who was twice married, but left no heirs. Her second husband, John du Plessis, assumed the title of earl of Warwick in 1245, and in 1250 received a grant of his wife's lands for life. He was succeeded in 1263 by Countess Margaret's cousin and heir, Sir William Mauduit (1220–1268), 8th earl of Warwick. Mauduit's sister and heiress, Isabel de Beauchamp, had apparently adopted the religious life at the time of her brother's death, and her son William de Beauchamp became 9th earl of Warwick.

His son Guy de Beauchamp, 10th earl of Warwick (1278–1315), received grants of land in Scotland for his services at Falkirk, and in 1301 was one of the signatories of the letter to the pope denying the papal right to interfere in Scottish affairs. He was with Edward I. at the time of his death, and is said to have been warned by him against Piers Gaveston. He was one of the lords ordainers of 1310, and was concerned in the capture of Gaveston, though he declined to countenance his execution. He died on the 10th of August 1315. His son, Thomas de Beauchamp, 11th earl (1313–1369), was marshal of England in 1344, and of the English army in France in 1346. He fought at Crecy and Poitiers, and was one of the original knights of the Garter.

Thomas de Beauchamp, 12th earl (*c.* 1345–1401), was about twenty-four years old when he succeeded his father. He served on the lords' committee of reform in the Good Parliament in 1376, and again in 1377, and was a member of the commission of inquiry in 1379. Appointed governor to Richard II. in February 1381, he joined the nobles who sought to impose their authority on the king, and was one of the lords appellant in 1388. After the overthrow of his party in 1389 Warwick lived in retirement, but although he had for the moment escaped Richard's vengeance he was not forgiven. Being invited with Gloucester and Arundel to a banquet at court on the 10th of July 1397 he alone of the three was imprudent enough to obey the summons. He was immediately arrested and imprisoned in the Tower of London, in that part of the fortress since known as the Beauchamp Tower. Warwick made a full confession in parliament; his honours were forfeited and he himself banished. He was again in the Tower in 1398, but was liberated and restored to his honours on the accession of Henry IV. His son Richard Beauchamp, 13th earl of Warwick, is separately noticed.

Henry, 14th earl of Warwick (1423–1445), Earl Richard's son, a descendant, through his mother Constance le Despenser, of Edmund, duke of York, fifth son of Edward III., received a patent making him premier earl in 1444. A year later he was created duke of Warwick with precedence next after the duke of Norfolk, a rank disputed by the duke of Buckingham. The assertion that he was crowned king of the Isle of Wight seems to have no foundation in fact. The 14th earl, whose honours were probably due to his father's services, died in his twenty-second year, leaving a daughter Anne, who died in 1449. On her death the earldom lapsed to the crown. The estates passed to Sir Richard Neville (see [illegible] Warwick, earl of), in right of his wife [illegible]; duke of Warwick. His [illegible] countess of Warwick [illegible], and, these failing, to Margaret, countess of Shrewsbury, half-sister of the countess Anne. After the death of her husband, the Kingmaker, at Barnet in 1471, the rights of the countess, heiress of the Beauchamp estates, were set aside "as if the seid countes were nowe naturally dede" (act of 13 Edward IV. 1473) in favour of her daughters, Isabel, wife of George, duke of Clarence, and Anne, who, after the murder of her first husband Edward prince of Wales in 1471, married Richard, duke of Gloucester, afterwards Richard III. Their mother was allowed to resume her estates in 1487, but only to settle them on the crown. She was succeeded in 1493 in the earldom by her grandson Edward Plantagenet, 18th earl of Warwick (1475–1499), son of the duke of Clarence, and therefore the Yorkist heir to the crown. He was imprisoned in 1484, his sole offence being his birth, and was executed in 1499 on a charge of conspiracy with his fellow-prisoner, Perkin Warbeck. He was the last representative of the male line of the Plantagenets. His honours were forfeited, and his estates passed to his sister Margaret, countess of Salisbury in her own right, the unfortunate lady who was executed in 1541.

The next bearer of the title was John Dudley, Viscount Lisle, afterwards duke of Northumberland (*q.v.*), who was created earl of Warwick in 1547, on account of his descent from Margaret, countess of Shrewsbury, daughter of Richard Beauchamp, earl of Warwick. The earldom became extinct with his son John Dudley, 20th earl of Warwick (*c.* 1528–1554), who was condemned to death for having signed the letters patent making his sister-in-law, Lady Jane Grey, heir apparent. He was released from prison in October 1554, but died in the same month. His brother, Ambrose Dudley (*c.* 1528–1590), who fought at St Quentin in 1557, secured the reversal of the attainder of himself and his brother consequent on the attempt to place Lady Jane Grey on the throne, and in 1561 was created Baron Lisle and earl of Warwick. He was in high favour with Elizabeth, as was his third wife Anne, daughter of Francis Russell, 2nd earl of Bedford. His brother Robert, earl of Leicester, having predeceased him his honours became extinct on his death in 1590.

The earldom was revived in 1618 in favour of Robert Rich, 3rd Baron Rich (*c.* 1560–1619), grandson of Lord Chancellor Rich, who died shortly after his elevation. His wife Penelope, Lady Rich, is separately noticed. He was succeeded in 1619 by his eldest son Robert Rich, 2nd or 23rd earl of Warwick (*q.v.*), whose two sons Robert (1611–1659) and Charles (1619–1673) succeeded him in the earldom and died leaving no male issue. The 5th or 26th earl of Warwick was their cousin Robert Rich (1620–1675), eldest son of Henry, 1st earl of Holland. His grandson, the 7th or 28th earl, left no issue, and the title became extinct on the death, on the 15th of September 1759, of his kinsman Edward Rich, 8th or 29th earl. It was revived two months later, when Francis Greville, Baron Brooke of Beauchamps Court (1719–1773), who had in 1746 been created Earl Brooke of Warwick Castle, became earl of Warwick. Greville was descended from Robert Greville, the 2nd baron, who was killed at Lichfield during the civil war and he represented a cadet branch of the Beauchamp family. His son George (1746–1816) became the 2nd earl of this line, and the earldom has remained with his descendants, Francis Richard (b. 1853) becoming the 5th earl in 1893. His wife, Frances Evelyn, countess of Warwick, daughter of Colonel the Hon. C. H. Maynard (d. 1865), inherited the estates of her grandfather, Henry Maynard, 5th and last Viscount Maynard (1788–1865). She became well known in society, and later for her interest in social questions.

WARWICK, SIR PHILIP (1609–1683), English writer and politician, was the son of Thomas Warwick, or Warrick, a musician, and was born in Westminster on the 24th of December 1609. Educated at Eton, he travelled abroad for some time and in 1636 became secretary to the lord high treasurer, William Juxon; later he was a member of the Long Parliament, being one of those who voted against the attainder of Strafford and who followed Charles I. to Oxford. He fought at Edgehill and was one of the king's secretaries during the negotiations with the parliament at Hampton Court, and also during those at Newport, Charles speaking very highly of his services just before his execution. Remaining in England, Warwick was passively loyal to Charles II. during the Commonwealth and enjoyed the confidence of the royalist leaders. In 1660 the king made him a knight, and in 1661 he became a member of parliament and secretary to another lord treasurer, Thomas Wriothesley, earl of Southampton, retaining this post until the treasury was put into commission on Southampton's death in May 1667. He died on the 15th of January 1683. Warwick's only son, the younger Philip Warwick (d. 1683), was envoy to Sweden in 1680.

Warwick is chiefly known for his *Memoirs of the reigne of King Charles I., with a continuation to the happy restauration of King Charles II.*, written between 1675 and 1677 and published in London in 1701.

WARWICK, RICHARD BEAUCHAMP, Earl of (1382–1439), son of Thomas Beauchamp, was born at Salwarp in Worcestershire on the 28th of January 1382, and succeeded his father in 1401. He had some service in the Welsh War, fought on the king's side at the battle of Shrewsbury on the 22nd of July 1403, and at the siege of Aberystwith in 1407. In 1408 he started on a pilgrimage to the Holy Land, visiting on his way Paris and Rome, and fighting victoriously in a tournament with Pandolfo Malatesta at Verona. From Venice he took ship to Jaffa, whence he went to Jerusalem, and set up his arms in the temple. On his return he travelled through Lithuania, Prussia and Germany, and reached England in 1410. Two years later he was fighting in command at Calais. Up to this time Warwick's career had been that of the typical knight errant. During the reign of Henry V. his chief employment was as a trusted counsellor and diplomatist. He was an ambassador to France in September 1413, and the chief English envoy to the coronation of Sigismund at Aix-la-Chapelle, and to the council of Constance in the autumn of 1414. During the campaign of Agincourt he was captain of Calais, where in April 1416 he received Sigismund with such courtly magnificence as to earn from him the title of the "Father of Courtesy." In the campaigns of 1417–18 Warwick took a prominent part, reducing Domfront and Caudebec. Then he joined the king before Rouen, and in October 1418 had charge of the negotiations with the dauphin and with Burgundy. Next year he was again the chief English spokesman in the conference at Meulan, and afterwards was Henry's representative in arranging the treaty of Troyes. At the sieges of Melun in 1420, and of Mantes in 1421–22 he held high command. Warwick's sage experience made it natural that Henry V. should on his death-bed appoint him to be his son's governor. For some years to come he was engaged chiefly as a member of the council in England. In 1428 he received formal charge of the little king's education. He took Henry to France in 1430, and whilst at Rouen had the superintendence of the trial of Joan of Arc. In 1431 he defeated Pothon de Xaintrailles at Savignies. Next year he returned to England. The king's minority came nominally to an end in 1437. Warwick was then not unnaturally chosen to succeed Richard of York in the government of Normandy. He accepted loyally a service "full far from the ease of my years," and went down to Portsmouth in August, but was long detained by bad weather, "seven times shipped or ever he might pass the sea," and only reached Honfleur on the 8th of November. In Normandy he ruled with vigour for eighteen months, and died at his post on the 30th of April 1439. His body was brought home and buried at Warwick. His tomb in St Mary's church is one of the most splendid specimens of English art in the 15th century. Warwick married (1) Elizabeth Berkeley, (2) Isabella Despenser. By his second wife he left an only son Henry, afterwards duke of Warwick, who died in 1445, and a daughter Anne, who as her brother's sister of the whole blood brought the title and chief share of the estates to her husband Richard Neville, the king-maker. By his first wife he had three daughters, of whom the eldest, Margaret, married John Talbot, earl of Shrewsbury.

Bibliography.—John Rous (d. 1491) wrote a life of Warwick, illustrated with over fifty drawings, now at the British Museum (Cotton MS. Julius E. iv.). They have been reproduced in Strutt's *Manners and Customs*; new edition by Mr Emery Walker, with notes by Lord Dillon and Mr W. St John Hope. More authoritative material must be sought in strictly contemporary chronicles, and especially in the *Vita Henrici Quinti* ascribed to Elmham, Monstrelet; *Chronicles of London* (ed. C. L. Kingsford) and J. Stevenson, *Letters, &c. illustrative of the English Wars in France* ("Rolls" series). For modern accounts consult J. H. Wylie, *Henry IV.*; C. L. Kingsford, *Henry V.*; and Sir James Ramsay, *Lancaster and York*. (C. L. K.)

WARWICK, RICHARD NEVILLE, Earl of (1428–1471), called "the king-maker," was eldest son of Richard Neville, earl of Salisbury, by Alice, only daughter and heiress of Thomas, the last Montacute earl of Salisbury. He was born on the 22nd of November 1428, and whilst still a boy betrothed to Anne, daughter of Richard Beauchamp, earl of Warwick. When her brother's daughter died in 1449, Anne, as only sister of the whole blood, brought her husband the title and chief share of the Warwick estates. Richard Neville thus became the premier earl, and both in power and position excelled his father. Richard, duke of York, was his uncle, so when York became protector in 1453, and Salisbury was made chancellor, it was natural that Warwick should be one of the council. After the king's recovery in 1455 Warwick and his father took up arms in York's support. Their victory at St Albans on the 22nd of May was due to the fierce energy with which Warwick assaulted and broke the Lancastrian centre. He was rewarded with the important office of captain of Calais; to his position there he owed his strength during the next five years. Even when York was displaced at home, Warwick retained his post, and in 1457 was also made admiral. He was present in February 1458 at the professed reconciliation of the two parties in a loveday at St Paul's, London. During the previous year he had done some good fighting on the march of Calais by land, and kept the sea with vigour; now on his return he distinguished himself in a great fight with Spanish ships off Calais on the 28th of May, and in the autumn by capturing a German salt-fleet on its way to Lübeck. These exploits brought him a prestige and popularity that were distasteful to the home government. Moreover, England was at war neither with Castile nor with the Hanse. Warwick's action may possibly have formed part of some Yorkist design for frustrating the foreign policy of their rivals. At all events there was pretext enough for recalling him to make his defence. Whilst he was at the court at Westminster a brawl occurred between his retainers and some of the royal household. Warwick himself escaped with difficulty, and went back to Calais, alleging that his life had been deliberately attempted. When in the following year a renewal of the war was imminent, Warwick crossed over to England with his trained soldiers from Calais under Sir Andrew Trollope. But at Ludlow on the 12th of October Trollope and his men deserted, and left the Yorkists helpless. Warwick, with his father, his cousin the young Edward of York, and only three followers, made his way to Barnstaple. There they hired a little fishing vessel. The master pleaded that he did not know the Channel, but Warwick resourcefully took command and himself steered a successful course to Calais. He arrived just in time to anticipate the duke of Somerset, whom the Lancastrians had sent to supersede him. During the winter Warwick held Calais against Somerset, and sent out a fleet which seized Sandwich and captured Lord Rivers. In the spring he went to Ireland to concert plans with Richard of York. On his return voyage he encountered a superior Lancastrian fleet in the Channel. But Exeter, the rival commander, could not trust his crews and dared not fight.

From Calais Warwick, Salisbury and Edward of York crossed to Sandwich on the 26th of June. A few days later they entered London, whence Warwick at once marched north. On the 10th of July he routed the Lancastrians at Northampton, and took the king prisoner. For the order to spare the commons and slay the lords Warwick was responsible, as also for some later executions at London. Yet when Richard of York was disposed to claim the crown, it was, according to Waurin, Warwick who decided the discussion in favour of a compromise, perhaps from loyalty to Henry, or perhaps from the wish not to change a weak sovereign for a strong. Warwick was in charge of London at the time when Richard and Salisbury were defeated and slain at Wakefield. The Lancastrians won a second victory at St Albans on the 17th of February 1461, possibly through lack of generalship on Warwick's part. But in his plans to retrieve the disaster Warwick showed skill and decision. He met Edward of York in Oxfordshire, brought him in triumph to London, had him proclaimed king, and within a month of his defeat at St Albans was marching north in pursuit of the Lancastrians. The good generalship which won the victory of Towton may have been due to Edward rather than to Warwick, but the new king was of the creation of the powerful earl, who now had his reward. For four years the government was centred undisputedly in the hands of Warwick and his friends. The energy of his brother John, Lord Montagu, frustrated the various attempts of the Lancastrians in the north. In another sphere Warwick himself was determining the lines of English policy on the basis of an alliance with France. The power of the Nevilles seemed to be completed by the promotion of George, the third brother, to be archbishop of York. The first check came with the announcement in September 1464 of the king's secret marriage to Elizabeth Woodville. This was particularly distasteful to Warwick, who had but just pledged Edward to a French match. For the time, however, there was no open breach. The trouble began in 1466, when Edward first made Rivers, the queen's father, treasurer, and afterwards threw obstacles in the way of an intended marriage between Warwick's daughter Isabel and George of Clarence, his own next brother. Still in May 1467 Warwick went again with the king's assent to conclude a treaty with France. He returned to find that in his absence Edward, under Woodville's influence, had committed himself definitely to the Burgundian alliance. Warwick retired in dudgeon to his estates, and began to plot in secret for his revenge. In the summer of 1469 he went over to Calais, where Isabel and Clarence were married without the king's knowledge. Meantime he had stirred up the rebellion of Robin of Redesdale in Yorkshire; and when Edward was drawn north Warwick invaded England in arms. The king, outmarched and outnumbered, had to yield himself prisoner, whilst Rivers and his son John were executed. Warwick was apparently content with the overthrow of the Woodvilles, and believed that he had secured Edward's submission. In March 1470 a rebellion in Lincolnshire gave Edward an opportunity to gather an army of his own. When the king alleged that he had found proof of Warwick's complicity, the earl, taken by surprise, fled with Clarence to France. There, through the instrumentality of Louis XI., he was with some difficulty reconciled to Margaret of Anjou, and agreed to marry his second daughter to her son. In September Warwick and Clarence, with the Lancastrian lords, landed at Dartmouth. Edward in his turn had to fly oversea, and for six months Warwick ruled England as lieutenant for Henry VI., who was restored from his prison in the Tower to a nominal throne. But the Lancastrian restoration was unwelcome to Clarence, who began to intrigue with his brother. When in March 1471 Edward landed at Ravenspur, Clarence found an opportunity to join him. Warwick was completely outgeneralled, and at Barnet on the 14th of April was defeated and slain.

Warwick has been made famous by Lytton as "The Last of the Barons." The title suits him as a great feudal lord, who was a good fighter but a poor general, who had more sympathy with the old order than with the new culture. But he was more than this. He had some of the qualities of a strong ruler, and the power to command popularity. He was a skilled diplomatist and an adroit politician. These qualities, with his position as the head of a great family, the chief representative of Beauchamp, Despenser, Montacute and Neville, made him during ten years "the king-maker."

Warwick's only children were his two daughters. Anne, the younger, was married after his death to Richard of Gloucester, the future Richard III. Their husbands shared his inheritance and qua [illegible] vision.

Bi [illegible] of course fills a great place in contemp [illegible] a note on the chief of them see under EDWARD IV. For modern authorities see especially C. W. Oman's brilliant but enthusiastic *Warwick the King-Maker*, Sir James Ramsay's *Lancaster and York*, and Stubbs's *Constitutional History*. (C. L. K.)

WARWICK, SIR ROBERT RICH, 2ND EARL OF (1587–1658), colonial administrator and admiral, was the eldest son of Robert Rich, earl of Warwick (see above) and his wife Penelope Rich (*q.v.*), and succeeded to the title in 1619. Early interested in colonial ventures, he joined the Bermudas, Guinea, New England and Virginia companies. His enterprises involved him in disputes with the East India Company (1617) and with the Virginia Company, which in 1624 was suppressed through his action. In 1627 he commanded an unsuccessful privateering expedition against the Spaniards. His Puritan connexions and sympathies, while gradually estranging him from the court, promoted his association with the New England colonies. In 1628 he indirectly procured the patent for the Massachusetts colony, and in 1631 he granted the "Saybrook" patent in Connecticut. Compelled the same year to resign the presidency of the New England Company, he continued to manage the Bermudas and Providence Companies, the latter of which, founded in 1630, administered Old Providence on the Mosquito coast. Meanwhile in England Warwick opposed the forced loan of 1626, the payment of ship-money and Laud's church policy, and with his brother the first lord Holland (*q.v.*) came to be recognized as one of the heads of the Puritans. In March 1642 the Commons, in spite of the king's veto, appointed him admiral of the fleet, and in July he gained the whole navy for the parliament. He raised forces in Norfolk and Essex on the outbreak of the war, and as lord high admiral (1643–1645) he did good service in intercepting the king's ships and relieving threatened ports. In 1643 he was appointed head of a commission for the government of the colonies, which the next year incorporated Providence Plantations, afterwards Rhode Island, and in this capacity he exerted himself to secure religious liberty. Reappointed lord high admiral in May 1648, in the vain hope that his influence with the sailors would win back the nine ships which had revolted to the king, he collected a new fleet and blockaded them at Helvoetsluys. Dismissed from office on the abolition of the House of Lords in 1649, he retired from public life, but was intimately associated with Cromwell, whose daughter Frances married his grandson and heir Robert Rich in 1657. He died on the 19th of April 1658. The suspicions cast by his enemies on his religious sincerity and political fidelity appear to be baseless.

WARWICK, a town of Merivale county, Queensland, Australia, 169 m. by rail S.W. of Brisbane. Pop. (1901) 3836. It lies on the bank of the river Contadamine, in the heart of one of the best agricultural districts in Queensland, and is perhaps the most attractive inland town in the colony. It is well laid out with many substantial public and private buildings, and has two large parks, besides smaller recreation grounds. The district is famous for its vineyards, and quantities of excellent wine are made; wheat and maize are the principal crops, but tobacco, oats and lucerne are largely grown. Coal is found near the town, as are also marble, good building stone and brick clay.

WARWICK, a municipal and parliamentary borough, and the county town of Warwickshire, England; finely situated on the river Avon, the Warwick & Napton and Birmingham canals, 98 m. N.W. from London. Pop. (1901) 11,889. It is served by the Great Western and the London & North-Western railways. The parliamentary borough was united with that of Leamington in 1885, and returns one member. Leamington lies 2 m. E., and the towns are united by the suburb of New Milverton.

The magnificent castle of the earls of Warwick stands in a commanding and picturesque position on a rocky eminence above the river. Its walls, enclosing a lovely lawn and gardens, are flanked by towers, of which Caesar's tower, 147 ft. high, the Gateway tower and Guy's tower are the chief, dating from the 14th century. The residential portion lies on the river side. Excepting a few traces of earlier work, its appearance is that of a princely mansion of the 17th century. There is a famous collection of pictures. The Great Hall and other apartments suffered from fire in 1871, but were restored. A vase of marble attributed to the 4th century B.C. is preserved here, it was discovered near Hadrian's Villa at Tivoli in Italy. Below the castle the Avon, with thickly wooded banks, affords one of the most exquisite reaches of river scenery in England. The church of St Mary is principally, as it stands, a rebuilding of the time of Queen Anne, after a fire in 1694. It appears from Domesday that a church existed before the Conquest. It was made collegiate by Roger de Newburgh, the second Norman earl, in 1123. At the Dissolution Henry VIII. granted the foundation to the burgesses of the town. The Beauchamp Chapel survived the fire; it is a beautiful example of Perpendicular work, founded by the will of Earl Richard Beauchamp, and built between 1443 and 1464. The fine tomb of the earl stands in the centre. There are only scanty traces of the old town walls, but the east and west gates remain, rendered picturesque by chapels built above them. The priory of St Sepulchre was founded by Henry de Newburgh and completed in the reign of Henry I., on the site of an ancient church, for a society of canons regular. It is now a private residence. Leicester Hospital, established by Robert Dudley, earl of Leicester, is a picturesque example of half-timber building. It was originally used as the hall of the united gilds of the Holy Trinity, the Blessed Virgin and St George the Martyr. The earl of Leicester, by an act of incorporation obtained in 1571, founded the hospital for the reception of twelve poor men possessing not more than £5 a year, and a master. The first master, appointed by the earl himself, was the famous Puritan, Thomas Cartwright. St John's Hospital, a foundation of the time of Henry II., is represented by a beautiful Jacobean mansion. There are numerous charities in the town, the principal being those of Henry VIII., Sir Thomas White and Thomas Oken. The first is devoted to ecclesiastical and municipal stipends and to the King's School. By the charity of Sir Thomas White, the sum of £100 is lent, without interest, to young tradesmen for a period of nine years. The King's School, an important foundation for boys, dates from the reign of Edward the Confessor. It occupies modern buildings. Upon the same foundation are the high school for girls and the King's middle school. Among public buildings are a shire hall, free library and museum. Industries include gelatine- and brick-making, and there are ironworks. The parliamentary borough returns one member. Area, 5613 acres.

A famous site in the vicinity of Warwick is Guy's Cliffe, where a modern mansion, embodying ancient remains, crowns the precipitous rocky bank of the Avon. Here was the hermitage of the first Guy, earl of Warwick. Blacklow Hill in the vicinity was the scene of the execution of Piers Gaveston, the favourite courtier of Edward II., in 1312.

Warwick (*Warwic*, *Warrewici*, *Warrewyk*) is said to have been a Roman station, and was later fortified by Æthelflæd, the lady of Mercia, against the Danes. At the time of the Domesday Survey, Warwick was a royal borough, containing 261 houses, of which 130 were in the king's hands, while 19 belonged to burgesses who enjoyed all the privileges they had had in the time of Edward the Confessor. The Conqueror granted the borough to Henry of Newburgh, who was created earl of Warwick, and in all probability built the castle on the site of Æthelflæd's fortification. The Beauchamps, successors of Henry of Newburgh as earls of Warwick, held the borough of the king in chief. Although the borough owed its early importance to the castle of the earls of Warwick as well as to its position, and received a grant of a fair from John, earl of Warwick, in 1261, it seems to have developed independently of them, and received no charter until it was incorporated under the title of the burgesses of Warwick in 1546 after it had come into the king's hands by the attainder of Edward, earl of Warwick, in 1499. Other charters were granted in 1553, 1665, 1684 and 1694, of which that of 1553 allowed the appointment of assistant burgesses, though this was discontinued in 1698 because through their means a candidate for the borough was elected who was not supported by the recorder and aldermen. The charter of 1694 conferred the title of "Mayor, Aldermen and Burgesses" on the corporation, and appointed the offices of the borough. The mayor, aldermen and assistant burgesses were to assemble yearly at Michaelmas, and in the presence of all the burgesses nominate two aldermen, who should elect the new mayor and other officers. A mayor refusing office was to be fined £20, an alderman £10 and an assistant burgess £5. In 1882 the borough was divided into three wards, and the corporation consists of a mayor, 6 aldermen and 18 town councillors. Warwick returned two members to parliament from 1295, but in 1885 the number was reduced to one. In addition to the fair granted by the earl to the burgesses in 1261, he himself held by prescriptive right a yearly fair in August and a market every Wednesday. Another fair was granted in 1290, and in 1413 the fair held at Michaelmas was changed to the feast of St Bartholomew. Fairs are now held on the 12th of October and on the Monday before St Thomas's day. A market is held every Saturday, the first charter for this being granted in 1545. A gaol is mentioned here as early as 1200 in a pipe roll of that year.

WARWICK, a township of Kent county, Rhode Island, U.S.A., about 5 m. S. of Providence, on the W. side of Narragansett Bay (here called Providence river) and crossed by the Pawtuxet river, which is in its lower course a part of the township's northern boundary. Pop. (1890) 17,761; (1900) 21,316, of whom 7792 were foreign-born; (1910 census) 26,629. The township is crossed by the New York, New Haven & Hartford railway, and electric lines serve most of its twenty-seven rather scattered villages. The larger villages are: on the river, Pontiac, Natick, River Point (at the junction of the two upper branches of the Pawtuxet), Phoenix, Centreville and Crompton; on Greenwich Bay, Apponaug and Warwick; and on Providence river, Shawomet, Warwick Neck, Oakland Beach, Buttonwoods, Conimicut and Long Meadow, which are summer resorts. Water power is provided by the Pawtuxet river, and much cotton and some woollen and print goods are manufactured. The value of the factory product in 1905 was $7,051,971 (17·1% more than in 1900); of the total, nine-tenths was the value of textile products. Warwick, originally called Shawomet (Shawmut), its Indian name, was settled in 1643 by Samuel Gorton (*q.v.*) and a few followers. Gorton quarrelled with the Indians, was carried off to Boston, was tried there for heresy, was convicted, and was imprisoned; was released with orders to leave the colony in March 1644, went to England, and under the patronage of the earl of Warwick returned to his settlement in 1648 and renamed it in honour of the earl. In 1647 the settlement entered into a union with Providence, Newport and Portsmouth under the Warwick (or Williams) charter of 1644, but during 1651–1654 Warwick and Providence were temporarily separated from the other two towns. Warwick was the birthplace of General Nathanael Greene.

WARWICKSHIRE, a midland county of England, bounded N. by Staffordshire, E. by Leicestershire and Northamptonshire, S. by Oxfordshire and Gloucestershire, and W. by Worcestershire. The area is 902·3 sq. m. The river Avon, watering a rich valley on a line from N.E. to S.W., divides the county into two unequal parts. The greater, lying to the N.W., drains principally to the Trent through the rivers Cole, Blythe, Rea, Anker and minor streams. Between these valleys, and dividing the system from that of the Avon, the land rises in gentle undulations, and is of plateau-like character, generally between 400 and 600 ft. in elevation. There are considerable tracts of this nature on the western boundary, both north and south of Birmingham, on the eastern boundary north of Rugby, and in the centre between the Blythe, the Anker and the Avon. From this side the Avon receives the Swift, the Sowe and the Alne. The northern district was distinguished by Camden as the Woodland, as opposed to the southern or Feldon, "a plain champain." The northern woodland embraced the ancient forest of Arden (*q.v.*) and it is this district which gave to the county the common epithets of "woody" or "leafy." The Feldon or south-eastern district is almost wholly in the Avon valley. From this side the Avon receives the Leam, the Itchen and the Stour. Along the south-eastern boundary runs the highest line of hills in the county, reaching some 800 ft., and including Edge Hill (which gives name to the battle of 1642), and the Brailes, Dassett, Napton and Shuckburgh hills. The county boundary here extends across the highest line of hills, to include the headwaters of some of the feeders of the Cherwell, and thus a small part of the drainage area of the Thames. These hills rise abruptly, and command wide views over the champaign. The finest silvan scenery is found on the banks of the Avon; the position of Guy's Cliffe and of Warwick Castle are well-known examples. It is not difficult to trace the influence of the scenic characteristics of the county in the writings of its most famous son, William Shakespeare.

Geology.—The Archean rocks are represented by some volcanic ashes and intrusive dykes (the Caldecote Series), which are exposed north-west of Nuneaton. They dip south-westward under the Cambrian beds—Hartshill Quartzite and Stockingford Shales—which give rise to higher ground; the quartzite, which is opened up in numerous large roadstone quarries, contains towards its summit a fauna suggesting that of the *Olenellus* zone, one of the oldest faunas known. The quartzite as well as the overlying shales is seamed with intrusive dykes of diorite. A small inlier of the same shales occurs at Dosthill, south of Tamworth. The Coal Measures of the Warwickshire coalfield crop out in the north of the county between Nuneaton and Tamworth and contain valuable coal-seams; they pass conformably under the so-called Permian red sandstones and marls which are apparently the equivalents of the Keele Beds of Staffordshire, and like them should be grouped with the Coal Measures; they occupy a considerable area north and west of Coventry, and at Corley form high ground (625 ft.); in several places shafts have been sunk through them to the productive Coal Measures below. The rest of the county is occupied in the northern half by the Triassic red rocks, and in the south-east by the Lias. Of the Trias the Bunter (soft red sandstones with pebble-beds) is represented only between Birmingham and Sutton Coldfield, where it is succeeded by the Keuper Sandstone, which is occasionally exposed also around the edge of the coalfield (Tamworth, Coventry, Warwick, Maxstoke); the Keuper Marls occupy a large area in the centre of the county, while some sandstones in them form picturesque scarps near Henley-in-Arden. The highly fossiliferous Rhaetic beds which introduce the Lias are seldom exposed. The Lower Lias limestones are worked for cement (as near Rugby) and abound in ammonites. The Middle Lias sands and limestones follow, and form escarpments (as at Edge Hill, 710 ft.); but these and the lowest members of the Oolite series scarcely cross the county boundary from Oxfordshire. Glacial drifts—boulder-clay, sand and gravel—overspread large areas of the older rocks; their composition shows them to have been deposited from glaciers or ice-sheets which entered the district from the Irish Sea, from North Wales and from the North Sea. Later fluvio-glacial gravels of the Avon valley have yielded mammalian remains (hippopotamus, mammoth, &c.), while palaeolithic implements of quartzite have been found in the old gravels of the Rea near Birmingham. Coal, ironstone, lime and cement are the chief mineral products; manganese ore was formerly got from the Cambrian rocks.

Climate and Agriculture.—The climate is generally mild and healthy. The soil is on the whole good, and consists of various loams, marls, gravels and clays, well suited for most of the usual crops. It is rich in pasture-land, and dairy-farming is increasing. It has excellent orchards and market-gardens, and possesses some of the finest woodlands in England. About five-sixths of the total area, a high proportion, is under cultivation, and of this about two-thirds is in permanent pasture. Oats and wheat occupy the greater part of the area under grain crops. In connexion with the cattle-rearing and dairy-farming, over half the acreage under green crops is occupied by turnips, swedes and mangolds.

Industries.—The industrial part of the county is the northern. Warwickshire includes the greatest manufacturing centre of the Midlands—Birmingham, though the suburbs of that city extend into Staffordshire and Worcestershire. Metal-working in all branches is prosecuted here, besides other industries. Coventry is noted for cycle-making, and, with Bedworth and Nuneaton and the intervening villages, is a seat of the ribbon- and tape-makers. A small rich coalfield occurs in the north-east, extending outside the county northward from Coventry. Clay, limestone and other stone are quarried at various points, and an appreciable amount of iron ore is raised.

Communications.—The main line of the London & North-Western railway runs within the county near the N.E. boundary, by Rugby, Nuneaton and Tamworth, with branches to Leamington and Warwick, Coventry and Birmingham, and cross-branches. The northern line of the Great Western railway runs through Leamington and Warwick to Birmingham, with branches to Stratford-on-Avon and Henley-in-Arden. The Leicester and Birmingham branch of the rosses the north of the county by Nuneaton, and resham line of this company serves Alcester. The East and West Junction railway, from Blisworth in Northamptonshire, serves Stratford-on-Avon and terminates at Broom Junction on the Evesham line of the Midland. Water communication through the east of the county is afforded by the Oxford and Coventry canals. The Warwick & Napton canal joins the Oxford at Napton; the Warwick & Birmingham joins these towns, and the Stratford-on-Avon is a branch from it. The Fazeley canal runs N.E. from Birmingham. None of the rivers is of commercial value for navigation.

Population and Administration.—The area of the ancient county is 577,462 acres, with a population in 1891 of 805,072, and in 1901 of 897,835, the chief centres of increase lying naturally in the parts about Birmingham and Coventry. The area of the administrative county is 579,885 acres. The municipal boroughs are: Aston Manor (pop. 77,326), Birmingham (522,204), Coventry (69,978), Leamington, officially Royal Leamington Spa (26,888), Nuneaton (24,996), Stratford-on-Avon (8310), Sutton Coldfield (14,264) and Warwick (11,889), the county town. The urban districts are: Bulkington (1548), Erdington (16,368), Kenilworth (4544) and Rugby (16,830). Among the towns not appearing in these lists there should be mentioned: Alcester (2303), Atherstone (5248), Bedworth (7169), Coleshill (2593), Foleshill (5514) and Solihull (7517). Warwickshire is in the midland circuit, and assizes are held at Warwick. It has one court of quarter sessions, and is divided into 14 petty sessional divisions. The boroughs of Birmingham, Coventry, Royal Leamington Spa, Stratford-on-Avon, Sutton Coldfield and Warwick have separate commissions of the peace, and the boroughs of Birmingham and Warwick have, in addition, separate courts of quarter sessions. The total number of civil parishes is 267. The county, which is mostly in the diocese of Worcester, but also extends into those of Lichfield, Gloucester, Peterborough and Oxford, contains 297 ecclesiastical parishes or districts, wholly or in part. Warwickshire has four parliamentary divisions—Northern or Tamworth, North-eastern or Nuneaton, South-eastern or Rugby, and South-western or Stratford-on-Avon, each returning one member. The parliamentary boroughs of Aston Manor, Coventry and Warwick return one member each, and that of Birmingham has seven divisions, each returning one member.

Birmingham is the seat of a university, of the large grammar school of King Edward VI., and of other important educational institutions. At Rugby is one of the most famous of English public schools. The King's School, Warwick, is a large boys' school, and the Leamington High School is for girls. There is a day training college for schoolmasters and schoolmistresses in connexion with Mason University College, Birmingham. Among other institutions there may be mentioned the Lady Warwick College for the instruction of women in the higher branches of agriculture, &c., founded by Frances, countess of Warwick, at Reading in 1898, and subsequently removed to Studley Castle in western Warwickshire, where there is accommodation for 50 students.

History.—The earliest English settlers in the district now known as Warwickshire were a tribe of Hwiccas who, pushing up the Severn valley in the 6th century, made their way along the passages afforded by the Avon valley and the Roman Fosse Way, the extent of their settlement being indicated by the ancient limits of the diocese of Worcester. The vast forest of Arden, stretching from the Avon to the site of the modern Birmingham, barred any progress northwards, at the same time affording protection from the Anglian tribes who were already settled about Atherstone, and it was only after the battle of Cirencester in 628 that the whole of the Hwiccan territory was comprised in Mercia. In 675 Cosford was included in the endowment of Peterborough, and in 757 Æthelbald was slain at Seckington in a battle with the West Saxons. The shire of Warwick originated in the 10th century about Æthelflæd's new burgh at Warwick, and is mentioned by name in the *Saxon Chronicle* in 1016, when it was harried by Canute. The Danes made frequent incursions in the district in the 10th and 11th centuries, but no traces of their settlements occur south of Rugby.

The shire offered little resistance to the Conqueror, who was at Warwick in 1068, and Thurkill the sheriff was one of the few Englishmen to retain large estates which he had held before the conquest, his family long continuing in the county under the name of Arden. The fortification which he had raised at Warwick William entrusted to Henry, son of Roger de Beaumont, afterwards earl of Warwick, and Robert, count of Meulan, Henry's elder brother, had an important fief. Coventry Minster was richly endowed, and in 1285 the prior claimed among other privileges to have an independent coroner and to hold two courts a year. The earldom and castle of Warwick subsequently passed to the Beauchamps, and in the reign of Henry VI. to the Nevilles. The Clintons, founders of the castles and priories at Maxstoke and Kenilworth, enjoyed large estates in the county during the Norman period.

The ten Domesday hundreds of Warwickshire are now reduced to four, all of which are mentioned in the 12th century. Hemlingford represents the Domesday hundred of Coleshill; Knightlow, the Domesday hundreds of Bomelau, Meretone and Stanlei; Kineton, the Domesday hundreds of Tremelau, Honesberie, Fexhole and Berricestone; Barlichway, the Domesday hundreds of Fernecumbe and Patelau. Coleshill took its name from Coleshill, a town near the junction of the Cole and the Blythe; Hemlingford from a ford over the Tame near Kingsbury; Knightlow from a hill on Dunsmore Heath; Meretone and Stanlei from the villages of Marton and Stoneleigh; Berricestone from Barcheston on the Stour; Barlichway from a plot of ground on a hill between Haselor and Burton. Patelau hundred, which derived its name from a tumulus between Wootton Wawen and Stratford-on-Avon, was a liberty of the bishops of Worcester, and in the 17th century, though reckoned part of Barlichway hundred, possessed a court leet and court baron. The boundaries of Warwickshire have remained practically unchanged since the Domesday Survey, but Spilsbury, now in Oxfordshire, Romsley, Shipley, Quat and Rudge, now in Shropshire, and Chillington, now in Staffordshire, were assessed under this county, while Sawbridge, Berkswell, Whitacre, Over and Whichford, now in this county, were assessed under Northamptonshire. Warwickshire was united with Leicestershire under one sheriff until 1566, the shire court for the former being held at Warwick.

In the 13th century Warwickshire included the deaneries of Warwick and Kineton within the archdeaconry and diocese of Worcester; the rest of the county constituting the archdeaconry of Coventry within the Lichfield diocese, with the deaneries of Coventry, Stoneley, Merton and Arden. In 1836 the archdeaconry of Coventry was annexed to the diocese of Worcester, and in 1854 its deaneries were entirely reconstituted and made thirteen in number. In 1861 the deanery of Alcester was formed within the archdeaconry of Worcester, and Kineton was divided into North Kineton and South Kineton. In 1894 the deaneries of Aston, Birmingham, Coleshill, Northfield, Polesworth, Solihull and Sutton Coldfield were formed into the archdeaconry of Birmingham, the archdeaconry of Coventry now including the deaneries of Atherstone, Baginton, Coventry, Dassett Magna, Dunchurch, Leamington, Monks Kirby, Rugby and Southam.

In the wars of the reign of Henry III. Simon de Montfort placed Kenilworth Castle in charge of Sir John Giffard, who in 1264 attacked Warwick Castle and took prisoner the earl and countess of Warwick, who had supported the king. During the Wars of the Roses the Nevilles, represented by the earl of Warwick, supported the Yorkist cause, while Coventry was a Lancastrian stronghold. On the outbreak of the Civil War of the 17th century Warwickshire and Staffordshire were associated for the parliament under Lord Brooke. The battle of Edgehill was fought in 1642, and in 1643 Birmingham, then a small town noted for its Puritanism, was sacked by Prince Rupert. Coventry endured a siege in 1642, and skirmishes took place at Southam and Warwick.

At the time of the Domesday Survey the industries of Warwickshire were almost exclusively agricultural, the extensive woodlands north of the Avon affording pasturage for sheep, while meadows and water-mills were numerous in the river valleys. The woollen industry flourished in Norman times, and Coventry was famed for its wool and broadcloths in the reign of Edward III. Coal was probably dug at Griff in the 12th century, but the Warwickshire collieries only came into prominence in the 17th century, when John Briggs of Bedworth made an attempt to monopolize the coal trade. Birmingham was already famous for its smiths and cutlers in the 16th century. In the early 17th century the depopulation and distress caused by the enclosures of land for pasture led to frequent riots. The silk industry at Coventry and the needle industry about Alcester both flourished in the 18th century.

Warwickshire returned two members to the parliament of 1290, and in 1295 Coventry and Warwick were each represented by two members. Tamworth returned two members in 1584. Under the Reform Act of 1832 the county returned four members in two divisions; Birmingham was represented by two members, and Tamworth was disfranchised. Under the act of 1868 the representation of Birmingham was increased to three members.

Antiquities.—Of pre-Norman architecture some traces appear in the fine church of Wootton Wawen in the Arden (western) district. Otherwise the type is scarce, but Saxon remains, such as burial urns and jewelry, have been found in several places, as near Bensford Bridge on Watling Street. For ecclesiastical architecture Coventry with its three spires is famous, and among village churches there are many fine examples. Of those retaining Norman portions may be mentioned: Wolston and Berkswell in the Coventry district; Polesworth, formerly conventual, and Curdworth in the north; and in the south, in the neighbourhood of Edgehill, Burton Dassett, a very noteworthy building, and Warmington, where there is a remarkable specimen of *domus inclusi* or anchorite's chamber. There are also fine examples of Decorated work, such as Knowle, Solihull and Temple Balsall in Arden, and Brailes under the southern hills. Among the numerous religious houses in the county several have left remains. Such are the Cistercian foundations of Coombe Abbey near Coventry, of the 12th century, adjoining the mansion of that name in a beautiful park; of Merevale near Atherstone; and of Stoneleigh near Kenilworth, also adjoining a famous mansion. This abbey was a 12th-century foundation, but a majestic gatehouse of the 14th century also stands. Maxstoke Priory, in Arden, was a foundation for Augustinian canons of the 14th century. Wroxall Abbey was a Benedictine nunnery of the 12th century; but the name is given to a modern mansion. In view of the large share the county has had in war, it is not surprising to find many examples of great fortified houses or castles. Warwick Castle and Kenilworth Castle, the one still a splendid residence, the other a no less splendid ruin, are described under those towns. At Hartshill (the birthplace of Michael Drayton the poet) there is a fragment of a Norman castle. Among fortified mansions Maxstoke Castle is of the 14th century; Baddesley Clinton Hall is of the 15th as it stands, but is an earlier foundation; Astley Castle is another good specimen of the period. Compton Wyniates, once fortified, is a beautiful Elizabethan house of brick, so remarkably hidden in a hollow of the southern hills as to be visible only from the closest proximity on all sides; Charles I. lodged here during the Civil Wars. Charlecote Park is a modernized Elizabethan hall in an exquisite situation on the Avon above Stratford. Of more modern mansions Arbury Hall, Astley Castle, Newnham Paddox, Ragley Hall and Walton Hall may be mentioned.

See *Victoria County History, Warwickshire*; Sir William Dugdale, *The Antiquities of Warwickshire* (London, 1656; 2nd ed., 2 vols., London, 1730); W. Smith, *A History of the County of Warwick* (Birmingham, 1830); J. T. Burgess, *Historic Warwickshire* (London, 1876); *Early Earthworks in Warwickshire* (Birmingham, 1884); S. Timmins, *History of Warwickshire* ("Popular County History" series) (London, 1889); J. Hannet, *The Forest of Arden* (London, 1863).

WASH, THE, a shallow bay of the North Sea, on the Lincolnshire and Norfolk coast of England. It is roughly square in shape, penetrating the land for 22 m., and being 20 m. wide at the head and 12 at the mouth. Through the sandbanks which form its bed there are two main channels into deep water; one, Boston Deeps, is kept open by the waters of the Witham and Welland; the other, Lynn Deeps, gives passage to those of the Nene and the Great Ouse. The Wash is the remnant of a much larger bay, which covered a large part of the Fens which now border it; it is gradually filling with the deposits of the rivers, and from time to time small portions are reclaimed (see FENS). The flat bordering lands are protected by sea-walls. The formerly dangerous passage of the marsh-lands, which were liable to irruptions of the tide, is illustrated by the accident to

King John in 1216 shortly before his death. Passing over the Cross Keys Wash, near Sutton Bridge, his baggage and treasure wagons were engulfed and he himself barely escaped with life.

WASHBURN, CADWALLADER COLDEN (1818–1882), American soldier and politician, was born at Livermore, Maine, on the 22nd of April 1818. He was admitted to the bar in 1842, and removed to Mineral Point, Wisconsin, where he practised law, speculated in land and engaged in banking. He became prominent in the Republican party, and was a member (1855–1861) of the U.S. House of Representatives, of which his brother Israel (1813–1883) was a member from Maine in 1851–1861; his brother Elihu Benjamin (see below) changed the spelling of the family surname to Washburne. At the beginning of the Civil War he became colonel of the Second Wisconsin Cavalry, was promoted to brigadier-general on the 16th of July 1862 and to major-general on the 29th of November 1862, and assisted in the capture of Vicksburg (4th July 1863), after which he served in Texas and West Tennessee. Resigning from the army in 1865, he became extensively interested in flour-milling and lumbering in Wisconsin. From 1867 to 1871 he was again a member of the U.S. House of Representatives, and subsequently served one term (1872–1874) as governor of Wisconsin.

WASHBURN, a city and the county-seat of Bayfield county, Wisconsin, U.S.A., about 52 m. E. of Superior, Wis., and about 6 m. N. of Ashland, on Chequamegon Bay, an arm of Lake Superior. Pop. (1910) 3830. Washburn is served by the Northern Pacific and the Chicago & North-Western railways, and by several lines of lake steamships. The city is finely situated on high land above the bay, and is a popular summer resort, being especially well known for its boating and fishing. It has a Carnegie library. Among its manufactures are staves, shingles, lumber, wooden ware and bricks. There is a powder and dynamite plant in the vicinity. In the city there are also grain elevators and large coal docks, and in the neighbourhood are valuable stone quarries. In 1659 Radisson and Groscilliers touched here on their trip along the south shore of Lake Superior. In 1665 Father Claude Allouez, the Jesuit, established on the shore of the bay, a short distance south of the present city, the first French mission in Wisconsin, which he named "La Pointe du Saint Esprit," and which in 1669 was placed in charge of Father Jacques Marquette. The place was visited by Du Luth in 1681–1682, and here in 1693 Le Sueur, a fur trader, built a stockaded post. In 1718 a fort was erected and a French garrison placed in it. About 1820–1821 a trading post of the American Fur Company was established in the neighbourhood. The present city, named in honour of Governor C. C. Washburn, dates from about 1879, but its growth was slow until after 1888. It was chartered as a city in 1904.

WASHBURNE, ELIHU BENJAMIN (1816–1887), American statesman, born in Livermore, Maine, on the 23rd of September 1816. He was one of seven brothers, of whom four sat in Congress from as many different states. He received a common school education, graduated at the Harvard Law School in 1839, and was soon afterwards admitted to the bar. In 1840 he removed to Galena, Illinois. He was elected to Congress in 1852, where, first as a Whig and afterwards as a Republican, he represented his district continuously until 1869, taking a prominent part in debate, and earning the name "watch-dog of the Treasury" by his consistent and vigorous opposition to extravagant and unwise appropriations. He contributed much to aid General Grant during the Civil War, and the latter on becoming President made Washburne secretary of state. On account of ill-health, however, he served only twelve days, and was then appointed minister to France, where during the Franco-Prussian War and the Commune he won much distinction as protector of German and other foreign citizens in Paris. He was the only foreign minister who remained at his post during the Commune. In 1877 he retired from public life, and died in Chicago, Ill., on the 22nd of October 1887. He published *Recollections of a Minister to France* (2 vols., 1887), and edited *ers* (1884).

WASHINGTON, BOOKER TALIAFERRO (*c.* 1859–), American negro teacher and reformer, was born on a plantation near Hale's Ford, Franklin county, Virginia. Soon after the Civil War he went to Malden, West Virginia, where he worked in a salt furnace and then in a coal mine. He obtained an elementary education at night school, and worked as a house servant in a family where his ambition for knowledge was encouraged. In 1872 "by walking, begging rides both in wagons and in the cars" he travelled 500 m. to the Hampton (Virginia) Normal and Agricultural Institute, where he remained three years, working as janitor for his board and education, and graduated in 1875. For two years he taught at Malden, West Virginia, and studied for eight months (1878–1879) at the Wayland Seminary in Washington, D.C. In 1879 he became instructor at the Hampton Institute, where he trained about seventy-five American Indians with whom General S. C. Armstrong was carrying on an educational experiment, and he developed the night school, which became one of the most important features of the institution. In 1881 he was appointed organizer and principal of a negro normal school at Tuskegee, Alabama (*q.v.*), for which the state legislature had made an annual appropriation of $2000. Opened in July 1881 in a little shanty and church, the Tuskegee Normal and Industrial Institute became, under Washington's presidency, the foremost exponent of industrial education for the negro. To promote its interests and to establish better understanding between whites and blacks, Washington delivered many addresses throughout the United States, notably a speech in 1895 at the opening of the Atlanta Cotton States and International Exposition. In 1900 at Boston, Massachusetts, he organized the National Negro Business League. Harvard conferred upon him the honorary degree of A.M. in 1896, and Dartmouth that of LL.D. in 1901.

Among his publications are a remarkable autobiography, *Up from Slavery* (1901), *The Future of the American Negro* (1899), *Sowing and Reaping* (1900), *Character Building* (1902), *Working with the Hands* (1904), *Tuskegee and its People* (1905), *Putting the most into Life* (1906), *Life of Frederick Douglass* (1907), *The Negro in Business* (1907) and *The Story of the Negro* (1909).

WASHINGTON, BUSHROD (1762–1829), American jurist, nephew of George Washington, was born in Westmoreland county, Virginia, on the 15th of June 1762. He graduated in 1778 at the College of William and Mary, where he was an original member of the Phi Beta Kappa Society; was a member of a volunteer cavalry troop in 1780; studied law in Philadelphia in 1781, and began practice in his native county. He served in the House of Delegates in 1787, and in the following year sat in the convention which ratified for Virginia the Federal Constitution. After living in Alexandria for a short time he removed to Richmond and in 1798 was appointed an associate justice of the United States Supreme Court by President John Adams. He was George Washington's literary executor, and supervised the preparation of John Marshall's *Life of Washington* (5 vols., 1804–1807); and on Mrs Washington's death in 1802 he inherited Mount Vernon and a part of the estate. He died in Philadelphia on the 26th of November 1829.

WASHINGTON, GEORGE (1732–1799), the first president of the United States, was born at Bridges Creek, Westmoreland county, Virginia, on the 22nd (Old Style 11th) of February 1732. The genealogical researches of Mr Henry E. Waters seem to have established the connexion of the family with the Washingtons of Sulgrave, Northamptonshire, England. The brothers John and Lawrence Washington appear in Virginia in 1658. John took up land at Bridges Creek, became a member of the House of Burgesses in 1666, and died in 1676. His eldest son, Lawrence, married Mildred Warner, by whom he had three children—John, Augustine (1694–1743) and Mildred. Augustine Washington married twice. By the first marriage, with Jane Butler, there were four children, two of whom, Lawrence and Augustine, grew to manhood. By the second marriage, in 1730, with Mary Ball, descendant of a family which migrated to Virginia in 1657, there were six children—George, Betty, Samuel, John, Charles and Mildred. Upon the death of the father, Lawrence inherited the estate at Hunting Creek, on the Potomac, later known as Mount Vernon, and George the estate on the Rappahannock, nearly opposite Fredericksburg, where his father usually lived.

Of Washington's early life little is known, probably because there was little unusual to tell. The story of the hatchet and the cherry-tree, and similar tales, are undoubtedly apocryphal, having been coined by Washington's most popular biographer, Mason Weems (d. 1825).[1] There is nothing to show that the boy's life was markedly different from that common to Virginia families in easy circumstances; plantation affairs, hunting, fishing, and a little reading making up its substance. From 1735 to 1739 he lived at what is now called Mount Vernon, and afterwards at the estate on the Rappahannock. His education was only elementary and very defective, except in mathematics, in which he was largely self-taught; and although at his death he left a considerable library, he was never an assiduous reader. Although he had throughout his life a good deal of official contact with the French, he never mastered their language. Some careful reading of good books there must have been, however, for in spite of pervading illiteracy, common in that age, in matters of grammar and spelling, he acquired a dignified and effective English style. The texts of his writings, as published by Jared Sparks, have been so "edited" in these respects as to destroy their value as evidence; but the edition of Mr Worthington C. Ford restores the original texts. Washington left school in the autumn of 1747, and from this time we begin to know something of his life. He was then at Mount Vernon with his half-brother Lawrence, who was also his guardian. Lawrence was a son-in-law of William Fairfax, proprietor of the neighbouring plantation of Belvoir, and agent for the extensive Fairfax lands in the colony. Lawrence had served with Fairfax at Cartagena, and had made the acquaintance of Admiral Edward Vernon, from whom Mount Vernon was named. The story that a commission as midshipman was obtained for George through the good offices of the admiral, but that the opposition of the boy's mother put an end to the scheme, seems to lack proof. In 1748, however, through the influence of Thomas, Lord Fairfax, the head of the family, who had come to America to live, Washington, then only sixteen years of age, was appointed surveyor of the Fairfax property; and an appointment as public surveyor soon followed. The next three years were spent in this service, most of the time on the frontier. He always retained a disposition to speculate in western lands, the ultimate value of which he early appreciated; many of his later investments of this character are treated in C. W. Butterfield's *Washington-Crawford Letters* (1877). He seems, too, to have impressed others already with his force of mind and character. In 1751 he accompanied his half-brother Lawrence, who was stricken with consumption, to the West Indies, where he had an attack of small-pox which left him marked for life. Lawrence died in the following year, making George executor under the will and residuary heir of Mount Vernon; and the latter estate became his in 1761.

In October 1753, on the eve of the last French and Indian war, Washington was chosen by Governor Robert Dinwiddie as the agent to warn the French away from their new posts on the Ohio, in western Pennsylvania. He accomplished the winter journey safely, though with considerable danger and hardship; and shortly after his return was appointed lieutenant-colonel of a Virginia regiment, under Colonel Joshua Fry. In April 1754 he set out with two companies for the Ohio, defeated (28th May) a force of French and Indians at Great Meadows (in the present Fayette county, Pennsylvania), but at Fort Necessity in this vicinity was forced to capitulate (3rd July), though only after a vigorous defence. For his services he received the thanks of the House of Burgesses. When General Edward Braddock arrived in Virginia in February 1755, Washington wrote him a diplomatically worded letter, and was presently made a member of the staff, with the rank of colonel. His personal relations with Braddock were friendly throughout, and in the calamitous defeat he showed for the first time that fiery energy which always lay hidden beneath his calm and unruffled exterior. He ranged the whole field on horseback, making himself the most conspicuous target for Indian bullets, and, in spite of what he called the "dastardly behaviour" of the regular troops, saved the expedition from annihilation, and brought the remnant of his Virginians out of action in fair order. In spite of his reckless exposure, he was one of the few unwounded officers. In August, after his return, he was commissioned commander of the Virginia forces, being then twenty-three years old. For about two years his task was that of "defending a frontier of more than 350 m. with 700 men," a task rendered the more difficult by the insubordination and irregular service of his soldiers, and by irritating controversies over official precedence. To settle the latter question he made a journey to Boston, in 1756, to confer with Governor William Shirley. In the winter of 1757 his health broke down, but in the next year he had the pleasure of commanding the advance guard of the expedition under General John Forbes which occupied Fort Duquesne and renamed it Fort Pitt. (See PITTSBURG: *History*.) At the end of the year he resigned his commission, the war in Virginia being at an end, and in January 1759 married Martha Dandridge (1732–1802), widow of Daniel Parke Custis.

For the next fifteen years Washington's life at Mount Vernon, where he made his home after his marriage, was that of a typical Virginia planter of the more prosperous sort, a consistent member and vestryman of the Established (Episcopal) Church, a large slave-holder, a strict but considerate master, and a widely trusted man of affairs. His extraordinary escape in Braddock's defeat had led a colonial preacher to declare in a sermon his belief that the young man had been preserved to be "the saviour of his country"; but if there was any such impression it soon died away, and Washington gave his associates no reason to consider him a man of uncommon endowments. His marriage brought him an increase of about $100,000 in his property, making him one of the richest men in the colonies; and he was able to develop his plantation and enlarge its extent. His attitude towards slavery has been much discussed, but it does not seem to have been different from that of many other planters of that day: he did not think highly of the system, but had no invincible repugnance to it, and saw no way of getting rid of it. In his treatment of slaves he was exacting, but not harsh, and was averse to selling them save in case of necessity. His diaries show a minutely methodical conduct of business, generous indulgence in hunting, comparatively little reading and a wide acquaintance with the leading men of the colonies, but no marked indications of what is usually considered to be "greatness." As in the case of Lincoln, he was educated into greatness by the increasing weight of his responsibilities and the manner in which he met them. Like others of the dominant planter class in Virginia, he was repeatedly elected to the House of Burgesses, but the business which came before the colonial assembly was for some years of only local importance, and he is not known to have made any set speeches in the House, or to have said anything beyond a statement of his opinion and the reasons for it. He was present on the 29th of May 1765, when Patrick Henry introduced his famous resolutions against the Stamp Act. That he thought a great deal on public questions, and took full advantage of his legislative experience as a means of political education, is shown by his letter of the 5th of April 1769 to his neighbour, George Mason, communicating the Philadelphia non-importation resolutions, which had just reached him. In this he considers briefly the best means of peaceable resistance to the policy of the ministry, but even at that early date faces frankly and fully the probable final necessity of resisting by force, and endorses it, though only as a last resort. In May following, when the House of Burgesses was dissolved, he was among the members who met at the Raleigh tavern and adopted a non-importation agreement; and he himself kept the agreement when others did not. Though on friendly terms with Governor Norborne Berkeley, Baron

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[1] Weems was a Protestant Episcopal clergyman, who first published a brief biography of Washington in 1800, and later (1806) considerably expanded it and introduced various apocryphal anecdotes. The biography, though worthless, had an immense circulation, and is to a considerable degree responsible for the traditional conception of Washington.

Botetourt and his successor, John Murray, earl of Dunmore, he nevertheless took a prominent part, though without speechmaking, in the struggles of the Assembly against Dunmore, and his position was always a radical one. As the breach widened, he even opposed petitions to the king and parliament, on the ground that the claims to taxation and control had been put forward by the ministry on the basis of right, not of expediency, that the ministry could not abandon the claim of right and the colonies could not admit it, and that petitions must be, as they already had been, rejected. "Shall we," he writes in a letter, "after this whine and cry for relief?"

On the 5th of August 1774 the Virginia convention appointed Washington as one of seven delegates to the first Continental Congress, which met at Philadelphia on the 5th of September, and with this appointment his national career, which was to continue with but two brief intervals until his death, begins. His letters during his service in Congress show that he had fully grasped the questions at issue, that he was under no delusions as to the outcome of the struggle over taxation, and that he expected war. "More blood will be spilled on this occasion," he wrote, "if the ministry are determined to push matters to extremity, than history has ever yet furnished instances of in the annals of North America." His associates in Congress at once recognized his military ability, and although he was not a member of any of the committees of the Congress, he seems to have aided materially in securing the endorsement by Congress of the Suffolk county, Massachusetts, resolves (see Milton, Mass.) looking towards organized resistance. On the adjournment of the Congress he returned to Virginia, where he continued to be active, as a member of the House of Burgesses, in urging on the organization, equipment and training of troops, and even undertook in person to drill volunteers. His attitude towards the mother country at this time, however, must not be misunderstood. Much as he expected war, he was not yet ready to declare in favour of independence, and he did not ally himself with the party of independence until the course of events made the adoption of any other course impossible. In March 1775 he was appointed a delegate from Virginia to the second Continental Congress, where he served on committees for fortifying New York, collecting ammunition, raising money and formulating army rules. It seems to have been generally understood that, in case of war, Virginia would expect him to act as her commander-in-chief, and it was noticed that, in the second Congress, he was the only member who habitually appeared in uniform. History, however, was to settle the matter on broader lines. The two most powerful colonies were Virginia and Massachusetts. The war began in Massachusetts, troops from New England flocking to the neighbourhood of Boston almost spontaneously; but the resistance, if it was to be effective, must have the support of the colonies to the southward, and the Virginia colonel who was serving on all the military committees of Congress, and whose experience in the Braddock campaign had made his name favourably known in England, was the obvious as well as the politic choice. When Congress, after the fights at Lexington and Concord, resolved that the colonies ought to be put in a position of defence, the first practical step was the unanimous selection (June 15), on motion of John Adams of Massachusetts, of Washington as commander-in-chief of the armed forces of the United Colonies. Refusing any salary and asking only the reimbursement of his expenses, he accepted the position, asking "every gentleman in the room," however, to remember his declaration that he did not believe himself to be equal to the command, and that he accepted it only as a duty made imperative by the unanimity of the call. He reiterated this belief in private letters even to his wife; and there seems to be no doubt that, to the day of his death, he was the most determined sceptic as to his fitness for the positions to which he was successively called. He was commissioned on the 17th of June 1775, set out at once for Cambridge, Mass., and on the 3rd of July took command of the levies there assembled for action against the British garrison in Boston. The battle of Bunker Hill had already taken place, news of it reaching him on the way north. Until the following March, Washington's work was to bring about some semblance of military organization and discipline, to collect ammunition and military stores, to correspond with Congress and the colonial authorities, to guide military operations in widely separate parts of the country, to create a military system for a people entirely unaccustomed to such a thing and impatient and suspicious under it, and to bend the course of events steadily towards driving the British out of Boston. He planned the expeditions against Canada under Richard Montgomery and Benedict Arnold, and sent out privateers to harass British commerce. It is not easy to see how Washington survived the year 1775; the colonial poverty, the exasperating annoyances, the outspoken criticism of those who demanded active operations, the personal and party dissensions in Congress, the selfishness or stupidity which cropped out again and again among some of the most patriotic of his coadjutors were enough to have broken down most men. They completed his training. The change in this one winter is very evident. If he was not a great man when he went to Cambridge, he was both a general and a statesman in the fullest sense when he drove the British out of Boston in March 1776. From that time until his death he was admittedly the foremost man of the continent.

The military operations of the remainder of the War of Independence are described elsewhere (see American War of Independence). Washington's retreat through New Jersey; the manner in which he turned and struck his pursuers at Trenton and Princeton, and then established himself at Morristown, so as to make the way to Philadelphia impassable; the vigour with which he handled his army at the Brandywine and Germantown; the persistence with which he held the strategic position of Valley Forge through the dreadful winter of 1777–1778, in spite of the misery of his men, the clamours of the people and the impotence and meddling of the fugitive Congress—all went to show that the fibre of his public character had been hardened to its permanent quality. "These are the times that try men's souls," wrote Thomas Paine at the beginning of 1776, and the words had added meaning in each year that followed; but Washington had no need to fear the test. The spirit which culminated in the treason of Benedict Arnold was a serious addition to his burdens; for what Arnold did others were almost ready to do. Many of the American officers, too, had taken offence at the close personal friendship which had sprung up between the marquis de La Fayette and Washington, and at the diplomatic deference which the commander-in-chief felt compelled to show to other foreign officers. Some of the foreign volunteers were eventually dismissed politely by Congress, on the ground that suitable employment could not be found for them. The name of one of them, Thomas Conway, an Irish soldier of fortune from the French service, is attached to what is called "Conway's Cabal," a scheme for superseding Washington by General Horatio Gates, who in October 1777 succeeded in forcing Burgoyne to capitulate at Saratoga, and who had been persistent in his depreciation of the commander-in-chief and in intrigues with members of Congress. A number of officers, as well as of men in civil life, were mixed up in the plot, while the methods employed were the lowest forms of anonymous slander; but at the first breath of exposure every one concerned hurried to cover up his part in it, leaving Conway to shoulder both the responsibility and the disgrace. The treaty of alliance of 1778 with France, following the surrender of Burgoyne, put an end to all such plans. It was absurd to expect foreign nations to deal with a second-rate man as commander-in-chief while Washington was in the field, and he seems to have had no further trouble of this kind. The prompt and vigorous pursuit of Sir Henry Clinton across New Jersey towards New York, and the battle of Monmouth, in which the plan of battle was thwarted by Charles Lee, another foreign recruit of popular reputation, closed the military record of Washington, so far as active campaigning was concerned, until the end of the war. The British confined their operations to other parts of the continent, and Washington, alive as ever to the importance of keeping up connexion with New England, devoted himself to watching the British in and about New York City. It was in every way fitting, however, that he who had been the mainspring of the war from the beginning, and had borne far more than his share of its burdens and discouragements, should end it with the campaign of Yorktown, conceived by himself, and the surrender of Cornwallis (October 1781). Although peace was not concluded until September 1783, there was no more important fighting. Washington retained his commission until the 23rd of December 1783, when, in a memorable scene, he returned it to Congress, then in session at Annapolis, Md., and retired to Mount Vernon. His expenses during the war, including secret service money, aggregated about $64,000; in addition he expended a considerable amount from his private fortune, for which he made no claim to reimbursement.

By this time the popular canonization of Washington had fairly begun. He occupied a position in American public life and in the American political system which no man could possibly hold again. He may be said to have become a political element quite apart from the Union, or the states, or the people of either. In a country in which newspapers had at best only a local circulation, and where communication was still slow and difficult, the knowledge that Washington favoured anything superseded, with very many men, both argument and the necessity of information. His constant correspondence with the governors of the states gave him a quasi-paternal attitude towards government in general. On relinquishing his command, for example, he was able to do what no other man could have done with either propriety or safety: he addressed a circular letter to the governors, pointing out changes in the existing form of government which he believed to be necessary, and urging "an indissoluble union of the states under one federal head," "a regard to public justice," the adoption of a suitable military establishment for a time of peace, and the making of "those mutual concessions which are requisite to the general prosperity." His refusal to accept a salary, either as commander-in-chief or as president, might have been taken as affectation or impertinence in any one else; it seemed natural and proper enough in the case of Washington, but it was his peculiar privilege. It is even possible that he might have had a crown, had he been willing to accept it. The army, at the end of the war, was justly dissatisfied with its treatment. The officers were called to meet at Newburgh, and it was the avowed purpose of the leaders of the movement to march the army westward, appropriate vacant public lands as part compensation for arrears of pay, leave Congress to negotiate for peace without an army, and "mock at their calamity and laugh when their fear cometh." Less publicly avowed was the purpose to make their commander-in-chief king, if he could be persuaded to aid in establishing a monarchy. Washington put a summary stop to the whole proceeding. A letter written to him by Colonel Lewis Nicola, on behalf of this coterie, detailed the weakness of a republican form of government as they had experienced it, their desire for "mixed government," with him at its head, and their belief that "the title of king" would be objectionable to but few and of material advantage to the country. His reply was peremptory and indignant. In plain terms he stated his abhorrence of the proposal; he was at a loss to conceive what part of his conduct could have encouraged their address; they could not have found "a person to whom their schemes were more disagreeable"; and he charged them, "if you have any regard for yourself or posterity, or respect for me, to banish these thoughts from your mind, and never communicate, as from yourself or any one else, a sentiment of the like nature." His influence, and his alone, secured the quiet disbanding of the discontented army. That influence was as powerful after he had retired to Mount Vernon as before the resignation of his command. The Society of the Cincinnati, an organization composed of officers of the late war, chose him as its first president; but he insisted that the Society should abandon its plan of hereditary membership, and change other features of the organization against which there had been public clamour. When the legislature of Virginia gave him 150 shares of stock in companies formed for the improvement of the Potomac and James rivers, and he was unable to refuse them lest his action should be misinterpreted, he extricated himself by giving them to educational institutions. His voluminous correspondence shows his continued concern for a standing army and the immediate possession of the western military posts, and his interest in the development of the western territory. From public men in all parts of the country he received such a store of suggestions as came to no other man, digested it, and was enabled by means of it to speak with what seemed infallible wisdom. In the midst of a burden of letter-writing, the minute details in his diaries of tree-planting and rotation of crops, and his increasing reading on the political side of history, he found time to entertain a stream of visitors from all parts of the United States and from abroad. Among these, in March 1785, were the commissioners from Virginia and Maryland, who met at Alexandria (*q.v.*) to form a commercial code for Chesapeake Bay and the Potomac, and made an opportunity to visit Mount Vernon. From that moment the current of events, leading into the Annapolis Convention (see ANNAPOLIS, Md.) of 1786 and the Federal Convention of the following year, shows Washington's close supervision at every point.

When the Federal Convention met at Philadelphia in May 1787 to frame the present constitution, Washington was present as a delegate from Virginia, though much against his will; and a unanimous vote at once made him the presiding officer. Naturally, therefore, he did not participate in debate; and he seems to have spoken but once, and then to favour an amendment reducing from 40,000 to 30,000 the minimum population required as a basis of representation in the House. The mere suggestion, coming from him, was sufficient, and the change was at once agreed to. He approved the constitution which was decided upon, believing, as he said, "that it was the best constitution which could be obtained at that epoch, and that this or a dissolution awaits our choice, and is the only alternative." As president of the convention he signed the constitution, and kept the papers of the convention until the adoption of the new government, when they were deposited in the Department of State. All his vast influence was given to secure the ratification of the new instrument, and his influence was probably decisive. When enough states had ratified to assure the success of the new government, and the time came to elect a president, there was no hesitation. The office of president had been "cut to fit the measure of George Washington," and no one thought of any other person in connexion with it. The unanimous vote of the electors made him the first president of the United States; their unanimous vote elected him for a second time in 1792–1793; and even after he had positively refused to serve for a third term, two electors voted for him in 1796–1797. The public events of his presidency are given elsewhere (see UNITED STATES, § *History*). While the success of the new government was the work of many men and many causes, one cannot resist the conviction that the factor of chief importance was the existence, at the head of the executive department, of such a character as Washington. It was he who gave to official intercourse formal dignity and distinction. It was he who secured for the president the power of removal from office without the intervention of the Senate. His support of Hamilton's financial plans not only insured a speedy restoration of public credit, but also, and even more important, gave the new government constitutional ground on which to stand; while his firmness in dealing with the "Whisky Insurrection" taught a much-needed and wholesome lesson of respect for the Federal power. His official visits to New England in 1789, to Rhode Island in 1790 and to the South in 1791 enabled him to test public opinion at the same time that they increased popular interest in the national government. Himself not a political partisan, he held the two natural parties apart, and prevented party contest, until the government had become too firmly established to be shaken by them. Perhaps the final result would not in any case have failed, even had "blood and iron" been necessary to bring it about; but the quiet attainment of the result was due to the personality of Washington, as well as to the political sense of the American people.

It would be a great mistake to suppose, however, that the influence of the president was fairly appreciated during his term of office, or that he himself was uniformly respected. Washington seems never to have understood fully either the nature, the significance, or the inevitable necessity of party government in a republic. Instead, he attempted to balance party against party, selected representatives of opposing political views to serve in his first cabinet, and sought in that way to neutralize the effects of parties. The consequence was that the two leading members of the cabinet, Alexander Hamilton and Thomas Jefferson, exponents for the most part of diametrically opposite political doctrines, soon occupied the position, to use the words of one of them, of "two game-cocks in a pit." The unconscious drift of Washington's mind was toward the Federalist party; his letters to La Fayette and to Patrick Henry, in December 1798 and January 1799, make that evident even without the record of his earlier career as president. It is inconceivable that, to a man with his type of mind and his extraordinary experience, the practical sagacity, farsightedness and aggressive courage of the Federalists should not have seemed to embody the best political wisdom, however little he may have been disposed to ally himself with any party group or subscribe to any comprehensive creed. Accordingly, when the Democratic-Republican party came to be formed, about 1793, it was not to be expected that its leaders would long submit with patience to the continual interposition of Washington's name and influence between themselves and their opponents; but they maintained a calm exterior. Some of their followers were less discreet. The president's proclamation of neutrality, in the war between England and France, excited them to anger; his support of Jay's treaty with Great Britain roused them to fury. His firmness in thwarting the activities of Edmond Charles Edouard Genet, minister from France, alienated the partisans of France; his suppression of the "Whisky Insurrection" aroused in some the fear of a military despotism. Forged letters, purporting to show his desire to abandon the revolutionary struggle, were published; he was accused of drawing more than his salary; his manners were ridiculed as "aping monarchy"; hints of the propriety of a guillotine for his benefit began to appear; he was spoken of as the "stepfather of his country." The brutal attacks, exceeding in virulence anything that would be tolerated to-day, embittered his presidency, especially during his second term: in 1793 he is reported to have declared, in a cabinet meeting, that "he would rather be in his grave than in his present situation," and that "he had never repented but once the having slipped the moment of resigning his office, and that was every moment since." The most unpleasant portions of Jefferson's *Anas* are those in which, with an air of psychological dissection, he details the storms of passion into which the president was driven by the newspaper attacks upon him. There is no reason to believe, however, that these attacks represented the feeling of any save a small minority of the politicians; the people never wavered in their devotion to the president, and his election would have been unanimous in 1796, as in 1792 and 1789, had he been willing to serve.

He retired from the presidency in 1797,[1] and returned to Mount Vernon, his journey thither being marked by popular demonstrations of affection and esteem. At Mount Vernon, which had suffered from neglect during his absence, he resumed the plantation life which he loved, the society of his family, and the care of his slaves. He had resolved some time before never to obtain another slave, and "wished from his soul" that Virginia could be persuaded to abolish slavery; "it might prevent much future mischief"; but the unprecedented profitableness of the cotton industry, under the impetus of the recently invented cotton gin, had already begun to change public sentiment regarding slavery, and Washington was too old to attempt further innovations. Visitors continued to flock to him, and his correspondence, as always, took a wide range. In 1798 he was made commander-in-chief of the provisional army raised in anticipation of war with France, and was fretted almost beyond endurance by the quarrels of Federalist politicians over the distribution of commissions. In the midst of these military preparations he was struck down by sudden illness, which lasted but for a day, and died at Mount Vernon on the 14th of December 1799. His disorder was an oedematous affection of the wind-pipe, contracted by exposure during a long ride in a snowstorm, and aggravated by neglect and by such contemporary remedies as bleeding, gargles of "molasses, vinegar and butter" and "vinegar and sage tea," which "almost suffocated him," and a blister of cantharides on the throat. He died as simply as he had lived; his last words were only business directions, affectionate remembrances to relatives, and repeated apologies to the physicians and attendants for the trouble he was giving them. Just before he died, says his secretary, Tobias Lear, he felt his own pulse; his countenance changed; the attending physician placed his hands over the eyes of the dying man, "and he expired without a struggle or a sigh." The third of the series of resolutions introduced in the House of Representatives five days after his death, by John Marshall of Virginia, later chief-justice of the Supreme Court, states exactly, if somewhat rhetorically, the position of Washington in American history: "first in war, first in peace, and first in the hearts of his countrymen."[2] His will contained a provision freeing his slaves, and a request that no oration be pronounced at his funeral. His remains rest in the family vault at Mount Vernon (*q.v.*), which since 1860 has been held by an association, practically as national property.

All contemporary accounts agree that Washington was of imposing presence. He measured just 6 ft. when prepared for burial; but his height in his prime, as given in his orders for clothes from London, was 3 in. more. La Fayette says that his hands were "the largest he ever saw on a man." Custis says that his complexion was "fair, but considerably florid." His weight was about 220 lb. Evidently it was his extraordinary dignity and poise, forbidding even the suggestion of familiarity, quite as much as his stature, that impressed those who knew him. The various and widely-differing portraits of him find exhaustive treatment in the seventh volume of Justin Winsor's *Narrative and Critical History of America*. Winsor thinks that "the favourite profile has been unquestionably Houdon's, with Gilbert Stuart's canvas for the full face, and probably John Trumbull's for the figure." Stuart's face, however with its calm and benign expression, has fixed the popular notion of Washington.

Washington was childless: the people of his time said he was the father only of his country. Collateral branches of the family have given the Lees, the Custises, and other families a claim to an infusion of the blood.

Bibliography.—A complete bibliography of books relating to Washington would be very voluminous. The best edition of his *Writings* is that of W. C. Ford (14 vols., New York, 1889–1893). Sparks's edition (12 vols., Boston, 1837) has in the main been superseded, though it contains some papers not included by Ford, and the *Life*, which comprises vol. i., still has value. J. D. Richardson's *Messages and Papers of the Presidents* (vol. i., Washington, 1896) collects the presidential messages and proclamations, with a few omissions. A descriptive list of biographies and biographical sketches is given in W. S. Baker's *Bibliotheca Washingtoniana* (Philadelphia, 1889). The most important lives are those of John Marshall (Philadelphia, 1804–1807), David Ramsay (New York, 1807), Washington Irving (New York, 1855–1859), E. E. Hale (New York, 1888), H. C. Lodge (Boston, 1889; rev. ed., 1898), B. T. Thayer (New York, 1894) and Woodrow Wilson (New York, 1897). Valuable for their presentation of differing aspects of Washington's career are: W. S. Baker's *Itinerary of Washington* (Philadelphia, 1892), H. B. Carrington's *Washington the Soldier* (New York, 1899), G. W. P. Custis's *Recollections and Private Memoirs of Washington* (New York, 1860), P. L. Ford's *True George Washington* (Philadelphia, 1896) and R. Rush's *Washington in Domestic Life* (Philadelphia 1857). The larger comprehensive histories of the United States by Bancroft, Hildreth, Winsor, McMaster, Von Holst, Schouler and Avery, the biographies in the "American Statesmen" series, and Hart's "American Nation" series, are indispensable. There is an interesting attempt to make a composite portrait of Washington in *Science* (December 11, 1885). (W. MacD.)

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[1] He had previously, under date of the 17th of September 1796, [illegible] a notable "Farewell Address" to the American people.

[2] This characterization originated with Henry Lee.

WASHINGTON, a city and the capital of the United States of America, coterminous with the District of Columbia, on the north-east bank of the Potomac river at the head of tide and navigation, 40 m. S.W. of Baltimore, 135 m. S.W. of Philadelphia, and 225 m. S.W. of New York. Area, 60 sq. m. (exclusive of 10 sq. m. of water surface). Pop. (1890) 230,392; (1900) 278,718, of whom 20,119 were foreign-born and 87,186 were negroes; (1910) 331,069. The city proper covers only about 10 sq. m. lying between the Anacostia river and Rock Creek, and rising from the low bank of the Potomac, which is here nearly 1 m. wide; above are encircling hills and a broken plateau, which rise to a maximum height of 420 ft. and contain the former city of Georgetown, the villages of Anacostia, Brightwood, Tennallytown, and other suburban districts.

Streets and Parks.—The original plan of the city, which was prepared by Major Pierre Charles L'Enfant (1755–1825), under the supervision of President Washington and Thomas Jefferson,[1] was a masterpiece in landscape architecture and in the main it has been preserved. Besides streets running east and west, which are named by the letters of the alphabet, and streets running north and south, which are numbered, there are avenues named for various states, which radiate from two foci—the Capitol and the White House—or traverse the city without any fixed plan. North and south of the Capitol they are numbered; east and west from it streets are lettered, but streets are distinguished by annexing to the name or letter the name of the quarter: N.W., S.W., N.E. or S.E.—the city is divided into these four parts by North Capitol, East Capitol and South Capitol streets, which intersect at the Capitol. The width of the avenues is from 120 to 160 ft. and the width of the streets from 80 to 120 ft. More than one-half the area of the city is comprised in its streets, avenues and public parks. Among the principal residence streets are Massachusetts, especially between Dupont and Sheridan circles, New Hampshire, Connecticut and Vermont Avenues and 16th Street, all in the N W. quarter of the city. The principal business streets are Pennsylvania Avenue (especially between the Capitol and the White House) and 7th, 9th, 14th and F streets. Streets and avenues for the most part are paved with a smooth asphalt pavement, and many of them have two and occasionally four rows of overarching shade trees and private lawns on either side. At nearly every intersection of two avenues is a circle or square in which is the statue of some notable American whose name the square bears. At the intersection of a street with an avenue there is usually the reservation of a small triangular grass plot at least. In L'Enfant's plan a park or mall was to extend from the Capitol to the White House Instead of this the mall extends from the Capitol to Washington Monument, which stands near the intersection of lines west from the Capitol and south from the White House. In 1901, however, a commission (Daniel Hudson Burnham, C. F. McKim, Augustus St Gaudens and F. L. Olmsted, Jr.) was appointed by authority of the United States Senate to prepare plans for the beautification of the city and this body, seeking in the main to return to L'Enfant's plan, has submitted a design for a park-like treatment of the entire district between Pennsylvania and Maryland avenues from the Capitol to the White House and between lower New York Avenue and the Potomac, with an elm-shaded mall 300 ft. wide bisecting the park from the Capitol to the Monument, with a group of official and scientific buildings fronting the mall on either side, with a group of municipal buildings between the mall and Pennsylvania Avenue, and with a Lincoln memorial on the bank of the Potomac. Potomac Park (740 acres), a portion of which is embraced in this design, has already been reclaimed from the Potomac river. On Rock Creek, above Georgetown, is the National Zoological Park (under the control of the Smithsonian Institution), embracing 170 acres in a picturesque site. North of this and extending to the boundary of the District, and including both banks of Rock Creek, with its wild and picturesque beauty, is a tract of 1600 acres, known as Rock Creek Park.

Climate.—The climate of Washington is characterized by great humidity, long-continued and somewhat oppressive heat in summer, and mild winters. During a period of thirty-three years ending December 1903 the mean winter temperature (December, January and February) was 35° F. and the mean summer temperature (June, July and August) 75°; the mean of the winter minima was 27°, and the mean of the summer maxima 85° Extremes ranged, however, from an absolute maximum of 104° to an absolute minimum of −15° There is an average annual precipitation of 43·1 in., which is quite evenly distributed throughout the year Although snowstorms are infrequent and snow never lies long on the ground, the average fall of snow for the year amounts to 22·5 in.

Buildings.—In a dignified landscape setting on the brow of a hill that is itself nearly 100 ft. above the Potomac stands the Capitol[2] (built 1793–1827, architect, William Thornton (d. 1827), superintendent of the Patent Office, whose designs were modified by B H Latrobe and Charles Bulfinch, wings and dome added 1851–1865) It consists of a central building of Virginia sandstone, painted white, and two wings of white Massachusetts marble Its length is 751 ft., and its breadth ranges in different parts from 121 to 324 ft The main building is surmounted with an iron dome, designed by Thomas Ustic Walter, which rises to a height of 268½ ft., and on the dome is a statue of Liberty (1863, 19½ ft high) by Thomas Crawford. The Capitol faces east, and on this side is a richly sculptured[3] portico with Corinthian columns leading to the rotunda under the dome, a sculptured Corinthian portico leading to the Senate Chamber in the north wing, and a plain Corinthian portico leading to the Hall of Representatives in the south wing, there is also a portico at each end and on the west side of each wing The rotunda, 96 ft. in diameter and 180 ft high, is decorated with eight historical paintings: "Landing of Columbus" (1492), by John Vanderlyn; "De Soto discovering the Mississippi" (1541), by William Henry Powell, "Baptism of Pocahontas" (1613), by John Gadsby Chapman; "Embarkation of the Pilgrims from Delft Haven" (1620), by Robert Walter Weir, "Signing the Declaration of Independence" (1776), by John Trumbull, "Surrender of Burgoyne at Saratoga" (1777), by Trumbull, "Surrender of Cornwallis at Yorktown" (1781), by Trumbull, and "Washington resigning his Commission at Annapolis" (1783), by Trumbull. Between the rotunda and the Hall of Representatives is the National Hall of Statuary (formerly the Hall of Representatives), in which each state in the Union may erect statues of two "of her chosen sons", and between the rotunda and the Senate Chamber is the room of the Supreme Court, which until 1859 was the Senate Chamber[4]

The Executive Mansion, more commonly called the White House, the official residence of the president, is a two-storey building of Virginia freestone, painted white since 1814 to hide the marks of fire—only the walls were left standing after the capture of the city by the British in that year It is 170 ft long and 86 ft deep It is simple but dignified, the principal exterior ornaments are an Ionic portico and a balustrade The White House was built in 1792–1799 from designs by James Hoban, who closely followed the plans of the seats of the dukes of Leinster, near Dublin, and in 1902–1903, when new executive offices and a cabinet room were built and were connected with the White House by an esplanade, many of the original features of Hoban's plan were restored East of the White House and obstructing the view from it to the Capitol stands the oldest of the departmental buildings, the Treasury Building (architect, Robert Mills (1781–1855), then U S architect), an imposing edifice mainly of granite, 510 ft. long and 280 ft wide, on the east front is a colonnade of thirty-eight Ionic columns, and on each of the other three sides is an Ionic portico On the opposite side of the White House is a massive granite building of the State, War and Navy Departments, 567 ft. long and 342 ft. wide The Library of Congress (1889–1897, cost, exclusive of site, over $6,000,000), south-east of the Capitol, was designed by Smithmeyer & Pelz, and the designs were modified by Edward Pearce Casey (b 1864), the architect, it is in the Italian Renaissance style, is 340 by 470 ft., and encloses four courts and a central rotunda surmounted by a flat black copper dome, with gilded panels and a lantern. The exterior walls are of white New Hampshire granite, and the walls of the interior courts are of Maryland granite and white enamelled bricks. There are numerous sculptural adornments without and there is elaborate interior decoration with paintings, sculpture, coloured marbles and gilding.[1] Two squares north of the Senate office-building is the Union Railway Station (1908, 343 by 760 ft.; cost, $4,000,000), designed by Daniel Hudson Burnham, consisting of a main building of white granite (from Bethel, Vermont) and two wings, and facing a beautiful plaza. On Pennsylvania Avenue, nearly midway between the Capitol and the White House, is the nine-storey Post Office (1899; with a tower 300 ft. high), housing the United States Post Office Department and the City Post Office. A few squares north-west of it are the General Land Office, the headquarters of the Department of the Interior (commonly called the Patent Office), with Doric portico; the Pension Office, in which the Inauguration Ball is held on the evening of each president's taking office; the Government Printing Office (twelve storeys—one of the few tall office-buildings in the city); the City Hall, or District Court House; and the District Building (1908), another building of the local government. On the heights north of Georgetown is the United States Naval Observatory, one of the best-equipped institutions of the kind; from it Washington time is telegraphed daily to all parts of the United States. Near Rock Creek, west of Georgetown, is the Signal Office and headquarters of the United States Weather Bureau. In the Mall are the building of the Department of Agriculture, the Smithsonian Institution (*q.v.*), the National Museum (1910), the Army Medical Museum and the Bureau of Fisheries, and here a building for the Department of Justice is to be erected. Facing the Mall on the south is the home of the Bureau of Engraving and Printing, in which the United States paper money and postage stamps are made. Not far from the White House is the Corcoran Gallery of Art (1894–1897; architect, Ernest Flagg), of white Georgia marble in a Neo-Grecian style, housing a collection of paintings (especially American portraits) and statuary; the gallery was founded and endowed in 1869 by William Wilson Corcoran (1798–1888) "for the perpetual establishment and encouragement of the Fine Arts." The Public Library, a gift of Andrew Carnegie, is a white marble building in the Mount Vernon Square, at the intersection of Massachusetts and New York avenues. A prominent building, erected with money given mainly by Mr Carnegie, is that of the Pan-American Union (formerly Bureau of American Republics) The old Ford's Theatre, in which President Lincoln was assassinated, is on Tenth Street N W between E and F The house in which Lincoln died is on the opposite side of the street, and contains relics of Lincoln collected by O H. Oldroyd.

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[1] The actual surveying and laying out of the city was done by Andrew Ellicott (1754–1820), a civil engineer, who had been employed in many boundary disputes, who became surveyor-general of the United States in 1792, and from 1812 until his death was professor of mathematics at the United States Military Academy at West Point.

[2] See Glenn Brown, *The History of the United States Capitol* (2 vols., 1900–1903)

[3] The allegorical decorations here are by Persico and Horatio Greenough, those on the Senate portico are by Thomas Crawford, who designed the bronze doors at the entrances to the Senate and House wings At the east door of the rotunda is the bronze door (1858, modelled by Randolph Rogers) At the west entrance are elaborate bronze doors (1910) by Louis Amateis (b 1855).

[4] Connected with the Capitol by subways, immediately S.E. and N E of the Capitol respectively, are the marble office buildings (1908) of the House of Representatives and of the Senate The Capitol is connected by subways with the Library of Congress also.

Monuments.—Foremost among the city's many monuments is that erected to the memory of George Washington. It is a plain obelisk of white Maryland marble, 55 ft. square at the base and 555 ft. in height, it was begun in 1848, but the work was abandoned in 1855–1877, but was completed in 1884 at a cost of $1,300,000[2] Among statues of Washington are the half-nude seated figure (1843) by Greenough in the Smithsonian Institution, and an equestrian statue (1860) of Washington at the Battle of Princeton by Clark Mills in Washington Circle. Among the other prominent statues are: the equestrian statue (1908) of General Philip Sheridan in Sheridan Circle, by Gutzon Borglum; an equestrian statue of General Sherman near the Treasury Building, by Carl Rohl-Smith; a statue of Frederick the Great (by T. Uphues; presented to the United States by Emperor William II. of Germany) in front of the Army War College at the mouth of the Anacostia river; a statue of General Nathanael Greene (by H K. Brown) in Stanton Square, statues of General Winfield Scott in Scott Square (by H K Brown) and in the grounds of the Soldiers' Home (by Launt Thompson), a statue of Rear-Admiral S F Du Pont in Dupont Circle (by Launt Thompson), of Rear-Admiral D G Farragut (by Vinnie Ream Hoxie); an equestrian statue of General George H Thomas (by J Q A Ward), erected by the Society of the Army of the Cumberland, one of General George B. McClellan, by Frederick Macmonnies; and statues of Lincoln,[3] by Scott Flannery and (in Lincoln Park) by Thomas Ball, of Joseph Henry (by W. W Story) in the grounds of the Smithsonian Institution, of John Marshall (by Story) on the west terrace of the Capitol, of General Andrew Jackson (by Clark Mills) and, in Lafayette Square, of the Marquis de Lafayette (by Falguière and Mercié), of the Comte de Rochambeau (by F. Hamar) and of Baron von Steuben (1910). In Pennsylvania Avenue, at the foot of Capitol Hill, is a Monument of Peace (by Franklin Simmons) in memory of officers, seamen and marines of the U.S. Navy killed in the Civil War.

Cemeteries.—On the opposite side of the Potomac, in Virginia, and adjoining Fort Myer, a military post (named in honour of General Albert James Myer (1827–1880), who introduced in 1870 a system of meteorological observations at army posts) with reservation of 186 acres, is Arlington, a National Cemetery (of 408·33 acres), in which lie buried 21,106 soldiers killed in the Civil War and in the war with Spain; among the distinguished officers buried here are General Philip Henry Sheridan, Admiral David Dixon Porter, General Joseph Wheeler and General Henry W. Lawton; there is a Spanish War Monument; the grounds are noted for their natural beauty, and on the brow of a hill commanding a magnificent view of the city is Arlington House (1802), the residence of George Washington Parke Custis (1781–1857), grandson of Martha Washington, and afterwards of General Robert E. Lee, Custis's son-in-law; the estate was seized by Federal troops early in the Civil War, and was bought by the United States in 1864; there was a military hospital here throughout the Civil War. Adjoining the grounds of the Soldiers' Home (3 m. N. of the Capitol) is a National Military Cemetery containing the graves of 7220 soldiers. On the bank of the Anacostia river, east of the Capitol, is the Congressional Cemetery containing the graves of many members of Congress. North of Georgetown is Oak Hill Cemetery, and in the vicinity of the Soldiers' Home are Rock Creek, Glenwood, Harmony, Prospect Hill and St Mary's Cemeteries. A crematorium was completed in 1909, and cremation instead of interment has since been urged by the District commissioners.

Charities, &c.—The National Soldiers' Home (1851), founded by General Winfield Scott, comprises five buildings, with accommodations for 800 retired or disabled soldiers, and 512 acres of beautiful grounds. The charitable and correctional institutions of the District of Columbia are the following government institutions, under the control of the United States or of the District of Columbia: Freedmen's Hospital (1862), United States Naval Hospital (1866), an Insane Asylum on the S. side of the Anacostia river, the District of Columbia Industrial Home School (1872), a Municipal Lodging House (1892), a Soldiers' and Sailors' Temporary Home (1888), Workhouse, Reform School for Boys, Reform School for Girls and Industrial Home School (1872). Among many private institutions are the Washington City Orphan Asylum (1815); Lutheran Eye, Ear and Throat Infirmary (1889); Episcopal Eye, Ear and Throat Hospital (1897); Providence Hospital (1861; Sisters of Charity); George Washington University Hospital (1898); Georgetown University Hospital (1898); Columbia Hospital for Women (1866); Children's Hospital (1871); Washington Hospital for Foundlings (1887); Children's Temporary Home (1899; for negroes); a German Orphan Asylum (1879); Washington Home for Incurables (1889), Home for the Aged (1871); the National Lutheran Home (1890), the Methodist Home (1890) and Baptist Home (1880). A "non-support law," which went into effect in 1906, enacts that a man who refuses to provide for his family when able to do so shall be committed to the workhouse for hard labour, and that fifty cents a day shall be paid to his family. A Juvenile Court and a Board of Children's Guardians have extensive jurisdiction over dependent and delinquent children, and a general supervision of all charities and corrections is vested in a Board of Charities, consisting of five members appointed by the president of the United States.

Education.—Washington is one of the leading educational centres of the United States. The public school system, under the control of a Board of Education of six men and three women appointed by the supreme court judges of the District of Columbia, embraces kindergartens, primary schools, grammar schools, high schools, a business high school, manual training schools, normal schools and night schools. The schools are open nine months in the year, and all children between eight and fourteen years of age are required to attend some public, private or parochial school during these months unless excused because of some physical or mental disability. George Washington University, in the vicinity of the White House, is a non-sectarian institution (opened in 1821 under the auspices of the Baptist General Convention as "The Columbian College in the District of Columbia", endowed by W W. Corcoran in 1872, organized as the Columbian University in 1873, organized under its present name[4] in 1904), and comprises Columbian College of Arts and Sciences with a graduate department (1893), a College of the Political Sciences (1907), Washington College of Engineering, divisions of architecture and education (1907), a Department of Law (first organized in 1826; closed in 1827, reorganized in 1865), a Department of Medicine (1821; since 1866 in a building given by W. W. Corcoran), with several affiliated hospitals, a Department of Dentistry (1887), the National College of Pharmacy (united with the university in 1906), and a College of Veterinary Medicine (1908). In 1909 this University had 185 instructors and 1520 students. Georgetown University is in Georgetown (*q.v.*). The Catholic University of America (incorporated 1887, opened 1889), with buildings near the Soldiers' Home, stands at the head of Roman Catholic schools in America. Although designed especially for advanced theological studies, it comprises a School of the Sacred Sciences, a School of Philosophy, a School of Letters, a School of Physical Sciences, a School of Biological Sciences, a School of Social Sciences, a School of Jurisprudence, a School of Law and a School of Technological Sciences. In 1909 its faculty numbered 42 and its students 225. A Franciscan convent, Dominican, Paulist and Marist houses, and Trinity College for girls are affiliated with the Catholic University. The American University (chartered 1893), under Methodist Episcopal control, designed to bear a relation to the Protestant churches similar to that of the Catholic University to the Catholic Church, with a campus of 94 acres at the north-west end of the city, in 1910 had not been opened to students. Howard University (1867), for the higher education of negroes, is situated south-west of the Soldiers' Home, it was named in honour of General Oliver Otis Howard, one of its founders and (in 1869-1873) its president; it has a small endowment, and is supported by Congressional appropriations which are administered by the Secretary of the Interior; it comprises an academy, a college of arts and sciences, a teachers' college, a school of theology, a school of law, a school of medicine, a pharmaceutic college, a dental college, a school of manual arts and applied sciences, and a commercial college. In 1909 it had 121 instructors and 1253 students.

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[1] A bronze fountain, "The Court of Neptune," in front of the Library, is by Hinton Perry. Granite portrait busts of great authors occupy niches in windows near the entrance; these are by J S. Hartley, Herbert Adams and F. W. Ruckstuhl. The allegorical figures over the entrance are by Bela L. Pratt There are fine bronze doors by Olin Warner and Frederick Macmonnies. Among the mural paintings are series by John W. Alexander, Kenyon Cox, E. H. Blashfield, Henry Oliver Walker (b. 1843), Walter McEwen, Elihu Vedder, Charles Sprague Pearce (b. 1851), Edward Simmons (b. 1852), George Willoughby Maynard (b. 1843), Robert Reid (b. 1862), George R. Barse, Jr. (b. 1861), W. A. Mackay, F W. Benson (b. 1862), Walter Shirlaw (b. 1838), Gari Melchers (b. 1860), W. De L. Dodge (b. 1867) and others.

[2] The site is said to have been chosen by Washington himself—Congress had planned a marble monument in 1783. In 1833 the Washington National Monument Society was formed and a popular subscription was taken. The obelisk was designed by Robert Mills, whose original plan included a "Pantheon" 100 ft. high with a colonnade and a colossal statue of Washington. After 1877 the work was carried on by an appropriation made by Congress. See Frederick L. Harvey, *History of the Washington Monument and the National* (Washington, 1903).

[3] A Lincoln memorial is to be erected on the Mall W of the Washington monument

[4] The name was changed when the offer of the George Washington Memorial Association to build a $500,000 memorial building was accepted.

The Columbia Institution for the Deaf and Dumb (see DEAF AND DUMB), on Kendall Green, in the north-eastern part of the city, is composed of Kendall school (a secondary school) and of Gallaudet College (called in 1864-1893 the National Deaf Mute College, the present name is in honour of Dr T. H. Gallaudet), it was the first institution to give collegiate courses to the deaf, and it has received Congressional appropriations, though it is a private foundation. Washington has also several academies, seminaries and small colleges; among the latter are St John's College (Roman Catholic, 1870) and Washington Christian College (non-sectarian, 1902). The Washington College of Law (1896) is an evening school especially for women. A School of Art is maintained in the Corcoran Gallery of Art.

The Carnegie Institution of Washington, founded by Andrew Carnegie in 1902 and endowed by him with $22,000,000 ($10,000,000 in 1902; $12,000,000 later), is designed "to encourage in the broadest and most liberal manner investigation, research and discovery, and the application of knowledge to the improvement of mankind; and in particular to conduct, endow and assist investigation in any department of science, literature or art, and to this end to co-operate with governments, universities, colleges, technical schools, learned societies and individuals, to appoint committees of experts to direct special lines of research, to publish and distribute documents; and to conduct lectures, hold meetings and acquire and maintain a library." It is under the control of a board of twenty-four trustees, vacancies in which are filled by the remaining members. In 1908 ten departments had been organized: Botanical Research, with a "desert laboratory" (1903) at Tucson, Arizona, Economics and Sociology (1904), Experimental Evolution with a station (1904) at Cold Spring Harbor, New York (see HUNTINGTON, N.Y.), Geophysical Research, with a laboratory (1906-1907) at Washington—investigations have been carried on by the U.S. Geological Survey and at McGill University, Toronto, Historical Research (1903), Marine Biology, with a laboratory (1904) at Tortugas, Florida, Meridian Astrometry (1906, work is carried on especially at Dudley Observatory, Albany, New York), Research in Nutrition with a laboratory (1906) at Boston, Massachusetts—investigations (since 1904) had been carried on at Yale and Wesleyan universities; Solar Physics, with observatory (1905) on Mount Wilson, California, and workshops at Pasadena, California, and Terrestrial Magnetism (1903, headquarters in Washington), the institution had assisted Luther Burbank in his horticultural experiments since 1905, and had published the *Index Medicus* since 1903, and it makes occasional grants for minor research and tentative investigations.

The learned societies of Washington are to a large degree more national than local in their character; among them are the Washington Academy of Sciences (1898), a "federal head" of most of the societies mentioned below; the Anthropological Society (founded 1879; incorporated 1887), which has published *Transactions* (1879 sqq., with the co-operation of the Smithsonian Institution) and *The American Anthropologist* (1888-1898; since 1898 published by the American Anthropological Association), the National Geographic Society (1888), which since 1903 has occupied the Hubbard Memorial Building, which sent scientific expeditions to Alaska, Mont Pelée and La Soufrière, and which publishes the *National Geographic Magazine* (1888 sqq.), *National Geographic Monographs* (1895) and various special maps; the Philosophical Society of Washington (1871, incorporated 1901), devoted especially to mathematical and physical sciences; the Biological Society (1880), which publishes *Proceedings* (1880 sqq.); the Botanical Society of Washington (1901); the Geological Society of Washington (1893), the Entomological Society of Washington (1884), which publishes *Proceedings* (1884 sqq.); the Chemical Society (1884), the Records of the Past Exploration Society (1901), which publishes *Records of the Past* (1902 sqq.); the Southern History Association (1896), which issues *Publications* (1897 sqq.), the Society for Philosophical Inquiry (1893), which publishes *Memoirs* (1893 sqq.), the Society of American Foresters (1900), which publishes *Proceedings* (1905 sqq.), and the Cosmos Club. The libraries and scientific collections of the Federal government and its various bureaus and institutions afford exceptional opportunities for students and investigators (see LIBRARIES: § *United States*). The Library of Congress contains more than 1,800,000 volumes and 100,000 manuscripts, and large collections of maps and pieces of music. In the library of the State Department are 70,000 volumes of documents. The library of the Surgeon-General's Office contains 200,000 volumes, and is the largest medical library in the world. Besides these there is a vast amount of material in the collections of the Bureau of Education, the Bureau of Ethnology, the Smithsonian Institution, the National Museum, the House of Representatives, the Patent Office, the Department of Agriculture, the Botanic Gardens, the Bureau of Fisheries, the Naval Observatory, the Geological Survey and the Coast and Geodetic Survey. The Public Library, containing about 110,000 volumes, is a circulating library.

Communications.—Seven railways enter the city: the Philadelphia, Baltimore & Washington division of the Pennsylvania System, the Baltimore & Ohio, the Southern, the Chesapeake & Ohio, the Washington, Baltimore & Annapolis, the Washington Southern and the Washington, Alexandria & Mt Vernon. Steamboats ply daily from the foot of Seventh Street to Alexandria, Mt Vernon, Old Point Comfort and Norfolk, and at Old Point Comfort there is connexion with boats for New York. There is also an hourly ferry service to Alexandria, and at irregular intervals there are boats direct to Baltimore, Philadelphia, New York and Boston. The street railways, underground trolley in the urban district and overhead trolley in the suburbs, connect at several points with interurban railways in Maryland and Virginia.

Industries.—The city's manufactures and commerce are of little importance in proportion to its population. Only government manufactures and manufactures for local consumption are at all large. In 1905 the government's printing and publishing cost $5,999,996, its ordnance and ordnance stores (in the Navy Yard on the bank of the Anacostia river), $5,331,459, and its engraving and plate printing $3,499,517. The total value of the products of all the factories in the District which were operated under private ownership amounted to $18,359,159, and $9,575,971, or 52% of this was the value of printing and publishing, bread and other bakery products, gas and malt liquors.

Government.—Washington is the seat of the Federal government of the United States and as such is not self-ruled, but governed by the Federal Congress. The city was chartered in 1802, with a mayor appointed annually by the president of the United States and an elective council of two chambers. The mayor was elected by the council from 1812 to 1820, and by the people (biennially) from 1820 to 1871. In 1871 the Federal Congress repealed the charters of Washington and Georgetown and established a new government for the entire District, consisting of a governor, a secretary, a board of public works, a board of health and a council appointed by the president with the concurrence of the Senate, and a House of Delegates and a delegate to the National House of Representatives elected by the people. In 1874 Congress substituted a government by three commissioners appointed by the president with the concurrence of the Senate, and in 1878 the government by commissioners was made permanent. Two of the commissioners must be residents of the District, and the third commissioner must be an officer of the Corps of Engineers of the United States Army. The people of the District have no voice in its government, have no representation in Congress and do not vote for the president of the United States. The District commissioners are the chief executive officers. Congress and the commissioners legislate for the District; the president, the commissioners and the supreme court of the District appoint the administrative officers and boards, and the president appoints the judges of the District courts, viz. a court of appeals, a supreme court, a municipal court, a police court, a probate court and a juvenile court. One-half the expenses of the government of Washington is paid by the District of Columbia and one-half by the United States. The revenue of the District, which is derived from a property tax and from various licences, is paid into the United States Treasury; appropriations, always specific and based on estimates prepared by the commissioners, are made only by Congress; and all accounts are audited by the Treasury Department. The government owns the waterworks, by which an abundant supply of water is taken from the Potomac at the Great Falls, conducted for 12 m through an aqueduct 9 ft. in diameter and filtered through a sand filtration plant.

The government of the District has been uniformly excellent, and the laws therefor have been modern in their tendency The employment of children under fourteen years of age in any factory, workshop, mercantile establishment, store, business office, telegraph or telephone office, restaurant, hotel, apartment house, club, theatre, bootblack stand, or in the distribution or transmission of merchandise or messages is forbidden, except that a child between twelve and fourteen years of age may with the permission of the judge of the juvenile court be employed at an occupation not dangerous or injurious to his health or morals if necessary for his support or for the assistance of a disabled, ill or invalid parent, a younger brother or sister, or a widowed mother No child under fourteen years of age may be employed in any work whatever before six o'clock in the morning, after seven o'clock in the evening, or during the hours when the public schools are in session.

History—During the War of Independence Philadelphia was the principal seat of the Continental Congress, but it was driven thence in 1783 by mutinous soldiers, and for the succeeding seven years the discussion of a permanent site for the national capital was characterized by sectional jealousy, and there was a strong sentiment against choosing a state capital or a large city lest it should interfere with the Federal government. The Constitution, drafted in 1787, authorized Congress "to exercise exclusive legislation in all cases whatsoever, over such district (not exceeding 10 sq. m.) as may, by cession of particular states, and the acceptance of Congress, become the seat of government of the United States." Virginia and Maryland promised such a cession; President Washington was known to be in favour of a site on the Potomac, and in July 1790 Alexander Hamilton, in return for Thomas Jefferson's assistance in passing the bill for the assumption of the state war debts by the Federal government, helped Jefferson to pass a bill for establishing the capital on the Potomac, by which the president was authorized to select a site anywhere along the Potomac between the Eastern Branch (Anacostia) and the Conococheague river, a distance of about 80 m, and to appoint three commissioners who under his direction should make the necessary surveys and provide accommodations for the reception of Congress in 1800. The commissioners—Thomas Johnson (1732–1819) and Daniel Carroll (1756–1829) of Maryland and Dr David Stuart of Virginia—gave the city its name; Major L'Enfant drew its plan, and Andrew Ellicott laid it out. When, in 1800, the government was removed to Washington it was "a backwoods settlement in the wilderness"; as a city it existed principally on paper, and the magnificence of the design only served to emphasize the poverty of the execution. One wing of the Capitol and the President's House were nearly completed, but much of the land surrounding the Capitol was a marsh; there were no streets worthy of the name, the roads were very bad, and the members of Congress were obliged to lodge in Georgetown. For many years such characterizations as "Wilderness City," "Capital of Miserable Huts," "City of Streets without Houses," "City of Magnificent Distances" and "A Mudhole almost Equal to the Great Serbonian Bog" were common. Resolutions were frequently offered by some disgusted member of Congress for the removal of the capital. In 1814, during the second war with Great Britain, the British, after defeating on the 24th of August an American force at Bladensburg, Prince George county, Maryland, about 6 m. N.E. of Washington, occupied the city and burned the Capitol, the President's House, some of the public offices, and the Navy Yard. In the following year when a bill appropriating $500,000 for rebuilding was before Congress it met with formidable opposition from the "capital movers." T[illegible] al was again to the front when, in 1846, [illegible] the District was retroceded to that state in response to the appeal of Alexandria, which had suffered from the neglect of Congress. The lethargy of the nation toward its capital suddenly vanished at the outbreak of the Civil War. At the close of the first day's bombardment of Fort Sumter (April 12th, 1861) Leroy P Walker (1817–1884), the Confederate Secretary of War, boasted that before the 1st of May the Confederate flag would float over the Capitol. The North, alarmed at the threat, speedily transformed Washington into a great military post and protected it on all sides with strong earthworks. Throughout the war it was the centre of the military operations of the North here the armies were officered and marshalled, from here they marched on their campaigns against the South, here was the largest depot of military supplies, and here were great hospitals for the care of the wounded. Although several times threatened by the South, Washington was never really in danger except in July 1864 when General Jubal A. Early advanced against it with 12,000 veterans, defeated General Lew Wallace with about 3500 men at Monocacy Bridge on the 6th, and on the 11th appeared before the fortifications, which were at the time defended by only a few thousand raw troops; the city was saved by the timely arrival of some of Grant's veterans. In the city, on the 23rd and 24th of May 1865, President Andrew Johnson reviewed the returning soldiers of the Union Army.

The population of Washington increased from 61,122 to 109,199 or 78·6% in the decade from 1860 to 1870, and the stirring effects of the Civil War were far-reaching. The city had been founded on too elaborate and extensive a plan to be left to the initiative and unaided resources of its citizens. But under the new form of government which was instituted in 1871 a wonderful transformation was begun under the direction of Alexander R. Shepherd (1835–1902), the governor of the District and president of the board of public works. Temporary financial embarrassment followed, but when the Federal government had taken upon itself half the burden and established the economic administration of the commissioners, the problem of beautifying the nation's capital was solved.

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WASHINGTON, a city and county-seat of Daviess county, Indiana, U.S.A., about 50 m. N.E. of Evansville. Pop. (1890) 6064, (1900) 8551, of whom 391 were foreign born and 255 negroes, (1910 census) 11,404. It is served by the Baltimore & Ohio South Western (which has repair shops here) and the Evansville & Indianapolis railways. The city has a public library and a city park of 45 acres. It is the shipping point of the surrounding farming, stock-raising and coal-mining region, and there are deposits of kaolin and fireclay in the vicinity. The total value of the factory product in 1905 was $1,168,749 (48·6% more than in 1900). The municipality owns and operates the electric lighting plant. Washington was settled in 1816 and chartered as a city in 1870.

WASHINGTON (or WASHINGTON COURT HOUSE), a city and the county-seat of Fayette county, Ohio, U.S.A., on Paint Creek, 35 m. S.E. of Springfield. Pop. (1880) 3798, (1890) 5742, (1900) 5751 (708 negroes); (1910) 7277. It is served by the Baltimore & Ohio, the Cincinnati & Muskingum Valley (Pennsylvania Lines), the Detroit, Toledo & Ironton, and the Cincinnati, Hamilton & Dayton railways. It is in a rich farming and stock and poultry-raising region, has a large poultry-packing house and various manufactures. Washington, or Washington Court House as it is often called to distinguish it from the village of Washington in Guernsey county, Ohio, was laid out in 1810 and was chartered as a city in 1888.

WASHINGTON, a borough and the county-seat of Washington county, Pennsylvania, U.S.A., about 25 m. S.W. of Pittsburg and about 30 m. N.E. of Wheeling, West Virginia, on Chartiers Creek. Pop. (1900) 7670, of whom 465 were foreign born and 984 were negroes; (1910) 18,778. Washington is served by the main line of the Baltimore & Ohio, the Chartiers Valley branch of the Pittsburg, Cincinnati, Chicago & St Louis (Pennsylvania system) and the Waynesburg & Washington railways and a connecting line for freight service, and by electric railway to Pittsburg. Among its public buildings and institutions are the county court-house (in which are the rooms of the Washington County Historical Society), the Federal building, two hospitals, a Y.M.C.A. building and a public library. It is the seat of Washington and Jefferson College, of Washington Seminary (1836) for girls and of a school of business. Washington and Jefferson College was incorporated, in 1865, by the consolidation of two rival institutions, Washington Academy and Jefferson College. Washington Academy (incorporated in 1787 and endowed by the legislature of Pennsylvania), which was opened in 1789, was incorporated as Washington College in 1806, and in 1852 became a synodical college of the Presbyterian Church, under the direction of the synod of Wheeling. Jefferson College, which was an outgrowth of Canonsburg Academy at Canonsburg, 7 m. from Washington, was chartered in 1794, and incorporated as Jefferson College in 1802; from 1826 until 1838 the Jefferson Medical College of Philadelphia was its medical department. In 1869, by an act of the legislature, all departments were located at Washington. In 1872 a chair of engineering and applied mathematics and one of biology were established with an endowment of $40,000, the gift of Dr Francis J. LeMoyne, and the chairs of Greek and of Latin were endowed by the Rev. C. C. Beatty with $60,000. In 1909–1910 Washington and Jefferson College (including Washington and Jefferson Academy) had 29 instructors, 413 students, about 20,000 volumes in its library and an endowment of $630,000. Washington is in a bituminous coal and natural gas region, and there are manufactories of glass, iron tubing and pipe, tin plate, steel, &c. The site was part of a tract bought in 1771 by David Hoge and was known at first as Catfish camp after an Indian chief, Tingooqua or Catfish. It was platted in October 1781 and called Bassettown in honour of Richard Bassett (d. 1815), a member of the Federal constitutional convention of 1787 and of the United States Senate in 1789–1793, and governor of Delaware in 1798–1801. The village was replatted in November 1784 and renamed in honour of General Washington, to whom a large part of the site had belonged. The early settlers were chiefly Scotch-Irish. At first a part of Strabane township, one of the original thirteen townships of Washington county, in February 1786 Washington was made a separate election district; it was incorporated as a town in 1810; was chartered as a borough and enlarged in 1852, and its limits were extended in 1854 and 1855. Since 1900 there have been added to the borough North and South Washington and the industrial suburb of Tylerdale, East and West Washington, although practically one with the borough, remaining under separate administration. The location of Washington on the old "National Road" gave it importance before the advent of railways. At the LeMoyne crematory established here by Dr Francis Julius LeMoyne,[1] on the 6th of December 1876, took place the first public cremation in the United States; the body burned was that of Baron Joseph Henry Louis de Palm (1809–1876), a Bavarian nobleman who had emigrated to the United States in 1862 and had been active in the Theosophical Society in New York.

See Boyd Crumrine (ed.), *The History of Washington County, Pennsylvania* (Philadelphia, 1882); and Alfred Creigh, *The History of Washington County from its First Settlement to the Present Time* (Harrisburg, 1871).

WASHINGTON, the most north-westerly state of the United States of America. It lies between latitudes 45° 32′ and 49° N. and between longitudes 116° 57′ and 124° 48′ W. On the N. it is bounded by British Columbia, along the 49th parallel as far W. as the middle of the Strait of Georgia and then down the middle of this strait and Haro Strait, and along the middle of the channel the Strait of Juan de Fuca, which separate it from Vancouver Island, on the E. the south portion of its boundary is the Snake river, which separates it from Idaho, but from the confluence of the Snake and Clearwater rivers (a little W. of 117°) the E. boundary line between Washington and Idaho runs directly N., on the S. the Columbia river separates it from Oregon from the mouth of that river to the point of the upper intersection with the 46th parallel of N. latitude, but from thence eastward the S. boundary line between Washington and Oregon is the 46th parallel; on the W. the state is bounded by the Pacific Ocean. The state has a maximum length, from E. to W., of 360 m. and a maximum width of 240 m.; area, 69,127 sq. m., of which 2291 sq m. are water surface.

Physical Features.—The western half of Washington lies in the Pacific Mountains province, consisting of the Coast range and the Cascade range, separated by a broad basin known as the Sound Valley The eastern half of the state is occupied in the north by a westward extension of the Rocky Mountains, and in the centre and south by the north-western portion of the Columbia Plateau province. The most prominent physical feature of the state is the Cascade mountain range, which with a N.N.E. and S.S.W. trend crosses the state 30 to 40 m. W. of the middle. On the S. border this mountain range occupies a tract about 50 m. in width, and to the northward it widens to 100 m. or more. The general height of the ridges and peaks is about 8000 ft. above the sea, but there are five ancient snow-capped volcanoes which equal or exceed 10,000 ft. These are Mount Rainier or Tacoma (14,363 ft.), Mount Adams (12,470 ft.), Mount Baker (10,827 ft.), Glacier Peak (10,436 ft.) and Mount St Helens (10,000 ft.). Glaciers are common both in the N. and in the S. region, even on the higher elevations. Both slopes of the Cascades are cut deep by valleys. Along the Pacific Coast the ridges of the Coast range are only about 1500 ft. in height in the S. part of the state, but they rise northward in the Olympic Mountains and reach a maximum of elevation on Mount Olympus of 8150 ft. The Olympics meet the ocean along a rather straight line, but farther S. the coast line is broken by Gray's Harbour and Willapa Bay, the drowned lower portions of river valleys. The upheaval of the Cascade Mountains on the E. and the Olympic Mountains and Coast range on the W. left between them the Puget Sound Basin, the gently sloping sides of which descend in the central portion to less than 100 ft. from sea-level. A still greater subsidence farther north produced Puget Sound. East of the Cascade Mountains the Columbia and Spokane rivers mark the boundary between the Okanogan Highlands to the northward and the Columbia plateau to the southward. The Okanogan Highlands, an outlier of the Rocky Mountains extending westward from the Cœur d'Alene Mountains in Idaho, reach heights of 5000 to 6000 ft. above the sea, but are characterized by long gentle slopes, rounded divides and wide stream basins. In some of the larger valleys there are glacial terraces. The Columbia plateau consists of horizontal beds of lava having a total thickness of several thousand feet, and its surface has a general elevation of 1000 to 2000 ft. above sea-level. West of the Columbia river the plain is broken by several monoclinal ridges rising 2000 to 3000 ft. above it and extending eastward 50 to 75 m. from the foothills of the Cascades. In some parts, especially (in Douglas and Grant counties) within the Big Bend of the Columbia, the plain is frequently cut by coulées, or abandoned river channels, some of them 500 to 600 ft. deep and with very precipitous walls. The Grand Coulée represents the course of the Columbia river during the glacial period, when its regular channel was blocked with ice. There are also deep canyons which have been cut by the rivers in their present courses, especially by the Snake river and its tributaries. The S.W. corner of the state is occupied by the Blue Mountains, which rise about 7000 ft. above the sea and are cut deep by canyons. About 11,000 sq. m. in Washington have a minimum elevation exceeding 3000 ft.; an approximately equal area has a maximum elevation less than 500 ft., and the mean elevation of the entire state is 1700 ft.

The Okanogan Highlands, the Columbia plain, the E. slope of the Cascade Mountains and the S. portion of the Puget Sound Basin are drained by the Columbia and its tributaries. This large river enters the N.E. corner of the state from the N., traverses it in a winding course from N. to S., forms the greater portion of its S. boundary, and discharges into the Pacific Ocean. The Snake (in the S.E., a little W. of the 119th parallel), the Spokane (in the east central part) and the Pend Oreille (on the N. boundary) are its principal tributaries from the E.; the Yakima (a little above the mouth of the Snake) from the W.; and the Okanogan (in the north central part of the state), from the N. A portion of the Puget Sound Basin and a portion of the Coast range are drained by the Chehalis river, which has cut a channel through the Coast range and discharges into Gray's Harbour. The W. slope of the Cascades, most of the E. slope of the Olympics and the N. portion of the Puget Sound Basin are drained by a great number of small rivers into the Puget Sound; and the W. slope of the Olympics and Coast range is drained by several other small rivers into the Pacific. On the Cascade Mountains, at the heads of streams, are a number of lakes of glacial origin, the largest of which is Lake Chelan on the E. slope in Chelan county. This is nearly 60 m. in length, and from 1 to 4 m. wide. At the upper end it is about 1400 ft. deep, but it is shallow at the lower end where the water is held back by a morainal dam, and where only 3½ m. from the Columbia river it is about 400 ft. above the level of the river. There are also several alkali lakes or chains of alkali lakes in the coulées on the Columbia plateau.

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[1] LeMoyne (1798–1879) was the son of a French refugee, and was an ardent abolitionist. In 1840 he was the Liberty party's candidate for the vice-presidency. He built a normal school for negroes near Memphis, Tennessee, and gave money to Washington College, at which he had graduated in 1815. Largely through LeMoyne's influence Washington became an important point on the "underground railway" for assisting runaway slaves to Canada.

Fauna.—Many species of wild animals still inhabit the state, but the number of each species has been much reduced. The caribou, moose, antelope, mountain sheep, beaver, otter and mink are scarce. Few elk are found except in the inaccessible districts on the Olympic Mountains. White- and black-tailed deer and black bear inhabit the densest forests. Mountain goats are quite numerous on the Cascades. The destruction of cougars, lynx (" wildcats "), coyotes and wolves is encouraged by bounties. Coyotes and jack-rabbits are the most numerous denizens of the Columbia plain. Musk-rats and skunks are numerous west of the Cascades. The blue grouse and partridge are the principal game birds. The sage-hen is common on the Columbia plain. The Japanese pheasant and the California quail have increased in numbers under the protection of the state. Among other game birds are prairie-chickens, ducks, geese, swan, brant, sandhill crane and snipe. The speckled trout, which abounds in nearly all of the mountain streams and lakes, is the principal game fish. Other freshwater fish are the perch, black bass, pike, pickerel and white fish. There are large quantities of salmon in the lower Columbia river, in Gray's and Willapa harbours, and in Puget Sound; oyster fisheries in Gray's and Willapa harbours and in Puget Sound; cod, perch, flounders, smelt, herring and sardines in these and other salt waters. For all the more desirable game a close season has been established by the state.

Flora.—The Puget Sound Basin and the neighbouring slopes of the Cascade and Olympic Mountains are noted for their forests, consisting mainly of giant Douglas fir or Oregon pine (*Pseudotsuga Douglasii*), but containing also some cedar, spruce and hemlock, a smaller representation of a few other species and a dense undergrowth. Near the Pacific Coast the forests consist principally of hemlock, cedar and Sitka spruce. At an elevation of about 3000 ft. on the W. slope of the Cascades the red fir ceases to be the dominant tree, and between this elevation and the region of perpetual snow, on a few of the highest peaks, rise a succession of forest zones containing principally: (1) yellow pine, red and yellow fir, white fir and cedar; (2) lodgepole pine, white pine, Engelmann spruce and yew; (3) subalpine fir, lovely fir, noble fir, Mertens hemlock, Alaska cedar and tamarack; (4) white-bark pine, Patton hemlock, alpine larch and creeping juniper. Deciduous trees and shrubs are represented in western Washington by comparatively small numbers of maple, alder, oak, cottonwood, willow, ash, aspen, birch, dogwood, sumach, thornapple, wild cherry, chokecherry, elder, huckleberry, blueberry, blackberry, raspberry, gooseberry and grape. The E. slope of the Cascades and most of the Okanogan Highlands are clothed with light forests consisting chiefly of yellow pine, but containing also Douglas fir, cedar, larch, tamarack and a very small amount of oak. In the eastern part of the Okanogan Highlands there is some western white pine, and here, too, larch is most abundant. The Columbia plain is for the most part treeless and, except where irrigated, grows principally bunch-grass or, in its lower and more arid parts, sagebrush. In the forest regions of eastern Washington the underbrush is light, but grasses and a great variety of flowering plants abound.

Climate.—In western Washington, where the ocean greatly influences the temperature and the mountains condense the moisture of vapour-bearing winds, the climate is equable and moist. Eastern Washington, too, usually has a mild temperature, but occasionally some regions in this part of the state are visited by a continental extreme, and as the winds from the ocean lose most of their moisture in passing over the Cascades, the climate is either dry or arid according to elevation. Along the coast the temperature is rarely above 92° F. or below 10° F.; the mean temperature for July is about 60°, for January 40°, and for the entire year 50°. In the Puget Sound Basin an occasional cold east wind during a dry period in winter causes the temperature to fall below zero. At Centralia, in the Chehalis Valley, the temperature has risen as high as 102°. [illegible] mean temperature for January is 34° in the N. portion of [illegible] and 40° in the S. portion; for July it is 60° in the north [illegible] in the south; and for the entire year it is 46° in the north [illegible] During April and October the temperatures [illegible] nearly the same as those in western Washington, but during July the temperatures in eastern Washington are subject to a range from 40° to 110°, and during January from 65° to − 30°. However, the climate is so dry in eastern Washington that the " sensible " variations are much less than those recorded by the thermometer. In the south-eastern counties the winters are mild, with the exception of an occasional cold period, and the summers are hot. The rainfall on the W. slope of the Olympic, Coast range and Cascade Mountains is from 60 to 120 in. annually, and in the Puget Sound Basin it is from 25 to 60 in., it being least on the N.E. or leeward side of the Olympics. About three-fourths of the rain in western Washington falls during the wet season from November to April inclusive. On the Okanogan Highlands, on the eastern foothills of the Cascade Mountains, on the Blue Mountains and on the elevated portion of the Columbia Plain which comprises the E. border counties, the annual rainfall and melted snow amount to from 12 to 24 in., but in the southern half of eastern Washington the Columbia river flows through a wide district of low elevation, where the rainfall and melted snow amount to only 6 to 12 in. a year, and where there is scarcely any precipitation during the summer months. There is a heavy snowfall in winter on the mountains, and in a large portion of eastern Washington the average annual snowfall is 40 in. or more. Along the coast the prevailing winds blow from the west or south; in the Puget Sound Basin from the south, and in eastern Washington from the south-west, except in the Yakima and Wenatchee valleys, where they are north-west. During summer the winds are very moderate in western Washington, but during winter they occasionally blow with great violence. In eastern Washington hot winds from the north or east are occasionally injurious to the growing wheat in June or July. Light hailstorms are not uncommon, but tornadoes are unknown in the state.

Soils.—The soils of western Washington are chiefly glacial, those of eastern Washington chiefly volcanic. In the low tidewater district of the Puget Sound Basin an exceptionally productive soil has been made by the mixture of river silt and sea sand. In numerous depressions, some of which may have been the beds of lakes formed by beaver dams, the soil is deep and largely of vegetable formation. In the valleys of rivers which have overflowed their banks and on level bench lands there is considerable silt and vegetable loam mixed with glacial clay; but on the hills and ridges of western Washington the soil is almost wholly a glacial deposit consisting principally of clay but usually containing some sand and gravel. On the Columbia plateau the soil is principally volcanic ash and decomposed lava; it is almost wholly volcanic ash in the more arid sections, but elsewhere more decomposed lava or other igneous rocks, and some vegetable loam is mixed with the ash. On the E. slope of the Cascades and on the Okanogan Highlands glacial deposits of clay, gravel or sand, as well as vegetable loam, are mixed with the volcanic substances.

Fisheries.—Washington's many waterways, both fresh and salt, and especially those which indent or are near the coast, make the fisheries resources of great value. The catch and canning of salmon are particularly important. In 1905 the value of canned salmon was $2,431,605 (26,601,429 lb).

Forests.—In 1907 the estimated area of standing timber in Washington was 11,720 sq. m. besides that included in national forest reserves. The forest reserves are included in ten national parks, named the Chelan, Columbia, Colville, Kaniksu, Olympic, Ranier, Snoqualmie, Washington, Wanaha and Wenatchee, the Chelan being the largest, with an area of 2,492,500 acres. The aggregate area of these parks (all of which were opened in 1907 and 1908) is 18,850·7 sq. m., or about three-elevenths of the total area of the state.

Irrigation.—The principal Federal irrigation undertakings in 1910 were known as the " Okanogan project " and the " Yakima project." The former (authorized in 1905) provided for the irrigation of about 10,000 acres in Okanogan county by means of two reservoirs of an aggregate area of 650 acres, main canals and main laterals 20 m. long and small laterals 30 m. long, the water being taken from the Salmon river. In 1909 about 3000 acres in this project were watered and under cultivation. The Yakima project involved the irrigation of about 600,000 acres by means of five reservoirs of an aggregate area of 804,000 acre-feet, and was undertaken by the United States government in 1905.

Agriculture.—The development of the agricultural resources of Washington was exceedingly rapid after 1880. The wheat crop in 1909 was 35,780,000 bushels, valued at $33,275,000; oats, 9,898,000 bushels, valued at $4,751,000; barley, 7,189,000 bushels, valued at $4,601,000; rye, 84,000 bushels, valued at $79,000; Indian corn, 417,000 bushels, valued at $359,000. The principal wheat-producing region is the south-eastern part of the state. Western Washington has large hay crops; in the E. part of the state much alfalfa is grown, especially in Yakima county. In W. Washington peas are raised for forage.

Vegetable crops are successfully grown in low alluvial lands of the W. part of the state, and on the irrigated volcanic ash lands E. of the mountains. Apple-growing and the raising of other fruits have increased rapidly. Small fruits are more successful in the W. part of the state. Grapes are grown on the mountain sides, cranberries on the bog lands near the coast, and nuts in the S.E. parts.

Live-stock and dairy products are important factors in the

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agricultural wealth of Washington, but the raising of live-stock on ranges is less common than when large herds grazed free on government lands. Dairying, as distinct from grazing, has much increased in importance in recent years.

Minerals.—The mineral wealth of Washington is large, but its resources have been only slightly developed, and had hardly begun before the first decade of the 20th century: in 1902 the total value of all mineral products was $5,393,659; in 1907 it was $11,617,706 and in 1908 $11,610,224.

The coal deposits of Washington are the only important ones in the Pacific states, and in Washington only, of the Pacific states, is there any coking coal. In the Cowlitz Valley an inferior coal was found in 1848. The first important coal-mining was near Bellingham Bay, in Whatcom county, where coal was discovered in 1852 and where 5374 tons were mined in 1860. Between 1850 and 1860 coal was found on the Stilaguamish river (Snohomish county) and on the Black river (near Seattle) and in 1863 at Gilman (King county); but it was not until between 1880 and 1885, when the Green river field in King county and the Roslyn mines in Kittitas county were opened, that commercial production became important: the output was 3,024,943 tons (valued at $6,690,412) in 1908, when nearly one-half (1,414,621 tons) of the total was from Kittitas county and most of the remainder from the counties of King (931,643 tons) and Pierce (551,678 tons). There are large deposits of glacial and residual clays and clay shales throughout the state.

Serpentine marble with seamed markings has been found in Adams and Stevens counties. Granite is found about Puget Sound and in the extreme eastern part of the state; it is largely used in riprap or rough foundations. Sandstone is found especially in the N.W. in Whatcom and San Juan counties; it is used for paving blocks. Limestone also is found most plentifully in the north and north-western parts of the state.

Gold, silver, copper, lead and a little iron (almost entirely brown ore) are the principal ores of commercial importance found in Washington. The total value of gold, silver, copper and lead in 1908 was $378,816 (gold $242,234, silver $47,076, copper $41,188, lead $48,318). The largest output of each of these ores in 1908 was in Stevens county; Ferry, King and Okanogan counties ranked next in the output of gold; Okanogan and Ferry counties in the output of silver; Okanogan in the output of copper; and King in the output of lead. About nine-tenths of the gold was got from dry or siliceous ores and about 8 % from placer mines; about two-thirds of the silver from dry or siliceous ores, about two-ninths from copper ores, and most of the other ninth from lead ores. The only lead ore is galena. The copper is mostly a copper glance passing into chalcopyrite; it is found in fissure veins with granite. A small quantity of zinc (7 tons in 1906) is occasionally produced. Tungsten is found as wolframite in Stevens county near Deer Trail and Bissell, in Okanogan county near Loomis, in Whatcom county near the international boundary, and (with some scheelite) at Silver Hill, near Spokane. Nickel has been found near Keller in Ferry county, and molybdenum near Davenport, Lincoln county. There is chromite in the black sands of the sea-coast and the banks of the larger rivers. Antimony deposits were first worked in 1906. Arsenic is found.

Manufactures.—There was remarkable growth in the manufacturing industries of Washington between 1880 and 1905, due primarily to the extraordinary development of its lumber industry. In 1870 the value of lumber products was $1,307,585, and the Territory ranked thirty-first among the states and territories in this industry, and in 1880 the value of the product was $1,734,742; by 1905 the value had increased to $49,572,512, and Washington now ranked first. The manufacture of planing mill products, including sashes, doors and blinds, was an important industry, the products being valued in 1905 at $5,173,422.

Next in commercial importance to lumber and timber products are flour and grist mill products, valued in 1905 at $14,663,612. Other important manufactures are: slaughtering and meat packing (wholesale), $6,251,705 in 1905; malt liquors, $4,471,777; and foundry and machine shop products, $3,862,279.

Transportation and Commerce.—Puget Sound has formed a natural terminus for several transcontinental railways, the cities of Seattle and Tacoma on its shores affording outlets to the commerce of the Pacific for the Northern Pacific, the Great Northern and the Chicago, Milwaukee & Puget Sound transcontinental lines, which enter these cities with their own tracks. The Union Pacific and the Canadian Pacific reach Seattle over the tracks of other roads. The Northern Pacific and the Great Northern enter the state near the middle of its eastern boundary at Spokane, which is a centre for practically all the railway lines in the eastern part of the state. The Northern Pacific, the first of the transcontinental roads to touch the Pacific north of San Francisco, reaches Seattle with a wide sweep to the south, crossing the Columbia river about where it is entered by the Yakima and ascending the valley of the latter to the Cascade Mountains. The Great Northern, running west from Spokane, crosses the state in nearly a straight line, and between this road and the Northern Pacific, and paralleling the Great Northern, runs the recently constructed Chicago, Milwaukee & Puget Sound, the westward extension of the Chicago, Milwaukee & St Paul. The Northern Pacific sends a branch line south from Tacoma parallel with the coast to Portland on the Columbia river, where it meets the Southern Pacific and the Oregon Railroad & Navigation Company's line (a subsidiary of the Union Pacific), thus affording communication southwards, and up the valley of the Columbia to the east. Entering the south-east corner of the state, the Oregon Railroad & Navigation Company extends a line northwards to Spokane, and a branch of the Great Northern, leaving the main line at this city, runs north-westward into British Columbia. The Spokane, Portland & Seattle railway connects the three cities named by way of the Columbia Valley; and the Spokane & Inland Empire sends a line eastward into Idaho to the Cœur d'Alene country and another through the south-eastern part of the state into Nevada. In 1880 the railway mileage was 289 m.; in 1890, 2012·05 m.; in 1900, 2888·44 m.; and on the 1st of January 1909, 4180·32 m.

Seattle and Tacoma are among the four leading ports of the United States on the Pacific. Other harbours on Puget Sound of commercial importance are Olympia, Everett and Bellingham. Port Townsend is the port of entry for Puget Sound. Gray's Harbour, on the western coast, is of importance in lumber traffic.

Population.—The population in 1860 was 11,594; in 1870, 23,955; in 1880, 75,116; in 1890, 349,390, an increase within the decade of 365·1%; in 1900, 518,103, an increase of about 45%. In 1910, according to the U.S. census returns, the total population of the state reached 1,141,990. Of the total population in 1900, 394,179 were native whites, 111,364 or 21·5% were foreign-born, 10,139 (of whom 2531 were not taxed) were Indians, 5617 were Japanese, 3629 were Chinese, and 2514 were negroes. The Indians on reservations in 1909 were chiefly those on Colville Reservation (1,297,000 acres unallotted), in the N.E. part of the state, and the Yakima Reservation (837,753 acres unallotted), in the S. part; they belonged to many small tribes chiefly of the Salishan, Athapascan, Chinookan and Shahaptian stocks. Of the foreign-born, 18,385 were English-Canadians, 16,686 Germans, 12,737 Swedes, 10,481 natives of England, 9891 Norwegians and 7262 Irish. Of the total population 241,388 were of foreign parentage (*i.e.* either one or both parents were foreign-born), and of those having both parents of a given nationality 34,490 were of German, 19,359 of Swedish, 17,456 of Irish, 16,959 of Norwegian and 16,835 of English parentage. The Roman Catholic Church in 1906 had more members than any other religious denomination, 74,981 out of the total of 191,976 in all denominations; there were 31,700 Methodists, 13,464 Lutherans, 11,316 Baptists, 10,628 Disciples of Christ, 10,025 Congregationalists and 6780 Protestant Episcopalians.

Government.—Washington is governed under its original constitution, which was adopted on the 1st of October 1889. An amendment may be proposed by either branch of the legislature; if approved by two-thirds of the members elected to each branch and subsequently, at the next general election, by a majority of the people who vote on the question it becomes a part of the constitution. Five amendments have been adopted: one in 1894, one in 1896, one in 1900, one in 1904, and one in 1910. Suffrage is conferred upon all adult citizens of the United States (including women, 1910) who have lived in the state one year, in the county ninety days, and in the city, town, ward or precinct thirty days immediately preceding the election, and are able to read and speak the English language; Indians who are not taxed, idiots, insane persons and convicts are debarred. General elections are held biennially, in even-numbered years, on the first Tuesday after the first Monday in November, and candidates, except those for the supreme court bench and a few local offices, are nominated at a direct primary election, held the second Tuesday in September.

The governor, lieutenant-governor, secretary of state, treasurer, auditor, attorney-general, superintendent of public instruction and commissioner of public lands are elected for a term of four years; and each new administration begins on the second Monday in January. The governor's salary is $6000 a year, which is the maximum allowed by the constitution.

The legislature consists of a Senate and a House of Representatives, and the constitution provides that the number of representatives shall not be less than sixty-three nor more than ninety-nine, and the number of senators not more than one-half nor less than one-third the number of representatives. Senators are elected by single districts for a term of four years, a portion retiring every two years; representatives are elected, one, two or three from a district, for a term of two years. Regular sessions of the legislature are held biennially, in odd-numbered years, and begin on the second Monday in January. Any bill or any item or items of any bill which has passed both houses may be vetoed by the governor, and to override a veto a two-thirds vote of the members present in each house is required. No law other than appropriation bills can go into effect until ninety days after the adjournment of the legislature, except in case of an emergency, by a vote in each house of two-thirds of all its members. The members of the legislature are paid $5 for each day's attendance during the session, besides an allowance for travelling expenses.

Justice is administered principally by a supreme court, superior courts and justices of the peace. The supreme court consists of nine judges elected for a term of six years, one of those whose term next expires being chosen chief justice, and is divided into two departments. The presence of at least three judges in each department is required, and the concurrence of at least three judges is necessary to a decision. In case of a disagreement the case may be heard again in the same department, transferred to the other department, or to the court *en banc*. The chief justice or any four of his associates may at any time convene the court *en banc*, and if so convened at least five of the judges must be present, and the concurrence of at least five is necessary to a decision. The supreme court has original jurisdiction in *habeas corpus*, *quo warranto* and *mandamus* proceedings against all state officers; and it has appellate jurisdiction except in civil actions for the recovery of money or personal property, in which the original amount in controversy does not exceed $200, and which at the same time do not involve the legality of a tax, impost, assessment, toll or municipal fine, or the validity of a statute. Judges of the superior courts (one or more for each county, or one for two or more counties jointly) are elected for a term of four years. They have original jurisdiction in all cases in equity, in all cases at law which involve the title or possession of real property, or the legality of a tax, impost, assessment, toll or municipal fine, and in all other cases at law in which the amount in controversy is $100 or more, in nearly all criminal cases, in matters of probate, in proceedings for divorce, and in various other cases; and they have appellate jurisdiction of cases originally tried before a justice of the peace or other inferior courts where the amount in controversy is more than $20. Justices of the peace, one or more in each election precinct, are elected for a term of two years. They have jurisdiction of various civil actions in which the amount in controversy is less than $100, and concurrent jurisdiction with the superior courts in all cases of misdemeanours, but punishment by a justice of the peace is limited in cities of the first class to a fine of $500, or imprisonment for six months, and elsewhere to a fine of $100 or imprisonment for thirty days.

Local Government.—The government of each county is vested principally in a board of three commissioners elected by a county at large, some for two and some for four years. The other county officers are a clerk, a treasurer, an auditor, an assessor, an attorney, an engineer, a sheriff, a coroner and a superintendent of public schools, each elected for a term of two years. Township organization is in force only when adopted by a particular county at a county election; in 1910 only one county (Spokane) had the township organization. Each township is governed by the electors assembled annually (the first Tuesday in March) in town meeting and by three supervisors, a clerk, a treasurer, an assessor, a justice of the peace and a constable, and an overseer of highways for each road district, all elected at the town meeting, justice of the peace and a constable for a term of two years, the other officers for a term of one year; each overseer of highways is chosen by the electors of his district. Municipalities are incorporated under general laws, and cities are divided into three classes, the first class including those having a population of 20,000 or more, the second class those having a population between 10,000 and 20,000, the third class those having a population between 1500 and 10,000. When a community has a population between 300 and 1500 within an area of 1 sq. m., it may be incorporated as a town. A city of the first class is permitted to frame its own charter, but its general powers are prescribed by statute. A city of the second class must elect a mayor and twelve councilmen, and its mayor must appoint a police judge, an attorney, a street commissioner and a chief of police. A city of the third class must elect a mayor, seven councilmen, a treasurer, a health officer, a clerk and an attorney, and its mayor must apoint a marshal, a police justice and as many policemen as the council provides for. An incorporated town must elect a mayor, five councilmen and a treasurer, and its mayor must appoint a marshal and a clerk.

Miscellaneous Laws.—Either husband or wife may hold, manage and dispose of his or her separate property independent of the other, but property which they hold in common is under the management and control of the husband except that he cannot devise by will more than one-half of the community real or personal property, or convey, mortgage or encumber any of the community real estate unless his wife joins him. When either husband or wife dies intestate one-third of the separate real estate of the deceased goes to the survivor if there are two or more children, one-half of it if there is only one child, the whole of it if there are no children, no issue of children, and no father, mother, brother or sister. One-half of the community property goes to the survivor in any case, and the whole of it if there is no will and neither children nor the issue of children. Where there is no will one-half of the residue of the separate personal estate goes to the survivor if there are issue, and the whole of it if there are no issue. A law enacted in 1909 forbids a marriage in which either of the parties is a common drunkard, habitual criminal, epileptic, imbecile, feeble-minded person, idiot or insane person, a person who has been afflicted with hereditary insanity, a person who is afflicted with pulmonary tuberculosis in its advanced stages, or a person who is afflicted with any contagious venereal disease, unless the woman is at least forty-five years of age. A plaintiff must reside in the state one year before filing an application for a divorce. Neither party is permitted to marry a third party until six months after the divorce has been obtained. Washington has a state board consisting of three members appointed by the governor to confer with commissioners from other states upon such matters as marriage and divorce, insolvency, descent and distribution of property, the execution and probate of wills, for the purpose of promoting uniformity of legislation respecting them. A homestead to the value of $1000 which is owned and occupied by the head of a family is exempt from attachment or forced sale except for debts secured by mechanics', labourers', materialmen's or vendors' liens upon the premises. If the owner is a married man the homestead may be selected from the community property but not the wife's separate property without her consent, and when it has been selected, even if from the husband's separate property, it cannot be encumbered or conveyed without the wife's consent. Personal property is exempt from execution or attachment as follows: all wearing apparel of every person and family; private libraries to the value of $500; all family pictures; household goods to the value of $500; certain domestic animals or $250 worth of other property chosen instead; firearms kept for the use of a person or family; certain articles (within specified values) necessary to the occupations of farmers, physicians, and other professional men, teamsters, lightermen, &c., and the proceeds of all life and accident insurance. By a law enacted in 1909 the licensing of the sale of intoxicating liquors, other than for medical purposes by druggists and pharmacists, is left to the option of counties and cities.

Charities, &c.—The state charitable and penal institutions consist of the Western Washington Hospital for the Insane at Fort Steilacoom, the Eastern Washington Hospital for the Insane at Medical Lake, the State School for the Deaf and the State School for the Blind at Vancouver, the State Institution for Feeble-minded near Medical Lake, the Washington Soldiers' Home and Soldiers' Colony at Orting, the Veterans' Home at Port Orchard, the State Penitentiary at Walla Walla, the State Reformatory at Monroe and the State Training School at Chehalis. All of these institutions are under the management of a bi-partisan State Board of Control which consists of three members appointed by the governor for a term of six years, one every two years, and also removable by the governor in his discretion. Each member receives a salary of $3000 a year. The same board together with the superintendent of the penitentiary constitute a prison board. The State Training School is for the reformatory training of children between eight and eighteen years of age who have been found guilty of any crime other than murder, manslaughter or highway robbery, or who for some other cause have been committed to it by a court of competent jurisdiction.

Education.—The public school system is administered by a state superintendent of public instruction, a state board of education, regents or trustees of higher institutions of learning, a superintendent of the common schools and a board of education in each county, and a board of directors in each school district. The state superintendent is elected for a term of four years. The state board of education consists of the state superintendent, the president of the University of Washington, the president of the State College of Washington, the principal of one of the state normal schools chosen biennially by the principals of the state normal schools, and three other members appointed biennially by the governor, one of whom must be a superintendent of a district of the first class, one a county superintendent and one a principal of a high school. This body very largely determines the course of study in the elementary schools, high schools, normal school and the normal departments of the University and the State College, approves the requirements for entrance to the University and the State College, and prepares the questions for the examination of teachers. Each county superintendent is elected for a term of two years. The county board of education consists of the county superintendent and four other members appointed by him for a term of two years; one of its principal duties is to adopt the text-books for schools in districts in which there is no four-year accredited high school. In a school district which maintains a four-year accredited high school there is a text-book commission consisting of the city superintendent or the principal of the high school, two members of the board of directors designated by the board, and two teachers appointed by the board. All children between eight and fifteen years of age, and all between fifteen and sixteen years of age who are not regularly employed in some useful or remunerative occupation, must attend the public school all the time it is in session or a private school for the same time unless excused by the city or the county superintendent because of mental or physical disability or because of proficiency in the branches taught in the first eight grades. Washington has three state normal schools: one at Cheney, one at Bellingham, and one at Ellensburg, and each of them is under the management of a board of three trustees appointed by the governor with the concurrence of the Senate for a term of six years, one every two years. The State College of Washington (1890) at Pullman, for instruction in agriculture, mechanical arts and natural sciences, includes an agricultural college, an experiment station and a school of science. The University of Washington (1862) at Seattle embraces a college of liberal arts, a college of engineering and schools of law, pharmacy, mines and forestry. Whitman College (Congregational, 1866) at Walla Walla, Gonzaga College (Roman Catholic, 1887) at Spokane, Whitworth College (Presbyterian, 1890) at Tacoma and the University of Puget Sound (Methodist Episcopal, 1903) at Tacoma are institutions of higher learning maintained and controlled by their respective denominations.

Finance.—The revenue for state, county and municipal purposes is derived principally from a general property tax, a privilege tax levied on the gross receipts of express companies and private car companies, an inheritance tax and licence fees for the sale of intoxicating liquors. Real property is assessed biennially; personal property, annually. For the two years ending the 1st of October 1908 the total receipts into the state treasury amounted to $10,854,281·42 and the total disbursements amounted to $11,053,375·13. The net state debt on the 1st of October 1908 amounted to $967,576·38.

History.—The early exploration of the western coast of North America grew out of the search for a supposed passage, sometimes called the "Strait of Anian" between the Pacific and the Atlantic. In *Purchas his Pilgrimmes* (1625) was published the story of Juan de Fuca, a Greek mariner whose real name was Apostolos Valerianos, who claimed to have discovered the passage and to have sailed in it more than twenty days. Though the story was a fabrication, the strait south of Vancouver Island was given his name. An account of the various Spanish and English explorers has already been given under OREGON and need not be repeated at length here.

In 1787 a company of Boston merchants sent two vessels, the "Columbia" and the "Washington" under John Kendrick and Robert Gray (1755–1806) to investigate the possibility of establishing trading posts. They reached Nootka Sound in September 1788, and in July 1789 Captain Gray in the "Columbia" began the homeward voyage by way of China. Captain Kendrick remained, erected a fort on Nootka Sound, demonstrated that Vancouver was an island and in 1791 purchased from the Indians large tracts of land between 47° and 51° N. lat. for his employers. On the homeward voyage he was accidentally killed and his vessel was lost. Meanwhile Captain Gray in September 1790 sailed from Boston on a second voyage. During the winter of 1791–1792 he built another fort on Nootka Sound and mounted four cannon from the ship. With the coming of spring he sailed southward, determined to settle definitely the existence of the great river, which he had vainly attempted to enter the previous summer. Captain George Vancouver (1758–1798), in charge of a British exploring expedition then engaged in mapping the coast (1792–1794), was sceptical of the existence of the river, but Captain Gray, undiscouraged, persisted in the search and on the 11th of May 1792 anchored in the river which he named Columbia in honour of his ship. The later claim of the United States to all the territory drained by the river was based chiefly upon this discovery by Captain Gray, who had succeeded where Spanish and British had failed. The territory became known as Oregon (*q.v.*).

The first white man certainly known to have approached the region from the east was Alexander Mackenzie of the North-west Fur Company, who reached the coast at about lat. 52° in July 1793. With the purchase of Louisiana (30th April 1803) the United States gained a clear title to the land between the Mississippi and the Rocky Mountains as far north as 49° and, because of contiguity, a shadowy claim to the region west of the mountains. In 1819 Spain specifically renounced any claim she might have to the coast north of 42°, strengthening thereby the position of the United States. Just before the purchase of Louisiana, President Jefferson had recommended to Congress (18th January 1803) the sending of an expedition to explore the headwaters of the Missouri, cross the Rockies and follow the streams to the Pacific. In accordance with the recommendation Meriwether Lewis (*q.v.*) and William Clark, both officers of the United States Army, with a considerable party left St Louis on the 14th of May 1804, ascended the Missouri to the headwaters, crossed the Rockies and, following the Columbia river, reached the ocean in November 1805. The return journey over nearly the same route was begun on the 23rd of March 1806, and on the 23rd of September they reached St Louis.

The story of the struggle of the rival British and American companies to control the fur trade, with the final dominance of the Hudson's Bay Company has been told under OREGON and need not be repeated. Since the country was considered to be of little value the question of boundaries was not pressed either by Great Britain or the United States after the War of 1812, and by a treaty concluded on the 20th of October 1818 it was agreed that "any country that may be claimed by either party on the north-west coast of North America, westward of the Stony (Rocky) Mountains shall be free and open for the term of ten years from the date of the signature of the present convention to the vessels, citizens and subjects of the two powers." On the 6th of August 1827 the convention was continued in force indefinitely with the proviso that either party might abrogate the agreement on twelve months' notice. Meanwhile Russia (17th April 1824) agreed to make no settlement south of 54° 40′ and the United States agreed to make none north of that line. In February 1825 Great Britain and Russia made a similar agreement. This left only Great Britain and the United States as the contestants for that territory west of the Rocky Mountains between 42° and 54° 40′, which by this time was commonly known as the Oregon country. American settlers in considerable numbers soon began to enter the region south of the Columbia river, and in 1841, and again in 1843, these settlers attempted to form a provisional government. A fundamental code was adopted in 1845 and a provisional government was established, to endure until "the United States of America extend their jurisdiction over us." North of the river, the Hudson's Bay Company discouraged settlement, believing that the final determination of the boundary controversy would make that stream the dividing line. Though there were a few mission stations in the eastern part of the present state of Washington (see WHITMAN, MARCUS), the first permanent American settlement north of the Columbia was made in 1845 on the Des Chutes river, at the head of Puget Sound at the present Tumwater. Others soon followed in spite of the efforts of the chief factor of the Hudson's Bay Company, Dr John M'Loughlin, and these permanent settlers finally carried the day.

Interest in the Oregon country developed with the increase of settlers and of knowledge and a demand for the settlement of the boundary dispute arose. The report of Captain Charles Wilkes, who visited the coast in 1841–1842 in charge of the United States exploring expedition helped to excite this interest. In the presidential campaign of 1844 one of the Democratic demands was "Fifty-four forty or fight." By a treaty negotiated by James Buchanan, on the part of the United States, and Richard Pakenham, on the part of Great Britain, and ratified on the 17th of July 1846, the boundary was fixed at 49° to the middle of the channel separating the continent from Vancouver Island and thence "southerly through the middle of the said channel and of Fuca's Straits to the Pacific Ocean." A dispute later arose over this water-line. The act establishing a territorial government for Oregon was approved on the 14th of August 1848, and the first governor, Joseph Lane (1801–1881), assumed the government on the 3rd of March 1849. Following the increase of population north of the Columbia, the territory was divided, and Washington Territory was established on the 2nd of March 1853, with the river as the southern boundary to the point where it is intersected by the forty-sixth parallel, and thence along that parallel to the summit of the Rocky Mountains, thereby including portions of the present states of Idaho and Montana. The first governor, Major Isaac I. Stevens, of the United States Army, took charge on the 29th of September 1853, and a census indicated a population of 3965, of whom 1682 were voters. Olympia was chosen as the temporary seat of government, and Governor Stevens at once set to work to extinguish the Indian titles to land and to survey a route for a railway, which was later to become the Northern Pacific. The Indians, alarmed by the rapid growth of the white population, attempted to destroy the scattered settlements and the wandering prospectors for gold, which had been discovered in eastern Washington in 1855. Between 1855 and 1859, after many sharp contests, the Indians were partially subdued.

Shortly after 1846, the British began to assert that the Rosario Strait and not Haro Strait (as the Americans held) was the channel separating the mainland and Vancouver Island, thus claiming the Haro Archipelago of which San Juan was the principal island. Conflict of authority arose, and in 1859 San Juan was occupied by U.S. troops commanded by Captain George E. Pickett (1825–1875), and for a time hostilities seemed imminent. By agreement joint occupation followed until, by the Treaty of Washington (May 8, 1871), the question was left to the German emperor, who decided (October 21, 1872) in favour of the United States. Meanwhile Oregon was admitted as a state (February 14, 1859) with the present boundaries, and the remnant of the territory, including portions of what are now Idaho and Wyoming, was added to Washington. The discovery of gold in this region, however, brought such a rush of population that the Territory of Idaho was set off (March 3, 1863) and Washington was reduced to its present limits. Rapid growth in population and wealth led to agitation for statehood, and a constitution was adopted in 1878, but Congress declined to pass an enabling act. The development of Alaska and the completion of the Northern Pacific Railroad to the coast (1883) brought a great increase in population. A large number of Chinese coolies who had been introduced to construct the railway congregated in the towns on the completion of the work, and in 1885 serious anti-Chinese riots led to the declaration of martial law by the governor and to the use of United States troops. Finally the long-desired admission to statehood was granted by Congress (February 22, 1889) and President Benjamin Harrison (November 11, 1889) formally announced the admission complete.

Since admission the progress of the state has continued with increasing rapidity. The Alaska-Yukon Exposition, designed to exhibit the resources of western America, held at Seattle June–October 1909, was a complete success. In politics the state has been Republican in national elections, except in 1896, when it was carried by a fusion of Democrats and Populists. A Populist was elected governor and was re-elected in 1900.

GOVERNORS OF WASHINGTON

Territorial.

Isaac I. Stevens	1853–1857
C. H. Mason (acting)	1857
Fayette McMullen	1857–1858
C. H. Mason (acting)	1858–1859
Richard D. Gholson	1859–1860
Henry M. McGill (acting)	1860–1861
Wm. H. Wallace	1861
L. J. S. Turney (acting)	1861–1862
Wm. Pickering [1]	1862–1866
George E. Cole	1866–1867
E. L. Smith (acting)	1867
Marshall F. Moore	1867–1869
Alvin Flanders	1869–1870
Edward S. Salmon	1870–1872
Elisha P. Ferry	1872–1880
W. A. Newell	1880–1884
Watson C. Squire	1884–1887
Eugene Semple	1887–1889
Miles C. Moore	1889

State.

Elisha P. Ferry	Republican	1889–1893
John H. McGraw	"	1893–1897
J. R. Rogers	Populist	1897–1901
Henry C. McBride [2]	Republican (acting)	1901–1905
Albert E. Mead	Republican	1905–1909
Samuel G. Cosgrove [3]	"	1909
M. E. Hay	Republican (acting)	1909–

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WASHSTAND, a table or stand containing conveniences for personal ablutions. In its 18th-century form it was called a "basin stand" or "basin frame," and is still sometimes described as a "washhand stand." Its direct, but remote, ancestor was the monastic *lavabo*, ranges of basins of stone, lead or marble fed from a cistern. They were usually of primitive conception, and a trough common to all was probably more frequent than separate basins. Very occasionally they were of bronze adorned with enamels and blazoned with heraldry. Very similar usages obtained in castles and palaces, fixed lavatories being constructed in the thickness of the walls for the use of their more important residents. These arrangements were obviously intended only for the summary ablutions which, until a very late date, sufficed to even the high-born. By degrees the *lavabo* became portable, and a "basin frame" is mentioned as early as the middle of the 17th century. Examples of earlier date than the third or fourth decade of the 18th century are, however, virtually unknown. Thenceforward, until about the end of that century, this piece of furniture was usually literally a "stand." It was supported upon a tripod; a circular orifice in the top received the basin, and smaller ones were provided for a soap dish and a water-bottle. Sometimes a stand for the water-jug when the basin was in use was provided below, and very commonly there was a drawer, sometimes even two drawers, below the basin. Great numbers of these stands were made to fit into corners, and a "corner wash-stand" is still one of the commonest objects in an old furniture shop. Chippendale designed such stands in an elaborate rococo fashion, as well as in simpler form. As the 18th century drew to its close the custom of using the same apartment as reception room by day and sleeping room by night produced a demand for what was called "harlequin furniture"—pieces which were contrived a double or triple debt to pay. Thus a variety of complicated combination washstands and dressing tables were made, and fitted with mirrors and sometimes with writing conveniences and drawers for clothes. Sheraton developed astonishing ingenuity in devising a type of furniture which, if we may judge by the large number of examples still existing, must have become highly popular. With the beginning of the 19th century and the expansion of ideals of personal cleanliness, the washstand grew in size and importance. It acquired the form of an oblong wooden table provided, like its smaller predecessors, with orifices for basins and fitted with a broad shelf-like stretcher upon which the jugs were placed when they were removed from the basins. Ample space was provided for soap-dishes and water-bottles. These tables were single or double, for the use of one or two persons. The washstand, as we know it in the 20th century, took its final form when the wooden top was replaced by marble, unpierced, the basins being placed upon the slab, which, in the beginning almost invariably white, is now often of red or other warm-tinted marble.

WASP (Lat. *vespa*), the common name for a well-known sort of stinging insect. The order Hymenoptera is divided into two sub-orders, the Symphyta and the Apocrita. The latter is subdivided into several sections, one of which, the Vespoidea, includes all the true wasps; in addition to the ruby wasps and many of the "Fossores" or digging wasps.

The true wasps (forming the old section Diploptera) are in their turn divided into three families—(1) the Vespidae, (2) the

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[1] Absent from the Territory during the greater part of 1865, during which time Elwood Evans acted as governor.

[2] In place of J. R. Rogers, deceased.

[3] Died 28th March 1909.

Eumenidae, and (3) the Masaridae, which together comprise some 1500 different species. They are characterized by their wings, which are present in both sexes and also in the modified females or workers, being longitudinally folded when at rest, except in the Masaridae. The antennae are usually elbowed, and contain twelve or thirteen joints; in some cases they are clavate. A pair of notched faceted eyes are present, and three ocelli in the top of the head. The mouth-parts are arranged for sucking, but have not reached that degree of perfection found amongst the bees. Hence wasps cannot obtain the sugary secretion from deeply-seated nectaries, and their visits to flowers are confined to such as are shallow or widely opened; they particularly frequent the Umbelliferae. The maxillae are elongated, and compressed, the maxillary palp six-jointed. The labium is prolonged centrally into a "tongue," which is glandular at the tip; the paraglossae are linear. The labial palp has three or four joints. The pro-thorax is oval, and its sides are prolonged backward to the base of the wings. The fore wing has two or three submarginal cells. The legs are not provided with any adaptations for collecting pollen. The abdomen is sometimes pedunculate, its second (apparently first) segment being drawn out into a long stalk, which connects it with the alitrunk, made up of the thorax and the first abdominal segment. The queens and the workers are armed with a powerful sting. The usual colour of these insects is black, relieved to a greater or less degree by spots and patches of yellow or buff.

The Diploptera may be subdivided into two groups in accordance with the habits of life of the insects comprising the section. One of the groups includes the family Vespidae, which is composed of social wasps, and includes the hornet (*Vespa crabro*) and the common wasp (*V. vulgaris*). The other group contains two smaller families, the Eumenidae and the Masaridae, the members of which are solitary in their mode of life.

Family 1. *Vespidae*.—In addition to their social habits the members of this family are characterized by certain structural features. The anterior wings have three submarginal cells. The antennae have thirteen joints in the males and twelve in the females; the claws of the tarsi are simple; the anterior four tibiae have two spines at the tip; the abdomen is but rarely pedunculated, and the posterior segments are often very contractile.

The members of this family approximate very closely to bees in their social manner of life. The communities are composed of males, fertile females and workers. The latter are females in which the ovary remains undeveloped; they resemble the perfect female in external appearance, but are slightly smaller. It has been shown by P. Marchal that a clear line of distinction between queen and worker cannot always be drawn. Unlike the hive bees', the wasps' community is annual, existing for one summer only. Most of the members die at the approach of autumn, but a few females which have been fertilized hibernate through the winter, sheltered under stones or in hollow trees. In the spring and with the returning warm weather the female regains her activity and emerges from her hiding-place. She then sets about finding a convenient place for building a nest and establishing a new colony. The common wasp (*V. vulgaris*) usually selects some burrow or hole in the ground, which, if too small, she may enlarge into a chamber suitable for her purpose. She then begins to build the nest. This is constructed of small fibres of old wood, which the wasp gnaws, and kneads, when mixed with the secretion from the salivary glands, into a sort of papier-mâché pulp. Some of this is formed into a hanging pillar attached to the roof of the cavity, and in the lower free end of this three shallow cup-like cells are hung. In each of these an egg is laid. The foundress of the society then continues to add cells to the comb, and as soon as the grubs appear from the first-laid eggs she has in addition to tend and feed them. The development within the egg takes eight days.

The grubs are apodal, thicker in the middle than at either end; the mandibles bear three teeth; the maxillae and labium are represented by fleshy tubercles. The body, exclusive of the head, consists of thirteen segments, which bear lateral tubercles and spiracles. The larva has no anus. The larvae are suspended with the head downwards in the cells, and require a good deal of attention, being fed by their mother upon insects which are well chewed before they are given to the larvae, or upon honey. At the same time the mother is enlarging and deepening the cells in which they live, building new cells, and laying more eggs, which are usually suspended in the same angle of each cell.

After about a fortnight the grubs cease to feed, and, forming a silky cover to their cells, become pupae. This quiescent stage lasts about ten days, at the end of which period they emerge as the imago or perfect insect. The silky covering of the cell is round or convex outwards; and to leave the cell the insect either pushes it out, when it opens like a box lid, or gnaws a round hole through it. As soon as the cell is vacated it is cleaned out and another egg deposited. In this way two or three larvae occupy successively the same cell during the summer. The first wasps that appear in a nest are workers, and these at once set to work to enlarge the comb, and feed the larvae, &c.

The material of the nest, as before stated, is usually dried wood, worked by the mandibles of the wasp, with the addition of its salivary secretion, into a pulp, which can easily be moulded whilst moist; it dries into a substance of a papery appearance, but possessing considerable tenacity. Sometimes paper itself, such as old cartridge cases, is used. The combs are arranged horizontally; each contains a single layer of cells opening downwards. The second comb is suspended from the first by a number of hanging pillars which are built from the point of union of three cells. The space between two combs is just sufficient to allow the wasps to cross each other. The combs are roughly circular in outline, and increase in size for the first four or five layers, after which they begin to decrease; the whole is covered by a roughly made coating consisting of several layers of the same papery substance which composes the combs. This is continued down until it forms a roughly spherical covering for the whole, but not giving any support to the combs, which are independent of it. As the nest increases in size, the covering needs to be repeatedly pulled to pieces and reconstructed, its inner layer being cut away as the combs are enlarged. The covering is pierced by apertures for the passage of the wasps. The cells are hexagonal at their mouths, but above become more rounded in their cross section.

During the first half of the summer workers only are produced, but, as fruit ripens and food becomes more abundant, fully developed females and males appear, the latter often from parthenogenetically developed eggs of the later broods of workers. The males and females are larger than the workers, and require larger cells for their development; these are usually kept apart from one another and from those of the workers. The males may be distinguished by their longer antennae, by the more elongated outline of their body, and by the absence of a sting.

In a favourable season, when the weather is warm and food plentiful, a nest may contain many thousands of cells full of wasps in various stages of development; and, as each cell is occupied two or three times in the course of a summer, those authorities who put the number of the members of the community as high as 30,000 are probably not far wrong.

At the approach of autumn the society begins to break up; the males fertilize the females whilst flying high in the air. They then die, often within a few hours. The workers leave the nest, carrying with them any grubs that remain in the cells, and both soon perish. The nest is entirely deserted. The fertilized females, it has been seen, creep into crevices under stones or trees, or hide amongst moss, and hibernate until the warmth of the following spring induces them to leave their hiding-places and set about founding a new community.

There are altogether seven species of *Vespa* met with in Britain. *V. vulgaris*, the common or ground wasp, *V. rufa*, the red wasp, distinguished by its reddish-yellow abdomen, and *V. germanica*, the German wasp, with three black spots upon its first abdominal segment, are classed together as ground wasps. They build their nests in burrows in the ground, but this is not an invariable rule; they may be distinguished from the tree wasps by their shorter cheeks and usually by the first joint in the antennae of the female being black. *Vespa austriaca* (*arborea*) is a race of *V. rufa*, in whose nest it sometimes lives as an inquiline. The tree wasps build stouter nests upon branches of trees; the first joint of the antennae of the females is yellow in front. The tree wasps are *V. sylvestris*, *norvegica* and *crabro*.

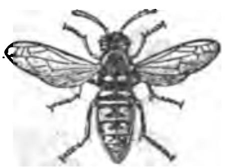

FIG. 1.—*Vespa rufa*.

The hornet, *V. crabro*, is the largest species occurring in Great Britain. They have a more distinctly red colour than the common wasp, and a row of red spots upon each side of the abdomen. They occur much more rarely than the common wasp, and appear to be almost confined to the southern half of England. Their nests resemble those described above, but are larger; they are found in hollow trees or deserted out-houses. Their communities are smaller in number than those of the other wasps.

The hornet, where it occurs in any number, does a considerable amount of damage to forest trees, by gnawing the bark off the younger branches to obtain material for constructing its nest. It usually selects the ash or alder, but sometimes attacks the lime, birch and willow. Like the wasp, it does much damage to fruit, upon the juices of which it lives. On the other hand, the wasp is useful by keeping down the numbers of flies and other insects. It catches these in large numbers, killing them with its jaws and not with its sting. It then tears off the legs and wings, and bears the body back to its nest as food for the larvae. Wasps also act to some extent as flower fertilizers, but in this respect they cannot compare with bees; they visit fewer flowers, and have no adaptations on their limbs for carrying off the pollen.

The genus *Vespa* is very widely spread; it contains over forty species, distributed all over the world. Some of the largest and handsomest come from eastern Asia. *V. mandarina* of China and Japan, and *V. magnifica* of the East Indies and Nepal, measure 2 in. across the wings; *V. orientalis*, found in Greece, Egypt and the East, builds its nest of clay.

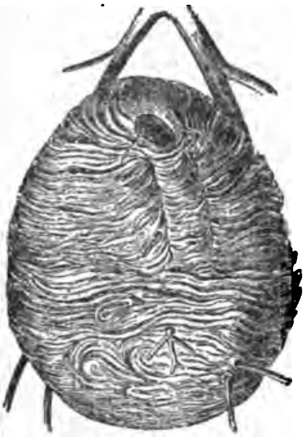
FIG. 2.—Nest of *Vespa sylvestris*.

The only other genus of Vespidae which is found in Europe is *Polistes*, which occurs in the countries bordering the Mediterranean. The colonies of this genus are much smaller than those of *Vespa*. Each nest consists of a single tier of cells in the form of a round plate, supported in the middle by a single stalk. This comb is sometimes vertical, the cells then being horizontal or slightly oblique. Some of the members of this genus store up honey, which in the case of a South American species is poisonous, from the nature of the flowers from which it is gathered. The members of this genus have a slender body; the thorax is more oblong than in the genus *Vespa*, the palps are stouter and the abdomen is more distinctly pedunculate.

The genus *Ischnogaster*, from the East Indies, has many structural features in common with the Eumenidae, but the character of its communities, and its nest, which is very small, justify its position amongst the social wasps.

The genus *Icaria*, common in Australia and the East Indies, builds very small nests, of two or three rows of cells, hanging on one side from a stalk.

Synaeca is a South American genus, which builds large nests, sometimes 3 ft. in length, closely applied to the branch of a tree; they never contain more than one layer of cells, which are horizontally placed. The whole nest is built of coarse material, chiefly small pieces of bark: and there is only one opening, at the lower end.

Another South American genus, *Chartergus*, makes a tough nest, pendent from boughs of trees, and opening to the exterior below by a median aperture. The combs are arranged, somewhat like funnels, inside one another, but with spaces between. The apex of each comb is pierced by a hole for the wasps to pass from one gallery to another.

The nest of *Tatua*, which occurs in Mexico and South America, is also pendent, but the combs are horizontal; the opening from the exterior is at the side, and the passage from one gallery to another is also lateral.

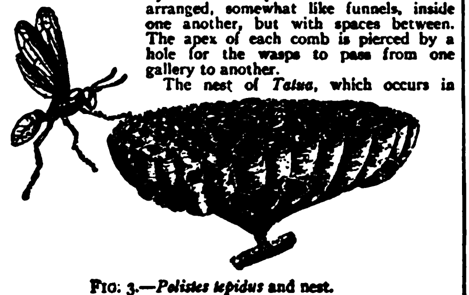
FIG. 3.—*Polistes lepidus* and nest.

The external appearance of the nest of *Nectarina*, found in Brazil and other parts of South America, resembles that of the common wasp, but is rougher. Internally the combs are arranged concentrically, more or less parallel with the external covering which affords them support.

The members of the two remaining families, the Eumenidae and the Masaridae, resemble one another in their solitary mode of life; only males and normal females exist—no workers being found.

Family 2. *Eumenidae.*—So[illegible] three submarginal cells in the fore wing; an[illegible]nts in the male, twe[illegible]late, posterior se[illegible] features the [illegible] having bifid claws on their tarsi, and the two anterior tibiae have but one spine at the tip. The mandibles are elongated, and form a kind of rostrum, in this respect approaching the *Fossores*.

Eumenes coarctata is the only British species of this genus. The female is ½ in. long, the male somewhat shorter. The abdomen is connected with the thorax by a long peduncle. The colour is black, relieved by spots of yellow. It constructs small spherical cells of mud, which are found attached to stems of plants, very generally to the heath. At first the cell opens to the exterior by means of a round pore; one egg is deposited in each cell, and a store of honey as food for the larva when hatched; the cell is then closed with mud. The larvae of some species are carnivorous, and then the food-supply stored up in the cell consists of caterpillars and other insect larvae which have been paralysed by the parent wasp stinging them through the cerebral ganglion; when the larva of the *Eumenes* emerges from the egg it sets upon these and devours them.

FIG. 4. *Eumenes smithii.*

The genus *Odynerus* contains a very large number of species, found in all parts of the world. The members of this genus are about the size of a fly, and they differ from *Eumenes* in having a sessile abdomen. Some of the species construct their cells in sand-heaps, lining them with agglutinated grains of sand; others live in cavities of trees lined with the same material, whilst others build their nests of mud. Like some of the species of *Eumenes*, they store up paralysed Lepidopterous and Chrysomeleous larvae as food for their carnivorous grubs.

Family 3. *Masaridae.*—The members of the third family, the Masaridae, are sharply distinguished by the possession of only two submarginal cells in the fore wing, which folds imperfectly or not at all when at rest. Their antennae are frequently clavate, particularly so in the genus *Celonites*; they are twelve-jointed, but as the terminal joints are almost fused they appear to be composed of only eight joints. The wings are not so completely folded as in the other two families, and the abdomen is but slightly contractile. The maxillae are short and their palps very small, with but three or four joints.

The number of genera comprised in this family is small; none occur in Britain, but in southern Europe some species are found. They make their nest in cavities in the earth, generally in a bank, and construct an irregular gallery leading down to it.

During hot fine summers wasps cause a good deal of loss to market gardeners and fruit growers. During this time of year they live almost exclusively upon the sweet juices of ripe fruit, occasionally carrying off small particles of the flesh. At the same time they have not entirely lost their carnivorous tastes, for they frequently attack the meat in butcher's shops, but render compensation by killing and carrying off to feed their grubs considerable numbers of blow-flies. Wasps also perform an important service in keeping down the numbers of caterpillars. The larvae are almost exclusively carnivorous, living upon insects captured by their parents and reduced by them to a pulp before being given to the young. During the spring the first broods that appear live largely upon honey; and this forms the staple food of the genus *Polistes* throughout their whole life.

FIG. 5.—*Masaris vespiformis.*

In attempting to rid a district of wasps, unless the nest can be taken, there is little good in killing stray members of the community. On the other hand, the killing of queen-wasps in early spring probably means that the formation of a nest and the production of a society whose members are counted by thousands is in each case prevented.

The number of wasps is kept down by numerous enemies. The most effective of these live in the nests and devour the larvae; among them are two species of beetle, *Rhipiphorus paradoxus* and *Lebia linearis*. Two species of *Ichneumon*, and a species of *Anthomyia*, also infest the nests of wasps and prey upon the grubs. The larvae of the syrphid flies *Volucella*, found in the nests of both wasps and bees, are now believed to be scavengers rather than parasites. In the tropics some species are attacked by fungi, the hyphae of which protrude between the segments of the abdomen, and give the wasp a very extraordinary appearance.

Bibliography.—In addition to various systematic memoirs enumerated at the end of the article on Hymenoptera, reference may be made to De Saussure (*Monographie des guêpes sociales*, Genève, 1853–1858), P. Marchal (*Arch. Zool. Exp. Gen.* (3), iv., 1896), C. Janet (*Mem. Soc. Zool. France*, viii., 1895) and O. H. Latter (*Natural History of Common Animals*, ch. v., Cambridge, 1904).

(A. E. S.; G. H. C.)

WASSAIL (O. Eng. *was hál*, "be whole," "be well"), primarily the ancient form of "toasting," the term being applied later to the Christmas feasting and revelries and particularly to the bowl of spiced ale or wine which was a feature of the medieval Christmas. One of the earliest references to the wassail-bowl in English history is in the description of the reception of King Vortigern by Hengist, when Rowena "came into the king's presence, with a cup of gold filled with wine in her hand, and making a low reverence unto the king said, 'Waes hael hlaford Cyning,' which is 'Be of health, Lord King.'" In a collection of ordinances for the regulations of the royal household in Henry VII.'s reign, the steward on Twelfth Night was to cry "wassail" three times on entering with the bowl, the royal chaplain responding with a song. Wassailing was as much a custom in the monasteries as in laymen's houses, the bowl being known as *poculum Caritatis*. What was popularly known as wassailing was the custom of trimming with ribbons and sprigs of rosemary a bowl which was carried round the streets by young girls singing carols at Christmas and the New Year. This ancient custom still survives here and there, especially in Yorkshire, where the bowl is known as "the vessel cup," and is made of holly and evergreens, inside which are placed one or two dolls trimmed with ribbons. This cup is borne on a stick by children who go from house to house singing Christmas carols. In Devonshire and elsewhere it was the custom to wassail the orchards on Christmas and New Year's eve. Pitchers of ale or cider were poured over the roots of the trees to the accompaniment of a rhyming toast to their healths.

WASTE (O. Fr. *wast*, *guast*, *gast*, *gaste*; Lat. *vastus*, vast, desolate), a term used in English law in several senses, of which four are the most important. (1) "Waste of a manor" is that part of a manor subject to rights of common, as distinguished from the lord's demesne (see Commons, Manor). (2) "Year, day, and waste" was a part of the royal prerogative, acknowledged by a statute of Edward II., *De Praerogativa Regis*. The king had the profits of freehold lands of those attainted of felony and petit treason, and of fugitives for a year and a day with a right of committing waste in sense (3) thereon. After the expiration of a year and a day the lands returned to the lord of the fee. This species of waste was abolished by the Corruption of Blood Act 1814 (see Felony, Treason). (3) The most usual signification of the word is "any unauthorized act of a tenant, for a freehold estate not of inheritance, or for any lesser interest, which substantially alters the permanent character of the thing demised (i.) by diminishing its value, (ii.) by increasing the burden on it, (iii.) by impairing the evidence of title and thereby injuring the "inheritance" (*West Ham Charity Board* v. *East London W.W.*, 1900, 1 Ch. 624, 637; cf. Pollock, *Law of Torts*, 7th ed., 345).

Waste in sense (3) is either *voluntary* or *permissive*. Voluntary waste is by act of commission, as by pulling down a house, wrongfully removing fixtures (*q.v.*), cutting down timber trees, *i.e.* oak, ash, elm, twenty years old, and such other trees, *e.g.* beech, as by special custom are counted timber, in the district, opening new quarries or mines (but not continuing the working of existing ones), or doing anything which may—for this is the modern test—alter the nature of the thing demised, such as conversion of arable into meadow land. Although an act may technically be waste, it will not as a rule constitute actionable waste, or be restrained by injunction, in the absence of some prohibitive stipulation if it is "ameliorating," *i.e.* if it improves the value of the land demised (see *Meux* v. *Cobley*, 1892, 2 Ch. 253, 263). In the case of "timber estates" upon which trees of various kinds are cultivated solely for their produce and the profit gained from their periodical felling and cutting, the timber is not considered as part of the inheritance but as the annual fruits of the estate, and an exception arises in favour of the tenant for life (see *Dashwood* v. *Magniac*, 1891, 3 Ch. 306). Under the Settled Land Act 1882 a tenant for life may grant building, mining and other leases for the prescribed terms "for any purpose whatever, whether involving waste or not." *Permissive* waste is by act of omission, such as allowing buildings to fall out of repair. A "fermor"—a term which here includes "all who held by lease for life or lives, or for years by deed or without deed" by the statute of Marlborough (1267)—may not commit waste without licence in writing from the reversioner. In case a tenant for life or for any smaller interest holds (as is often the case by the terms of a will or settlement) "without impeachment of waste" (*sauns impeachment de wast*, *i.e.* without liability to have his waste challenged or impeached), his rights are considerably greater, and he may use the profits *salva rerum substantia* (to use the language of Roman law, from which the English law of waste is in great measure derived). For instance, he may cut timber in a husband-like manner and open mines; but he may not commit what is called *equitable* waste, that is, pull down or deface the mansion or destroy timber planted or left for ornament or shelter (*Weld-Blundell* v. *Wolseley*, 1903, 2 Ch. 664). Acts of equitable waste were, before 1875, not cognizable in courts of common law, but by the Judicature Act 1873, s. 25 (3), in the absence of special provisions to that effect an estate for life without impeachment of waste does not confer upon the tenant for life any legal right to commit equitable waste. A copy-holder may not commit waste unless allowed to do so by the custom of the manor. The penalty for waste is forfeiture of the copyhold; *Galbraith* v. *Poynton*, 1905, 2 K.B. 258 (see Copyhold). The Agricultural Holdings Acts 1900 and 1906, by reason of their provisions giving compensation for improvement, as regards the holdings to which they apply, override some of the old common law doctrines as to waste. The act of 1900 provides (s. 2 [3]) that where a tenant, who claims compensation for improvements, has wrongfully been guilty of waste, either voluntary or permissive, the landlord shall be entitled to set off the sums due to him in respect of such waste, and to have them assessed by arbitration in manner provided by the acts of 1900 and 1906. Under the act of 1906 the tenant is permitted to disregard the terms of his tenancy as to the mode of cropping on arable land, but if he exercises his statutory freedom of cropping in such a manner as to injure or deteriorate his holding, the landlord is entitled to recover damages for such injury, &c. (s. 3).

Remedies for Waste.—Various remedies for waste have been given to the reversioner at different periods in the history of English law. At common law only *single* damages seem to have been recoverable. This was altered by the legislature, and for some centuries waste was a criminal or quasi-criminal offence. Magna Carta enacted that a guardian committing waste of the lands in his custody should make amends and lose his office. The statute of Marlborough (1267) made a "fermor" (as above defined) committing waste liable to grievous amercement as well as to damages, and followed Magna Carta in forbidding waste by a guardian. The statute of Gloucester (1278) enacted that a writ of waste might be granted against a tenant for life or years or in courtesy or dower, and on being attainted of waste the tenant was to forfeit the land wasted and to pay thrice the amount of the waste. This statute was repealed by the Civil Procedure Acts Repeal Act 1879. In addition to the writ of waste the writ of *estrepement* (said to be a corruption of *exstirpamentum*, and to be connected with the French *estrepier*, to lame) lay to prevent injury to an estate to which the title was disputed. This writ has long been obsolete. Numerous other statutes dealt with remedies for waste. The writ of waste was superseded at common law by the "mixed action" of waste (itself abolished by the Real Property Limitation Act 1833), and by the action of trespass on the case (see Tort, Trespass). The court of chancery also intervened by injunction to restrain equitable waste. At present proceedings may be taken either by action for damages, or by application for an injunction, or by both combined, and either in the king's bench or in the chancery divisions. By the Judicature Act 1873, s. 25 (8), the old jurisdiction to grant injunctions to prevent threatened waste is considerably enlarged. The Rules of the Supreme Court, Ord. xvi. r. 37, enable a representative action to be brought for the prevention of waste. In order to obtain damages or an injunction, substantial injury or danger of it must be proved. In England only the high court (unless by agreement of the parties) has jurisdiction in questions of waste, but in Ireland, where the law of waste is similar to English law, county courts and courts of summary jurisdiction have co-ordinate authority to a limited extent (cf. Land Act 1860, ss. 35-39).

The law of waste as it affects ecclesiastical benefices will be found under Dilapidations.

(4) "Waste of assets" or "*devastavit*" is a squandering and misapplication of the estate and effects of a deceased person by his executors or administrators, for which they are answerable out of their own pockets as far as they have or might have had assets of the deceased (see Executors and Administrators). Executors and administrators may now be sued in the county court for waste of assets (County Courts Act 1888, s. 95).

Scotland.—In Scots law "waste" is not used as a technical term, but the respective rights of fiar and life-renter are much the same as in England. As a general rule, a life-renter has no right to cut timber, even though planted by himself. An exception is admitted in the case of coppice wood, which is cut at regular intervals and allowed to grow again from the roots. Grown timber is also available to the life-renter for the purpose of keeping up the estate or repairing buildings. Before making use of mature timber for estate purposes, the life-renter should give notice to the fiar. He is also entitled to the benefit of ordinary windfalls. Extraordinary windfalls are treated as grown timber. Life-renters by "constitution" (*i.e.* by grant from the proprietor) as opposed to life-renters by "reservation" (where the proprietor has reserved the life-rent to himself in conveying the fee to another) have, as a rule, no right to coals or minerals underground if they are not expressed in the grant or appear to have been intended by a testator to pass by his settlement, for they are *partes soli.* Where coals or minerals are expressed in the grant, and also in cases of life-rent by "reservation," the life-renter may work any mine which had been opened before the beginning of his right, provided he does not employ a greater number of miners, or bring up a greater quantity of minerals, than the unburdened proprietor did. All life-renters are entitled to such minerals as are required for domestic use and estate purposes.

British Possessions.—French law is in force in Mauritius, and has been followed in substance in the civil codes of Quebec (art. 455) and St Lucia (art. 406). In most of the other colonies the rules of English law are followed, and in many of them there has been legislation on the lines of the English Settled Land Acts. In India the law as to waste is included to some extent in the Transfer of Property Act (No. IV. of 1882) and its amendments. Section 108 deals with the liabilities of lessees for waste, which may be varied by the terms of the lease or by local usage. The liabilities for waste of persons having under Hindu or Mahommedan law limited interests in reality depend in the main upon those laws and not on Indian statute law.

United States.—"In the United States, especially in the Western states, many acts are held to be only in a natural and reasonable way of using and improving the land—clearing wild woods, for example—which in England, or even in the Eastern states, would be manifest waste" (Pollock, *Torts*, 7th ed., 345). Thus Virginia, North Carolina, Vermont and Tennessee have deviated in favour of the tenant from English rules, while Massachusetts has adhered to them (*Ruling Cases*, tit. "Waste," xxv. 380, American notes). In certain states, *e.g.* Minnesota, Oregon and Washington (ibid., p. 381), the action of waste is regulated by statute.

Europe.—The French Civil Code provides (art. 591) that the usufructuary may cut timber in plantations that are laid out for cutting, and are cut at regular intervals, although he is bound to follow the example of former proprietors as to quantity and times. This provision is in force in Belgium (Civil Code, art. 591). Analogous provisions are to be found in the civil codes of Holland (art. 814), Spain (art. 485), Italy (art. 486), and cf. the German Civil Code, art. 1036.

AUTHORITIES.—English law: Bewes, *Law of Waste*; Fawcett, *Law of Landlord and Tenant*; Foa, *Law of Landlord and Tenant*; Woodfall, *Law of Landlord and Tenant.* Scots law: Erskine, *Principles* (Edinburgh). Irish law: Nolan and Kane, *Statutes relating to the Law of Landlord and Tenant in Ireland* (Dublin); Wylie, *Judicature Acts* (Dublin). American law: Bouvier, *Law Dict.* (Boston and London). Indian law: Shepherd and Brown, *Indian Transfer of Property Act 1882.* (A. W. R.)

WATCH (in O. Eng. *wæcce*, a keeping guard or watching, from *wacian*, to guard, watch, *wæcan*, to wake), a portable timepiece. This is the most common meaning of the word in its substantival form, and is the subject of the present article. The word, by derivation, means that which keeps watchful or wakeful observation or attention over anything, and hence is used of a person or number of persons whose duty it is to protect anything by vigilance, a guard or sentry; it is thus the term for the body of persons who patrolled the streets, called the hours, and performed the duties of the modern police. The application of the term to a period of time is due to the military division of the night by the Greeks and Romans into "watches" (*φυλακαί*, *vigiliae*), marked by the change of sentries; similarly, on shipboard, time is also reckoned by "watches," and the crew is divided into two portions, the starboard and port watches, taking duty alternately.[1] The transference of the word to that which marks the changing hours is easy.

The invention of portable timepieces dates from the end of the 15th century, and the earliest manufacture of them was in Germany. They were originally small clocks with mainsprings enclosed in boxes; sometimes they were of a globular form and were often called "Nuremberg eggs." Being too large for the pocket they were frequently hung from the girdle. The difficulty with these early watches was the inequality of action of the mainspring. An attempt to remedy this was provided by a contrivance called the stack-freed, which was little more than a sort of rude auxiliary spring. The problem was solved about the years 1525–1540 by the invention of the fusee. By this contrivance the mainspring is made to turn a barrel on which is wound a piece of catgut, which in the latter part of the 16th century was replaced by a chain. The other end of the catgut band is wound upon a spiral drum, so contrived that as the spring runs down and becomes weaker the leverage on the axis of the spiral increases, and thus gives a stronger impulse to the works (fig. 1).

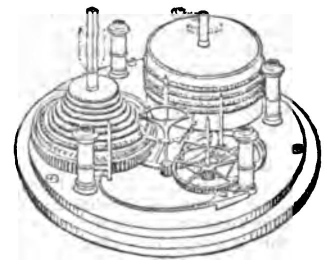
FIG. 1.

In early watches the escapement was the same as in early clocks, namely, a crown wheel and pallets with a balance ending in small weights. Such an escapement was, of course, very imperfect, for since the angular force acting on the balance does not vary with the displacement, the time of oscillation varies with the arc, and this again varies with every variation of the driving force. An immense improvement was therefore effected when the hair-spring was added to the balance, which was replaced by a wheel. This was done about the end of the 17th century. During the 18th century a series of escapements were invented to replace the old crown wheel, ending in the chronometer escapement, and though great improvements in detail have since been made, yet the watch, even as it is to-day, may be called an 18th-century invention.

The watches of the 16th century were usually enclosed in cases ornamented with the beautiful art of that period. Sometimes the case was fashioned like a skull, and the watches were made in the form of octagonal jewels, crosses, purses, little books, dogs, sea-shells, &c., in almost every instance being finely engraved. Queen Elizabeth was very fond of receiving presents, and, as she was also fond of clocks, a number of the gifts presented to her took the form of jewelled watches.

The man to whom watch-making owes perhaps most was Thomas Tompion (1639–1713), who invented the first dead-beat escapement for watches (fig. 2). It consisted of a balance-wheel mounted on an axis of semi-cylindrical form with a notch in it, and a projecting stud. When the teeth of the scape-wheel came against the cylindrical part of the axis they were held from going forward, but when the motion of the axis was reversed, the teeth slipped past the notch and struck the projection, thus giving an impulse. This escapement was afterwards developed by George Graham (1673–1751) into the horizontal cylindrical escapement and into the well-known dead-beat escapement for clocks.

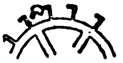
FIG. 2.

The development of escapements in the 18th century greatly improved watches. But a defect still remained, namely, the influence of temperature upon the hair-spring of the balance-wheel. Many attempts were made to provide a remedy. John Harrison proposed a curb, so arranged that alterations of temperature caused unequal expansion in two pieces of metal, and thus actuated an arm which moved and mechanically altered the length of the hair-spring, thus compensating the effect of its altered elasticity. But the best solution of the problem was ultimately proposed by Pierre le Roy (1717–1785) and perfected by Thomas Earnshaw (1749–1829). This was to diminish the inertia of the balance-wheel in proportion to the increase of temperature, by means of the unequal expansion of the metals composing the rim.

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[1] In the British navy the twelve hours of the night are divided into three watches of four hours—from eight to twelve the first watch, from twelve to four the middle watch, and from four to eight the morning watch. The twelve hours of the day are divided into four watches, two of four hours—eight to midday, midday to four P.M.—and two of two hours, from four to six and six to eight. These are the "dog watches," and their purpose is to change the turn of the watches every twenty-four hours, so that the men who watch from eight to midnight on one night, shall watch from midnight till 4 A.M. on the next. The "watch bill" is the list of the men [illegible] to the watch, who are mustered by the officers. Time [illegible] kept by an hour-glass, every half-hour; the [illegible] is shown by striking the watch bell hanging on a beam of the forecastle, or by the [illegible] One stroke is given for each half-hour [illegible] bell in the middle watch, and [illegible] to indicate the course [illegible] tolled the bell, a [illegible] watch guns were fired [illegible] relieving it in the morning.

Invention in watches was greatly stimulated by the need of a good timepiece for finding longitudes at sea, and many successive rewards were offered by the government for watches which would keep accurate time and yet be able to bear the rocking motion of a ship. The difficulty ended by the invention of the chronometer, which was so perfected towards the early part of the 19th century as to have even now undergone but little change of form. In fact the only great triumph of later years has been the invention of watch-making machinery, whereby the price is so lowered that an excellent watch (in a brass case) can now be purchased for about £2 and a really accurate time-keeper for about £18.

A modern watch consists of a case and framework containing the four essential parts of every timepiece, namely, a mainspring and apparatus for winding it up, a train of wheels with hands and a face, an escapement and a balance-wheel and hair-spring. We shall describe these in order.

The Mainspring.—As has been said, the mainspring of an old-fashioned watch was provided with a drum and fusee so as to equalize its action on the train. An arrangement was provided to prevent overwinding, consisting of a hook which when the chain was nearly wound up was pushed aside so as to engage a pin, and thus prevent further winding (see fig. 1). Another arrangement for watches without a fusee, called a Geneva stop, consists of a wheel with one tooth affixed to the barrel arbour, working into another with only four or five teeth. This allows the barrel arbour only to be turned round four or five times.

The "going-barrel," which is fitted to most modern watches, contains no fusee, but the spring is delicately made to diminish in size from one end to the other, and it is wound up for only a few turns, so that the force derived from it does not vary very substantially. The unevenness of drive is in modern watches sought to be counteracted by the construction of the escapement and balance-wheel.

Watches used formerly to be wound with a separate key. They are now wound by a key permanently fixed to the case. The depression of a small knob gears the winding key with the hands so as to enable them to be set. With this contrivance watches are well protected against the entry of dust and damp.

Watch Escapements.—The escapements that have come into practical use are—(1) the old *vertical* escapement, now disused; (2) the *lever*, very much the most common in English watches; (3) the *horizontal* or *cylinder*, which is equally common in foreign watches, though it was of English invention; (4) the *duplex*, which used to be more in fashion for first-rate watches than it is now; and (5) the *detached* or *chronometer* escapement, so called because it is always used in marine chronometers.

The *vertical* escapement is simply the original clock escapement adapted to the position of the wheels in a watch and the balance, in the manner exhibited in fig. 3. As it requires considerable thickness in the watch, is inferior in going to all the others and is no cheaper than the level escapement can now be made, it has gone out of use.

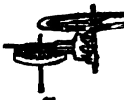


Fig. 3.

The *lever* escapement, as it is now universally made, was brought into use late in the 18th century by Thomas Mudge. Fig. 4 shows its action. The position of the lever with reference to the pallets is immaterial in principle, and is only a question of convenience in the arrangement; but it is generally such as we have given it. The principle is the same as in the dead-beat clock escapement, with [illegible] that there is no friction on the dead faces of the [illegible] necessary for locking. The reason why this [illegible] with a pendulum is that its arc of vibration [illegible] requisite depth of intersection cannot be got [illegible] described by the end S of the lever and any [illegible] would work into it; whereas, in a watch, [illegible] a cylinder on the verge of the balance, does [illegible] the nick in the end of the lever until the [illegible] its middle position. The pallets are under-[illegible] called, *i.e.* the dead faces are so sloped as to give a little recoil the wrong way, or slightly to resist the unlocking, because otherwise there would be a risk that a shake of the watch would let a tooth escape while the pin is disengaged from the lever. There is also a further provision added for safety. In the cylinder which carries the impulse pin P there is a notch just in front of P, into which the other pin S on the lever fits as they pass; but when the notch has got past the cylinder it would prevent the lever from returning, because the safety-pin S cannot pass except through the notch, which is only in the position for letting it pass at the same time that the impulse-pin is engaged in the lever. The pallets in a lever escapement (except bad and cheap ones) are always jewelled, and the scape-wheel is of brass. The staff of the lever also has jewelled pivot-holes in expensive watches, and the scape-wheel has in all good ones. The holes for the balance-pivots are now always jewelled. The scape-wheel in this and most of the watch escapements generally beats five times in a second, in large chronometers four times; and the wheel next to the scape-wheel carries the seconds-hand.

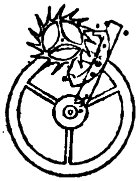


Fig. 4.

Fig. 5 is a plan of the *horizontal* or *cylinder* escapement, cutting through the cylinder, which is on the verge of the balance, at the level of the tops of the teeth of the escape-wheel; for the triangular pieces A, B are not flat projections in the same plane as the teeth, but are raised on short stems above the plane of the wheel; and still more of the cylinder than the portion shown at ACD is cut away where the wheel itself has to pass. The author of this escapement was G. Graham, and it resembles his dead escapements in clocks in principle more than the lever escapement does, though much less in appearance, because in this escapement there is the dead friction of the teeth against the cylinder, first on the outside, as here represented, and then on the inside, as shown by the dotted lines, during the whole vibration of the balance, except that portion which belongs to the impulse. The impulse is given by the oblique outside edges *Aa*, *Bb* of the teeth against the edges A, D of the cylinder alternately. The portion of the cylinder which is cut away at the point of action is about 30° less than the semicircle. The cylinder itself is made either of steel or ruby, and, from the small quantity of it which is left at the level of the wheel, it is very delicate; and probably this has been the main reason why, although it is an English invention, it has been most entirely abandoned by the English watchmakers in favour of the lever, which was originally a French invention, though very much improved by Mudge, for before his invention the lever had a rack or portion of a toothed wheel on its end, working into a pinion on the balance verge, and consequently it was affected by the dead friction, and that of this wheel and pinion besides. This used to be called the rack lever, and Mudge's the detached lever; but, the rack lever being now quite obsolete, the word "detached" has become confined to the chronometer, to which it is more appropriate, as will be seen presently. The Swiss watches have almost universally the horizontal escapement. It is found that—for some reason which is apparently unknown, as the rule certainly does not hold in cases seemingly analogous—a steel scape-wheel acts better in this escapement than a brass one, although in some other cases steel upon steel, or even upon a ruby, very soon throws off a film of rust, unless they are kept well oiled, while brass and steel, or stone, will act with scarcely any oil at all, and in some cases with none.

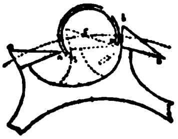


Fig. 5.

The *duplex* escapement (fig. 6) is probably so called because there is a double set of teeth in the scape-wheel—the long ones (like those of the lever escapement in shape) for locking only, and short ones (or rather upright pins on the rim of the wheel) for giving the impulse to the pallet P on the verge of the balance. It is a single-beat escapement; *i.e.* the balance only receives the impulse one way, or at every alternate beat, as in the chronometer escapement. When the balance is turning in the direction marked by the arrow, and arrives at the position in which the dotted tooth *b* has its point against the triangular notch V, the tooth end slips into the notch, and, as the verge turns farther round, the tooth goes on with it till at last it escapes when the tooth has got into the position A; and by that time the long tooth or pallet which projects from the verge has moved from *p* to P, and just come in front of the pin T, which stands on the rim of the scape-wheel, and which now begins to push against P, and so gives the impulse until it also escapes when it has arrived at *t*; and the wheel is then stopped by the next tooth B having got into the position *b*, with its point resting against the verge, and there is dead friction between them, and this friction is lessened by the

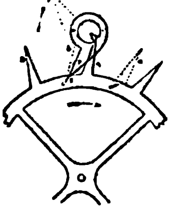


Fig. 6.

distance of the points of the long teeth from the centre of the scape-wheel. As the balance turns back, the nick V goes past the end of the tooth *b*, and in consequence of its smallness it passes without visibly affecting the motion of the scape-wheel, though of course it does produce a very slight shake in passing. It is evident that, if it did not pass, the tooth could not get into the nick for the next escape. The objection to this escapement is that it requires very great delicacy of adjustment, and the watch also requires to be worn carefully; for, if by accident the balance is once stopped from swinging back far enough to carry the nick V past the tooth end, it will stop altogether, as it will lose still more of its vibration the next time from receiving no impulse. The performance of this escapement, when well made, and its independence of oil, are nearly equal to those of the detached escapement; but, as lever watches are now made sufficiently good for all but astronomical purposes, for which chronometers are used, and they are cheaper both to make and to mend than duplex ones, the manufacture of duplex watches has almost disappeared.

The *chronometer* or *detached* escapement is shown at fig. 7 in the form to which it was brought by Earnshaw, and in which it has remained ever since, with the very slight difference that the pallet P, on which the impulse is given (corresponding exactly to the pallet P in the duplex escapement), is now generally set in a radial direction from the verge, whereas Earnshaw made it sloped backward, or undercut, like the scape-wheel teeth. The early history of escapements on this principle does not seem to be very clear. They appear to have originated in France; but there is no doubt that they were considerably improved by the first Arnold (John), who died in 1799. Earnshaw's watches, however, generally beat his in trials.

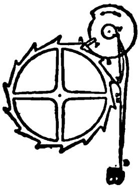


FIG. 7.

In fig. 7 the small tooth or cam V, on the verge of the balance, is just on the point of unlocking the detent DT from the tooth T of the scape-wheel; and the tooth A will immediately begin to give the impulse on the pallet P, which, in good chronometers, is always a jewel set in the cylinder; the tooth V is also a jewel. This part of the action is so evident as to require no further notice. When the balance returns, the tooth V has to get past the end of the detent, without disturbing it; for, as soon as it has been unlocked, it falls against the banking-pin E, and is ready to receive the next tooth B, and must stay there until it is again unlocked. It ends, or rather begins, in a stiffish spring, which is screwed to the block D on the watch frame, so that it moves without any friction of pivots, like a pendulum. The passing is done by means of another spring VT, called the passing spring, which can be pushed away from the body of the detent towards the left, but cannot be pushed the other way without carrying the detent with it. In the back vibration, therefore, as in the duplex escapement, the balance receives no impulse, and it has to overcome the slight resistance of the passing spring besides; but it has no other friction, and is entirely *detached* from the scape-wheel the whole time, except when receiving the impulse. That is also the case in the lever escapement; but the impulse in that escapement is given obliquely, and consequently with a good deal of friction; and, besides, the scape-wheel only acts on the balance through the intervention of the lever, which has the friction of its own pivots and of the impulse pin. The locking-pallet T is undercut a little for safety, and is also a jewel in the best chronometers; and the passing spring is usually of gold. In the duplex and detached escapements, the timing of the action of the different parts requires great care, *i.e.* the adjusting them so that each may be ready to act exactly at the right time; and it is curious that the arrangement which would be geometrically correct, or suitable for a very slow motion of the balance, will not do for the real motion. If the pallet P were really set so as just to point to the tooth A in both escapements at the moment of unlocking (as it has been drawn, because otherwise it would look as if it could not act at all), it would run away some distance before the tooth could catch it, because in the duplex escapement the scape-wheel is then only moving slowly, and in the detached it is not moving at all, and has to start from rest. The pallet P is therefore, in fact, set a little farther back, so that it may arrive at the tooth A just at the time when A is ready for it, without wasting time and force in running after it. The detached escapement has also been made on the duplex plan of having long teeth for the locking and short ones or pins nearer the centre for the impulse; but the advantages do not appear to be worth the additional trouble, and the force required for unlocking is not sensibly diminished by the arrangement, as the spring D must in any case be fairly stiff, to provide against the watch being carried in the position in which the weight of the detent helps to unlock it.

An escapement called the *lever chronometer* has been several times reinvented, which implies that it has never come into general use. It is a combination of the lever as to the locking and the chronometer as to the impulse. It involves a little drop and therefore waste of force as a tooth of the wheel just escapes at the "passing" beat where no impulse is given. But it should be understood that a single-beat escapement involves no more loss of force and the escape of no more teeth than a double one, except the slight drop in the duplex and this lever chronometer or others on the same principle.

There have been several contrivances for *remontoire* escapements; but there are defects in all of them; and there is not the same advantage to be obtained by giving the impulse to a watch-balance by means of some other spring instead of the mainspring as there is in turret-clocks, where the force of the train is liable to very much greater variations than in chronometers or small clocks.

The balance-wheel and hair-spring consist of a small wheel, usually of brass, to which is affixed a spiral, or in chronometers a helical, spring. This wheel swings through an angle of from 180° to 270° and its motions are approximately isochronous. The time of the watch can be regulated by an arm to which is attached a pair of pins which embrace the hair-spring at a point near its outer end, and by the movement of which the spring can be lengthened or shortened. The first essential in a balance-wheel is that its centre of gravity should be exactly in the axis, and that the centre of gravity of the hair-spring should also be in the axis of the balance-wheel. True isochronism is disturbed by variations in the driving force of the train or by variations in temperature, and also by variations in barometric pressure. Isochronism is produced in the first place by a proper shape of the spring and its overcoil. It is usual to time the watch's going when the mainspring is partly wound up, as well as when it is fully wound up, and then by removing parts of the hair-spring to get such an adjustment that the rate is not influenced by the lesser or greater extent to which the watch has been wound. The variations in length and still more in elasticity caused in a hair-spring by changes of temperature were for long not only a trouble to watchmakers but a bar to the progress of the art. A pendulum requires scarcely any compensation except for its own elongation by heat; but a balance requires compensation, not only for its own expansion, which increases its moment of inertia just like the pendulum, but far more on account of the decrease in the strength of the spring under increased heat. E. G. Dent, in a pamphlet on compensation balances, gave the following results of some experiments with a glass balance, which he used for the purpose on account of its less expansibility than a metal one: at 32° F., 3606 vibrations in an hour; at 66°, 3598·5; and at 100°, 3599. If therefore it had been adjusted to go right (or 3600 times in an hour) at 32°, it would have lost 7½ and 8½ seconds an hour, or more than three minutes a day, for each successive increase of 34°, which is about fifteen times as much as a common wire pendulum would lose under the same increase of heat; and if a metal balance had been used instead of a glass one the difference would have been still greater.

The necessity for this large amount of compensation having arisen from the variation of the elasticity of the spring, the first attempts at correcting it were by acting on the spring itself in the manner of a common regulator. Harrison's compensation consisted of a compound bar of brass and steel soldered together, having one end fixed to the watch-frame and the other carrying two curb pins which embraced the spring. As the brass expands more than the steel, any increase of heat made the bar bend; and so, if it was set the right way, it carried the pins along the spring, so as to shorten it. This contrivance is called a *compensation curb*; and it has often been reinvented, or applied in a modified form. But there are two objections to it: the motion of the curb pins does not correspond accurately enough to the variations in the force of the spring, and it disturbs the isochronism, which only subsists at certain definite lengths of the spring.

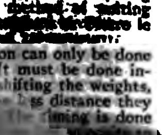


FIG. 8.

The compensation which was next invented left the spring untouched, and provided for the variations of temperature by the construction of the balance itself. Fig. 8 shows the plan of the ordinary compensation balance. Each portion of the rim of the balance is composed of an inner bar of steel with an outer one of brass soldered, or rather melted, upon it, and carrying the weights *b*, *b*, which are screwed to it. As the temperature increases, the brass expanding must bend the steel inwards, and so carries the weights farther in, and diminishes the moment of inertia of the balance, the decrease of rate being inversely as the diameter of the balance-wheel. The metals are generally soldered together by pouring melted brass round a solid steel disk, and the whole is afterwards turned and filed away till it leaves only the crossbar in the middle lying flat and the two portions of the rim standing edgeways. The first person to practise this [illegible] them appears to have been either Th[illegible] le Roy.

The adjustment of a balance for compensation can only be done by trial, and requires a good deal of time. It must be done independently of that for time—the former by shifting the weights, because the nearer they are to the crossbar the less distance they will move over as the rim bends wi[illegible] The timing is done by screws with heavy heads [illegible] the ends of the cross[illegible] bendin[illegible] for adjusting [illegible] the known results of previous experience with similar balances; and many watches are sold with compensation balances which have never been tried or adjusted, and sometimes with a mere sham compensation balance, not even cut through.

Secondary Compensation.—When chronometers had been brought to great perfection it was perceived that there was a residuary error, which was due to changes of temperature, but which no adjustment of the compensation would correct. The cause of the secondary error is that as the temperature rises the elasticity of the spring decreases, and therefore its accelerating force upon the balance-wheel diminishes. Hence the watch tends to go slower.

In order to compensate this the split rim of the balance-wheel is made with the more expansible metal on the outside, and therefore tends to curl inwards with increase of temperature, thus diminishing the moment of inertia of the wheel. Now the rate of error caused by the increase of temperature of the spring varies approximately with the temperature according to a certain law, but the rate of correction due to the diminution of the moment of inertia caused by the change of form of the rim of the wheel does not alter proportionally, but according to a more complex law of its own, varying more rapidly with cold than with heat, so that if the rate of the chronometer is correct, say, at 30° F. and also at 90° F., it will gain at all intermediate temperatures, the spring being thus under-corrected for high temperatures and over-corrected for low. Attempts have been made by alterations of shape of the balance-wheel to harmonize the progress of the error with the progress of the correction, but not with very conspicuous success.

We shall give a short description of the principal classes of inventions for this purpose. The first disclosed was that of J. S. Eiffe (sometimes attributed to Robert Molyneux), which was communicated to the astronomer-royal in 1835. In one of several methods proposed by him a compensation curb was used; and though, for the reasons given before, this will not answer for the primary compensation, it may for the secondary, where the motion required is very much smaller. In another the primary compensation bar, or a screw in it, was made to reach a spring set within it with a small weight attached at some mean temperature, and, as it bent farther in, it carried this secondary compensation weight along with it. The obvious objection to this is that it is discontinuous; but the whole motion is so small, not more than the thickness of a piece of paper, that this and other compensations on the same principle appear to have been on some occasions quite successful.

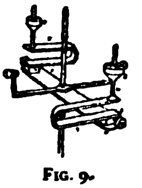


FIG. 9.

Another large class of balances, all more or less alike, may be represented by E. J. Dent's, which came next in order of time. He described several forms of his invention; the following description applies to the one he thought the best. In fig. 9 the flat crossbar *rr* is itself a compensation bar which bends upwards under increased heat; so that, if the weights *v*, *v* were merely set upon upright stems rising from the ends of the crossbar, they would approach the axis when that bar bends upwards. But, instead of the stems rising from the crossbar, they rise from the two secondary compensation pieces *stu*, in the form of staples, which are set on the crossbar; and, as these secondary pieces themselves also bend upwards, they make the weights approach the axis more rapidly as the heat increases; and by a proper adjustment of the height of the weights on the stems the moment of inertia of the balance can be made to vary in the proper ratio to the variation of the intensity of the spring. The cylindrical spring stands above the crossbar and between the staples.

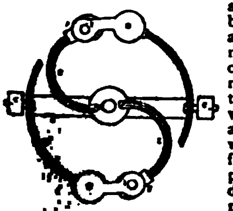


Fig. 10 represents E. T. Loseby's mercurial compensation balance. Besides the weights D, D, set near the end of the primary compensation bars B, B, there are small bent tubes FE, FE with mercury in them, like a thermometer, the bulbs being at F, F. As the heat increases, not only do the primary weights D, D and the bulbs F, F approach the centre of the balance, but some of the mercury is driven along the tube, thus carrying some more of the weight towards the centre, at a ratio increasing more rapidly than the temperature. The tubes are sealed at the thin end, with a little air included. The action is here equally continuous with Dent's, and the adjustments for primary and secondary compensation are apparently more independent of each other; and this modification of Le Roy's use of mercury for compensated balances (which does not appear to have [illegible] elegant and ingenious. Nevertheless an [illegible] for seven years of Loseby's trials [illegible] this method over the others was more [illegible] Dent's compensation was the most suc- [illegible] out of the seven, and Loseby's in only one. Loseby's method has never been adopted by any other chronometer-maker, whereas the principles both of Eiffe's and of Dent's methods have been adopted by several other makers.

A few chronometers have been made with glass balance-springs, which have the advantage of requiring very little primary and no secondary compensation, on account of the very small variation in their elasticity, compared with springs of steel or any other metal.

One of the most important and interesting attempts to correct the temperature errors of a hair-spring by a series of corresponding temperature changes in the moment of inertia of the balance-wheel has been made by means of the use of the nickel-steel compound called invar, which, on account of its very small coefficient of expansion, has been of great use for pendulum rods. In a memoir published in 1904 at Geneva, Dr Charles Guillaume, the inventor of invar, shows that in order to get a true secondary compensation what is wanted is a material having the property of causing the curve of the rim of the wheel to change at an increasing rate as compared with changes in the temperature. This is found in those specimens of invar in which the second coefficient of expansion is negative, *i.e.* which are less dilatable at higher temperatures than at lower ones. It is satisfactory to add that such balance-wheels have been tried successfully on chronometers, and notably in a deck watch by Paul Ditisheim of Neuchâtel, who has made a chronometer with a tourbillon escapement and an invar balance-wheel, which holds the highest record ever obtained by a watch of its class.

It is obvious that in order that a watch may keep good time the centre of gravity of the balance-wheel and hair-spring must be exactly in the axis; for if this were not the case, then the wheel would act partly like a pendulum, so that the time would vary according as the watch was placed in different positions. It is exceedingly difficult to adjust a watch so that these "position errors" are eliminated. Accordingly it has been proposed to neutralize their effect by mounting the balance-wheel and hair-spring upon a revolving carriage which shall slowly rotate, so that in succession every possible position of the balance-wheel and spring is assumed, and thus errors are averaged and mutually destroy one another. This is called the tourbillon escapement. There are several forms of it, and watches fitted with it often keep excellent time.

Stop watches or chronographs are of several kinds. In the usual and simplest form there is a centre seconds hand which normally remains at rest, but which, when the winding handle is pressed in, is linked on to the train of the watch and begins to count seconds, usually by fifths. A second pressure arrests its path, enabling the time to be taken since the start. A third pressure almost instantaneously brings the seconds hand back to zero, this result being effected by means of a heart-shaped cam which, when a lever presses on it instantaneously, flies round to zero position. The number of complete revolutions of the seconds hand, *i.e.* minutes, is recorded on a separate dial.

Calendar work on watches is, of course, fatal to great accuracy of time-keeping, and is very complicated. A watch is made to record days of the week and month, and to take account of leap years usually by the aid of star-wheels with suitable pauls and stops. The type of this mechanism is to be found in the calendar motion of an ordinary grandfather's clock.

Watches have also been made containing small musical boxes and arranged with performing figures on the dials. Repeaters are striking watches which can be made at will to strike the hours and either the quarters or the minutes, by pressing a handle which winds up a striking mechanism. They were much in vogue as a means of discovering the time in the dark before the invention of lucifer matches, when to obtain a light by means of flint and steel was a troublesome affair.

From what has been said it will be seen that for many years the form of escapements and balance-wheels has not greatly altered. The great improvements which modern science has been able to effect in watches are chiefly in the use of new metals and in the employment of machinery, which, though they have altered the form but little, have effected an enormous revolution in the price. The cases of modern watches are made sometimes of steel, artificially blackened, sometimes of compounds of aluminium and copper, known as aluminium gold. Silver is at present being less employed than formerly. The hair-springs are often of palladium in order to render the watch non-magnetizable. An ordinary watch, if the wearer goes near a dynamo, will probably become magnetized and quite useless for time-keeping. One of the simplest cures for this accident is to twirl it rapidly round while retreating from the dynamo and to continue the motion till at a considerable distance. The use of invar has been already noticed.

It would be impossible to enumerate, still more to describe, the vast number of modern machines that have been invented for making watches. It may be said briefly that every part, including the toothed wheels, is stamped out of metal. The stamped pieces are then finished by cutters and with milling machinery. Each machine as a rule only does one operation, so that a factory will contain many hundreds of different sorts of machines. The modern watchmaker therefore is not so much of a craftsman as an engineer. The effect of making all the parts of a watch by machinery is that each is interchangeable, so that one part will fit any watch. It is not an easy thing to secure this result, for as the machines are used the cutting edges wear down and require regrinding and resetting. Hence a tool is not allowed to make more than a given quantity of parts without being examined and readjusted, and from time to time the pieces being put out are tested with callipers. The parts thus made are put in groups and sorted into boxes, which are then given over to the watch-adjusters, who put the parts together and make the watch go. The work of adjustment for common watches is a simple matter. But expert adjusters select their pieces, measure them and correct errors with their tools. The finest watches are thus largely machine-made, but hand-finished. The prejudice against machine-made watches has been very strong in England, but is dying out—not, unfortunately, before much of the trade has been lost. A flourishing watch industry exists in Switzerland in the neighbourhood of Neuchâtel. A watch in a stamped steel case can now be made for about five shillings. There is no reason why in such a neighbourhood as Birmingham the English watch industry should not revive.

The use of jewelled bearings for watch pivots was introduced by Nicholas Facio about the beginning of the 18th century. Diamonds and sapphires are usually employed and pierced either by diamond drills or by drills covered with diamond dust. Rubies are not a very favourite stone for jewels, but as they and sapphires can now be made artificially for about two shillings a carat the difficulty of obtaining material for watch jewelling has nearly disappeared.

Watches have also been fitted with machinery whereby electric contacts are made by them at intervals, so that if wires are led to and away from them, they can be made to give electric signals and thus mark dots at regular intervals on a moving strip of paper.

As in the case of clocks, the accuracy of going of a watch is estimated by observation of the variations of its mean daily rate. This is officially done at Kew Observatory, near Richmond, and also for admiralty purposes at Greenwich. At Richmond watches are divided into two classes, A and B. For an A certificate the trials last for forty-five days, and include tests in temperatures varying from 40° to 90° F., going in every position with dial vertical, face up and face down. The average daily departure from the mean daily rate, that is the average error due to irregular departures from the average going rate, must not exceed 2 seconds a day except where due to position, when it may amount to 5 seconds. The errors should not increase more than 0·3 seconds a day for each 1° F. The trial for the B certificate is somewhat similar but less severe. Chronometers are put through trials lasting 55 days, and their average error from mean rate is expected not to exceed 0·5 seconds per diem. The fees for these tests are various sums from two guineas downwards. In estimating the time-keeping qualities of a watch or clock, the error of rate is of no consequence. It is simply due to the time-keeper going too fast or too slow, and this can easily be corrected. What is wanted for a good watch is that the rate, whatever it is, shall be constant. The daily error is of no account provided it is a uniform daily error and not an irregular one. Hence the object of the trials is to determine not merely the daily rate but the variations of the daily rate, and on the smallness of these the value of the watch as a time-keeper depends. (G., H. H. C.)

WATER. Strictly speaking, water is the oxide of hydrogen which is usually stated to have the formula H_2O (see below), but in popular use the term is applied to a great variety of different substances, all of which agree, however, in being the water of the chemist modified differently in the several varieties by the nature or proportion of impurities. In all ordinary waters, such as are used for primary purposes, the impurities amount to very little by weight—as a rule to less than $\frac{1}{10}$th of 1%.

Of all natural stores of water the *ocean* is by far the most abundant, and from it all other water may be said to be derived. From the surface of the ocean a continuous stream of vapour is rising up into the atmosphere to be recondensed in colder regions and precipitated as rain, snow or sleet, &c. Some $\frac{8}{11}$ths of these precipitates of course return directly to the ocean; the rest, falling on land, collects into pools, lakes, rivers, &c., or else penetrates into the earth, perhaps to reappear as springs or wells. As all the saline components of the ocean are non-volatile, rain water, in its natural state, can be contaminated only with the ordinary atmospheric gases—oxygen, nitrogen and carbon dioxide. Rain water also contains perceptible traces of ammonia, combined as a rule, at least partly, with the nitric acid, which is produced wherever an electric discharge pervades the atmosphere.

Lcke waters, as a class, are relatively pure, especially if the mountain slopes over which the rain collects into a lake are relatively free of soluble components. For example, the water of Loch Katrine (Scotland) is almost chemically pure, [illegible] taken up from the peat of the surrounding hills, and which impart to it a faint brownish hue, while really pure water is blue when viewed through a considerable thickness.

River water varies very much in composition even in the same bed, as a river in the course of its journey towards the ocean passes from one kind of earth to others; while, compared with spring waters, relatively poor in dissolved salts, rivers are liable to be contaminated with more or less of suspended matter.

Spring waters, having been filtered through more or less considerable strata of earth, are, as a class, clear of suspended, but rich in dissolved, mineral and organic matter, and may also contain gases in solution. Of ordinarily occurring minerals only a few are perceptibly soluble in water, and of these calcium carbonate and sulphate and common salt are most widely diffused. Common salt, however, in its natural occurrence, is very much localized; and so it comes that spring and well waters are contaminated *chiefly* with calcium carbonate and sulphate. Of these two salts, however, the former is held in solution only by the carbonic acid of the water, as calcium bicarbonate. But a carbonate-of-lime water, if exposed to the atmosphere, even at ordinary temperatures, loses its carbonic acid, and the calcium carbonate is precipitated. The stalactites (*q.v.*) which adorn the roofs and sides of certain caverns are produced in this manner. Many waters are valuable medicinal agents owing to their contained gases and salts (see MINERAL WATERS).

In addition to its natural components, water is liable to be contaminated through accidental influxes of foreign matter. Thus, for instance, all the Scottish Highland lochs are brown through the presence in them of dissolved peaty matter. Rivers flowing through, or wells sunk in, populous districts may be contaminated with excrementitious matter, discharges from industrial establishments, &c. The presence of especially nitrogenous organic matter is a serious source of danger, inasmuch as such matter forms the natural food or soil for the development of micro-organisms, including those kinds of bacteria which are now supposed to propagate infectious diseases. Happily nature has provided a remedy. The nitrogenous organic matter dissolved in (say) a river speedily suffers disintegration by the action of certain kinds of bacteria, with formation of ammonia and other (harmless) products; and the ammonia, again, is no sooner formed than, by the conjoint action of other bacteria and atmospheric oxygen, it passes first into (salts of) nitrous and then nitric acid. A water which contains combined nitrogen in the form of nitrates only is, as a rule, safe organically; if nitrites are present it becomes liable to suspicion; the presence of ammonia is a worse symptom, and if actual nitrogenous organic matter is found in more than microscopic traces the water is possibly (not necessarily) a dangerous water to drink.

All waters, unless very impure, become safe by boiling, which process kills any bacteria or germs that may be present.

Of the ordinary saline components of waters, soluble magnesium and calcium salts are the only ones which are objectionable sanitarily if present in relatively large proportion. Calcium carbonate is harmless; but, on the other hand, the notion that the presence of this component adds to the value of a water as a drinking water is a mistake. The farinaceous part of food alone is sufficient to supply all the lime the body needs, besides, it is questionable whether lime introduced in any other form than that of phosphate is available for the formation of, for instance, bone tissue.

The fitness of a water for washing is determined by its degree of softness. A water which contains lime or magnesia salts decomposes soap with formation of insoluble lime or magnesia salts of the fatty acids of the soap used. So much of the soap is simply wasted; only the surplus can effect any detergent action. Several methods for determining the hardness of a water have been devised. The most exact method is to determine the lime and magnesia gravimetrically or by alkalimetry; or by Clark's soap test, but this process frequently gives inaccurate results. In this method, which, however, is largely used, a measured volume of the water is placed in a stoppered bottle, and a standard solution of soap is then dropped in from a graduated vessel, until the mixture, by addition of the last drop of soap, has acquired the property of throwing up a peculiar kind of creamy froth when violently shak [illegible] all the soap-destroying components have been [illegible] soap required measures the hardne [illegible] is referred to a standard by [illegible] hardness pre [illegible] converting [illegible] and d [illegible] pres [illegible] gallo [illegible]

On the English scale, a water of 15° and over is hard, between 5° and 15° moderately hard, and of less than 5° soft.

That part of the hardness of a water which is actually owing to carbonate of lime (or magnesia) can easily be removed in two ways. (1) By boiling, the free carbonic acid goes off with the steam, and the carbonate of lime, being bereft of its solvent, comes down as a precipitate which can be removed by filtration, or by allowing it to settle, and decanting off the clear supernatant liquor. (2) A method of Clark's is to mix the water with just enough of milk of lime to convert the free carbonic acid into carbonate. Both this and the original carbonate of lime are precipitated, and can be removed as in the first case.

From any uncontaminated natural water pure water is easily prepared. The dissolved salts are removed by distillation; if care be taken that the steam to be condensed is dry, and if its condensation be effected within a tube made of a suitable metal (platinum or silver are best, but copper or block tin work well enough for ordinary purposes), the distillate can contain no impurities except atmospheric gases, which latter, if necessary, must be removed by boiling the distilled water in a narrow-necked flask until it begins to "bump," and then allowing it to cool in the absence of air. This latter operation ought, strictly speaking, to be performed in a silver or platinum flask, as glass is appreciably attacked by hot water. For most purposes distilled water, taken as it comes from the condenser, is sufficiently pure. The preparation of absolutely pure water is a matter of great difficulty. Stas, in his stoichiometric researches, mixed water with potassium manganate, and distilled after twenty-four hours; the product being redistilled and condensed in a platinum tube just before it was required.

Pure water, being so easily procured in any quantity, is used largely as a standard of reference in metrology and in the quantitative definition of physical properties. Thus a "gallon" is defined as the volume at 62° F. of a quantity of water whose uncorrected mass, as determined by weighing in air of 30-in. pressure and 62° F of temperature, is equal to 10 lb avoirdupois. The kilogramme in like manner is defined as the mass of 1 cubic decimetre of water, measured at the temperature corresponding to its maximum density (4° C.). The two fixed points of the thermometer correspond—the lower (0° C., or 32° F.) to the temperature at which ice melts, the upper (100° C., or 212° F.) to that at which the maximum tension of steam, as it rises from boiling water, is equal to 760 mm. or 30-in. mercury pressure. 30 in. being a little more than 760 mm., 212° F. is, strictly speaking, a higher temperature than 100° C., but the difference is very trifling. Specific heats are customarily measured by that of water, which is taken as = 1. All other specific heats of liquids or solids (with one exception, formed by a certain strength of aqueous methyl alcohol) are less than 1. The temperate character of insular climates is greatly owing to this property of water Another physiographically important peculiarity of water is that it expands on freezing (into ice), while most other liquids do the reverse. 11 volumes of ice fuse into only 10 volumes of water at 0° C.; and the ice-water produced, when brought up gradually to higher and higher temperatures, again exhibits the very exceptional property that it contracts between 0° and 4° C. (by about $\frac{1}{7000}$ of its volume) and then expands again by more and more per degree of increase of temperature, so that the volume at 100° C. is 1·043 times that at 4° C.

In former times water was viewed as an "element," and the notion remained in force after this term (about the time of Boyle) had assumed its present meaning, although cases of decomposition of water were familiar to chemists. In Boyle's time it was already well known that iron, tin and zinc dissolve in aqueous hydrochloric or sulphuric acid with evolution of a stinking inflammable gas. Even Boyle, however, took this gas to be ordinary air contaminated with inflammable stinking oils. This view was held by all chemists until Cavendish, before 1784, showed that the gas referred to, if properly purified, is free of smell and constant in its properties, which are widely different from those of air—the most important point of difference being that the gas when kindled in air burns with evolution of much heat and formation of water. Cavendish, however, did not satisfy himself with merely proving this fact qualitatively; he determined the quantitative relations, and found that it takes very nearly 1000 volumes of air to burn 423 volumes of "hydrogen" gas; but 1000 volumes of air, again, according to Cavendish, contain 210 volumes of oxygen; hence, very nearly, 2 volumes of hydrogen take up 1 volume of oxygen to become water. This important discovery was only confirmed by the subsequent experiments of Humboldt and Gay-Lussac, which were no more competent than Cavendish's to prove that the surplus of 3 units (423 volumes instead of 420) of hydrogen was an observational error. More recent work, e.g. [illegible] Leduc and Scott, has shown that the ratio is not exactly [illegible] gravimetric composition was [illegible] Berzelius [illegible] and later by Dumas by [illegible] oxide. It has also been [illegible] methods (see HYDROGEN) [illegible] attracted much attention, [illegible] boiling point, refractive [illegible] consistent with the simple [illegible] to the probable formula [illegible] (H₂O)₄. The question [illegible] e.g., who suggests that the simple molecule, H_2O, which he calls hydrone, condenses in liquid water to form cyclic or chained compounds, containing tetravalent oxygen, resembling in structure the polymethylenes or paraffins.

WATER-BOATMAN, an aquatic hemipterous insect of the family *Notonectidae*, of which the best known species (*Notonecta glauca*) is a prominent feature in the pond-life of Great Britain. The technical name, *Notonecta*, meaning "back-swimmer," alludes to the habit of the insect of swimming upside down, the body being propelled through the water by powerful strokes of the hind legs, which are fringed with hair and, when at rest, are extended laterally like a pair of sculls in a boat. As is the case with other water-bugs, this insect is predaceous and feeds upon aquatic grubs or worms. The body is richly supplied with long hairs, which serve to entangle bubbles of air for purposes of respiration. The eggs are laid in the stems of water plants.

WATERBUCK (*Wasserbok*), the name of a large South African antelope (*Cobus ellipsiprymnus*) belonging to the subfamily *Cervicaprinae*, characterized by the white elliptical ring on the buttocks, and the general reddish grey colour of the long and coarse hair They have heavily fringed necks and tufted tails, the bucks carry long sub-lyrate and heavily ringed horns, but the does are hornless. They seek refuge from pursuit in the water. The name is extended to include the sing-sing or defassa waterbuck (*C. defassa*), a widespread species, without the white ring on the buttocks, and represented by several local races, one of which is foxy red while a second is greyish. Both species equal in size the red deer. The smaller members of the genus *Cobus* (which is exclusively African) are generally called kobs. (See ANTELOPE.)

Waterbuck.

WATERBURY, a city and one of the county-seats of New Haven county, Connecticut, U.S.A., since 1900 coextensive with the township of Waterbury, on the Naugatuck river, in the west central part of the state, about 32 m. S.W. of Hartford. Pop. (1900) 51,139, of whom 15,368 were foreign-born (5866 being Irish, 2007 Italian, 1777 French Canadian, 1265 Russian, 1195 French, and 938 English); (1910 census) 73,141. Area 29 sq. m. Waterbury is served by the New York, New Haven & Hartford railway, and is connected by electric lines with New Haven, Bridgeport, Thomaston, Woodbury and Watertown. It has four public parks (the Green, Chase, Hamilton and Forest), with a total acreage of 80 acres, and a Soldiers' and Sailors' Monument, designed by George E. Bissell. The most important public buildings are the Federal building, the county court house, a state armoury, the Silas Bronson Public Library (1870, with an endowment of $200,000 and with 81,500 volumes in 1910), the Odd Fellows Temple, a Y.M.C.A. building and the Buckingham Music Hall (1907), and among the charitable institutions are the Southmayd Home (1898) for aged women, the Waterbury hospital (1890) and the St Mary's hospital (1908). In the city are the St Margaret's Diocesan School for Girls (Protestant Episcopal, 1875), the Waterbury Industrial School and the Academy of Notre Dame (1868). There is good water power here from the Naugatuck river and its tributaries Mad river and Great Brook. In 1905 Waterbury ranked third among the manufacturing cities of Connecticut (being surpassed only by

Bridgeport and New Haven), with a factory product valued at $32,367,359 (6·7 % more than in 1900). The most important manufactures are rolled brass and copper (value in 1905, $12,599,736, or 24·3 % of the total for the United States), brass-ware (value in 1905, $7,387,228, or 42·2 % of the total for the United States), clocks and watches—over a million watches are made here each year—and stamped ware (value in 1905, $1,037,666). The manufacture of brass-ware originated here in 1802 with the making of brass buttons; iron buttons covered with silver were first made here about 1760, block tin and pewter buttons about 1800, bone and ivory buttons about 1812, sheet brass in 1830, and pins and plated metals for daguerreotypes in 1842. Old-fashioned tall wooden clocks were made in Waterbury in the latter part of the 18th century, and cheap watches were first made here in 1879, these were long distinctive of Waterbury, and were often called "Waterbury watches." The manufacture of cloth dates from 1814, and broadcloth was first made here in 1833. The city has a large wholesale trade and is a shipping point for dairy products. The municipality owns and operates the waterworks.

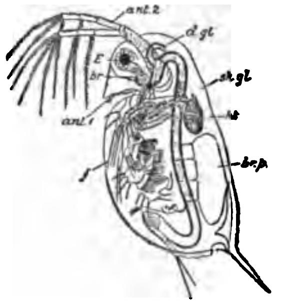
The township of Waterbury was incorporated in 1686, having been since its settlement in 1677 a part of Farmington township known as Mattatuck. The city of Waterbury was first chartered in 1853. The city and the township were consolidated in 1901. City elections are held biennially and the mayor, city clerk, treasurer, comptroller, city sheriff and aldermen hold office for two years. With the consent of the Board of Aldermen the mayor appoints five electors who with the mayor constitute a department of public works; appoints three electors who with the mayor, comptroller, and president of the Board of Aldermen constitute a department of finance; appoints five electors who with the mayor constitute a department of public safety; and appoints five electors who constitute a department of public health. In 1902 there was a destructive fire in the business district of the city, and during a strike of street railway employees in 1903 state troops were called out to maintain order.

WATER-DEER, a small member of the deer-tribe from northern China differing from all other *Cervidae* except the musk-deer (with which it has no affinity) by the absence of antlers in both sexes. To compensate for this deficiency, the bucks are armed with long sabre-like upper tusks (see DEER). The species typifies a genus, and is known as *Hydrelaphus* (or *Hydropotes*) *inermis*; but a second form has been described from Hankow under the name of *H. kreyenbergi*, although further evidence as to its claim to distinction is required. Water-deer frequent the neighbourhood of the large Chinese rivers where they crouch amid the reeds and grass in such a manner as to be invisible, even when not completely concealed by the covert. When running, they arch their backs and scurry away in a series of short leaps. In captivity as many as three have been produced at a birth.

This is one of the few deer in which there are glands neither on the hock nor on the skin covering the cannon-bone. These glands probably enable deer to ascertain the whereabouts of their fellows by the scent they leave on the ground and herbage. The sub-aquatic habits of the present species probably render such a function impossible, hence the absence of the glands. The tail is represented by a mere stump. (R. L.*)

WATERFALL, a point in the course of a stream or river where the water descends perpendicularly or nearly so. Even a very small stream of water falling from any considerable height is a striking object in scenery. Such falls, of small volume though often of immense depth, are common, for a small stream has not the power to erode a steady slope, and thus at any considerable irregularity of level in its course it forms a fall. In many mountainous districts a stream may descend into the valley of the larger river to which it is tributary by way of a fall, its own valley having been eroded more slowly and less deeply than the main valley. Mechanical considerations apart, the usual cause of the occurrence of a waterfall is a sudden change in geological structure. For example, if there be three horizontal strata, so laid down that a hard stratum occurs between [illegible] soft ones, a river will be able to grade its course through the upper or lower soft strata, but not at the same rate through the intermediate hard stratum, over a ledge of which it will consequently fall. The same will occur if the course of the river has been interrupted by a hard barrier, such as an intrusive dyke of basalt, or by glacial or other deposits. Where a river falls over an escarpment of hard rock overlying softer strata, it powerfully erodes the soft rock at the base of the fall and may undermine the hard rock above so that this is broken away. In this way the river gradually cuts back the point of fall, and a gorge is left below the fall. The classic example of this process is provided by the most famous falls in the world—Niagara.

WATER-FLEA, a name given by the earlier microscopists (Swammerdam, 1669) to certain minute aquatic Crustacea of the order Cladocera, but often applied also to other members of the division Entomostraca (*q.v.*). The Cladocera are abundant everywhere in fresh water. One of the commonest species, *Daphnia pulex*, found in ponds and ditches, is less than one-tenth of an inch in length and has the body enclosed in a transparent bivalved shell. The head, projecting in front of the shell, bears a pair of branched feathery antennae which are the chief swimming organs and propel the animal, in a succession of rapid bounds, through the water. There is a single large black eye. In the living animal five pairs of leaf-like limbs acting as gills can be observed in constant motion between the valves of the shell, and the pulsating heart may be seen near the dorsal surface, a little way behind the head. The body ends behind in a kind of tail with a double curved claw which can be protruded from the shell. The female carries the eggs in a brood-chamber between the back of the body and the shell until hatching takes place. Throughout the greater part of the year only females occur and the eggs develop "parthenogenetically," without fertilization. When the small males appear, generally in the autumn, fertilized "winter" or "resting eggs" are produced which are cast adrift in a case of "ephippium" formed by a specially modified part of the shell. These resting eggs enable the race to survive the cold of winter or the drying up of the water.



Parker and Haswell's *Text-Book of Zoology*, by permission of Macmillan & Co.

Daphnia (after Claus).

ant. 1.	antennule.	*d.gl.*	Digestive gland.
ant. 2.	Antenna.	*f.*	Swimming-feet.
br.	Brain.	*ht.*	Heart.
br.p.	Brood-pouch.	*sh.gl.*	Shell-gland.
E.	Eye.		

For a fuller account of the Cladocera and of other organisms which sometimes share with them the name of "water-fleas," see the article ENTOMOSTRACA. (W. T. CA.)

WATERFORD, a county of Ireland in the province of Munster, bounded E. by Waterford Harbour, separating it from Wexford, N. by Kilkenny and by Tipperary, W. by Cork, and S. by the Atlantic. The area is 458,108 acres, or about 716 sq. m. The coast line is in some parts bold and rocky, and is indented by numerous bays and inlets, the principal being Waterford Harbour; Tramore Bay, with picturesque cliffs and some extensive caves, and noted for its shipwrecks, on account of the rocky character of its bed; Dungarvan Harbour, much frequented for refuge in stormy weather; and Youghal Harbour, partly separating county Waterford from county Cork. The surface of the county is to a [illegible]

be[illegible]

Mountains, reaching a height of 2504 ft. To the south of Dungarvan there is a lower but very rugged range, called the Drum Hills. The south-eastern division of the county is for the most part level. Though Waterford benefits in its communications by the important rivers in its vicinity, the only large river it can properly claim as belonging to it is the Blackwater. This river is famous for salmon fishing, and, particularly in the stretch between Cappoquin and Lismore, flows between high, well-wooded banks, contrasting beautifully with the background of mountains. It enters the county east of Fermoy, and flows eastward to Cappoquin, the head of navigation, where it turns abruptly southward, to fall into the sea at Youghal Harbour. Waterford Harbour may be called the estuary of three important rivers, the Suir, the Nore and the Barrow, but neither of the two last touches the county. The Suir reaches it about 8 m. from Clonmel, and thence forms its northern boundary with Tipperary and Kilkenny. It is navigable to Clonmel, but the traffic lies mainly on the left bank, outside the county.

Geology.—The Knockmealdown Mountains are an anticline of Old Red Sandstone, cut away at the eastern end to expose Silurian strata, which are associated with an extensive series of volcanic and intrusive rocks, often crushed by earth-movement. The impressive scarp formed by the Old Red Sandstone conglomerate above this lower ground is called the Comeragh Mountains. The moraine-dammed cirque of Lough Coumshingaun lies in these, with a precipice 1000 ft. in height. The unconformity of the Old Red Sandstone on the greenish and yellowish Silurian .shales is excellently seen on the north bank of the Suir at Waterford. Carboniferous Limestone is found in the floor of the synclinals on either side of the great anticline, that is, in the Suir valley on the north, and in the green and richly-wooded hollow of the Blackwater on the south. Rapidly repeated anticlinal and synclinal folds continue this structure across the country between Dungarvan and Youghal. Rich copper-mines were worked, mainly in the 19th century, in the Silurian area near Bonmahon, and the region remains full of mineral promise.

Industries.—The land is generally better adapted for pasturage than for tillage, although there are considerable tracts of rich soil in the south-eastern districts. The proportion of tillage to pasture is, however, roughly as 1 to 3½, though the acreage under the principal crops of oats, potatoes and turnips is on the whole fairly maintained. The numbers of cattle, sheep and poultry increase steadily, and pigs are extensively reared. The woollen manufacture, except for home use, is practically extinct, but the cotton manufacture is still of some importance. There are also breweries, distilleries and a large number of flour-mills. The valuable deep sea and coast fisheries have distinct headquarters at Waterford, and the noted salmon fisheries of the Suir and Blackwater have theirs at Waterford and Lismore respectively. Railway communication is provided by the Waterford, Dungarvan, Lismore and Co. Cork branch of the Great Southern and Western railway, traversing the county from E. to W.; and by the Waterford and Tramore railway, while the city of Waterford is approached by lines of the first-named company from the N. (from Dublin) and W. (from Limerick).

Population and Administration.—The population (95,702 in 1891; 87,187 in 1901) decreases at a rate about equal to the average of the Irish counties, and emigration is considerable. Nearly 95% of the total are Roman Catholics, and about 74% constitute the rural population. The chief towns are the city of Waterford (pop. 26,769), Dungarvan (4850), and Lismore (1583); Portlaw and Tramore, and Cappoquin are lesser towns. The county is divided into eight baronies. Down to the Union in 1800 the county returned two members, and the boroughs of Dungarvan, Lismore and Tallow two each. Thereafter, and before the Redistribution Act of 1885, the county returned two members, the borough of Waterford two, and Dungarvan one. The county now returns two members, for the east and west divisions respectively, while the county of the city of Waterford returns one member. Assizes are held at Waterford, and quarter sessions at Lismore, Dungarvan, and Waterford. The county is mainly in the Protestant diocese of Ossory, and the Roman Catholic diocese of Waterford and Lismore.

History and Antiquities.—In the 9th century the Danes landed [illegible], and afterwards made a permanent settlement. [illegible] of the twelve counties into which King John [illegible] Ireland which he nominally [illegible] of the convenience of [illegible]quent expeditions passed [illegible] disaffected or rebellious tribes. In 1444 the greater part of it was granted to James, earl of Desmond, and in 1447 it was bestowed on John Talbot, earl of Shrewsbury, who was created earl of Waterford. The county suffered severely during the Desmond rebellion, in the reign of Elizabeth, as well as in the rebellion of 1641 and during the Cromwellian period. There are in the county a considerable number of barrows, duns, cromlechs and similar relics of the ancient inhabitants. At Ardmore, overlooking the sea from Ram Head, there is a round tower 95 ft. in height, and near it a huge rath and a large number of circular entrenchments. Among the old castles special mention may be made of Lismore, originally erected in 1185, but now in great part comparatively modern. The chief ecclesiastical remains are those of the chancel and nave of the cathedral of Ardmore, where a monastery and oratory were founded by St Declan in the 7th century. The see of Ardmore was abolished in the 12th century. Here are also remains of a church and oratory, and a holy well. Mention should be made of the existing monastery of Mount Melleray, a convent of Trappists founded near Cappoquin in 1830, on the expulsion of the foreign members of this order from France. Schools, both free and boarding, are maintained; and there is a branch of the order at Roscrea (Co. Tipperary).

WATERFORD, a city, county of a city, parliamentary borough, seaport, and the chief town of Co. Waterford, Ireland. Pop. (1901) 26,769. It is finely situated on the south bank of the Suir 4 m. above its junction with the Barrow, at the head of the tidal estuary called Waterford Harbour, 111 m. S.S.W. from Dublin by the Great Southern and Western railway. This is the principal railway serving the city, having lines from Dublin and from the north-west, besides the trunk line between Rosslare, Waterford and Cork. Waterford is also, however, the terminus of the Dublin and South-Eastern line from Dublin via New Ross, and for the Waterford and Tramore line, serving the seaside resort of Tramore, 7 m. S. The Suir is crossed by a wooden bridge of thirty-nine arches, and 832 ft. long, connecting Waterford with the suburb of Ferrybank. The city is built chiefly along the banks of the river, occupying for the most part low and level ground except at its western extremity, and excepting the quay and the Mall, which connects with the southern end of the quay, its internal appearance is hardly of a piece with the beauty of its environs. The modern Protestant cathedral of the Holy Trinity, generally called Christ Church, a plain structure with a lofty spire, occupies the site of the church built by the Danes in 1096, in the Mall. Near it are the episcopal palace and deanery. There is a handsome Roman Catholic cathedral, and the training seminary for priests called St John's College deserves notice. The principal secular buildings are the town-hall, the county and city courts and prisons, the custom-house and the barracks. At the extremity of the quay is a large circular tower, called Reginald's Tower, forming at one time a portion of the city walls, and occupying the site of the tower built by Reginald the Dane in 1003. Near the summit one of the balls shot from the cannon of Cromwell while besieging the city is still embedded in the wall. Other remains of the fortifications, consisting of towers and bastions, are to be seen as in the Tramore railway sidings and in Castle Street. There are a number of hospitals and similar benevolent institutions, including the leper house founded in the reign of King John, now used practically as an infirmary. The town possesses breweries, salt-houses, foundries and flour mills; and there is a large export trade in cattle, sheep and pigs, and in agricultural produce. It is the headquarters of extensive salmon and sea fisheries. Waterford is second in importance to Cork among the ports of the south coast of Ireland. There is regular communication by steamer with Cork, with Dublin and Belfast, with Fishguard, Glasgow, Liverpool, Bristol, Plymouth, Southampton, London and other ports. Local steamers ply to Duncannon, New Ross and other places on the neighbouring estuaries.

Waterford Harbour is a winding and well-sheltered bay formed by the estuary of the river Suir, and afterwards by the joint estuary of the Nore and Barrow. Its length to the sea is about 15 m. Its entrance is 3 m. wide, and is lighted by a fixed light on the ancient donjon of Hook Tower (139 ft. in height) and others. The quay, at which there is a depth of 22 ft. of water at low tide, was enlarged in 1705 by the removal of the city walls, and is about 1¼ m. in length. At Ferrybank, on the Kilkenny side of the river, there is a shipbuilding yard with patent slip and graving dock. By the Suir there is navigation for barges to Clonmel, and for sailing vessels to Carrick-on-Suir; by the Barrow for sailing vessels to New-Ross and thence for barges to Athy, and so to Dublin by a branch of the Grand Canal; and by the Nore for barges to Inistioge. The shores of the harbour are picturesque and well-wooded, studded with country residences and waterside villages, of which Passage and Duncannon are popular resorts of the citizens of Waterford.

Anciently Waterford was called *Cuan-na-groith*, the haven of the sun. By early writers it was named Menapia. It is supposed to have existed in very early times, but first acquired importance under the Danes, of whom it remained one of the principal strongholds until its capture by Strongbow in 1171. On the 18th of October 1172 Henry II. landed near Waterford, and he here received the hostages of the people of Munster. It became a cathedral city in 1096. The Protestant dioceses of Cashel, Emly, Waterford and Lismore were united in 1833. Prince John, afterwards king of England, who had been declared lord of Ireland in 1177, landed at Waterford in 1185. After ascending the English throne he granted it a fair in 1204, and in 1206 a charter of incorporation. He landed at Waterford in 1210, in order to establish within his nominal territories in Ireland a more distinct form of government. The city received a new charter from Henry III. in 1232. Richard II. landed at Waterford in October 1394 and again in 1399. In 1447 it was granted by Henry VI. to John Talbot, earl of Shrewsbury, who was created earl of Waterford. In 1497 it successfully resisted an attempt of Perkin Warbeck to capture it, in recognition of which it received various privileges from Henry VII., who gave it the title of *urbs intacta*. In 1603, after the accession of James I. to the English crown, the city, along with Cork, took a prominent part in opposition to the government and to the Protestant religion, but on the approach of Mountjoy it formally submitted. From this time, however, the magistrates whom it elected refused to take the oath of supremacy, and, as by its charter it possessed the right to refuse admission to the king's judges, and therefore to dispense with the right of holding assizes, a rule was obtained in the Irish chancery for the seizure of its charter, which was carried into effect in 1618. In 1619 an attempt was made to induce Bristol merchants to settle in the city and undertake its government, but no one would respond to the invitation, and in 1626 the charter was restored. The city was unsuccessfully attacked by Cromwell in 1649, but surrendered to Ireton on the 10th of August 1650. After the battle of the Boyne James II. embarked at it for France (July 1690). Shortly afterwards it surrendered to William, who sailed from it to England. It sent two members to parliament from 1374 to 1885, when the number was reduced to one. In 1898 it was constituted one of the six county boroughs having separate county councils.

WATERFORD, a village of Saratoga county, New York, U.S.A., on the W. bank of the Hudson river, near the mouth of the Mohawk river, and about 10 m. N. of Albany. Pop. (1900) 3146, of whom 474 were foreign-born; (1905) 3134; (1910) 3245. Waterford is served by the Delaware & Hudson railway, and is at the junction of the Erie and the Champlain divisions of the great barge canal connecting Lake Erie and Lake Champlain. There was a settlement here probably as early as 1630, and Waterford was laid out in 1784, and was incorporated as a village in 1794.

WATERHOUSE, ALFRED (1830–1905), English architect, was born at Liverpool on the 19th of July 1830, and passed his professional pupilage under Richard Lane in Manchester. His earliest commissions were of a domestic nature, but his [illegible] as a designer of public buildings was assured as early as [illegible] success in the open competition for the Manchester [illegible] This work marked him not only as an adept in the [illegible] complicated building on a large scale, but al[illegible] the Gothic cause. Nine years later, in 1868, another competition secured for Waterhouse the execution of the Manchester town-hall, where he was able to show a firmer and perhaps more original handling of the Gothic manner. The same year brought him the rebuilding of part of Caius College, Cambridge, not his first university work, for Balliol, Oxford, had been put into his hands in 1867. At Caius, out of deference to the Renaissance treatment of the older parts of the college, the Gothic element was intentionally mingled with classic detail, while Balliol and Pembroke, Cambridge, which followed in 1871, may be looked upon as typical specimens of the style of his mid career—Gothic tradition (European rather than British) tempered by individual taste and by adaptation to modern needs. Girton College, Cambridge, a building of simpler type, dates originally from the same period (1870), but has been periodically enlarged by further buildings. Two important domestic works were undertaken in 1870 and 1871 respectively—Eaton Hall for the duke, then marquis, of Westminster, and Heythrop Hall, Oxfordshire, the latter, a restoration, being of a fairly strict classic type. Iwerne Minster for Lord Wolverton was begun in 1877. In 1865 Waterhouse had removed his practice from Manchester to London, and he was one of the architects selected to compete for the Royal Courts of Justice. He received from the government, without competition, the commission to build the Natural History Museum, South Kensington, a design which marks an epoch in the modern use of terra-cotta. The new University Club—a Gothic design—was undertaken in 1866, to be followed nearly twenty years later by the National Liberal Club, a study in Renaissance composition. Waterhouse's series of works for Victoria University, of which he was made LL.D. in 1895, date from 1870, when he was first engaged on Owens College, Manchester. Yorkshire College, Leeds, was begun in 1878; and Liverpool University College in 1885. St Paul's School, Hammersmith, was begun in 1881, and in the same year the Central Technical College in Exhibition Road, London. Waterhouse's chief remaining works in London are the new Prudential Assurance Company's offices in Holborn; the new University College Hospital; the National Provincial Bank, Piccadilly, 1892; the Surveyors' Institution, Great George Street, 1896; and the Jenner Institute of Preventive Medicine, Chelsea, 1895. For the Prudential Company he designed many provincial branch offices, while for the National Provincial Bank he also designed premises at Manchester. The Liverpool Infirmary is Waterhouse's largest hospital; and St. Mary's Hospital, Manchester, the Alexandra Hospital, Rhyl, and extensive additions at the general hospital, Nottingham, also engaged him. Among works not already mentioned are the Salford gaol; St Margaret's School, Bushey; the Metropole Hotel, Brighton; Hove town-hall; Alloa town-hall; St Elizabeth's church, Reddish; the Weigh House chapel, Mayfair; and Hutton Hall, Yorks. He died on the 22nd of August, 1905.

Waterhouse became a fellow of the Royal Institute of British Architects in 1861, and president from 1888 to 1891. He obtained a *grand prix* for architecture at the Paris Exposition of 1867, and a "Rappel" in 1878. In the same year he received the Royal gold medal of the Royal Institute of British Architects, and was made an associate of the Royal Academy, of which body he became a full member in 1885 and treasurer in 1898. He became a member of the academies of Vienna (1869), Brussels (1886), Antwerp (1887), Milan (1888) and Berlin (1889), and a corresponding member of the Institut de France (1893). After 1886 he was constantly called upon to act as assessor in architectural competitions, and was a member of the international jury appointed to adjudicate on the designs for the west front of Milan Cathedral in 1887. In 1890 he served as architectural member of the Royal Commission on the proposed enlargement of Westminster Abbey as a place of burial. From 1891 to 1902, when he retired, his work was conducted in partnership with his son [illegible]

WATERHOUSE [illegible] the [illegible] active [illegible] must be [illegible]. He was elected an associate of the Royal Academy in 1885 and academician in 1895. Four of his paintings, "Consulting the Oracle," "St Eulalia," "The Lady of Shalott" and "The Magic Circle," are in the National Gallery of British Art.

See "J. W. Waterhouse and his Work," by A. L. Baldry, *Studio*, vol. iv.

WATER-LILY, a name somewhat vaguely given to almost any floating plant with conspicuous flowers, but applying more especially to the species of *Nymphaea*, *Nuphar*, and other members of the order Nymphaeaceae. These are aquatic plants with thick fleshy rootstocks or tubers embedded in the mud, and throwing up to the surface circular shield-like leaves, and leafless flower-stalks, each terminated by a single flower, often of great beauty, and consisting of four or five sepals, and numerous petals gradually passing into the very numerous stamens without any definite line of demarcation between them. The ovary consists of numerous carpels united together and free, or more or less embedded in the top of the flower-stalk. The ovary has many cavities with a large number of ovules attached to its walls, and is surmounted by a flat stigma of many radiating rows as in a poppy. The fruit is berry-like, and the seeds are remarkable for having their embryo surrounded by an endosperm as well as by a perisperm. The anatomical construction of these plants presents many peculiarities which have given rise to discussion as to the allocation of the order among the dicotyledons or among the monocotyledons, the general balance of opinion being in favour of the former view. The leaf-stalks and flower-stalks are traversed by longitudinal air-passages, whose disposition varies in different species. The species of *Nymphaea* are found in every quarter of the globe. Their flowers range from white to rose-coloured; yellow and blue. Some expand in the evening only, others close soon after noon. *Nymphaea alba* (*Castalia alba*) is common in some parts of Britain, as is also the yellow *Nuphar luteum* (*Nymphaea lutea*). The seeds and the rhizomes contain an abundance of starch, which renders them serviceable in some places for food.

Of recent years great strides have been made in the culture of new varieties of water-lilies in the open air. Many beautiful *Nymphaea* hybrids have been raised between the tender and hardy varieties of different colours, and there are now in commerce lovely forms having not only white, but also yellow, rose, pink and carmine flowers. In many gardens open-air tanks have been fitted up with hot-water pipes running through them to keep the water sufficiently warm in severe weather. The open-air water-lily tank in the Royal gardens, Kew, is one of the latest and most up-to-date in construction. These coloured hybrids were originated by M. Latour Marliac, of Temple-sur-Lot, France, some of the most favoured varieties being *carnea*, *chromatella*, *flammea*, *ignea*, *rosea*, *Robinsoni*, *Aurora*, *blanda*, &c.

Amongst hardy species of *Nymphaea* now much grown are *candida*, *nitida*, *odorata*, *pygmaea* and *tuberosa*, all with white, more or less sweet-scented flowers; *flava*, yellow, and *sphaerocarpa*, rose-carmine. Amongst the tender or hothouse *Nymphaeas* the following are most noted: *blanda*, white; *devoniensis*, scarlet (a hybrid between *N. Lotus* and *N. rubra*); *edulis*, white; *elegans*, yellowish white and purple; *gigantea*, blue; *kewensis*, rose-carmine (a hybrid between *N. devoniensis* and *N. Lotus*); *Lotus*, red, white; *pubescens*, white; *scutifolia*, bright blue; *stellata*, blue, with several varieties; and *Sturtevanti*, a pale-rose hybrid.

Under the general head of water-lily are included the lotus of E[illegible] *Nymphaea Lotus*, and the sacred lotus of India and China, N[illegible] *speciosum*, formerly a native of the Nile, as shown by [illegible]ptures and other evidence, but no longer found in [illegible] gigantic *Victoria regia*, with leaves 6 to 7 ft. in [illegible] flowers 8 to 16 in. across, also belongs to this group. [illegible] backwaters of the Amazon, often covering the surface [illegible] are eaten under the name water maize.

[illegible] the county-seat of Black Hawk [illegible]he Cedar river, about 90 m. W. of [illegible]W. of Chicago. Pop. (1890) 6674; [illegible] were foreign-born; (1910 census) [illegible] Illinois Central (which has large [illegible]ops here), the Chicago, Rock Island [illegible]at Western, and the Waterloo, Cedar [illegible]dar Falls to Sumner) railways. The [illegible]ks, a public library (1879) with two buildings, a Y.M.C.A. building, and a good public school system, including a manual training school. There is a Chautauqua park. The river here is 700 to 900 ft. wide; its clear water flows over a limestone bed through a rather evenly sloping valley in the middle of the city with enough fall to furnish valuable water power. The value of the factory product in 1905 was $4,693,888. The city is situated in a rich agricultural, dairying and poultry-raising region, and is an important shipping point. Waterloo was first settled about 1846, was laid out in 1854, first chartered as a city in 1868, and became a city of the first class in 1905.

WATERLOO CAMPAIGN, 1815. On February 27, 1815, Napoleon set sail from Elba with his force of 1000 men and 4 guns, determined to reconquer the throne of France. On March 1 he landed near Cannes, and proceeded at once to march on Paris. He deliberately chose the difficult route over the French Alps because he recognized that his opponents would neither expect him by this route nor be able to concert combined operations in time to thwart him. Events proved the wisdom of his choice. His advance to Paris was a series of triumphs, his power waxing with every league he covered, and when he reached Paris the Bourbons had fled. But he had soon to turn his attention to war His sudden return, far from widening the breaches between the allies, had fused them indissolubly together, and the four powers bound themselves to put 150,000 men apiece under arms and to maintain them in the field until Napoleon had been utterly crushed. So, from the first, France was faced with another war against an affrighted and infuriated Europe, a war in which the big battalions would be on the side of the Seventh Coalition; and to oppose their vast armies Napoleon only had in March the 150,000 men he had taken over from Louis XVIII. when the Bourbon hurriedly quitted the throne. Of this force the emperor could have drawn together some 50,000 men within ten days and struck straight at the small allied forces that were in Belgium at the moment. But he wisely refrained from taking the immediate offensive. Such an act would have proved that he desired, nay provoked a war; and further, the engagement of such small forces could lead to no decisive results. Napoleon therefore stayed his hand and proceeded to hasten forward the organization, almost the creation of an army, with which he could confront the coalition. Meanwhile he sought to detach Great Britain and Austria from the alliance. But he did not permit his political enterprise to stay his military preparations; and, by constant attention to the minutest details, by June 1 he had got together an army of 360,000 for the defence of France, one half of which was available for field service. In this army was comprised his whole means of defence; for he had no allies. On his return from Elba it is true that Murat, the king of Naples, took his side; but recklessly opening an offensive campaign, Murat was beaten at Tolentino (May 2–3), and he found himself compelled to fly in disguise to France, where the emperor refused him an audience or employment. Herein Napoleon wronged France, for he deprived her of the most brilliant cavalry soldier of the period. Shorn thus of his single ally, the emperor realized that the whole eastern land-frontier of France was open to invasion, from the North Sea to the Mediterranean. By the end of May he had placed his forces as follows to protect his empire.

Napoleon's preparations.

D'Erlon's I. Corps cantoned between Lille and Valenciennes.
Reille's II. Corps cantoned between Valenciennes and Avesnes.
Vandamme's III. Corps cantoned around Rocroi.
Gérard's IV. Corps cantoned at Metz.
Lobau's VI. Corps cantoned at Laon.
Grouchy's Cavalry Reserve at Guise.
Marshal Mortier with the Imperial Guard at Paris.
Rapp with the V. Corps (20,000) near Strassburg.

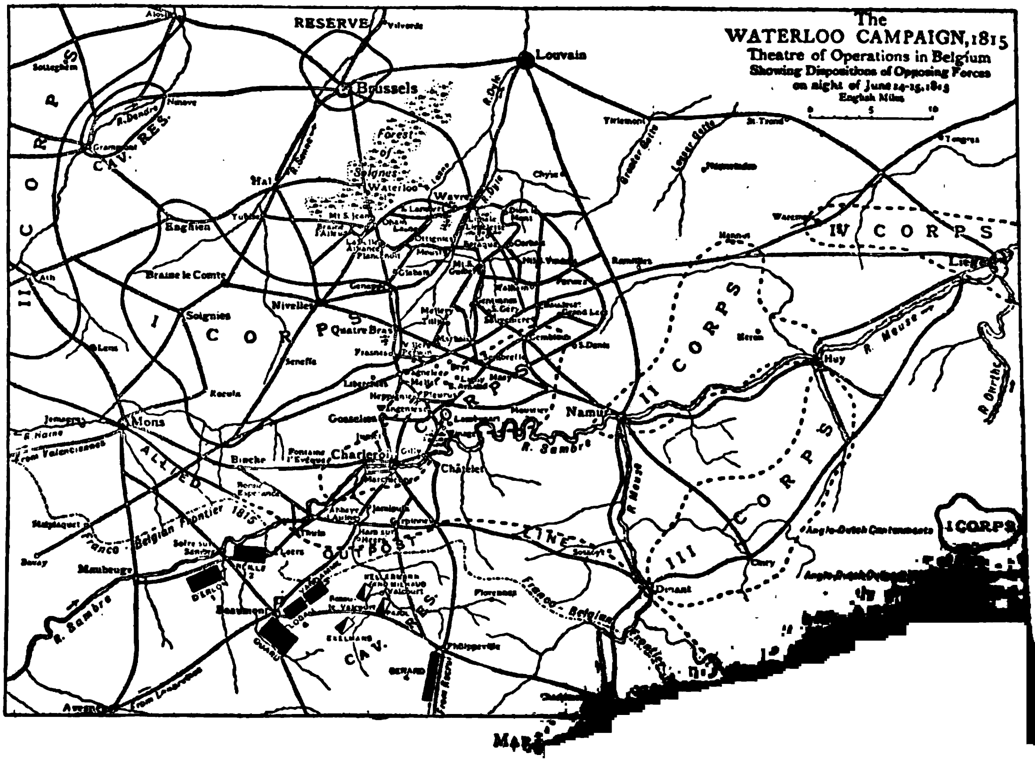
18,500 more troops under Suchet, Brune and Lecourbe guarded the S.E. frontier from Basel to Nice, and covered Lyons; 8000 men under Clausel and Decaen guarded the Pyrenean frontier; whilst Lamarque led 10,000 men into La Vendée to quell the insurrection in that quarter. In 1815 Napoleon was not supported by a united and unanimous France; the country was weakened by internal dissensions at the very moment when it was needful to put every man in line to meet the rising tide of invasion surging against the long curving eastern frontier.

Napoleon now pondered over his plan of campaign. In Belgium, across an almost open frontier, lay an ever-increasing force of Anglo-Dutch and Prussian troops under Wellington and Blücher. The Rhine frontier was threatened by Schwarzenberg's Austrians (210,000); Barclay de Tolly's Russians (150,000) were slowly coming up; and another Austrian force menaced the S.E. frontier of France. The allies determined that they would wage a war without risks, and they were particularly anxious to avoid the risk of defeat in detail. It was accordingly arranged that Wellington and Blücher should await in Belgium the arrival of the Austrian and Russian masses on the Rhine, about July 1, before the general invasion of France was begun. Thereafter, whatever befell, the allied armies would resolutely press forward towards Paris, affording each other mutual support, and with the tremendous weight of troops at their disposal thrust back Napoleon upon his capital, force him to fight in front of it, and drive him when defeated within its works. The end would then be in sight. Thus they had planned the campaign, but Napoleon forestalled them. In fact, the threatening danger forced his hand and compelled him to strike before he had collected a sufficient army for his defensive needs. Consequently he determined to advance swiftly and secretly against Wellington and Blücher, whose forces, as Napoleon knew, were dispersed over the country of their unenthusiastic ally. Thus he designed to crush a part of the coalition before the Russians and Austrians poured over the eastern frontier. Once Wellington and Blücher were destroyed he would move southwards and meet the other allies on the Rhine. He might thus compensate for his numerical inferiority by superior mobility and superior leadership.

His information showed that Wellington held the western half of Belgium from the Brussels-Charleroi road to the Scheldt, that his base of operations was Ostend, and that his headquarters were at Brussels. Blücher, based on the Rhine at Coblentz, held the eastern half from the Brussels-Charleroi road to the Meuse, and had his headquarters at Namur. The emperor was convinced that nothing could be gained by invading Belgium from the S.E. or W.; such a stroke would surely drive the allies together, and that was never Napoleon's custom. On the other hand, if he struck straight at Charleroi—the allied junction point—he would drive the "Armée du Nord" like an armoured wedge between the allies, if only he caught them unsuspicious and unready. Forced asunder at the outset, each would (in all probability) fall back along his own line of communication, and the gap thus made between the allies would enable the emperor to manœuvre between them and defeat them in turn. To gain the best chance of success he would have to concentrate his whole army almost within gunshot of the centre of the enemies' outposts without attracting their attention; otherwise he would find the allies concentrated and waiting for him.

Napoleon's plans.

Wellington and Blücher were disposed as follows in the early days of June (Map I.). The Anglo-Dutch army of 93,000 with headquarters at Brussels were cantoned: I. Corps (Prince of Orange), 30,200, headquarters Braine-le-Comte, disposed in the area Enghien-Genappe-Mons; II. Corps (Lord Hill), 27,300, headquarters Ath, distributed in the area Ath-Oudenarde-Ghent; reserve cavalry (Lord Uxbridge) 9900, in the valley of the Dendre river, between Grammont and Ninove; the reserve (under Wellington himself) 25,500, lay around Brussels. The frontier in front of Leuze and Binche was watched by the Dutch-Belgian light cavalry.



Blücher's Prussian army of 116,000 men, with headquarters at Namur, was distributed as follows:—

I. Corps (Zieten), 30,800, cantoned along the Sambre, headquarters Charleroi, and covering the area Fontaine l'Évêque-Fleurus-Moustier.

II. Corps (Pirch I.), 31,000, headquarters at Namur, lay in the area Namur-Hannut-Huy.

III. Corps (Thielemann), 23,900, in the bend of the river Meuse, headquarters Ciney, and disposed in the area Dinant-Huy-Ciney.

IV. Corps (Bülow), 30,300, with headquarters at Liége, around that place.

The frontier in front of Binche, Charleroi and Dinant was watched by the Prussian outposts.

Thus the allied front extended for nearly 90 m. across Belgium, and the mean depth of their cantonments was 30 m. To concentrate the whole army on either flank would take six days, and on the common centre, about Charleroi, three days.

The allies had foreseen the very manœuvre that Napoleon designed to put into execution, and had decided that if an attempt were made to break their centre they would concentrate forwards and on their inner flanks, the Anglo-Dutch army forming up at Gosselies and the Prussians at Fleurus. Here they would be in contact, and ready to act united against Napoleon with a numerical superiority of two to one. The necessary three days' warning of the French concentration they felt certain they would obtain, for Napoleon's troops were at this juncture distributed over an area (Lille-Metz-Paris) of 175 m. by 100 m.; and to concentrate the French army unknown to, and unobserved by, the allies, within striking distance and before they had moved a man to meet the onrush of the foe, was unthinkable. But, as in 1800, it was the unthinkable that happened.

It will be seen that Blücher covered Fleurus, his concentration point, by Zieten's corps, in the hope of being able to collect his army round Fleurus in the time that Zieten would secure for him by a yielding fight. Wellington on the other hand was far less satisfactorily placed; for in advance of Gosselies he had placed only a cavalry screen, which would naturally be too weak to gain him the requisite time to mass there. Hence his ability to concentrate hung on the mere good luck of obtaining timely information of Napoleon's plans, which in fact he failed to obtain. But the two tracts of country covered by the allies differed vastly in configuration. Blücher's left was protected by the difficult country of the Ardennes. On the other hand, the duke's whole section lay close to an open frontier across which ran no fewer than four great roads, and the duke considered that his position "required, for its protection, a system of occupation quite different from that adopted by the Prussian army." He naturally relied on his secret service to warn him in such time as would enable him to mass and meet the foe. His reserve was well placed to move rapidly and promptly in any direction and give support wherever required.

The emperor made his final preparations with the utmost secrecy. The Army of the North was to concentrate in three fractions—around Solre, Beaumont and Philippeville—as close to Charleroi as was practicable; and he arranged to screen the initial movements of the troops as much as possible, so as to prevent the allies from discovering in time that their centre was aimed at. He directed that the movements of the troops when they drew near the allied outposts should be covered as far as possible by accidents of ground, for there was no great natural screen to cover his strategical concentration

Gérard and the IV Corps from Metz, having the longest distance to go, started first (on June 6), and soon the whole army was in motion for the selected points of concentration, every effort being made to hide the movements of the troops. On June 11 Napoleon himself left Paris for the front, and by June 14 he had achieved almost the impossible itself, for there, at Solre, Beaumont and Philippeville, [illegible] 124,000 [illegible] trated under [illegible] the [illegible] and ready [illegible] were things [illegible] still resting [illegible] tant canton- [illegible] them, and

The [illegible]

The opposing armies were of very different quality. Wellington's was a collection of many nationalities, the kernel being composed of his trusty and tenacious British and King's German Legion troops, numbering only 42,000 men. Of the remainder many were far from enthusiastic in the cause for which they had perforce to take up arms, and might prove a source of weakness should victory incline to the French eagles. Blücher's army was undoubtedly more homogeneous, and though it is doubtful if he possessed any troops of the same quality as Wellington's best, on the other hand he had no specially weak elements.

Napoleon was at the head of a veteran army of Frenchmen, who worshipped their leader and were willing to die for France if necessity demanded. But there were lines of weakness, too, in his army. He had left Marshal Davout behind in Paris, and Murat in disgrace; Suchet was far off on the eastern frontier, and Clausel was in the south of France. The political reasons for these arrangements may have been cogent, but they injured France at the very outset. Marshal Soult was appointed chief of the staff, a post for which he possessed very few qualifications; and, when the campaign began, command of the left and right wings had perforce to be given to the only two marshals available, Ney and Grouchy, who did not possess the ability or strategic skill necessary for such positions. Again, the army was morally weakened by a haunting dread of treason, and some of the chiefs, Ney for example, took the field with disturbing visions of the consequences of their late betrayal of the Bourbon cause, in case of Napoleon's defeat. Finally, the army was too small for its object. Herein Napoleon showed that he was no longer the Napoleon of Austerlitz; for he left locked up in far-distant secondary theatres no less than 56,500 men, of whom he could have collected some 30,000 to 36,000 for the decisive campaign in Belgium. Had he made in 1815 the wise distribution of his soldiers in the theatre of war which he made in his former immortal campaigns, he would have concentrated 155,000 to 160,000 of his available force opposite to Charleroi on June 14, and the issue of the campaign would hardly have been in doubt. But he failed to do so, and by taking the field with such inferior numbers he left too much to Fortune.

For his advance into Belgium in 1815 Napoleon divided his army into two wings and a reserve. As the foe would lie away to his right and left front after he had passed the Sambre, one wing would be pushed up towards Wellington and another towards Blücher; whilst the mass of the reserve would be centrally placed so as to strike on either side, as soon as a force of the enemy worth destroying was encountered and gripped To this end he had, on the 14th, massed his left wing (Reille and D'Erlon) around Solre, and his right wing (Gérard) at Philippeville, whilst the central mass (Vandamme, Lobau, the Guard and the Cavalry Reserve) lay around Beaumont.

The orders for the French advance next day, among the finest ever issued, directed that the army should march at dawn and move to the Sambre at Marchienne and Charleroi. By evening it was expected that the whole would have crossed the Sambre, and would bivouac between the sundered allies.

The passage of the Sambre.

But at the very outset delays occurred. Owing to an accident that befell the single orderly despatched with orders for Vandamme, the III. Corps remained without other definite orders than those issued on June 13, warning them to be ready to move at 3 A.M. The corps therefore stood fast on the morning of June 15, awaiting further instructions. This was the more unfortunate as Vandamme was destined to lead the advance on Charleroi by the centre road. But the emperor regarded it merely as "an unfortunate accident," nothing more, and the advance in two wings and a reserve continued, undisturbed by such occurrences.

Gérard, too, was late in starting, for his corps had not been fully concentrated over-night. Zieten's outposts on the right bank of the Sambre gained still further time, for they fought stubbornly to retard the French advance on Marchienne and Charleroi. But Zieten declined, and very wisely, to fight on the right bank, and he made the most of the screen afforded by the little river. He had to delay the French advance for 24 hours and give time for Blücher's concentration, at the same time retaining his own freedom of manœuvre, and this in spite of the great length of the summer day, the short distance that he lay in front of Fleurus, the tremendous numerical superiority of the French and Napoleon's personal presence at their head.

When the French left wing and centre reached the Sambre bridges, at Marchienne and Charleroi, they found them held and strongly barricaded, and the cavalry were powerless to force the passage. It was nearing noon when the emperor reached the front with the Young Guard, whom he had personally hurried forward. He immediately took action, and under his direction the bridge at Charleroi was stormed shortly after noon. Almost at the same time Reille forced the passage at Marchienne. Instead of drawing his corps together and retreating *en masse* up the Fleurus road, Zieten wisely withdrew on two roads, using those to Quatre Bras and Fleurus. The defenders of Marchienne used the former, while the brigade which had held Charleroi fell back by the latter. The emperor at once began the advance along both the roads. The left wing was directed to push up the Gosselies-Quatre Bras road, and Pajol's cavalry followed the Prussians who retired along the Gilly-Fleurus road. The emperor took post at Charleroi About 3 P.M. Marshal Ney joined the army, was given the command of the left wing, and ordered to drive the Prussians out of Gosselies, and clear the road northward of that place. Ney took over his command just when the attack on Gosselies was impending. The Prussians were driven from the town, but they managed to effect a roundabout retreat to Ligny, where they rallied. Ney pushed on his advance up the Brussels road. When he had left for the front, the emperor proceeded with Grouchy to reconnoitre the Prussian position at Gilly, and handing over the command of the right wing to the marshal, whom he ordered to capture Gilly, Napoleon returned to Charleroi, to hasten the passage of the French army across the Sambre and mass it in the gap between the allies. But the head of Vandamme's corps had by this time crossed the river, and the emperor ordered it to assist Grouchy.

What meanwhile were the allies doing? There is no doubt that, surprised by the suddenness of the French advance, they were caught unprepared. But on the 15th the critical nature of the situation dawned on them, and naturally on Blücher first, as his headquarters were nearer to the frontier than Wellington's, and Blücher had had previous experience of Napoleon's powers. As soon as the Prussian marshal got the first real warning of imminent danger, he ordered (in accordance with the prearranged plan) an immediate concentration of his army on his inner flank at Sombreffe. Unfortunately for him the first orders sent to Bülow by Gneisenau, chief of the staff, at midnight June 14–15, were written in so stilted and hazy a style that Bülow did not consider any especial display of energy was required. Hence the IV Corps was neutralized until after the 16th. The other two corps commanders (Pirch I. and Thielemann) received clearer orders, and acted promptly enough. They concentrated their scattered men and hastened to march to the appointed rendezvous. By nightfall Pirch I. had bivouacked the II Corps at Mazy, only 4 m. short of Sombreffe, and Thielemann and the III. Corps had reached Namur, within easy distance of the Ligny battlefield. Blücher wisely shifted his own headquarters to Sombreffe on the afternoon of the 15th.

Wellington's position at nightfall was very different, and can hardly be termed safe or even satisfactory Definite news of the French advance only reached Brussels about 3 P.M. on the 15th; and even then the duke was by no means certain of the direction of Napoleon's main stroke. Hence the first orders he issued were for his divisions to concentrate at their respective alarm-posts, intending later to send them further orders when the situation had somewhat cleared up. For whatever reasons, Wellington thought Napoleon would attempt to turn his right and cut his line of communications. Had Napoleon attempted this he would (if successful) have driven the Anglo-Dutch army back upon the Prussians, instead of separating the allies, as [illegible] concentration on his inner (left) flank as Blücher had done, and the danger of Blücher's position was thus enormously increased.

Curiously enough, the allies do not appear to have decided upon the course to be taken in case they were surprised, as they virtually were, and their system of intercommunication—if system it can be called—was most imperfect. They ought to have arranged loyally and promptly to let each other know every move it was proposed to make and the reasons for moving, for thus only could concerted action be ensured when confronted with Napoleon, "in whose presence it was so little safe to make a false movement."

Wellington's subordinates at the critical point, however, acted with admirable boldness. Prince Bernard, in command of a brigade at Quatre Bras and Frasnes, recognizing the pressing danger that threatened on the Brussels road, retained his position there to check the French advance, instead of drawing off westwards and massing with the rest of his division at Nivelles; and in this action he was firmly supported by his immediate superiors. It was due to their presence of mind that Wellington maintained his hold on the important strategical point of Quatre Bras on June 15 and 16. Consequently, as Ney's wing advanced northward from Gosselies along the Brussels road, it came upon an advanced detachment of this force at Frasnes. The detachment was quickly forced to retire on its supports at the cross-roads, but here Prince Bernard firmly held his position; and by his skilful use of cover and the high standing corn he prevented the French gauging the weakness of the small force that barred their way. The day was now drawing to a close, and Ney decided wisely not to push his advance any farther. He was in front of a force of unknown strength which appeared resolved to stand its ground, his men were tired, and the cannon-thunder to his right rear proclaimed clearly that Grouchy had not made much headway on the Fleurus road. To push on farther might isolate the left wing among a host of allies. He therefore halted his command, and, later, made a report to the emperor

Meanwhile two long hours had been wasted on the right whilst Grouchy and Vandamme deliberated over their plan of action in front of the Prussian brigade at Gilly, and it was not until the emperor himself again reached the front, about 5.30 P.M., that vigour replaced indecision. There was a brief bombardment, and then Vandamme's corps was sent forward with the bayonet to drive out the foe. The shock was too great, the Prussians gave way immediately and were chased back into the woods by cavalry Grouchy now pushed on towards Fleurus, which was still held by Blücher's troops, and there the advance came to a halt, as the light was failing and the troops exhausted.

Thus, thanks to Zieten's fine delaying action, Blücher by nightfall on June 15 had secured most of the ground requisite for his pre-arranged concentration, for one corps was in position, and two others were at hand. Bülow's corps was unavailable, for the reason already given, but of this fact Blücher was still necessarily ignorant Wellington, owing to his original dispositions and the slowness of his concentration, had only retained a grip on Quatre Bras thanks to the boldness of his subordinates on the spot His other troops were assembling. I Corps, Nivelles, Braine-le-Comte and Enghien, II Corps, Ath, Grammont and Sotteghem, heavy cavalry at Ninove; Reserve at Brussels During the night of the 15th orders were sent for the divisions to move eastwards towards Nivelles, and at dawn the Reserve marched for Mt. S. Jean. Thus Wellington did not even yet realize the full significance of the emperor's opening moves.

But if the intelligence which the duke [illegible] had come to hand on the 15th, it cannot [illegible] would have effected a more expedi[illegible]. His trusted intelligen[illegible] at this time in Fr[illegible] should be [illegible] of selecting the reports which were worth forwarding, sent it back, saying that, so far from convincing him that the emperor was advancing to give battle, it assured him of the contrary. Owing to this officer's presumptuous folly Grant's information only reached the duke on June 18, too late to be of use.

The Army of the North on this night was disposed as follows:—The left wing stretched from Frasnes back to the Sambre at Marchienne and Thuin. Reille's corps was to the front and was covered by the light cavalry of the Guard and Piré's lancers. Ney's headquarters were at Gosselies; one division (Girard's) was at Wangenies and acted as a link between the two wings. The right wing, under Grouchy, had come to a halt in front of Fleurus. It was covered by Pajol's and Exelmans' cavalry corps. Vandamme's was the leading infantry corps, and it bivouacked with its head at Winage. Gérard's corps (with which was Kellermann's cuirassier corps) halted astride the Sambre at Chatelet. Gérard's advance had been delayed owing to the commander of his leading division deserting with his staff to the Prussians. Consequently the IV. Corps had not assisted at all in the passage of the river; though had it only been present, it would have been magnificently placed to co-operate with Grouchy in the action of Gilly. Thus each of these strategical covering forces was itself protected by an adequate tactical advanced guard, to perform the service of local protection. The centre (or reserve) was meanwhile disposed as follows: The Guard was halted between Gilly and Charleroi; the emperor's headquarters being at the latter place. Milhaud's Cuirassier corps and Lobau's (VI.) corps were south of the Sambre, between Charleroi and Jamioulx. In this particular the execution on June 15 fell short of the original conception, for at nightfall about one-third of the French army was still on the right bank of the river. This, however, signified little, for the emperor still occupied a dominant strategical position.

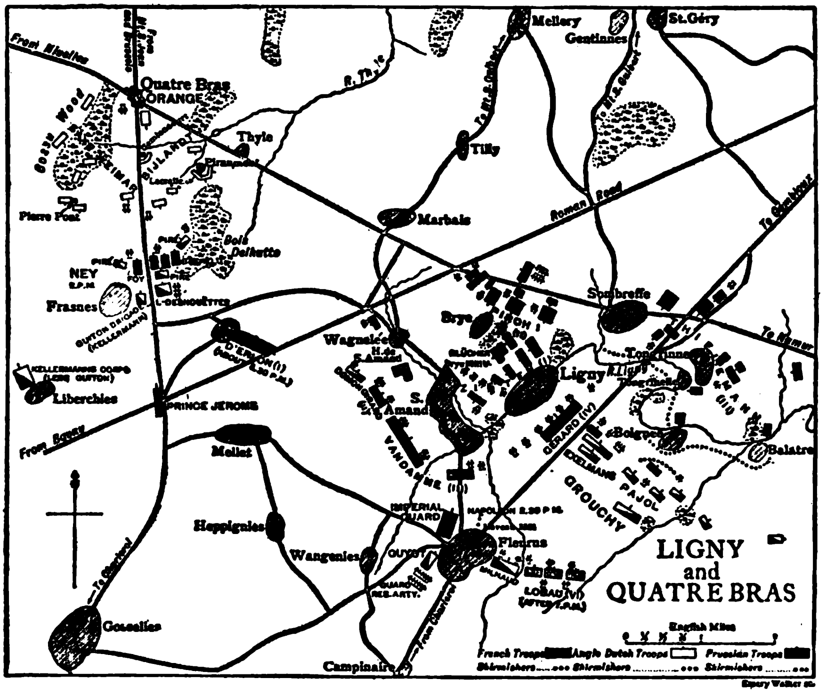
Napoleon had now perfected his arrangements for the invasion of Belgium, and his army was organized definitely in two wings and a reserve; the latter being so placed that it could be brought "into action on either wing as circumstances dictated." As circumstances dictated, either wing would fasten upon one of the allied armies and detain it until the reserve had time to come up and complete its destruction; the other wing meantime detaining the other allied army and preventing its commander from coming to his colleague's assistance. The emperor was not in possession of the Namur-Nivelles road. The allies were thus afforded an opportunity of committing the very blunder which Napoleon longed for, namely to attempt a risky forward concentration. His dispositions on the night of the 15th–16th were skilfully calculated to encourage the allies to mass at Quatre Bras and Sombreffe, and his covering force were pushed sufficiently forward—to Frasnes and Fleurus—to grip whichever ally adventured his army first. At nightfall the Army of the North lay concentrated "in a square whose sides measured 12 m. each; and it could with equal facility swing against the Prussians or the Anglo-Dutch, and was already placed between them."

Early on the morning of June 16 Prince Bernard was reinforced at Quatre Bras by the rest of his division (Perponcher's), and Wellington's other troops were now all on the march eastward except the reserve, who were heading southwards and halted at the cross-road of Mt. S. Jean until the duke had resolved that their objective should be Quatre Bras. They then marched in that direction. Blücher meanwhile was making his arrangements to [illegible] the south of the Namur-Nivelles road and [illegible] communication with Wellington at [illegible] he would keep open the Namur road, [illegible] for Bülow's arrival.

[illegible] in closing up his army, and [illegible]mportant letter of the [illegible]: "I have adopted as [illegible] divide my army into [illegible] will form the reserve, [illegible]er wing just as circum[illegible]mstances I shall weaken [illegible]." Here, in its simplest form, is the principle that underlies Napoleon's strategy in 1815. Only on the wing on which the reserve is brought into action will a decisive result be aimed at. The other is to be used exclusively to neutralize the other enemy, by holding him at bay.

Napoleon's original plan for the 16th was based on the assumption that the allies, who had been caught napping, would not attempt a risky forward concentration; and he intended therefore to push an advanced guard as far as Gembloux, for the purpose of feeling for and warding off Blücher. To assist this operation the reserve would move at first to Fleurus to reinforce Grouchy, should he need assistance in driving back Blücher's troops; but, once in possession of Sombreffe, the emperor would swing the reserve westwards and join Ney, who, it was supposed, would have in the meantime mastered Quatre Bras. In pursuance of this object Ney, to whom Kellermann was now attached, was to mass at Quatre Bras and push an advanced guard 6 m. northward of that place, with a connecting division at Marbais to link him with Grouchy. The centre and left wing together would then make a night-march to Brussels. The allies would thus be irremediably sundered, and all that remained would be to destroy them in detail. Napoleon now awaited further information from his wing commanders at Charleroi, where he massed the VI. Corps (Lobau), to save it, if possible, from a harassing countermarch, as it appeared likely that it would only be wanted for the march to Brussels. Ney spent the morning in massing his two corps, and in reconnoitring the enemy at Quatre Bras, who, as he was informed, had been reinforced. But up till noon he took no serious step to capture the cross-roads, which then lay at his mercy. Grouchy meantime reported from Fleurus that Prussian masses were coming up from Namur, but Napoleon does not appear to have attached much importance to this report. He was still at Charleroi when, between 9 and 10 A.M., further news reached him from the left that considerable hostile forces were visible at Quatre Bras. He at once wrote to Ney saying that these could only be some of Wellington's troops, and that Ney was to concentrate his force and crush what was in front of him, adding that he was to send all reports to Fleurus. Then, keeping Lobau provisionally at Charleroi, Napoleon hastened to Fleurus, arriving about 11. He found that Grouchy had made little progress beyond the town. As he surveyed the field from the windmill north of Fleurus it struck him as significant that Blücher's troops were disposed parallel to the Namur road, as if to cover a forward concentration, and not at right angles to it, as they would be had they been covering a retreat. Still, at the moment, only one corps was showing. Possibly, however, the decisive day of the campaign had come. By the emperor's arrangements Vandamme, Gérard, Pajol and Exelmans would be available after 2 P.M. to attack whatever force Blücher might command, and the Guard and Milhaud would be at hand to act as reserve. The wonder is that he did not now order Lobau to move to some intermediate position, such as Wangenies, where he would be available for either wing as circumstances dictated. At 2 P.M. Napoleon ordered Ney to master Quatre Bras, and added that the emperor would attack the corps which he saw in front of him. Whichever wing succeeded first would then wheel inwards and help the other. Not yet had Napoleon grasped the full significance of the allied movements, for the decisive flank had not yet become clear.

Blücher had already determined to fight. Meanwhile, Wellington, having reached Quatre Bras in the morning, wrote to him to concert the day's operations; then, as all was quiet in his front, he rode over to meet Blücher at Brye. The two chiefs, surveying the French army in their front, considered that no serious force was in front of Quatre Bras, and Wellington terminated the interview with the conditional promise that he would bring his army to Blücher's assistance at Ligny, if he was not attacked himself. This promise, of course, was never fulfilled, for Ney employed the duke all day at Quatre Bras; and, furthermore, the duke's tardy concentration made it quite impossible for him to help Blücher directly on the Ligny battlefield. On his return to Quatre Bras he found that a crisis had already been reached.



Emery Walker sc.

MAP II.

Quatre Bras.

Ney had allowed the valuable hours to slip away when he could have stormed Quatre Bras with ease and ensured co-operation with his master. Remembering the surprises that the battles in Spain had provided for the marshals opposed to the duke, he massed nearly the whole of Reille's corps before he advanced. The prince of Orange, in command at Quatre Bras, had only 7500 troops. But by boldly scattering his force and by making use of the Bossu wood and the farms, he covered the cross-roads and showed a firm front to the very superior force which Ney commanded. It was then 2 P.M. The Dutch-Belgian troops to the east of the Brussels highway were at once forced back by the mass of men moved against them, and it looked as if the whole defence would crumple up. But about 3 P.M. timely succour reached the field—Van Merlen's cavalry from Nivelles, Picton and the 5th division from Brussels—and Wellington returned and took over the command. Picton at once stopped the victorious French advance to the east of the road, but the remaining division (Jérôme) of Reille's corps now reached the front and Ney flung it into the Bossu wood to clear that place and keep his left flank free. A fierce fight now broke out all along the line, in which Jérôme steadily made ground in the Bossu wood, while Picton showing a dauntless front maintained his position. The Brunswick contingent now reached the field, but their duke whilst leading a charge received a mortal wound and the attack failed. It was nearly 4.15 P.M. when Ney received Napoleon's 2 P.M. order, and in obedience to it he made another attack, in which the Bossu wood was virtually cleared of its defenders. However, about 5 P.M. further reinforcements reached Wellington, Alten's (3rd) division coming in from Nivelles. Ney now realized that he could only capture Quatre Bras with D'Erlon's [illegible]

But shortly afterwards (about 5.15) he [illegible] Corps, without his direct order or kn[illegible] wards to assist in the battle of Lign[illegible] (about 5.30) he received an order from Napoleon to seize Quatre Bras and then turn eastwards to crush Blücher, who was caught at Ligny. Napoleon added, "The fate of France is in your hands." Ney's duty was merely to hold Wellington for certain at Quatre Bras and allow D'Erlon to carry out the movement which must ensure a decisive result at Ligny, in accordance with Napoleon's plan of campaign. In any case D'Erlon could not come back in time to give him effectual help. But incapable of grasping the situation, and beside himself with rage, Ney sent imperative orders to D'Erlon to return at once, and immediately afterwards he ordered Kellermann to lead his one available cuirassier brigade and break through Wellington's line. The charge was admirably executed; it overthrew one British regiment which it caught in line, but being unsupported it achieved nothing further of importance, and was beaten back. When this attempt to master the cross-roads had ended in failure, Ney received a verbal message from the emperor, enjoining him that, whatever happened at Quatre Bras, D'Erlon must be allowed to carry out the movement ordered by the emperor. The bearer, Major Baudus, knowing the importance of the manœuvre which the I. Corps was carrying out, strove to induce Ney to reconsider D'Erlon's recall; but the marshal refused and ended the discussion by plunging into the fight. Shortly afterwards (about 7 P.M.) Wellington received further reinforcements (Cooke's division of the British Guards), which brought his force up to 33,000 against Ney's 22,000 men. The duke [illegible] attacked strenuously all along the line, and before [illegible] the fight [illegible] back the French to [illegible] were as follows: [illegible] when the battle [illegible] It had already [illegible] the counter-order [illegible] order Marshal Ney [illegible] directing Ney to detach

D'Erlon, had on his own initiative ordered the I. Corps to the eastward) the general considered he ought to return to the left wing, and leaving one division at Wagnelée he withdrew his force. The incident was immeasurably unfortunate for the French. Had the I. Corps been thrown into the doubtful struggle at Quatre Bras, it must have crushed Wellington; had it been used at Ligny it would have entailed Blücher's annihilation. But oscillating between the two fields, it took part in neither. When the fighting was over, at 10 P.M., Ney wrote a short and somewhat one-sided account of the action to Soult.

Ligny.

On the other flank there had meanwhile been waged the bitterly fought battle of Ligny. As Blücher's dispositions gradually became clearer the emperor realized that the first decisive day of the campaign had actually come, and he promptly made arrangements for defeating the Prussian army in his front. Blücher, to cover the Namur road, held with the I. Corps the villages of Brye, St Amand and Ligny, whilst behind his centre was massed the II. Corps, and on his left was placed the III. Corps. Wellington and Bülow on arrival would act as general reserve. Blücher's army, as he finally disposed it, was quite visible to Napoleon on the bare open slopes which it occupied above St Amand and Ligny, the II. Corps being especially exposed. The emperor decided to bear down Blücher's centre and right with the corps of Vandamme and Gérard and with Girard's division which he had drawn into his operations, containing the Prussian left meanwhile with the squadrons of Pajol and Exelmans, assisted by a few infantry. The Guard and Milhaud were in hand at Fleurus. Further, he could order up Lobau, and direct Ney to move his rearward corps across and form it up behind Blücher's right. When the battle was ripe, he would crush the Prussian centre and right between the Guard and D'Erlon's corps. It was a somewhat complicated manœuvre; for he was attempting to outflank his enemy with a corps that he had subordinated to Marshal Ney. Much depended on whether Ney would grasp the full purport of his orders; in a similar case at Bautzen he had failed to do so, and he failed as badly now. The usual Napoleonic simplicity was wanting at Ligny, and he paid in full for the want.

It was just after 2·30 P.M. when Napoleon, hearing the sound of Ney's cannon to the westward and realizing that Wellington was attacked and neutralized, commenced the battle at Ligny. Blücher's force was numerically very superior. The Prussians numbered about 83,000 men to Napoleon's 71,000 (including Lobau, who only came up at the end of the day). A fierce fight was soon raging for the villages. Vandamme and Girard attacked S. Amand, whilst Gérard attempted to storm Ligny; on the right Grouchy held Thielemann in play, and in the centre near Fleurus were the Guard and Milhaud in reserve, close to the emperor's headquarters on the mill. At 3.15 P.M., when the battle was in full swing, Napoleon wrote in duplicate to Ney, saying, "The fate of France is in your hands," and ordering the marshal to master Quatre Bras and move eastwards to assist at Ligny. Immediately afterwards, hearing that Ney had 20,000 men in front of him, he sent the "pencil-note" by General La Bédoyère which directed Ney to detach D'Erlon's corps to Ligny. This, as we know, the A.D.C. in a fit of mistaken zeal took upon himself to do. Hence the corps appeared too soon, and in the wrong direction. But neither order made it sufficiently clear to Ney that co-operation at Ligny was the essential, provided that Wellington was held fast at Quatre Bras. In other words, Ney had merely to hold Wellington with part of the French left wing all day, and detach the remainder of his force to co-operate in the deathblow at Ligny. This is clear when the first letter to Ney is studied with the orders, as it was meant to be; but Ney in the heat of action, missed the later instructions. Meanwhile the [illegible]au to bring up his corps at once to Fleurus [illegible]y be of great service, whereas had he been [illegible]Wagnelée he might have co-operated in the [illegible]e efficiently. The fight for the villages [illegible]ely and incessantly, each side behaving as if [illegible] front. The villages were captured and re[illegible]lly the French had the better of the fighting, for they compelled Blücher to use up more and more of his reserves, and prevented the Prussians from breaking through to the southward of S. Amand. Eventually the fighting became so furious that the troops engaged literally melted away, particularly at Ligny, and the emperor was finally compelled to call on his reserve to replenish the troops first engaged. But hardly had the Young and Middle Guard marched off to reinforce Vandamme and Gérard, when Vandamme sent word that a hostile column, over 30,000 strong, was threatening the French left (in reality this was D'Erlon's corps). Vandamme's exhausted troops were unnerved at the sight of this fresh foe, and an incipient panic was only quelled by turning guns on the fugitives. It was now between 5.30 and 6. The emperor concluded that this could not be D'Erlon, because he had arrived too soon and was marching in an evidently wrong direction. He at once sent an officer to reconnoitre. Meanwhile the reinforcements which he had despatched were most opportune. The Prussians had seized the opportunity offered by the slackening of the French attacks to rally and deliver a counterstroke, which was parried, after achieving a small measure of success, by the bayonets of the Young Guard. It was about 6.30 before Napoleon learned that the unknown force was actually D'Erlon's, and somewhat later he heard that it had counter-marched and withdrawn westwards. Repeated orders sent to the commander of the division left by D'Erlon failed to induce him to engage his command decisively, and thus Napoleon obtained no direct co-operation from his left wing on this, the first decisive day of the campaign. Thus relieved about his left, but realizing that D'Erlon had returned to Ney, the emperor had perforce to finish the battle single-handed. Blücher now delivered a general counterstroke against Vandamme. Massing every available man he led the attack in person; but he vainly attempted to make ground to the south of S. Amand; the exhausted Prussians were overpowered by the chasseurs of the Guard and forced to retire in disorder. Napoleon's opportunity to finish the battle had come at last. He could at least beat Blücher and render the Prussians unfit for any serious operation except retreat on June 17, although he could no longer expect to destroy the Prussian army. Lobau's corps, too, was now arriving and forming up on the heights east of Fleurus. The artillery of the Guard, therefore, came into action above Ligny to prepare Blücher's centre for assault. Some delay was occasioned by a thunderstorm; but, as this passed over, the guns opened and the Old Guard and Milhaud's cuirassiers proceeded to form up opposite to Ligny. About 7.45 P.M. a crashing salvo of 60 guns gave the signal for a combined assault to be delivered by Gérard and the Guard, with Milhaud moving on their right flank. Blücher's worn-out soldiers could not withstand the tremendous impact of Napoleon's choicest troops, and the Prussian centre was pierced and broken. But the gallant old marshal still had some fresh squadrons in hand, and he promptly launched them to stem the French advance. While leading one of the charges in person his horse was shot and fell under him, but he was rescued and borne in a semi-conscious condition from the field. Without doubt, the personal risk to which Blücher exposed himself at this crisis was far too great; for it was essential that the command of the Prussian army should remain vested in a chief who would loyally keep in touch and act entirely in concert with his colleague. In this way only could the allies hope to obtain a decisive success against Napoleon. By 9 P.M. the main battle was over, and everywhere the French pushed resistlessly forward. Napoleon was master of Blücher's battlefield, and the beaten Prussians had retired to the north of the Namur-Nivelles road. Under the circumstances, the late hour, the failing light and the lack of information as to events on the left wing, immediate pursuit was out of the question.

The execution had again fallen short of the conception; Blücher though beaten was not destroyed, nor was his line with Wellington cut. If the Prussians now retired northwards, parallel to the direction which Wellington would follow perforce on the morrow, the chance of co-operating in a decisive battle would still remain to the allies; and Gneisenau's order issued by moonlight, directing the retreat on Tilly and Wavre, went far to ensuring the possibility of such combined action. However, Gneisenau was very remiss in not immediately reporting this vital move and the necessity for it to the duke, as it left the Anglo-Dutch inner flank quite exposed. Gneisenau apparently selected Wavre, not with the intention of assisting his ally, but rather to re-establish his own line of communication, and the presence of the Prussians on the field of battle of Waterloo must be put down to the immortal credit of Blücher and Grolmann, his quartermaster-general. Gneisenau at this crisis in the affairs of the allies does not appear to have subordinated everything to co-operation at all cost with Wellington, and he allowed supply considerations and the re-establishment of his communications to overweigh the paramount necessity of arranging concerted action with his ally. Probably Wellington's failure to co-operate at Ligny had heightened the Prussian chief-of-staff's unworthy suspicions of the good faith and soldierly qualifications of the British marshal; and it was well for the allies that Blücher was able to resume command before Napoleon had time to profit from the dissensions that would probably have arisen had Gneisenau remained in control. The casualties in the hard-fought battle of Ligny were very heavy. The Prussians lost about 12,000 men and 21 guns, and the French 8500; in Ligny more than 4000 dead lay on an area of about 400 sq. yds., and in one of the hamlets of S. Amand there lay, almost to a man, the gallant 82nd of the line (Girard's division). So close was the fighting that most of the 20,000 casualties lay on about 2 sq. m. of ground. It was a really Napoleonic battle.

Despite D'Erlon's misadventure the emperor had the game still in his hands, for Ney's failure had actually placed the Anglo-Dutch army in a precarious position. So true is it that a tactical failure encountered in carrying out a sound strategical plan matters but little. Again Napoleon's plan of campaign had succeeded. The emperor having beaten Blücher, the latter must fall back to rally and re-form, and call in Bülow, who had only reached the neighbourhood of Gembloux on June 16; whilst on the other flank Ney, reinforced by D'Erlon's fresh corps, lay in front of Wellington, and the marshal could fasten upon the Anglo-Dutch army and hold it fast during the early morning of June 17, sufficiently long to allow the emperor to close round his foe's open left flank and deal him a deathblow. But it was clearly essential to deal with Wellington on the morrow, ere Blücher could again appear on the scene. Wellington was by no means so well acquainted with the details of the Prussian defeat at Ligny as he ought to have been. It is true that, before leading the final charge, Blücher despatched an aide-de-camp to his colleague, to tell him that he was forced to retire; but this officer was shot and the message remained undelivered. To send a message of such vital importance by a single orderly was a piece of bad staff work. It should have been sent in triplicate at least, and it was Gneisenau's duty to repeat the message directly he assumed temporary command. Opposed as they were to Napoleon, Gneisenau's neglect involved them in an unnecessary and very grave risk.

June 17. Napoleon was unwell, and consequently was not in the saddle on the 17th as early as he would otherwise have been. In his absence neither Ney nor Soult appears to have made any serious arrangements for an advance, although every minute was now golden. During the night more reinforcements arrived for Wellington, and on the morning of June 17 the duke had most of his army about Quatre Bras. But it was 24 hours too late, for Blücher's defeat had rendered the Anglo-Dutch position untenable. Early in the morning Wellington (still ignorant of the exact position of his ally) sent out an officer, with an adequate escort, to establish touch with the Prussians. This staff officer discovered and reported that the Prussians were drawing off northwards to rally at Wavre; and about 9 A.M. a Prussian orderly officer arrived from Gneisenau to explain the situation and learn Wellington's plans. The duke replied that he should fall back on Mt S. Jean, and would accept battle there, in a selected position to the south of the Forest of [illegible] provided he was assured of the support of one of [illegible] corps. Like the good soldier and loyal ally that he [illegible] subordinated everything to the one essential of manœuvring so as to remain in communication with Blücher. It was 2 A.M. on June 18 before he received the answer to his suggestion.

Early on the 17th the Prussians drew off northwards on three roads, Thielemann covering the withdrawal and moving via Gembloux to join hands with Bülow. The French cavalry on the right, hearing troops in motion on the Namur road, dashed in pursuit down the turnpike road shortly after dawn, caught up the fugitives and captured them. They turned out to be stragglers; but their capture for a time helped to confirm the idea, prevalent in the French army, that Blücher was drawing off towards his base. Some delay too was necessary before Napoleon could finally settle on his plan for this day. The situation was still obscure, details as to what had happened on the French left were wanting, and the direction of Blücher's retreat was by no means certain. Orders, however, were sent to Ney, about 8 A.M., to take up his position at Quatre Bras, and if that was impossible he was to report at once and the emperor would co-operate. Napoleon clearly meant that Ney should attack whatever happened to be in his front. If confronted by a rear-guard he would drive it off and occupy Quatre Bras; and if Wellington was still there the marshal would promptly engage and hold fast the Anglo-Dutch army, and report to the emperor. Napoleon would in this case hasten up with the reserve and crush Wellington. Wellington in fact was there; but Ney did nothing whatever to retain him, and the duke began his withdrawal to Mt. S. Jean about 10 A.M. The last chance of bringing about a decisive French success was thus allowed to slip away.

Grouchy's operations. Meanwhile Napoleon paid a personal visit about 10 A.M. to the Ligny battlefield, and about 11 A.M. he came to a decision. He determined to send the two cavalry corps of Pajol and Exelmans, and the corps of Vandamme and Gérard, with Teste's division (VI. Corps), a force of 33,000 men and 110 guns, to follow the Prussians, penetrate their intentions and discover if they meditated uniting with Wellington in front of Brussels. As Exelmans' dragoons had already gained touch of the III. Prussian corps at Gembloux, the emperor directed Marshal Grouchy, to whom he handed over the command of this force, to "proceed to Gembloux." This order the marshal only too literally obeyed. After an inconceivably slow and wearisome march, in one badly arranged column moving on one road, he only reached Gembloux on June 17, and halted there for the night. His cavalry gained contact before noon with Thielemann's corps, which was resting at Gembloux, but the enemy was allowed to slip away and contact was lost for want of a serious effort to keep it. Grouchy did not proceed to the front, and entirely failed to appreciate the situation at this critical juncture. Pressing danger could only exist if Blücher had gone northwards, and northwards, therefore, in the Dyle valley, he should have diligently sought for traces of the Prussian retreat.[1] Had Blücher gone eastwards, Grouchy, holding the Dyle, could easily have held back any future Prussian advance towards Wellington. Grouchy, however, went to Gembloux as ordered. By nightfall the situation was all in favour of the allies; for Grouchy was now actually outside the four Prussian corps, who were by this time concentrated astride the Dyle at Wavre. Their retreat having been unmolested, the Prussians were ready once more to take the field, quite twenty-four hours before Napoleon deemed it possible for the foe defeated at Ligny.

On the other flank, too, things had gone all in favour of Wellington. Although the emperor wrote to Ney again at noon, from Ligny, that troops had now been placed in position at Marbais to second the marshal's attack on Quatre Bras, yet Ney remained quiescent, and Wellington effected [illegible] and skilful [illegible] that, on Napoleon's arrival [illegible] he found only the duke's cavalry screen and some horse artillery still in position. Can we wonder that he gave vent to his anger and declared that Ney had ruined France? This was the fatal mistake of the campaign, and Fortune turned now against her former favourite. Although the smouldering fires of his old energy flashed out once more and Napoleon began a rapid pursuit of the cavalry screen, which crumpled up and decamped as he advanced, yet all his efforts were powerless to entangle the Anglo-Dutch rearguard to such an extent that Wellington must turn back to its assistance. The pursuit, too, was carried out in the midst of a tropical thunderstorm which broke at the roar of the opening cannonade, and very considerably retarded the French pursuit. It was not until the light was failing that Napoleon reached the heights of Rossomme opposite to Wellington's position and, by a masterly reconnaissance in force, compelled the duke to disclose the presence of practically the whole Anglo-Dutch army. The French halted, somewhat loosened by pursuit, between Rossomme and Genappe and spent a wretched night in the sodden fields.

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[1] There appears to [illegible] any reconn[illegible] June 17 [illegible] try [illegible] 19 P.M.

Napoleon's pursuit of Wellington.

During the night Wellington received the reassuring news that Blücher would bring two corps certainly, and possibly four, to Waterloo, and determined to accept battle. Napoleon's plan being to penetrate between the allies and then defeat them successively, the left was really the threatened flank of the Anglo-Dutch army. Yet so far was Wellington from divining Napoleon's object that he stationed 17,000 men (including Colville's British division) at Hal and Tubize, 8 m. away to his right, to repel the turning movement that he groundlessly anticipated and to form a rallying point for his right in case his centre was broken. By deliberately depriving himself of this detachment, on June 18, the duke ran a very grave risk. With the 67,600 men whom he had in hand, however, he took up a truly admirable "Wellingtonian" position astride the Nivelles-Brussels and Charleroi-Brussels roads which meet at Mt S. Jean. He used a low ridge to screen his main defensive position, exposing comparatively few troops in front of the crest. Of his 156 guns, 78 belonged to the British artillery; but of his 67,600 men only 29,800 were British or King's German Legion troops, whereas all Napoleon's were Frenchmen and veterans. Wellington occupied Hougoumont in strength, chiefly with detachments of the British Guards; and he also placed a garrison of the K.G.L. in La Haye Sainte, the tactical key of the allied position. Both these farms were strengthened; but, still nervous about his right flank, the duke occupied Hougoumont in much greater force than La Haye Sainte, and massed the bulk of his troops on his right. The main position was very skilfully taken up, and care was taken to distribute the troops so that the indifferent and immature were closely supported by those who were "better disciplined and more accustomed to war." Owing to a misconception, one Dutch-Belgian brigade formed up in front of the ridge. Full arrangements were made for Blücher's co-operation through General Müffling, the Prussian attaché on the duke's staff. The duke was to stand fast to receive the attack, whilst the Prussians should close round Napoleon's exposed right and support Wellington's left. The Prussians were thus the real general [illegible], and it was Wellington's task to receive Napoleon's attack [illegible] him for the decisive counter-stroke.

June 18.

[illegible] kept his promise to his ally; but the execution [illegible] desired. He did not start his corps on their [illegible] until a considerable time after dawn, and then, [illegible] the rear corps of all (Bülow) was selected [illegible] delay was aggravated [illegible] Wavre and delayed the march. [illegible] was in the saddle.

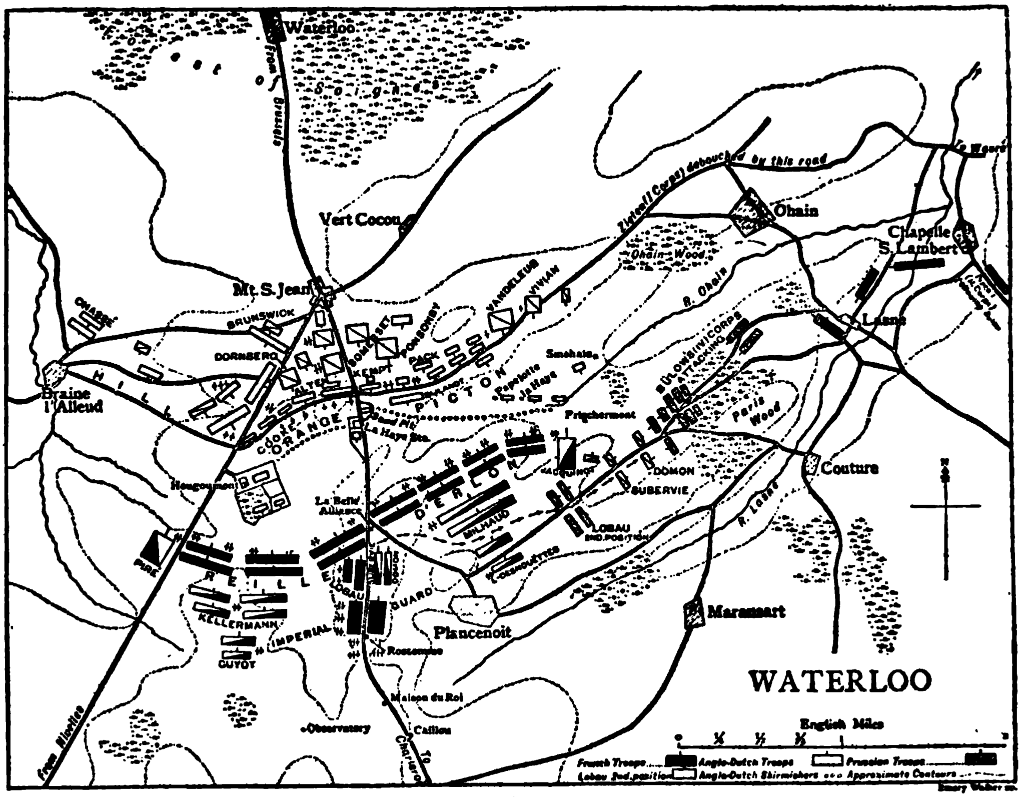
[illegible] army for the attack on [illegible] state of the ground (largely [illegible] the scattered bivouacs of the [illegible] attack from being made at 6 A.M. [illegible] was therefore put off first of all [illegible], to permit the sodden ground [illegible] arms to manœuvre freely and give time to the French army to close up. During the night the emperor had received a report from Marshal Grouchy, dated Gembloux, 10 P.M., 17th, which stated that the Prussians were retiring in two columns towards Wavre and Perwez. Grouchy added that if he found that the bulk of the Prussians were moving on Wavre he would follow them and separate them from Wellington. But a glance at the map shows that this was impossible. By following the Prussians Grouchy, who had taken up a position outside the Prussian left flank, would inevitably drive the allies together. It was 10 A.M. when the emperor answered this letter, and he directed the marshal to march for Wavre, thus approaching the French army and entering the zone of the main operations. The underlying idea of manœuvring in two wings and a reserve should be kept in mind when considering this letter. Its meaning will then clearly be, that Grouchy was to endeavour to place his force on the inner Prussian flank and hold them back from Waterloo. But this is just what the despatch does not state verbally and precisely, and accordingly Grouchy, like Ney on the 16th and 17th, misread it.

The French army proceeded to form up in an imposing array some 1300 yards from Wellington's position, and if some misgivings as to the result filled the minds of men like Soult, Reille and Foy, who had had previous experience of Wellington in the field, none at any rate dwelt in Napoleon's mind. The lateness of the hour at which the attack was delivered, and the emperor's determination to break Wellington's centre instead of outflanking the Anglo-Dutch left and further separating the allies, deprived him of whatever chance he still possessed of beating Wellington before Blücher could intervene. Napoleon drew up his army of 74,000 men and 246 guns in three lines, fully in view of the allies. In the first line were the corps of Reille and D'Erlon, who were destined to attack the allied line and prepare it for the final assault. In the second line were Kellermann's cuirassiers, the incomplete corps of Lobau, the squadrons of Domon and Subervie, and Milhaud's cuirassiers. In the third line was the Guard. It was an imposing array of veteran troops, and when their emperor rode along the lines they received him with extraordinary enthusiasm.

Waterloo: first phase.

The battle of Waterloo may be divided into five phases. About 11.30 the first phase opened with an attack by one of Reille's divisions on Hougoumont. This was a mere side-issue, destined to draw Wellington's attention to his right, and in this it failed. About noon, however, a battery of 80 French guns unlimbered on the long spur to the S.E. of La Haye Sainte, to prepare the duke's centre for the main attack. Here the form of the ground so skilfully chosen sheltered the defence in some degree from the tempest of iron that now beat against the position. After 1 P.M., and just before he gave orders for Ney to lead the main attack, the emperor scanned the battlefield, and on his right front he saw a dense dark cloud emerging from the woods at Chapelle Saint Lambert. It was soon discovered that this was Bülow's corps marching to Wellington's assistance. A letter was now awaiting despatch to Grouchy, and to it was added a postscript that the battle was raging with Wellington, that Bülow's corps had been sighted by the emperor, and that the marshal was to hasten to the field and crush Bülow. This order at least was precise and clear, but it was sent 12 hours too late, and when Grouchy received it he was unable to carry it out. To neutralize Bülow when necessity arose, the emperor now detached Lobau together with the squadrons of Domon and Subervie. The French general, however, hardly drew out far enough from the French right; otherwise the magnificent resolution he displayed and the admirable obstinacy with which his troops fought against ever-increasing odds are worthy of all praise. Thus as early as 1.30 P.M. the Prussian intervention deranged the symmetry of Napoleon's battle-array.

It did not occur to the emperor that it would be wise to break off the fight now and seek a more favourable opportunity of beating the allies in detail. He was still determined to play the game out to the bitter end, and involve Wellington and Bülow's corps in a common ruin.



MAP III.

Second phase.

Ney was therefore ordered to attack Wellington's centre with D'Erlon's corps. Owing to a misconception the columns used for advance were over-heavy and unwieldy, and the corps failed to achieve anything of importance. As D'Erlon's troops advanced the Dutch-Belgian brigade in front of the ridge, which had been subjected to an overwhelming fire from the 80 French guns at close range, turned about and retired in disorder through the main position. This, however, was the solitary success secured by the I. corps; for the left division failed to storm La Haye Sainte, which was most gallantly defended, and Picton's division met the remainder of D'Erlon's corps face to face, engaging them in a murderous infantry duel in which Picton fell. It was during this struggle that Lord Uxbridge launched two of his cavalry brigades on the enemy; and the "Union brigade" catching the French infantry unawares rode over them, broke them up, and drove them to the bottom of the slope with the loss of two eagles. The charge, however, over-reached itself, and the British cavalry, crushed by fresh French horsemen hurled on them by the emperor, were driven back with great loss. So far no success against Wellington had been achieved, and Bülow was still an onlooker.

Third phase.

Ney was now ordered to attack La Haye Sainte again, but the attack failed. A furious cannonade raged, and the Anglo-Dutch line withdrew slightly to gain more cover from the ridge. Ney misinterpreted this manœuvre and led out, about 4 P.M., Milhaud's and Lefebvre-Desnouëttes' horsemen (43 squadrons) to charge the allied centre between the two farms. For several reasons, the cavalry could only advance at a [illegible] rsemen closed they were received with volleys of case from the guns, and the infantry formed into squares. Against the squares the horsemen were powerless, and failing to break a single square, they were finally swept off the plateau by fresh allied horsemen. Kellermann's cuirassiers and the heavy horse of the Guard (37 fresh squadrons) now advanced to support the baffled cavalry, the latter falling in as supports. The whole 80 squadrons resumed the attack, but with no better result. The cavalry gradually became hopelessly entangled among the squares they were unable to break, and at last they were driven down the face of the ridge and the most dramatic part of the battle came to an end. Had these great cavalry attacks been closely supported by infantry, there can be little doubt that they must have achieved their object. But they were not. In his handling of the three arms together, Napoleon on this day failed to do justice to his reputation.

About 4.30 P.M. Bülow at last engaged. Lobau's men were gradually overpowered and forced back into Plancenoit, the village was stormed, and the Prussian round shot reached the main road. To set his right flank free the emperor called further on his reserve, and sent Duhesme with the Young Guard to Lobau's support. Together, these troops drove Bülow out of Plancenoit, and forced him back towards the Paris wood. But the Prussians had not yet changed the fate of the day.

Fourth phase.

Napoleon now ordered Ney to carry La Haye Sainte at whatever cost, and this the marshal accomplished with the wrecks of D'Erlon's corps soon after 6 P.M. The garrison (King's German Legion) had run out of rifle ammunition and the French bursting in seized the post. This was the first decided advantage that Napoleon had gained during the day. The key of the duke's position was now in Napoleon's hands, Wellington's centre was dangerously shaken, the troops were exhausted, and the reserves inadequate. But the Iron Duke faced the situation unmoved. Calmly he readjusted his line and strengthened the torn centre. Happily for him, Pirch I.'s and Zieten's corps were now at hand. Pirch I. moved to support Bülow; together they regained possession of Plancenoit, and once more the Charleroi road was swept by Prussian round shot. Napoleon, therefore, had to free his right flank before he could make use of Ney's capture. To this end he sent two battalions of the Old Guard to storm Plancenoit. The veterans did the work magnificently with the bayonet, ousted the Prussians from the place, and drove them back 600 yards beyond it. But Napoleon could not turn now on Wellington. Zieten was fast coming up on the duke's left, and the crisis was past. Zieten's advent permitted the two fresh cavalry brigades of Vivian and Vandeleur on the duke's extreme left to be moved and posted behind the depleted centre. The value of this reinforcement at this particular moment can hardly be overestimated.

Fifth phase.

The French army now fiercely attacked Wellington all along the line; and the culminating point of this phase was reached when Napoleon sent forward the Guard, less 5 battalions, to attack Wellington's centre. Delivered in three échelons, these final attacks were repulsed, the first échelon by Colin Halkett's British Brigade, a Dutch-Belgian battery, and a brigade of Chassé's Dutch-Belgian division; the second and third échelons by the Guards, the 52nd, and the Royal Artillery. Thus ended the fifth phase.

Rout of the French.

As the Guard recoiled (about 8 P.M.) Zieten pierced the north-east corner of the French front, and their whole line gave way as the allies rushed forward on their now defenceless prey. Three battalions of the Guard indeed stood their ground for some time, but they were finally overwhelmed. Afterwards, amidst the ruins of their army, two battalions of the 1st Grenadiers of the Guard defied all efforts to break them. But, with the exception of these two battalions, the French army was quickly transformed into a flying rabble. Bülow and Pirch I. now finally overpowered Lobau, once more recaptured Plancenoit, and sealed the doom of the French army. But Lobau's heroic efforts had not been in vain; they had given his master time to make his last effort against Wellington; and when the Guard was beaten back the French troops holding Plancenoit kept free the Charleroi road, and prevented the Prussians from seizing Napoleon's line of retreat.

When Wellington and Blücher met about 9.15 P.M. at "La Belle Alliance," the victorious chiefs arranged that the Prussians should take up the pursuit, and they faithfully carried out the agreement. Pushing on through the night, they drove the French out of seven successive bivouacs and at length drove them over the Sambre. The campaign was virtually at an end, and the price paid was great. The French had lost over 40,000 men and almost all their artillery on June 18; the Prussians lost 7000, and Wellington over 15,000 men. So desperate was the fighting that some 45,000 killed and wounded lay on an area of roughly 3 sq. m. At one point on the plateau "the 27th (Inniskillings) were lying literally dead in square"; and the position that the British infantry held was plainly marked by the red line of dead and wounded they left behind them.

Grouchy's operations June 18-19.

A few words may now be bestowed on Marshal Grouchy, commanding the right wing. The marshal wrongly determined on the 18th to continue his march to Wavre in a single column, and he determined, still more wrongly, to move by the right bank of the Dyle. Breaking up from bivouac long after dawn, he marched forward, via Walhain. Here he stopped to report to the emperor some intelligence which turned out to be false, and he remained for breakfast. Hardly had he finished when the opening roar of the cannonade at Waterloo was heard. Grouchy was now urged by his generals, especially by Gérard, to march to the sound of the firing, but he refused to take their advice, and pushed on to Wavre, where he found the Prussians (Thielemann's corps of 16,000 men) holding the passages across the Dyle. A fierce fight (called the Action of Wavre) began about 4 P.M., in which the Prussians were for long victorious. Instead of concentrating his force upon one bridge over the swampy and unfordable Dyle, Grouchy scattered it in attacks upon several; and when the emperor's despatch arrived, saying Bülow was in sight, the marshal was powerless to move westward. Towards the end of the day Colonel Vallin's Hussars stormed the Limale bridge, and a large part of Grouchy's force then promptly gained the left bank. The action continued till about 11 P.M., when it died out, to recommence shortly after dawn. Thielemann was at length overborne by sheer weight of numbers, and towards 11 A.M. he was forced to retire towards Louvain. The losses were considerable, about 2400 men on each side.

Grouchy's victory was barren. In the far higher duty of co-operation he had failed miserably. His tactical achievement could avail the emperor nothing, and it exposed his own force to considerable danger. Whilst pondering on the course he should follow, the marshal received the news of the awful disaster that had overtaken the emperor at Waterloo. In a flash he realized his danger and made prompt arrangements to begin his retreat on Namur, the only line to France that was then available. This retreat he carried out resolutely, skilfully and rapidly, slipping past Blücher and finally bringing his force to Paris. But the rapid advance of the allies gave France no time to rally. Napoleon was forced to abdicate, and finding escape was impossible, he surrendered (on July 14) to the British—"the most powerful, the most unwavering and the most generous of his foes."

The causes of Napoleon's failure in the Waterloo campaign were as follows:—The French army was numerically too weak for the gigantic task it undertook. Napoleon himself was no longer the Napoleon of Marengo or Austerlitz, and though he was not broken down, his physical strength was certainly impaired. Ney failed to grasp and hold Wellington on the critical 17th June; and on the 17th and 18th Grouchy's feeble and false manœuvres enabled Blücher to march and join Wellington at Waterloo. Napoleon's chance of success was dangerously diminished, if not utterly destroyed, by the incompetence of the two marshals whom in an evil hour he selected for high commands. Another dominant influence in shaping the course of events was the loyalty of Blücher to his ally, and the consequent appearance of the Prussian army at Waterloo. Nor must we overlook Wellington's unswerving determination to co-operate with Blücher at all costs, and his firmness on June 18; or the invincible steadiness shown by the British troops and those of the King's German Legion.

BIBLIOGRAPHY.—Some of the principal books on the campaign are: Colonel Grouard, *Critique de 1815*; H. Houssaye, *Waterloo*; General Pollio, *Waterloo* (*1815*); Shaw-Kennedy, *Battle of Waterloo*; Captain W. Siborne, 9th Foot, *History of the Waterloo Campaign*; Clausewitz, *Campagne de 1815*; Colonel Charras, *Histoire de la Campagne de 1815, Waterloo*; L. Navez, *Les Quatre Bras, Ligny, Waterloo et Wavre*; General H. T. Siborne, R.E., *Waterloo Letters*; Colonel Chesney, *Waterloo Lectures*; Wellington, *Despatches* and *Memorandum on the Battle of Waterloo*; *Correspondance* and *Commentaires* of Napoleon.

In this article the writer has been greatly assisted by the advice and suggestions of Lieut.-Col. H. W. L. Hime, R.A. (A. F. B.*)

WATERLOO-WITH-SEAFORTH, an urban district in the Bootle and Ormskirk parliamentary divisions of Lancashire, England, at the mouth of the Mersey, 4 m. N. by W. of Liverpool. Pop. (1891) 17,225; (1901) 23,102. On account of its facilities for bathing, firm sands, pleasant scenery and nearness to Liverpool, of which it is a suburb, it is much frequented both by visitors and by residents.

WATERLOW, SIR ERNEST ALBERT (1850-), English painter, was born in London, and received the main part of his art education in the Royal Academy schools, where, in 1873, he gained the Turner medal for landscape-painting. He was elected associate of the Royal Society of Painters in Water-Colours in 1880, member in 1894, and president in 1897; associate of the Royal Academy in 1890, and academician in 1903; and he was knighted in 1902. He began to exhibit in 1872 and has produced a considerable number of admirable landscapes, in oil and water-colour, handled with grace and distinction. One of his pictures, "Galway Gossips," is in the National Gallery of British Art.

See *Sir E. A. Waterlow, R.A., P.R.W.S.*, by C. Collins Baker (*Art Journal* Office, 1906).

WATER MOTORS. The subject of hydraulic transmission of power is treated generally under POWER TRANSMISSION (*Hydraulic*), and the present article is confined to water motors.

Hydraulic Lifts.—The direct-acting lift is perhaps the simplest of all machines using pressure-water, but as the height of the lift increases, certain problems in construction become exceedingly difficult to cope with, notably those due to the great increase in the weight and displacement of the ram. In fact, with a simple ram it is not possible to lift beyond a certain height with a given pressure and load. It becomes, therefore, necessary to balance in some way the varying displacement of the ram if economy is to be secured in the working: this is often done by the use of counter-weights attached to chains travelling over head sheaves, but this largely destroys the simplicity and safety of the direct-acting lift, and hence some form of hydraulic balancing is more satisfactory and more certain.

In one form, shown in fig. 1, the lift cylinder is in hydraulic connexion with a pair of short cylinders placed one above the other, the pistons working in them being connected together by a common rod. Below the piston of the upper cylinder is an annular space E (surrounding the common piston rod) with a capacity equal to the maximum displacement of the lift-ram, while the corresponding annular area C of the piston of the lower cylinder is just large enough when subjected to the working water pressure to enable the work of lifting the net load to be done and any friction to be overcome. The area B of the top side of the upper piston is proportioned in such a way that when under the full water pressure the dead weight of the ram and cage is just balanced when the former is at the bottom of its stroke. With this arrangement the lift-ram and the two balance pistons are always in equilibrium, or, in other words, the ever-changing displacement of the lift-ram is automatically in balance. To work the lift, pressure-water is admitted to the annular space C above the lower of the two balance pistons (the space B above the upper one is always in communication with the pressure-water), and the combined pressure on the two pistons is sufficient to lift the cage, ram and load. As the ram ascends it apparently increases in weight, but this is balanced by the greater pressure on the two balance pistons as they descend, owing to the increase of the head of water acting on them. To allow the lift-ram to descend, the pressure-water in C above the lower balance piston is discharged through the exhaust into the drain, while that above the upper piston is simply pushed back into the pressure main. As an illustration of the economy of this system, it may be mentioned that in one lift having a 6-in. ram with a lift of 90 ft., the working load being 1 ton and the maximum working speed 180 ft. a minute, the quantity of pressure-water used per journey of 90 ft. was reduced from 109 to 24½ gallons by the use of this method of balancing.

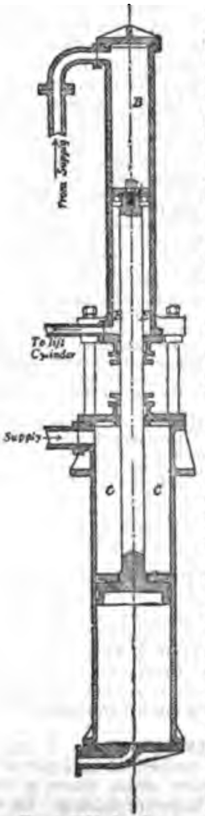


FIG. 1.—Hydraulic Balancing.

In another system of hydraulic balance (fig. 2) the ram A has an annular area so proportioned that when it is connected with the water in an elevated tank (usually placed somewhere in the roof of the building), the hydraulic pressure upon it just balances the weight of the ram and cage. Here again, since the intensity of the pressure on A becomes greater as it descends owing to the increased head, the apparent increase of weight of the lift-ram as it rises is automatically balanced; water from the high-pressure system is admitted down the hollow ram B and does the work of lifting the live load.

Since the i[illegible]o-level electric railways in London and elsewhere, hydraulic passenger lifts on a large scale have been brought into use for conveying passengers up and down from the street level to the underground stations.

Direct-acting Water Motors.—Owing to the difficulty of securing a durable motor with a simple and trustworthy means of automatically regulating the quantity of water used to the power needed at various times from the motor, not much advance has been recently made in the use of water motors with reciprocating rams or pistons. Probably the most successful one has been a rotary engine invented by Mr Arthur Rigg.[1]

In this engine the stroke, and therefore the amount of water used, can be varied either by hand or by a governor while it is running; the speed can also be varied, very high rates, as much as 600 revolutions a minute, being attainable without the question of shock or vibration becoming troublesome. The cylinders are cast in one piece with a circular valve, and rotate about a main stud S (fig. 3), while their plungers are connected to a disk crank which rotates above the point O, which is the centre of the main crank; O S being the crank length or half stroke of the engine, any variation in its length will vary the power of the engine and at the same time the quantity of water used. The movement of S is obtained by means of a relay engine, in which there are two rams of different diameters; a constant pressure is always acting on the smaller of these when the motor is at work, while the governor (or hand-power if desired) admits or exhausts pressure-water from the face of the other, and the movements to and fro thus given to the two rams alter the position of the stud S, and thus change the stroke of the plungers of the main engine. Fig. 4 gives an outside view of a 30-H.P. engine capable of using water at a pressure of 700 ℔ per sq. in.; the governor is carried within the driving pulley shown at the right-hand end, while the working revolving cylinders are carried inside the boxed-in flywheel at the left-hand end, the relay cylinder and its attachments being fixed to the bed-plate in front of the flywheel. On a test one of these engines gave an efficiency or duty of 80%.

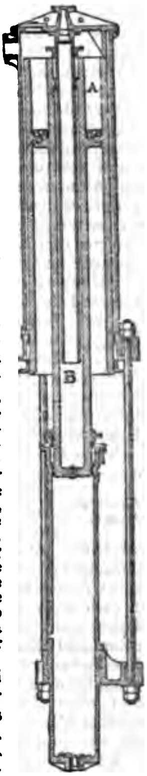


FIG. 2.—Hydraulic Balancing.

Water Wheels.—The Pelton water wheel (fig. 5) has proved a most successful motor when very high heads are available, heads of 2000 feet having been used occasionally. Such machines have been extensively employed in America, and have also lately been used in Great Britain, worked by the high-pressure water supplied in large towns.

The wheel carries a series of cups placed at equal distances around the circumference. A jet or jets of water impinge on the cups, the interiors of which are shaped in such a way that the jet is discharged parallel to its original direction. If the linear velocity of the cups in feet a second is V_1, and the linear velocity of the jet is V_2, then the velocity of the jet relative to the cup is V_2-V_1 feet a second, and if the whole energy of the water is to be given up to the cups, the water must leave the cup with zero absolute velocity. But its velocity relative to the cup, as it passes backwards, is $-(V_2-V_1)$, and since the forward velocity of the cup is V_1, the absolute velocity of the water is $-(V_2-V_1)+V_1$ or $2V_1-V_2$. This will become zero if V_1 is $\frac{1}{2}V_2$, that is, if the linear velocity of the cup-centres is one-half that of the jet of water impinging upon them. The theoretical efficiency of the wheel would then be 100%. The actual efficiency of these wheels when used with high falls is from 80 to 86%; when used in connexion with high-pressure water in London an efficiency

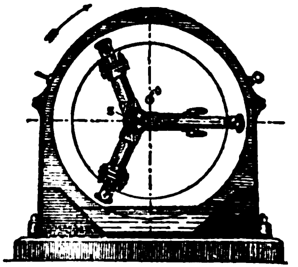


FIG. 3.—Section of Rigg's Water-Engine.

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[1] This engine was fully described in *Engineering*, vol. xlv. p. 61.

of 70% has been obtained, and when a dynamo is driven directly by them about 66% of the hydraulic energy has been converted into electric energy.

Pelton wheels are very sensitive to variation of load, and considerable trouble was experienced at first in securing adequate governing when they were used to generate electric energy; but this difficulty has been overcome, and they have been rendered most efficient machines for use with high falls, where ordinary turbines would be difficult to manage owing to the excessive speed at which they would run. In a small installation in the United States water is brought in a 36-in. pipe a distance of 1800 ft., and supplies six Pelton wheels each 28 in. in diameter, running at 135 revolutions a minute under a head of 130 ft. The total power developed is 600 H.P., and though the load factor varies very greatly in this case, the differential type of governor used secures perfect control of the running of the wheels.

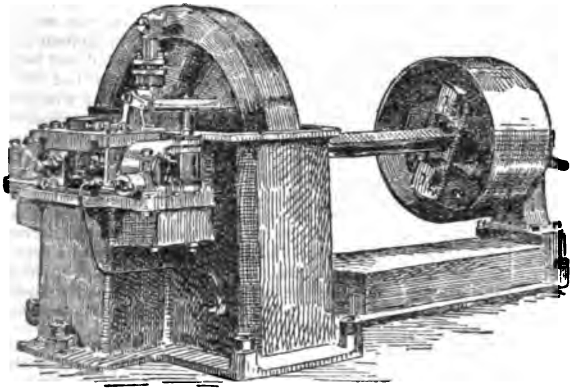

Fig. 4.—External View of Rigg's Water-Engine.[1]

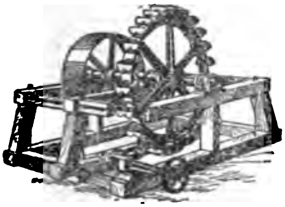

Fig. 5.—Pelton Wheel.

Turbines.—The turbine has now become one of the most efficient of the prime movers employed by man, and in the United States of America and on the continent of Europe[2] its use has enormously increased of recent years. Though no radical changes have been made in the design of turbines for some years, an immense amount of skill and ingenuity has been shown in perfecting and improving details, and such machines of great size and power are now constantly being made, and give every satisfaction when in use.

In the "Hercules" turbine, shown in fig. 6, the flow is what is called mixed, that is, it is partly a radial inward and partly an axial flow machine. On entering, the water flows at first in a radial direction, and then gradually, as it passes through the wheel, it receives a downward component which becomes more and more important. Professor Thurston has published the results of a test of one of these, which gave an efficiency of 87% at full load and 70% at about three-fifths full load.

Another turbine of the mixed flow type is the "Victor," which consists of three parts—the outer guide case, and, inside this, the register gate, and the wheel. The gate regulates the speed of the wheel by varying the quantity of water; when fully open it merely forms a continuation of the guide passages, and thus offers no obstruction to the flow of the water, but by giving it a movement through a part of a revolution the passages are partly blocked and the flow of the water is checked. This form of regulation is fairly efficient down to three-quarter opening. Turbines of this type may also be used on horizontal shafts, and are very useful in the case of low falls where there is a large amount of water and the head is fairly constant. At Massena, in New York State, 75,000 H.P. is to be developed from fifteen sets of these turbines working under a head of 40 ft. Each generator can develop 5000 H.P. at a potential of 2200 volts, and is driven by three horizontal double turbines on the same shaft; when working under a minimum head of 32 ft. at 150 revolutions, each turbine will have a nominal horse-power of 1000.

Probably the most important application of turbines to the generation of power on a great scale is that at Niagara Falls. The water is tapped off from the river Niagara about 1 m. above the falls and brought by a canal to the power-house. The wheel-pit is 180 ft. in depth, and is connected with the river below the falls by a tail-race, consisting of a tunnel 21 ft. high and 18 ft. 10 in. wide at its largest section. The original turbines were of the "Fourneyron" type, and a pair were mounted on each vertical shaft, the two being capable of giving out 5000 H.P. with a fall of 136 ft. Each pair of wheels is built in three storeys, and the outflow of the water is controlled by a cylindrical gate or sluice, which is moved up and down by the action of the governor. As the pair of wheels and the big vertical shaft (which is of hollow steel 38 in. in diameter) with the revolving part of the dynamo mounted on the upper end of the shaft weigh about 152,000 ℔, a special device, since adopted in other similar power plants, was designed to balance in part this dead weight. The water passes from the penstock through the guide blades of the upper wheel, and in doing so acts in an upward direction on a cover of the upper wheel, which thus becomes, as it were, a balance-piston. The total upward pressure on this piston is calculated to be equal to 150,000 ℔; hence the shaft-bearings are practically relieved from pressure when the wheels are running. Another turbine which has come into extensive use is the "Francis," an exceedingly efficient turbine on a low fall with large quantities of water. At Schaffhausen two of them with a fall of 12½ ft. developed 430 H.P., when the older turbines only gave 260 H.P., the

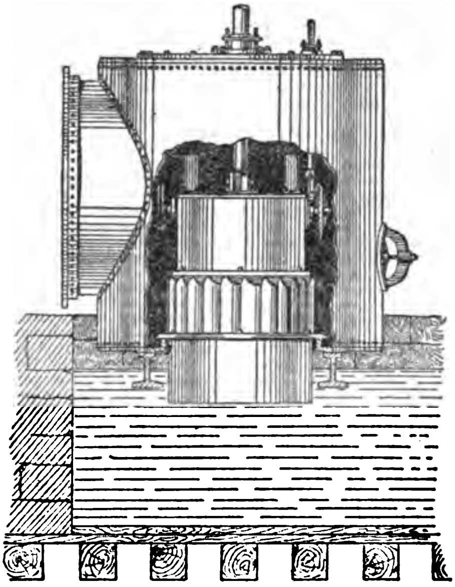

Fig. 6.—"Hercules" Turbine.

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[1] This and some of the other drawings have been taken from Blaine's *Hydraulic Machinery*.

[2] The following statistics of turbine construction in Switzerland are taken from *Schweizerische Bauzeitung* (1901), p. 128, which, in the same volume at p. 53, contains a valuable article on the most important improvements in turbines and their regulation shown in the Paris Exhibition of 1901:—

Period.	Number of Turbines.	Total H.P	Average H.P.
1844–1869	767	36,894	48
1869–1879	1006	66,688	66½
1879–1889	1840	133.579	72½
1889–1899	2231	400,474	179½
Totals	5844	637.635	

efficiency of the Francis turbine being in this case 86% at full load and 77% at half load.

A recent form of the Jonval turbine is shown in fig. 7. This turbine was designed to give 1250 H.P. with a fall of 25 ft. and an efficiency of 77%. It is fitted with a suction pipe and a circular balanced sluice for admitting and cutting off the water-supply. The wheel is 12 ft. 3½ in. in diameter, and has a speed of fifty revolutions per minute, and the power generated is transmitted through bevel-gearing to a horizontal shaft from which the power is taken off for various purposes. When complete the turbine weighed about 140 tons. There is a regulating arrangement, by which one-half of the guide-passages can be shut off in pairs from the water, and at the same time air is freely admitted into these unused passages by pipes which pass through the hinges of the controlling shutter. Tests of a turbine of this slow-moving type showed an efficiency of 82% at full gate, and one of 75% when half of the passages in the guide-blades were closed by the shutters, as described above.

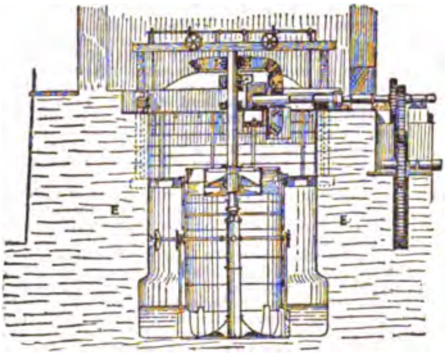

FIG. 7.—Jonval Turbine.

As an illustration of the use of water-power, even at a considerable distance from a town, the case of Lausanne may be described. The town has secured the right of using a waterfall of 113 to 118 ft. high, by impounding the Rhône near Saint Maurice. In dry seasons this will supply 6000 H.P., and for quite ten months in an ordinary year 14,000 H.P. The plant in 1902 consisted of five turbines, having horizontal axles, and each developing 1000 H.P. when running at 300 revolutions a minute. They drive electric generators, and the current so produced is taken at a pressure of 22,000 volts on overhead wires a distance of 35 m. to Lausanne, the loss being estimated not to exceed 10% in the long transmission. Near the town is a station for reducing the voltage, and current is distributed at 125 volts for lighting purposes and at 500 volts for use on the tramways and for other power purposes.

AUTHORITIES.—For further information concerning the construction and employment of water motors, the reader is referred to the following papers and textbooks:—*Proc. Inst. Mech. Eng.* (1882), p. 119 (1889), p. 350; (1895), p. 353. (These papers contain full accounts of recent forms of lifts.)—*Engineering*, vol. lxvii. pp. 91, 128, 160, "Power Station at Niagara"; vol. lxxii. pp. 391-767, "Governing of Water Wheels."—*Proc. Inst. Civil Eng.*, vol. lxxxvi. p. 60, "Mersey Railway Lifts"; vol. xciii. p. 596, "Experiments on Jonval and Girard Turbines at Alching"; vol. xcvi. p. 182, "Hydraulic Canal Lifts"; vol. cii. p. 154, "Keswick Water-Power Electric Station"; vol. cxii. p. 410, "Hydraulic Works at Niagara"; vol. cxviii. p. 537, "A 12-Mile Transmission of Power Generated by Pelton Wheels"; vol. cxxiii. p. 530, "The Pelton Water Wheel"; vol. cxxiv. p. 223, "The Niagara Power Works"; vol. cxxvi. p. 494, "The Rheinfelden Power Transmission Plant"; vol. cxli. p. 269, "Electric Transmission Plants in Transvaal," p. 307, "Turbines"; vol. cxlii. p. 451, "Electrical Installations at Lausanne"; vol. cxlv. p. 423, "Water Power at Massena"; vol. cxlvii. p. 467, "Some Large Turbine Installations."—Wood, *Theory of Turbines*; Bovey, *Hydraulics*; Björling, *Hydraulic Motors*; Blaine, *Hydraulic Machinery*; Bodmer, *Hydraulic Motors*; Unwin, "Water Motors" (Lectures on Hydro-Mechanics, *Inst. Civil Eng.*, 1885). (T. H. B.)

WATER-OPOSSUM, or YAPOCK (*Chironectes minimus*), the single representative of the genus. This animal is distinguished from other opossums by its webbed hind-feet, non-tuberculated soles, and peculiar coloration. Its ground colour is light grey, with four or five sharply contrasted brown bands passing across its head and back, giving it a very peculiar mottled appearance; the head [illegible] are about 14 in. long, and the tail measur[illegible]lmost wholly aquatic in its habits, living on small fish, crustaceans and other water animals; its range extends from Guatemala to southern Brazil.

WATER POLO, a game which has done much to advance swimming in popular favour and to improve the stamina of swimmers. It is played either in a bath or open water, the teams consisting of seven a side. The field of play must not exceed 30 yds. or be less than 19 yds. in length, and the width must not be more than 20 yds. The ball used must be round and fully inflated, and must not measure less than 26½, nor more than 28 in. in circumference. It must be waterproof, with no strapped seams outside, and no grease or other objectionable substance placed on it. The goals must be 10 ft. in width, with a cross-bar 3 ft. above the surface when the water is 5 ft. or over in depth, and 8 ft. from the bottom when the water is less than 5 ft. in depth; in no case must the water in which a game is played be less than 3 ft. Goal nets are used in all important matches. The duration of a match is supposed to be 14 minutes, seven minutes each way. The officials consist of a referee, a timekeeper and two goal scorers, the first-named official starting the game by throwing the ball into the centre of the bath. A goal is scored by the entire ball passing between the goal posts and under the cross-bar.

The players have to place themselves in a line with their respective goals, and are not allowed to start swimming to the centre of the bath until the word "Go" is given. They are usually divided into 3 forwards, 1 half-back, 2 backs and a goalkeeper. To the fastest swimmer is usually assigned the place of centre-forward, and it is his duty to make all headway possible so as to reach the ball before the opposing forward of the other side, then pass rapidly back to the half or one of the backs and swim on to within close proximity of the opponent's goal and wait for a pass. The other forwards should rapidly follow him up and each man carefully shadow one of the opposing side. In handling the ball only one hand may be used, for to touch the ball with both hands at the same time constitutes a foul, as also does the holding of the rail or the side, during any part of the game, the standing on or touching of the bottom of the bath except for the purpose of resting, interfering or impeding an opponent in any way, unless he be holding the ball, holding the ball under water when tackled, jumping from the bottom or pushing off from the side (except at starting or restarting) in order to play the ball or duck an opponent, holding, pulling back or pushing off from an opponent, turning on the back to kick at an opponent, assisting a player at the start or restart to get a good push off, throwing the ball at the goalkeeper from a free throw or refusing to play the ball at the command of the referee after a foul or the ball has been out of the field of play. Dribbling or striking the ball is held to be not holding, but lifting, carrying, pressing under water or placing the hand under or over the ball when actually touching, is holding; dribbling up the bath and through the posts is permissible. There is a penalty area, 4 yds. from each goal-post, and the imaginary line across the bath is not allowed to be passed by the respective goalkeepers, otherwise they commit a foul. They may stand to defend their goal, touch the ball with both hands or jump from the bottom to play the ball, but in all other respects the same rules as to fouls apply to them as to other players. In any case they are not allowed to throw the ball beyond half-distance. If they do so the opposing side is awarded a free throw. For fouls which the referee considers to have been committed wilfully there are very severe penalties, and those guilty of them are ordered out of the water until a goal has been scored, thus for the time being crippling the side. Deliberately wasting time, starting before the word "Go," taking up a position within 2 yds. of the opponent's goal, changing position after the whistle has blown for a free throw or other similar stoppage of play, or deliberately splashing an opponent in the face, are all held to be wilful fouls. Whenever the whistle blows for fouls the players have to remain in their respective places until the ball has left the hand of the player to whom the free throw was awarded. A player who has been wilfully fouled within 4 yds. of his opponent's goal line is given a penalty throw, and the consequence is that a close match is often won by reason of a player deliberately breaking the rules when his goal is hotly assailed. In ordinary fouls the ball must touch another player before a goal can be scored, but in penalty throws it need not. Any player throwing the ball over his own goal line concedes a corner throw to the other side, but if an opposing player sends it over it is a free throw for the goalkeeper. After each goal is scored the players return to their respective ends, waiting for the word "Go," and at half-time they are allowed a rest of three minutes, during which they leave the water. Fouls, half-time and time are declared by whistle, and goals by bell.

The game requires careful practice of smart and scientific passing, side and back-handed throws, and accurate shooting. For this purpose "throwing the water-polo ball" contests are commonly held by the leading clubs, who also engineer competitions on points for shooting at goal.

It was not until the formation of the London Water Polo League in 1889 that the game was specially catered for, but a form of it had previously been known and played in several parts of England and Scotland. In 1870 the old London Swimming Association, the forerunner of the present Amateur Swimming Association, appointed a committee to draw up rules for a game of "Football in the water," but no report of that committee appears to have been presented. In 1876 aquatic handball matches were played in the sea off Bournemouth by members of the Bournemouth Premier Rowing Club, and in 1877 there were similar matches at the annual competition for the Bon Accord Club in the river Dee, and a year prior to that some rules had been drawn up for the Aberdeen Club. The game at length found its way to the Midlands, and led to the foundation of the Midland Aquatic Football Association, whose rules were somewhat similar to those in vogue in America, where goals are scored by placing the ball in a marked-out space called "goal." In 1883 Birmingham Leander played All England at Portsmouth; in 1885 the Amateur Swimming Association took official recognition of the game, and in 1888 started the English championship, this being won the first year by Burton-on-Trent. Then came the foundation of the London Water Polo League, through whose agency county associations came into being, inter-county matches were played, and international games arranged. The first county matches were played in 1890, and the first international the same year, the game being between England and Scotland at Kensington Baths on 28th July. England was beaten by four goals to none, but the outcome of the match was the cementing of friendly relations between the English and Scottish associations, and the gradual spread of the game, until the English, Irish, Scottish and Welsh associations joined together and formed an international board, without whose sanction none of the rules of the game can now be altered. Oxford and Cambridge met for the first time in 1891, and since then the Blues' committee of each university have given swimming and water polo a "half blue." The game has become popular in many European countries, and friendly matches between English and continental clubs are frequently played. It has also extended to Egypt, India and Australia, in which countries the British rules have been adopted.

See the Amateur Swimming Association's *Handbook* for rules of the game and instructions to referees. (W. Hy.)

WATER RIGHTS. By the law of England the property in the bed and water of a tidal river, as high as the tide ebbs and flows at a medium spring tide, is presumed to be in the crown or as a franchise in a grantee of the crown, such as the lord of a manor, or a district council, and to be extra-parochial. The bed and water of a non-tidal river are presumed to belong to the person through whose land it flows, or, if it divide two properties, to the riparian proprietors, the rights of each extending to midstream (*ad medium filum aquae*). In order to give riparian rights, the river must flow in a defined channel, or at least above ground. The diminution of underground water collected by percolation, even though malicious, does not give a cause of action to the owner of the land in which it collects, it being merely *damnum sine injuria*, though he is entitled to have it unpolluted unless a right of pollution be gained against him by prescription. The right to draw water from another's well is an easement, not a *profit à prendre*, and is therefore claimable by custom. As a general rule a riparian proprietor, whether on a tidal or a non-tidal river, has full rights of user of his property. Most of the statute law will be found in the Sea Fisheries Acts 1843 to 1891, and the Salmon and Freshwater Fisheries Acts 1861 to 1886. In certain cases the rights of the riparian proprietors are subject to the intervening rights of other persons. These rights vary according as the river is navigable or not, or tidal or not. For instance, all the riparian proprietors might combine to divert a non-navigable river, though one alone could not do so as against the others, but no combination of riparian proprietors could defeat the right of the public to have a navigable river maintained undiverted. We shall here consider shortly the rights enjoyed by, and the limitations imposed upon, riparian proprietors, in addition to those falling under the head of fishery or navigation. In these matters English law is in substantial accordance with the law of other countries, most of the rules being deduced from Roman law. Perhaps the main difference is that running water is in Roman law a *res communis*, like the air and the sea. In England, owing to the greater value of river water for manufacturing and other purposes, it cannot be said to be common property, even though it may be used for navigation. The effect of this difference is that certain rights, public in Roman law, such as mooring and unloading cargo, bathing, drying nets, fishing for oysters, digging for sand, towing, &c., are only acquirable by prescription or custom in England. By Roman law, a hut might lawfully be built on the shore of the sea or of a tidal river; in England such a building would be a mere trespass. Preaching on the foreshore is not legal unless by custom or prescription (*Llandudno Urban Council* v. *Woods*, 1899, 2 Ch. 705). Nor may a fisherman who dredges for oysters appropriate a part of the foreshore for storing them (*Truro Corporation* v. *Rowe*, 1902, 2 K.B. 709).

The right of use of the water of a natural stream cannot be better described than in the words of Lord Kingsdown in 1858: "By the general law applicable to running streams, every riparian proprietor has a right to what may be called the ordinary use of water flowing past his land—for instance, to the reasonable use of the water for domestic purposes and for his cattle, and this without regard to the effect which such use may have in case of a deficiency upon proprietors lower down the stream. But, further, he has a right to the use of it for any purpose, or what may be deemed the extraordinary use of it, provided he does not thereby interfere with the rights of other proprietors, either above or below him. Subject to this condition, he may dam up a stream for the purposes of a mill, or divert the water for the purpose of irrigation. But he has no right to intercept the regular flow of the stream, if he thereby interferes with the lawful use of the water by other proprietors, and inflicts upon them a sensible injury" (*Miner* v. *Gilmour*, 12 Moore's P.C. Cases, 156). The rights of riparian proprietors where the flow of water is artificial rest on a different principle. As the artificial stream is made by a person for his own benefit, any right of another person as a riparian proprietor does not arise at common law, as in the case of a natural stream, but must be established by grant or prescription. If its origin be unknown the inference appears to be that riparian proprietors have the same rights as if the stream had been a natural one (*Baily* v. *Clark*, 1902, 1 Ch. 649). The rights of a person not a riparian proprietor who uses land abutting on a river or stream by the licence or grant of the riparian proprietor are not as full as though he were a riparian proprietor, for he cannot be imposed as a riparian proprietor upon the other proprietors without their consent. The effect of this appears to be that he is not entitled to sensibly affect their rights, even by the ordinary as distinguished from the extraordinary use of the water. Even a riparian proprietor cannot divert the stream to a place outside his tenement and there use it for purposes unconnected with the tenement (*McCartney* v. *Londonderry & Lough Swilly Rly. Co.*, 1904, A.C. 301).

The limitations to which the right of the riparian proprietor is subject may be divided into those existing by common right, those imposed for public purposes, and those established against him by crown grant or by custom or prescription. Under the first head comes the public right of navigation, of anchorage and fishery from boats (in tidal waters), and of taking shell-fish (and probably other fish except royal fish) on the shore of tidal waters as far as any right of several fishery does not intervene. Under the second head would fall the right of eminent domain by which the state takes riparian rights for public purposes, compensating the proprietor, the restrictions upon the sporting rights of the proprietor, as by acts forbidding the taking of fish in close time, and the Wild Birds Protection Acts, and the restrictions on the ground of public health, as by the Rivers Pollution Act 1876 and the regulations of port sanitary authorities. The jurisdiction of the state over rivers in England may be exercised by officers of the crown, as by commissioners of sewers or by the Board of Trade, under the Crown Lands Act 1866. A bridge is erected and maintained by the county authorities, and the riparian proprietor must bear any inconvenience resulting from it. An example of an adverse right by crown grant is a ferry or a port. The crown, moreover, as the guardian of the realm, has jurisdiction to restrain the removal of the foreshore, the natural barrier of the sea, by its owner in case of apprehended danger to the coast. The rights established against a riparian proprietor by private persons must as a rule be based on prescription or custom, only on prescription where they are in the nature of profits à *prendre*. The public cannot claim such rights by prescription, still less by custom. Among such rights are the right to land, to discharge cargo, to tow to dry nets, to beach boats, to take sand, shingle or water, to have a sea-wall maintained, to pollute the water (subject to the Rivers

Pollution Act), to water cattle, &c. In some cases the validity of local riparian customs has been recognized by the legislature. The right to enter on lands adjoining tidal waters for the purpose of watching for and landing herrings, pilchards and other sea-fish was confirmed to the fishermen of Somerset, Devon and Cornwall by 1 Jac. I. c. 23. Digging sand on the shore of tidal waters for use as manure on the land was granted to the inhabitants of Devon and Cornwall by 7 Jac. I. c. 18. The public right of taking or killing rabbits in the daytime on any sea bank or river bank in the county of Lincoln, so far as the tide extends, or within one furlong of such bank, was preserved by the Larceny Act 1881. It should be noticed that rights of the public may be subject to private rights. Where the river is navigable, although the right of navigation is common to the subjects of the realm, it may be connected with a right to exclusive access to riparian land, the invasion of which may form the ground for legal proceedings by the riparian proprietor (see *Lyon* v. *The Fishmongers' Company*, 1876, 1 A.C. 662). There is no common-law right of support by subterranean water. A grant of land passes all watercourses, unless reserved to the grantor.

A freshwater lake appears to be governed by the same law as a non-tidal river, surface water being *pars soli*. The preponderance of authority is in favour of the right of the riparian proprietors as against the crown. Most of the law will be found in *Bristow* v *Cormican*, 1878, 3 A.C. 648.

Unlawful and malicious injury to sea and river banks, towing paths, sluices, flood-gates, mill-dams, &c., or poisoning fish, is a crime under the Malicious Damage Act 1861.

Ferry is a franchise created by grant or prescription. When created it is a highway of a special description, a monopoly to be used only for the public advantage, so that the toll levied must be reasonable. The grantee may have an action or an injunction for infringement of his rights by competition unless the infringement be by act of parliament. In *Hopkins* v. *G.N. Ry. Co.*, 1877, 2 Q.B.D. 224 (followed in *Dibden* v. *Skirrow*, 1907, 1 Ch. 437), it was held that the owner of a ferry cannot maintain an action for loss of traffic caused by a new bridge or ferry made to provide for new traffic Many ferries are now regulated by local acts.

Weir, the *gurges* of Domesday, the *kidellus* of Magna Carta, as appurtenant to a fishery, is a nuisance at common law unless granted by the crown before 1272. From the etymology of *kidellus* the weir was probably at first of wicker, later of timber or stone The owner of a several fishery in tidal waters cannot maintain his claim to a weir unless he can show a title going back to Magna Carta. In private waters he must claim by grant or prescription. Numerous fishery acts from 25 Edw. III. st. 4, c. 4 deal with weirs, especially with regard to salmon fishery. An interesting case is *Hanbury* v. *Jenkins*, 1901, 2 Ch. 401, where it was held that a grant of "wears" in the Usk by Henry VIII. in 1516 passed the bed of the river as well as the right of fishing.

Mill may be erected by any one, subject to local regulations and to his detaining the water no longer than is reasonably necessary for the working of the wheel. But if a dam be put across running water, the erection of it can only be justified by grant or prescription, or (in a manor) by manorial custom. On navigable rivers it must have existed before 1272. The owner of it cannot pen up the water permanently so as to make a pond of it.

Bathing.—The reported cases affect only sea-bathing, but Hall (p. 160) is of opinion that a right to bathe in private waters may exist by prescription or custom. There is no common-law right to bathe in the sea or to place bathing-machines on the shore Prescription or custom is necessary to support a claim, whether the foreshore is the property of the crown or of a private owner (*Brinckman* v. *Matley*, 1904, 2 Ch. 313). Bathing in the sea or in rivers is now often regulated by the by-laws of a local authority.

Scotland.—The law of Scotland is in general accordance with that of England. One of the principal differences is that in Scotland, if a charter state that the sea is the boundary of a grant, the foreshore is included in the grant, subject to the burden of crown rights for public purposes. Persons engaged in the herring fishery off the coast of Scotland have, by 11 Geo. III. c. 31, the right to use the shore for 100 yds. from high-water mark for landing and drying nets, erecting huts and curing fish. By the Army Act 1881, s. 143, soldiers on the march in Scotland pay only half toll at ferries. The right of ferry is one of the *regalia minora* acquirable by prescriptive possession on a charter of barony. Sea-greens are private property. The right to take seaweed from another's foreshore may be prescribed as a servitude. Interference with the free passage of salmon by abstraction of water to artificial channels is restrainable by interdict (*Pirie* v. *Earl of Kintore*, 1906, A.C. 478). See the Salmon Fisheries (Scotland) Acts 1828 to 1868.

In *Ireland* the law is in general accordance with that of England. In *R.* v. *Clinton*, I.R. 4 C.L. 6, the Irish court went perhaps beyond any English precedent in holding that to carry away drift seaweed from the foreshore is not larceny. The Rivers Pollution Act 1876 was re-enacted for Ireland by the similar act of 1893.

In the *United States* the common law of England was originally [illegible] succeeding to the right of the crown. This was [illegible] in the thirteen original states, which are not [illegible] the largest size, but was not generally followed [illegible] conditions, unknown in England, had arisen. Accordingly the soil of navigable rivers, fresh or salt, and of lakes, is vested in the state, which has power to regulate navigation and impose tolls. The admiralty jurisdiction of the United States extends to all public navigable rivers and lakes where commerce is carried on between different states or with foreign nations (*Genesee Chief* v. *Fitzhugh*, 12 Howard's Rep. 443). And in a case decided in 1893 it was held that the open waters of the great lakes are "high seas" within the meaning of § 5346 of the Revised Statutes (*U.S.* v. *Rodgers*, 150 U.S. Rep. 249). A state may establish ferries and authorize dams. But if water from a dam overflow a public highway, an indictable nuisance is caused. The right of eminent domain is exercised to a greater extent than in England in the compulsory acquisition of sites for mills and the construction of levees or embankments, especially on the Mississippi. In the drier country of the west and in the mining districts, the common law as to irrigation has had to be altered, and what was called the "Arid Region Doctrine" was gradually established. By it the first user of water has a right by priority of occupation if he give notice to the public of an intention to appropriate, provided that he be competent to hold land.

AUTHORITIES —Hall's *Essay on the Rights of the Crown on the Sea-Shore* (1830) has been re-edited in 1875 and 1888. See also S. A. and H. S. Moore, *History and Law of Fisheries* (1903). Among American authorities are the works of Angell, Gould and Pomeroy, on *Waters and Watercourses*, Washburn on *Easements*, Angell on the *Right of Property in Tide Waters*, Kinney on *Irrigation* and the *Report to the Senate on Irrigation* (1900). (J. W.)

WATER-SCORPION, an aquatic hemipterous insect of the family Nepidae, so called from its superficial resemblance to a scorpion, which is due to the modification of the legs of the anterior pair for prehension, and to the presence of a long slender process, simulating a tail, at the posterior end of the abdomen. The common British species (*Nepa cinerea*) lives in ponds and stagnant water, and feeds upon aquatic animal organisms principally of the insect kind. Respiration in the adult is effected by means of the caudal process, which consists of a pair of half-tubes capable of being locked together to form a siphon by means of which air is conducted to the tracheae at the apex of the abdomen when the tip of the tube is thrust above the surface of the water. In immature forms the siphon is undeveloped and breathing takes place through six pairs of abdominal spiracles. The eggs, laid in the stems of plants, are supplied with seven filamentous processes which float freely in the water.

In *Nepa* the body is broad and flat; but in an allied water-bug, *Ranatra*, which contains a single British species (*R. linearis*), it is long and narrow, while the legs are very slender and elongate. Certain exotic members of this group, sometimes erroneously referred to the Nepidae, but really forming a special family, Belostomidae, are of large size, a South American species, *Belostoma grande*, reaching a length of between 4 and 5 in.

WATERSHED, in physical geography, the line separating the headstreams tributary to two different river-systems or basins. Alternative terms are "water-parting" and "divide." The crest of a mountain ridge forms the most clearly marked watershed; in a plain country of gentle slope (*e.g.* the central plain of Ireland) the watershed is often difficult to trace, as the headwaters of two different river systems may merge in marshes or lakes at the highest levels. In a mountainous country, where two streams, flowing in opposite directions but having their sources adjacent, are both gradually eroding or cutting back the land at their heads, a pass is formed. In such cases, where one stream erodes faster than the other, the stronger may ultimately "behead" the weaker, and "capture" some of its waters, whose flow is diverted from one basin to another.

WATERSPOUT, a local vorticular storm occurring over a water-surface, and in origin and form similar to a tornado (*q.v.*) over the land. A whirling, funnel-shaped cloud, first observed as a pendant from the mass of storm-cloud above, seems to grow downwards, tapering, towards the water-surface, which is violently agitated, and finally (when the spout is fully developed) appears to be drawn up to meet the cloud from above. This appearance is deceptive, as the bulk of the water carried along by the whirling spout is condensed from the atmosphere, and, even when the spout is formed over a salt-water surface, is found to be fresh. Waterspouts occur most frequently over the warm seas of the tropics, but they are not confined to the warmer tropical seasons, or even to low latitudes.

WATER SUPPLY. This article is confined to the collection and storage of water for domestic and industrial uses and irrigation, and its purification on a large scale. The conveyance of water is dealt with in the article AQUEDUCT.

COLLECTING AREAS

Surface Waters.—Any area, large or small, of the earth's surface from any part of which, if the ground were impermeable, water would flow by gravitation past any point in a natural watercourse is commonly known in Europe as the "hydrographic basin" above that point. In English it has been called indifferently the "catchment basin," the "gathering ground," the "drainage area" and the "watershed." The latter term, though originally equivalent to the German *Wasserscheide*—"water-parting"—is perhaps least open to objection. The water-parting is the line bounding such an area and separating it from other watersheds. The banks of a watercourse or sides of a valley are distinguished as the right and left bank respectively, the spectator being understood to be looking down the valley

The surface of the earth is rarely impermeable, and the structure of the rocks largely determines the direction of flow of so much of the rainfall as sinks into the ground and is not evaporated. Thus the figure and area of a surface watershed may not be coincident with that of the corresponding underground watershed; and the flow in any watercourse, especially from a small watershed, may, by reason of underground flow from or into other watersheds, be disproportionate to the area apparently drained by that watercourse.

Dry weather flow of stream.

When no reservoir exists, the volume of continuous supply from any watershed area is evidently limited to the minimum, or, so-called, *extreme dry weather flow of the stream* draining it. This cannot be determined from the rainfall; it entirely depends upon the power of the soil and rock to store water in the particular area under consideration, and to yield it continuously to the stream by means of concentrated springs or diffused seepage. Mountain areas of 10,000 acres and upwards, largely covered with moorland, upon nearly impermeable rocks with few water-bearing fissures, yield in temperate climates, towards the end of the driest seasons, and therefore solely from underground, between a fifth and a quarter of a cubic foot per second per 1000 acres Throughout the course of the river Severn, the head-waters of which are chiefly supplied from such formations, this rate does not materially change, even down to the city of Worcester, past which the discharge flows from 1,256,000 acres. But in smaller areas, which on the average are necessarily nearer to the water-parting, the limits are much wider, and the rate of minimum discharge is generally smaller.

Thus, for example, on 1000 acres or less, it commonly falls to one-tenth of a cubic foot, and upon an upland Silurian area of 940 acres, giving no visible sign of any peculiarity, the discharge fell, on the 21st of September 1893, to one-thirty-fifth of a cubic foot per second per 1000 acres. In this case, however, some of the water probably passed through the beds and joints of rocks to an adjoining valley lying at a lower level, and had both streams been gauged the average would probably have been considerably greater. The Thames at Teddington, fed largely from cretaceous areas, fell during ten days in September 1898 (the artificial abstractions for the supply of London being added) to about one-sixth of a cubic foot, and since 1880 the discharge has occasionally fallen, in each of six other cases, to about one-fifth of a cubic foot per second per 1000 acres. Owing, however, to the very variable permeability of the strata, the tributaries of the Thames, when separately gauged in dry seasons, yield the most divergent results. It may be taken as an axiom that the variation of minimum discharges from their mean values increases as the separate areas diminish. In the eastern and south-eastern counties of England even greater variety of dry weather flow prevails than in the west, and upon the chalk formations there are generally no surface streams, except such as burst out after wet weather and form the so-called "bournes." On the other hand, some rocks in mountain districts, notably the granites, owing to the great quantity of water stored in their numerous fissures or joints, commonly yield a much higher proportion of so-called dry weather flow.

Rainfall.

When, however, a reservoir is employed to equalize the flow during and before the period of dry weather, the minimum flow continuously available may be increased to a much higher figure, depending upon the capacity of that reservoir in relation to the mean flow of the stream supplying it. In such a case the first essential in determining the yield is to ascertain the rainfall. For this purpose, if there are no rain-gauges on the drainage area in question, an estimate may be formed from numerous gaugings throughout the country, most of which are published in *British Rainfall*, initiated by the late Mr G. J. Symons, F.R.S., and now carried on by Dr H. R. Mill.[1] But except in the hands of those who have spent years in such investigations, this method may lead to most incorrect conclusions. If any observations exist upon the drainage area itself they are commonly only from a single gauge, and this gauge, unless the area is very level, may give results widely different from the mean fall on the whole area. Unqualified reliance upon single gauges in the past has been the cause of serious errors in the estimated relation between rainfall and flow off the ground.

The uncertainties are illustrated by the following actual example: A battery of fourteen rain-gauges, in the same vertical plane, on ground having the natural profile shown by the section (fig. 1), gave during three consecutive years the respective falls shown by the height of the dotted lines above the datum line. Thus on the average, gauge C recorded 20% more than gauge D only 70 ft. distant; while at C, in 1897, the rainfall was actually 30% greater than at J only 560 ft. away. The greatly varying distribution of rainfall over that length of 1600 ft. is shown by the dotted lines measured upwards from the datum to have been remarkably consistent in the three years; and its cause—the path necessarily taken in a vertical plane by the prevailing winds blowing from A towards N—after passing the steep bank at C D—may be readily understood. Such examples show the importance of placing any rain-gauge, so far as possible, upon a plane surface of the earth—horizontal, or so inclined that, if produced, especially in the direction of prevailing winds, it will cut the mean levels of the area whose mean rainfall is intended to be represented by that gauge. It has been commonly stated that rainfall increases with the altitude. This is broadly true. A rain-cloud raised vertically upwards expands, cools and tends to precipitate; but in the actual passage of rain-clouds over the surface of the earth other influences are at work. In fig. 2 the thick line represents the profile of a vertical section crossing two ranges of hills and one valley. The arrows indicate the directions of the prevailing winds. At the extreme left the rain-clouds are thrown up, and if this were all, they would precipitate a larger proportion of the moisture

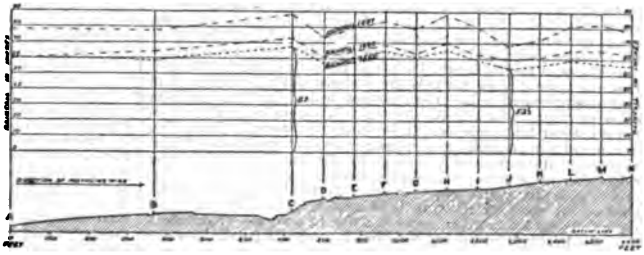

FIG. 1.

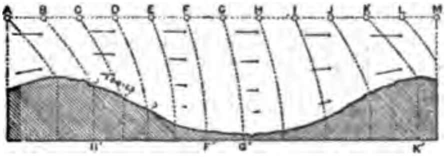

FIG. 2.

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[1] Since the above was written, this work has been taken over by the "British Rainfall Organization."

they contained as the altitude increased. But until the clouds rise above the hill there is an obvious countervailing tendency to compression, and in steep slopes this may reduce or entirely prevent precipitation until the summit is reached, when a fall of pressure with commotion must occur. Very high mountain ranges usually consist of many ridges, among which rain-clouds are entangled in their ascent, and in such cases precipitation towards the windward side of the main range, though on the leeward sides of the minor ridges of which it is formed, may occur to so large an extent that before the summit is reached the clouds are exhausted or nearly so, and in this case the total precipitation is less on the leeward than on the windward side of the main range; but in the moderate heights of the United Kingdom it more commonly happens from the causes explained that precipitation is prevented or greatly retarded until the summit of the ridge is reached. The following cause also contributes to the latter effect. Imagine eleven raindrops A to K to fall simultaneously and equi-distantly from the horizontal plane A M. A strong wind is urging the drops from left to right. The drops A and K may be readily conceived to be equally diverted by the wind, and to fall near the tops of the two hills respectively. Not so drop C, for directly the summit is passed the wind necessarily widens out vertically and, having a greater space to fill, loses forward velocity. It may even eddy backwards, as indicated by the curved arrows, and it is no uncommon thing, in walking up a steep hill in the contrary direction to the flight of the clouds, to find that the rain is coming from behind. Much the same tendency exists with respect to all drops between B and E, but at F the wind has begun to accommodate itself to the new regime and to assume more regular forward motion, and as J is approached, where vertical contraction of the passage through which the wind must pass takes place, there is an increasing tendency to lift the raindrops beyond their proper limits. The general effect is that the rain falling from between G and K is spread over a greater area of the earth G′K′ than that falling from the equal space between B and F, which reaches the ground within the smaller area B′F′. From this cause also, therefore, the leeward side of the valley receives more rain than the windward side. In the United Kingdom the prevailing winds are from the south-west, and some misapprehension has been caused by the bare, but perfectly correct, statement that the general slope towards the western coast is wetter than that towards the eastern. Over the whole width of the country from coast to coast, or of the Welsh mountain ranges only, this is so; but it is nevertheless true that the leeward side of an individual valley or range of hills generally receives more rain than the windward side. Successive abstraction of raindrops as the rain-clouds pass over ridge after ridge causes a gradually diminishing precipitation, but this is generally insufficient to reverse the local conditions, which tend to the contrary effect in individual ranges. The neglect of these facts has led to many errors in estimating the mean rainfall on watershed areas from the fall observed at gauges in particular parts of those areas.

In the simplest case of a single mountain valley to be used for the supply of an impounding reservoir, the rainfall should be known at five points, three being in the axis of the valley, of which one is near the point of intersection of that axis with the boundary of the watershed. Then, in order to connect with these the effect of the right- and left-hand slopes, there should be at least one gauge on each side about the middle height, and approximately in a line perpendicular to the axis of the valley passing through the central gauge. The relative depths recorded in the several gauges depend mainly upon the direction of the valley and steepness of the bounding hills. The gauge in the bottom of the valley farthest from the source will in a wide valley generally record the least rainfall, and one of those on the south-west side, the highest. Much will depend upon the judicious placing of the gauges. Each gauge should have for 10 or 15 yds. around it an uninterrupted plane fairly representing the general level or inclination, as the case may be, of the ground for a much larger distance around it. The earliest records of such gauges should be carefully examined, and if any apparently anomalous result is obtained, the cause should be traced, and when not found in the gauge itself, or in its treatment, other gauges should be used to check it. The central gauge is useful for correcting and checking the others, but in such a perfectly simple case as the straight valley above assumed it may be omitted in calculating the results, and if the other four gauges are properly placed, the arithmetical mean of their results will probably not differ widely from the true mean for the valley. But such records carried on for a year or many years would afford no knowledge of the worst conditions that could arise in longer periods, were it not for the existence of much older gauges not far distant and subject to somewhat similar conditions. The nearer such long-period gauges are to the local gauges the more likely are their records to rise and fall in the same proportion. The work of the late Mr James Glaisher, F.R.S., of the late Mr G. J. Symons, F.R.S., of the Meteorological Office and of the Royal Meteorological Society, has resulted in the establishment of a vast number of rain-gauges in different parts of the United Kingdom, and it is generally, though not always, found that the mean rainfall over a long period can be determined, for an area upon which the actual fall is known only for a short period, by assigning to the missing years of the short-period gauges, [illegible] the same proportion to those of correspondin[illegible] [illegible]od gauges that the rainfalls of the known years in the short-period gauges bear to those of corresponding years in the long-period gauges. In making such comparisons, it is always desirable, if possible, to select as standards long-period gauges which are so situated that the short-period district lies between them. Where suitably placed long-period gauges exist, and where care has been exercised in ascertaining the authenticity of their records and in making the comparisons, the short records of the local gauges may be thus carried back into the long periods with nearly correct results.

Rainfall is proverbially uncertain; but it would appear from the most trustworthy records that at any given place the total rainfall during any period of 50 years will be within 1 or 2 % of the total rainfall at the same place during any other period of 50 years, while the records of any period of 25 years will generally be found to fall within 3½ % of the mean of 50 years. It is equally satisfactory to know that there is a nearly constant ratio on any given area (exceeding perhaps 1000 acres) between the true mean annual rainfall, the rainfall of the driest year, the two driest consecutive years and any other groups of driest consecutive years. Thus in any period of 50 years the driest year (not at an individual gauge but upon such an area) will be about 63% of the mean for the 50 years.

That in the two driest consecutive years will be about 75% of the mean for the 50 years.

That in the three driest consecutive years will be about 80% of the mean for the 50 years.

That in the four driest consecutive years will be about 83% of the mean for the 50 years.

That in the five driest consecutive years will be about 85% of the mean for the 50 years.

That in the six driest consecutive years will be about 86½% of the mean for the 50 years.

Apart altogether from the variations of actual rainfall produced by irregular surface levels, the very small area of a single rain-gauge is subject to much greater variations in short periods than can possibly occur over larger areas. If, therefore, instead of regarding only the mean rainfall of several gauges over a series of years, we compare the relative falls in short intervals of time among gauges yielding the same general averages, the discrepancies prove to be very great, and it follows that the maximum possible intensity of discharge from different areas rapidly increases as the size of the watershed decreases. Extreme cases of local discharge are due to the phenomena known in America as "cloud-bursts," which occasionally occur in Great Britain and result in discharges, the intensities of which have rarely been recorded by rain-gauges. The periods of such discharges are so short, their positions so isolated and the areas affected so small, that we have little or no exact knowledge concerning them, though their disastrous results are well known. They do not directly affect the question of supply, but may very seriously affect the works from which that supply is given.

Evaporation and absorption.

Where in this article the term "evaporation" is used alone, it is to be understood to include absorption by vegetation. Of the total quantity of rainfall a very variable proportion is rapidly absorbed or re-evaporated. Thus in the western mountain districts of Great Britain, largely composed of nearly impermeable rocks more or less covered with pasture and moorland, the water evaporated and absorbed by vegetation is from 13 to 15 in. out of a rainfall of 80 in., or from 16 to 19%, and is nearly constant down to about 60 in., where the proportion of loss is therefore from 22 to 25%. The Severn down to Worcester, draining 1,256,000 acres of generally flatter land largely of the same lithological character, gave in the dry season from the 1st of July 1887 to the 30th of June 1888 a loss of 17·93 in. upon a rainfall of 27·34 in. or about 66%; while in the wet season, 1st of July 1882 to the 30th of June 1883, the loss was 21·09 in. upon a rainfall of 43·26 in., or only 49%. Upon the Thames basin down to Teddington, having an area of 2,353,000 acres, the loss in the dry season from the 1st of July 1890 to the 30th of June 1891 was 17·22 in. out of a rainfall of 21·62 in., or 79%; while in the wet season, 1st of July 1888 to the 30th of June 1889, it was 18·96 out of 29·22 in., or only 65%. In the eastern counties the rainfall is lower and the evaporation approximately the same as upon the Thames area, so that the percentage of loss is greater. But these are merely broad examples and averages of many still greater variations over smaller areas. They show generally that, as the rainfall increases on any given area evaporation increases, but not in the same proportion. Again, the loss from a given rainfall depends greatly upon the previous season. An inch falling in a single day on a saturated mountain area will nearly all reach the rivers, but if it falls during a drought seven-eighths may be lost so far as the period of the drought is concerned. In such a case most of the water is absorbed by the few upper inches of soil, only to be re-evaporated during the next few days, and the small proportion which sinks into the ground probably issues in springs many months later. Thus the actual yield of rainfall to the streams depends largely upon the mode of its time-distribution, and without a knowledge of this it is impossible to anticipate the yield of a particular rainfall. In estimating the evaporation to be deducted from the rainfall for the purpose of determining the flow into a reservoir, it is important to bear in mind that the loss from a constant water surface is nearly one and a half times as great as from the intermittently saturated land surface. Even neglecting the isolated and local discharges due to excessive and generally unrecorded rainfall, the variation in the discharge of all streams, and especially of mountain streams, is very great. We have seen that the average flow from mountain areas in Great Britain towards the end of a dry season does not exceed one-fifth of a cubic foot per second per 1000 acres. Adopting this general minimum as the unit, we find that the flow from such areas up to about 5000 acres, whose mean annual rainfall exceeds 50 in., may be expected occasionally to reach 300 cub. ft., or 1500 such units; while from similar areas of 20,000 or 30,000 acres with the same mean rainfall the discharge sometimes reaches 1200 or 1300 such units. It is well to compare these results with those obtained from much larger areas but with lower mean rainfall. The Thames at Teddington has been continuously gauged by the Thames Conservators since 1883, and the Severn at Worcester by the writer, on behalf of the corporation of Liverpool, during the 10 years 1881 to 1890 inclusive. The highest flood, common to the two periods, was that which occurred in the middle of February 1883. On that occasion the Thames records gave a discharge of 7·6 cub. ft. per second per 1000 acres, and the Severn records a discharge of 8·6 cub. ft. per second per 1000 acres, or 38 and 43 respectively of the above units; while in February 1881, before the Thames gaugings were commenced, the Severn had risen to 47 of such units, and subsequently in May 1886 rose to 50 such units, though the Thames about the same time only rose to 13. But in November 1894 the Thames rose to about 80 such units, and old records on the Severn bridges show that that river must on many occasions have risen to considerably over 100 units. In both these cases the natural maximum discharge is somewhat diminished by the storage produced by artificial canalization of the rivers.

Compensation water.

These illustrations of the enormous variability of discharge serve to explain what is popularly so little understood, namely, the advantage which riparian owners, or other persons interested in a given stream, may derive from works constructed primarily for the purpose of diverting the water of that stream—it may be to a totally different watershed—for the purposes of a town supply. Under modern legislation no such abstraction of water is usually allowed, even if limited to times of flood, except on condition of an augmentation of the natural dry-weather flow, and this condition at once involves the construction of a reservoir. The water supplied to the stream from such a reservoir is known as "compensation water," and is generally a first charge upon the works. This water is usually given as a continuous and uniform flow, but in special cases, for the convenience of mill-owners, as an intermittent one.[1] In the manufacturing districts of Lancashire and Yorkshire it generally amounts to one-third of the whole so-called "available supply." In Wales it is usually about one-fourth, and elsewhere still less; but in any case it amounts to many times the above unit of one-fifth of a cubic foot per second per 1000 acres. Thus the benefit to the fisheries and to the riparian owners generally is beyond all question; but the cost to the water authority of conferring that benefit is also very great—commonly (according to the proportion of the natural flow intended to be rendered uniform) 20 to 35% of the whole expenditure upon the reservoir works. Down to the middle of the 19th century, the proportioning of the size of a reservoir to its work was a very rough operation.

Yield of stream with reservoir.

There were few rainfall statistics, little was known of the total loss by evaporation, and still less of its distribution over the different periods of dry and wet weather. Certain general principles have since been laid down, and within the proper limits of their application have proved excellent guides. In conformity with the above-mentioned convention (by which compensation water is determined as a certain fraction of the average flow during the three driest consecutive years) the available supply or flow from a given area is still understood to be the average annual rainfall during those years, less the corresponding evaporation and absorption by vegetation. But this is evidently only the case when the reservoir impounding the water from such an area is of just sufficient capacity to equalize that flow without possible exhaustion in any one of the three summers. If the reservoir were larger it might equalize the flow of the four or more driest consecutive years, which would be somewhat greater than that of the three; if smaller, we might only be able to count upon the average of the flow of the two driest consecutive years, and there are many reservoirs which will not yield continuously the average flow of the stream even in the single driest year. With further experience it has become obvious that very few reservoirs are capable of equalizing the full flow of the three consecutive driest years, and each engineer, in estimating the yield of such reservoirs, has deducted from the quantity ascertained on the assumption that they do so, a certain quantity representing, according to his judgment, the overflow which in one or more of such years might be lost from the reservoir. The actual size of the reservoir which would certainly yield the assumed supply throughout the driest periods has therefore been largely a matter of judgment. Empirical rules have grown up assigning to each district, according to its average rainfall, a particular number of days' supply, independently of any inflow, as the contents of the reservoir necessary to secure a given yield throughout the driest seasons. But any such generalizations are dangerous and have frequently led to disappointment and sometimes to needless expenditure. The exercise of sound judgment in such matters will always be necessary, but it is nevertheless important to formulate, so far as possible, the conditions upon which that judgment should be based. Thus in order to determine truly the continuously available discharge of any stream, it is necessary to know not only the mean flow of the stream, as represented by the rainfall less the evaporation, but also the least favourable distribution of that flow throughout any year.

The most trying time-distribution of which the author has had experience in the United Kingdom, or which he has been able to discover from a comparison of rainfalls upon nearly impermeable areas exceeding 1000 acres, is graphically represented by the thick irregular line in the left-hand half of fig. 3, where the total flow for the driest year measures 100 on the vertical percentage scale; the horizontal time scale being divided into calendar months.

The diagram applies to ordinary areas suitable for reservoir construction and in which the minimum flow of the stream reaches about one-fifth of a cubic foot per second per 1000 acres. Correspondingly, the straight line *a a* represents uniformly distributed supply, also cumulatively recorded, of the same quantity of water over the same period. But, apart from the diurnal fluctuations of consumption which may be equalized by local "service reservoirs," uniform distribution of supply throughout twelve months is rarely what we require; and to represent the demand in most towns correctly, we should increase the angle of this line to the horizontal during the summer and diminish it during the winter months, as indicated by the dotted lines *b b*. The most notable features of this particular diagram are as follows: Up to the end of 59 days (to the 28th February) the rate of flow is shown, by the greater steepness of the thick line, to be greater than the mean for the year, and the surplus water—about 11% of the flow during the year—must be stored; but during the 184 days between this and the end of the 243rd day (31st August) the rate of flow is generally below the mean, while from that day to the end of the year it is again for the most part above the mean. Now, in order that a reservoir may enable the varying flow, represented cumulatively by the irregular line, to be discharged in a continuous and uniform flow to satisfy a demand represented cumulatively by the straight line a a, its capacity must be such that it will hold not only the 11 % surplus of the same year, but that, on June 10th, when this surplus has been used to satisfy the demand, it will still contain the water c d—19 %—stored from a previous year; otherwise between June 10th and August 31st the reservoir will be empty and only the dry weather flow of the stream will be available for supply. In short, if the reservoir is to equalize the whole flow of this year, it must have a capacity equal to the greatest deficiency c d of the cumulative flow below the cumulative demand, plus the greatest excess e f of the cumulative flow over the cumulative demand. This capacity is represented by the height of the line $a'a'$ (drawn parallel to a a from the point of maximum surplus f) vertically above the point of greatest deficiency c, and equal, on the vertical scale, to the difference between the height $c = 48$ % and $g = 78$ % or 30 % of the stream-flow during the driest year. A reservoir so proportioned to the stream-flow with a proper addition to avoid drawing off the bottom water, would probably be safe in Great Britain in any year for a uniform demand equal to the cumulative stream-flow; or, if it failed, that failure would be of very short duration, and would probably only occur once in 50 years.

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[1] The volume of compensation water is usually fixed as a given fraction of the so-called "available supply" (which by a convention that has served its purpose well, is understood to be the average flow of the stream during the three consecutive driest years).

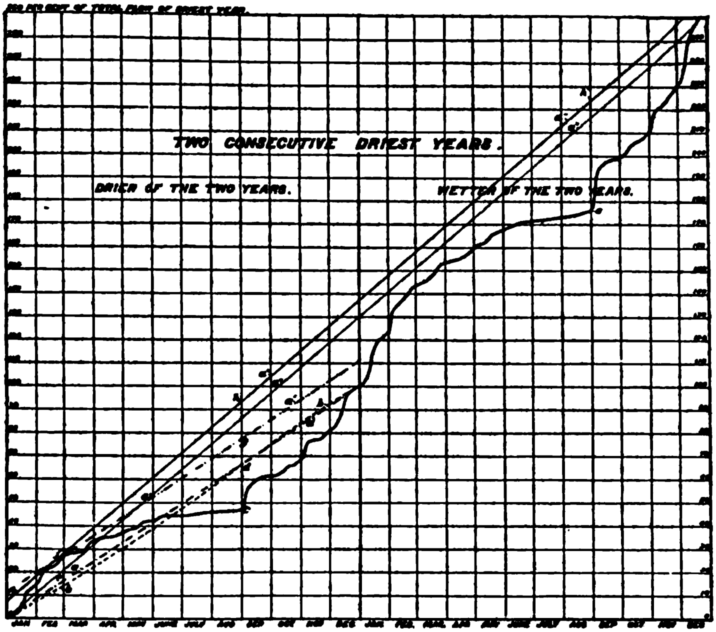
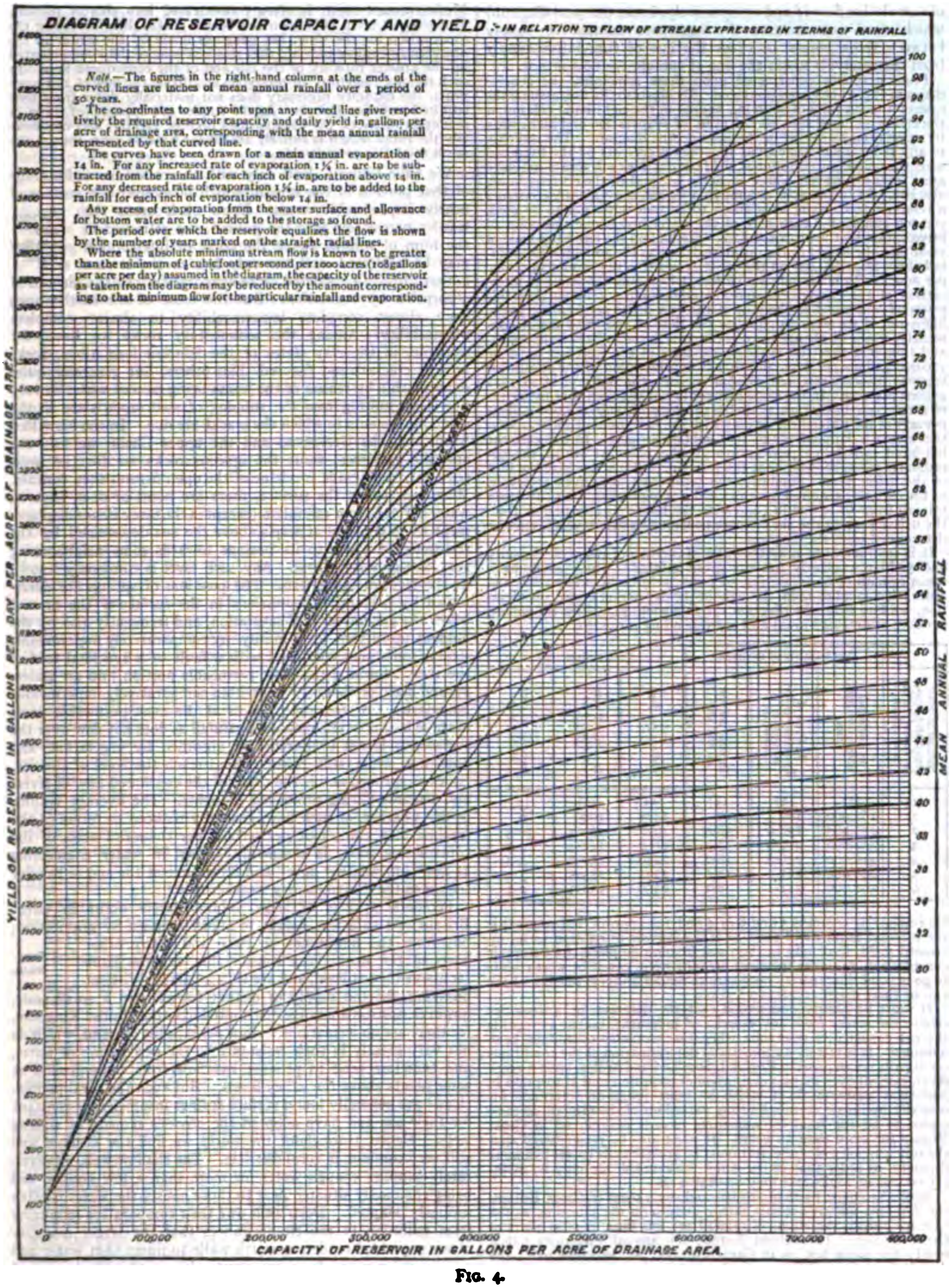


FIG. 3.

It may be at first sight objected that a case is assumed in which there is no overflow before the reservoir begins to fall, and therefore no such loss as generally occurs from that cause. This is true, but it is only so because we have made our reservoir large enough to contain in addition to its stock of 19 %, at the beginning of the year, all the surplus water that passes during the earlier months in this driest year with its least favourable time-distribution of flow. Experience shows, in fact, that if a different distribution of the assumed rainfall occurs, that distribution will not try the reservoir more severely while the hitherto assumed uniform rate of demand is maintained. But, as above stated, the time-distribution of demand is never quite uniform. The particular drought shown on the diagram is the result of an exceptionally early deficiency of rainfall which, in conjunction with the variation of demand shown by the dotted line b b, is the most trying condition. The reservoir begins to fall at the end of February, and continues to do so with few and short exceptions until the end of August, and it so happens that about the end of August this dotted line, b b representing actual cumulative demand, crosses the straight line a a of uniform demand, so that the excess of demand, represented by the slope from June to September, is balanced by the deficiency of demand, represented by the flatter slope in the first five months, except as regards the small quantity b e near the end of February, which, not having been drawn off during January and February, must overflow before the end of February. To avoid this loss the 11 % is in this case to be increased by the small quantity b e determined by examination of the variation of the actual from a constant demand. After the reservoir begins to fall—in this case at the end of February—no ordinary change in the variation of demand can affect the question, subject of course to the cumulative demand not exceeding the reservoir yield for the assumed year of minimum rainfall. In assuming a demand at the beginning of the year below the mean, resulting in an overflow equal in this case to b e at the end of February and increasing our reservoir to meet it, we assume also that some additional supply to that reservoir beyond the 11 % of the stream-flow from the driest year can be obtained from the previous year. In relation to this supply from the previous year the most trying assumption is that the rainfall of that year, together with that of the driest year, will be the rainfall of the two driest consecutive years. We have already seen that while the rainfall of the driest of 50 years is about 63 % of the mean, that of the driest two consecutive years is about 75 % of the mean. It follows, therefore, that the year immediately preceding the driest cannot have a rainfall less than about 87 % of the mean. As the loss by evaporation is a deduction lying between a constant figure and a direct proportional to the rainfall, we should err on the safe side in assuming the flow in the second driest year to be increased proportionally to the rainfall, or by the difference between 63 and 87 equal to 24 % of the mean of 50 years. This 24 % of the 50 years' mean flow is 38 % of the driest year's flow in fig. 3, and is therefore much more than sufficient to ensure the reservoir beginning the driest year with a stock equal to the greatest deficiency—19 %—of the cumulative flow of that year beyond the cumulative demand.

But in determining the capacity of reservoirs intended to yield a supply of water equal to the mean flow of two, three or more years, the error, though on the safe side, caused by assuming the evaporation to be proportional to the rainfall, is too great to be neglected. The evaporation slightly increases as the rainfall increases, but at nothing like so high a rate. Having determined this evaporation for the second driest consecutive year and deducted it from the rainfall—which, as above stated, cannot be less than 87 % of the mean of 50 years—we may, as shown on fig. 3, extend our cumulative diagram of demand and flow into the reservoir from one to two years.

The whole diagram shows, by the greater gradient of the unbroken straight lines, the greater demand which can be satisfied by the enlargement of the reservoir to the extent necessary to equalize the flow of the two driest consecutive years. The new capacity is either c k or c' k', whichever, in the particular case under investigation, is the greater. In the illustration the c' k' is a little greater, measuring 47½ % of the flow of the driest year. In the same way we may group in a single diagram any number of consecutive driest years, and either ascertain the reservoir capacity necessary for a given uniform yield (represented cumulatively by a straight line corresponding with $a'a'$, but drawn over all the years instead of one), or conversely, having set up a vertical from the most trying point in the line of cumulative flow (c or c' in fig. 3—representing, in percentage of the total annual flow of the driest year, the capacity of reservoir which it may be convenient to provide) we may draw a straight line a''' a''' of uniform yield from the head of that vertical to the previous point of maximum excess of cumulative flow. The line a'' a'' drawn from zero parallel to the first line, produced to the boundaries of the diagram, will cut the vertical at the end of the first year at the percentage of the driest year's flow which may be safely drawn continuously from the reservoir throughout the two years. It is to be observed that any irregularity in the rate of supply from the reservoir may occur between the critical periods of maximum excess of cumulative flow and maximum deficiency



Note.—The figures in the right-hand column at the ends of the curved lines are inches of mean annual rainfall over a period of 50 years.

The co-ordinates to any point upon any curved line give respectively the required reservoir capacity and daily yield in gallons per acre of drainage area, corresponding with the mean annual rainfall represented by that curved line.

The curves have been drawn for a mean annual evaporation of 14 in. For any increased rate of evaporation 1¼ in. are to be subtracted from the rainfall for each inch of evaporation above 14 in. For any decreased rate of evaporation 1¼ in. are to be added to the rainfall for each inch of evaporation below 14 in.

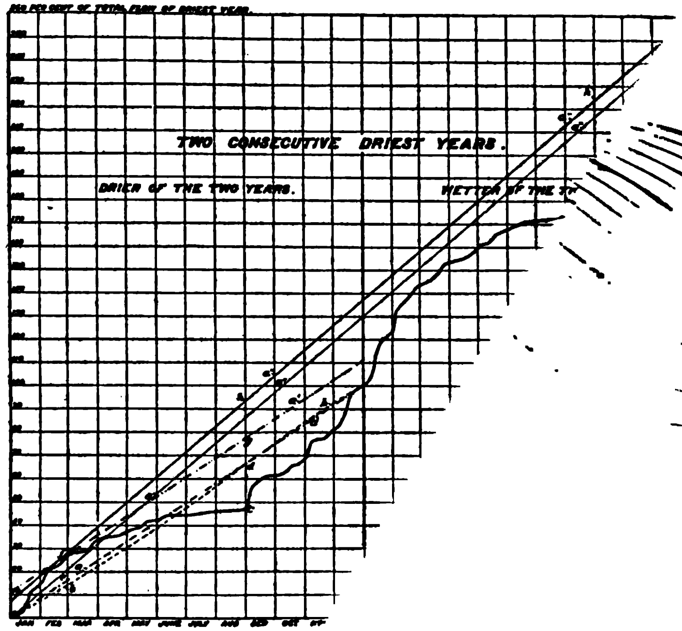
Any excess of evaporation from the water surface and allowance for bottom water are to be added to the storage so found.

The period over which the reservoir equalizes the flow is shown by the number of years marked on the straight radial lines.

Where the absolute minimum stream flow is known to be greater than the minimum of ⅙ cubic foot per second per 1000 acres (108 gallons per acre per day) assumed in the diagram, the capacity of the reservoir as taken from the diagram may be reduced by the amount corresponding to that minimum flow for the particular rainfall and evaporation.

FIG. 4.

cumulatively by the straight line *a a*, its capacity must be such that it will hold not only the 11% surplus of the same year, but that, on June 10th, when this surplus has been used to satisfy the demand, it will still contain the water *c d*—19%—stored from a previous year; otherwise between June 10th and August 31st the reservoir will be empty and only the dry weather flow of the stream will be available for supply. In short, if the reservoir is to equalize the whole flow of this year, it must have a capacity equal to the greatest deficiency *c d* of the cumulative flow below the cumulative demand, plus the greatest excess *e f* of the cumulative flow over the cumulative demand. This capacity is represented by the height of the line *a′a′* (drawn parallel to *a a* from the point of maximum surplus *f*) vertically above the point of greatest deficiency *c*, and equal, on the vertical scale, to the difference between the height *c* = 48% and *g* = 78% or 30% of the stream-flow during the driest year. A reservoir so proportioned to the stream-flow with a proper addition to avoid drawing off the bottom water, would probably be safe in Great Britain in any year



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ot vary greatly in their resistance to the percolation of water,
and therefore tend to produce overflow from underground at
some points above the valley levels. But even the rural populations have generally found surface springs insufficiently constant for their use and have adopted the obvious remedy of sinking wells. Hence, throughout the world we find the shallow well still very common in rural districts. The shallow well, however, rarely supplies enough water for more than a few houses, and being commonly situated near to those houses the water is often seriously polluted. Deep wells owe their comparative immunity from pollution to the circumstances that the larger quantity of water yielded renders it worth while to pump that water and convey it by pipes from comparatively unpolluted areas; and that any impurities in the water must have passed through a

Deep Wells.

considerable depth, and by far the larger part of them through a great length of filtering material, and must have taken so long a time to reach the well that their organic character has disappeared. The principal water-bearing formations, utilized in Great Britain by means of deep wells, are the Chalk and the New Red Sandstone. The Upper and Middle Chalk are permeable almost through their mass. They hold water like a sponge, but part with it under pressure to fissures by which they are intersected, and, in the case of the Upper Chalk, to ducts following eds of flints. A well sunk in these formations without striking y fissure or water-bearing flint bed, receives water only at very slow rate; but if, on the other hand, it strikes one or re of the natural water-ways, the quantity of water capable eing drawn from it will be greatly increased.

is a notable peculiarity of the Upper and Middle Chalk
ations that below their present valleys the underground
r passes more freely than elsewhere. This is explained
fact that the Chalk fissures are almost invariably rounded
larged by the erosion of carbonic acid carried from the
by the water passing through them. These fissures
lace of the streams in an impermeable area, and those
valleys must obviously be called upon to discharge
from the surface, and thus be brought in contact
bonic acid, than similar fissures elsewhere. Hence
n for a well in the Chalk is generally that over
rata were impermeable, the largest quantity of
ild flow. The Lower Chalk formation is for
ermeable, though it contains many ruptures
smashes, in the interstices of which large
ived from the Upper and Middle Chalk,
red, or which may merely form passages
the Upper Chalk. Thus despite the
ss large springs are occasionally found
Chalk. A striking example is that
under Abbot's Cliff, near Dover.
k formations to imitate artificially
d watercourses, by driving from
s" as they are called, below the
sures and water-bearing beds, and
ing area.

ice to the Chalk formations as a source of
ater supply comes the Trias or New Red Sand-
sisting in Great Britain of two main divisions, the
r above and the Bunter below. With the exception
the Red Marls forming the upper part of the Keuper, most of the New Red Sandstone is permeable, and some parts contain, when saturated, even more water than solid chalk; but, just as in the case of the chalk, a well or borehole in the sandstone yields very little water unless it strikes a fissure; hence, in New Red Sandstone, also, it is a common thing to form underground chambers or adits in search of additional fissures, and sometimes to sink many vertical boreholes with the same object in view.

Wells in sand.

As the formation approaches the condition of pure sand, the water-bearing property of any given mass increases, but the difficulty of drawing water from it without admixture of sand also increases. In sand below water there are, of course, no open fissures, and even if adits could be usefully employed, the cost of constructing and lining them through the loose sand would be prohibitive. The well itself must be lined; and its yield is therefore confined to such water as can be drawn through the sides or the bottom of the lining without setting up a sufficient velocity to cause any sand to flow with the water. Hence it arises that, in sand formations, only shallow wells or small boreholes are commonly found. Imagine for a moment that the sand grains were by any means rendered immobile without change in the permeability of their interspaces; we could then dispense with the iron or brickwork lining of the well; but as there would still be no cracks or fissures to extend the area of percolating water exposed to the open well, the yield would be very small. Obviously, it must be very much smaller when the lining necessary to hold up loose sand is used. Uncemented brickwork, or perforated ironwork, are the usual materials employed for lining the well and holding up the sand, and the quantity of water drawn is kept below the comparatively small quantity necessary to produce a velocity, through the joints or orifices, capable of disturbing the sand. The rate of increase of velocity towards any isolated aperture through which water passes into the side of a well sunk in a deep bed of sand is, in the neighbourhood of that aperture, inversely proportional to the square of the distance therefrom. Thus, the velocity across a little hemisphere of sand only ½ in. radius covering a 1-in. orifice in the lining is more than 1000 times the mean velocity of the same water approaching the orifice radially when 16 in. therefrom. This illustration gives some idea of the enormous increase of yield of such a well, if, by any means, we can get rid of the frictional sand, even from within the 16 in. radius. We cannot do this, but happily the grains in a sand formation differ very widely in diameter, and if, from the interstices between the larger grains in the neighbourhood of an orifice, we can remove the finer grains, the resistance to flow of water is at once enormously reduced. This was for the first time successfully done in a well, constructed by the Biggleswade Water Board in 1902, and now supplying water over a large area of North Bedfordshire. This well, 10 ft. diameter, was sunk through about 110 ft. of surface soil, glacial drift and impermeable gault clay and thence passed for a further depth of 70 ft. into the Lower Greensand formation, the outcrop of which, emerging on the south-eastern shore of the Wash, passes south-westwards, and in Bedfordshire attains a thickness exceeding 250 ft. The formation is probably more or less permeable throughout; it consists largely of loose sand and takes the general south-easterly dip of British strata. The Biggleswade well was sunk by processes better known in connexion with the sinking of mine shafts and foundations of bridges across the deep sands or gravels of bays, estuaries and great rivers. Its full capacity has not been ascertained; it much exceeds the present pumping power, and is probably greater than that of any other single well unassisted by adits or boreholes. This result is mainly due to the reduction of frictional resistance to the passage of water through the sand in the immediate neighbourhood of the well, by washing out the finer particles of sand and leaving only the coarser particles. For this purpose the lower 45 ft. of the cast-iron cylinders forming the well was provided with about 660 small orifices lined with gun-metal tubes or rings, each armed with numerous thicknesses of copper wire gauze, and temporarily closed with screwed plugs. On the removal of any plug, this wire gauze prevented the sand from flowing with the water into the well; but while the finer particles of sand remained in the neighbourhood of the orifice, the flow of water through the contracted area was very small. To remove this obstruction the water was pumped out while the plugs kept the orifices closed. A flexible pipe, brought down from a steam boiler above, was then connected with any opened orifice. This pipe was provided, close to the orifice, with a three-way cock, by means of which the steam might be first discharged into the sand, and the current between the cock and the well then suddenly reversed and diverted into the well. The effect of thus alternately forcing high-pressure steam among the sand, and of discharging high-pressure water contained in the sand into the well, is to break up any cohesion of the sand, and to allow all the finer particles in the neighbourhood of the orifice to rush out with the water through the wire gauze into the well. This process, in effect, leaves each orifice surrounded by a hemisphere of coarse sand across which the water flows with comparative freedom from a larger hemisphere where the corresponding velocity is very slow, and where the presence of finer and more obstructive particles is therefore unimportant. Many orifices through which water at first only dribbled were thus caused to discharge water with great force, and entirely free from sand, against the opposite side of the well, while the general result was to increase the inflow of water many times, and to entirely prevent the intrusion of sand. Where, however, a firm rock of any kind is encountered, the yield of a well (under a given head of water) can only be increased by enlargement

Artificial increase of yield.

Pumps in boreholes.

Air-lift.

of the main well in depth or diameter, or by boreholes or adits. No rule as to the adoption of any one of these courses can be laid down, nor is it possible, without examination of each particular case, to decide whether it is better to attempt to increase the yield of the well or to construct an additional well some distance away. By lowering the head of water in any well which draws its supply from porous rock, the yield is always temporarily increased. Every well has its own particular level of water while steady pumping at a given rate is going on, and if that level is lowered by harder pumping, it may take months, or even years, for the water in the interstices of the rock to accommodate itself to the new conditions; but the permanent yield after such lowering will always be less than the quantity capable of being pumped shortly after the change. We have hitherto supposed the pumps for drawing the water to have been placed in the well at such a level as to be accessible, while the suction pipe only is below water. Pumps, however, may be (and have been) placed deep down in boreholes, so that water may be pumped from much greater depths. By this means the head of pressure in the boreholes tending to hold the water back in the rock is reduced, and the supply consequently increased; but when the cost of maintenance is included, the increased supply from the adoption of this method rarely justifies expectations. When the water has been drawn down by pumping to a lower level its passage through the sandstone or chalk in the neighbourhood of the borehole is further resisted by the smaller length of borehole below the water; and there are many instances in which repeated lowering and increased pumping, both from wells and boreholes, have had the result of reducing the water available, after a few years, nearly to the original quantity. One other method—the use of the so-called "air-lift"—should be mentioned. This ingenious device originated in America. The object attained by the air-lift is precisely the same as that attained by putting a pump some distance down a borehole; but instead of the head being reduced by means of the pump, it is reduced by mixing the water with air. A pipe is passed down the borehole to the desired depth, and connected with air-compressors at the surface. The compressors being set to work, the air is caused to issue from the lower end of the pipe and to mix in fine bubbles with the rising column of water, sometimes several hundred feet in height. The weight of the column of water, or rather of water and air mixed, is thus greatly reduced. The method will therefore always increase the yield for the time, and it may do so permanently, though to a very much smaller extent than at first; but its economy must always be less than that of direct pumping.

In considering the principles of well supplies it is important to bear the following facts in mind. The crust of the earth, so far as it is permeable and above the sea-level, receives from rainfall its supply of fresh water. That supply, so far as it is not evaporated or absorbed by vegetation, passes away by the streams or rivers, or sinks into the ground. If the strata were uniformly porous the water would lie in the rock at different depths below the surface according to the previous quantity and distribution of the rainfall. It would slowly, but constantly, percolate downwards and towards the sea, and would ooze out at or below the sea-level, rarely regaining the earth's surface earlier except in deep valleys. Precisely the same thing happens in the actual crust of the earth, except that, in the formations usually met with, the strata are so irregularly permeable that no such uniform percolation occurs, and most of the water, instead of oozing out near the sea-level, meets with obstructions which cause it to issue, sometimes below the sea-level and sometimes above it, in the form of concentrated springs. After prolonged and heavy rainfall the upper boundary of the sub-soil water is, except in high ground, nearly coincident with the surface. After prolonged droughts it still retains more or less the same figure as the surface, but at lower depths and always with less pronounced differences of level.

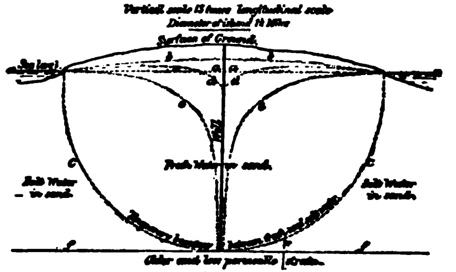
Saline water below ground.

Sedimentary rocks, formed below the sea or salt lagoons, must originally have contained salt water in their interstices. On the upheaval of such rocks above the sea-level, fresh water from rainfall began to flow over their exposed surfaces, and, so far as the strata were permeable, to lie in their interstices upon the salt water. The weight of the original salt water above the sea-level, and of the fresh water so superimposed upon it, caused an overflow towards the sea. A hill, as it were, of fresh water rested in the interstices of the rock upon the salt water, and continuing to press downwards, forced out the salt water even below the level of the sea. Subject to the rock being porous this process would be continued until the greater column of the lighter fresh water balanced the smaller head of sea water. It would conceivably take but a small fraction of the period that has in most cases elapsed since such upheavals occurred for the salt water to be thus displaced by fresh water, and for the condition to be attained as regards saturation with fresh water, in which with few exceptions we now find the porous portions of the earth's crust wherever the rainfall exceeds the evaporation. There are cases, however, as in the valley of the Jordan, where the ground is actually below the sea-level, and where, as the total evaporation is equal to or exceeds the rainfall, the lake surfaces also are below the sea-level. Thus, if there is any percolation between the Mediterranean and the Dead Sea, it must be towards the latter. There are cases also where sedimentary rocks, formed below the sea or salt lagoons, are almost impermeable: thus the salt deposited in parts of the Upper Keuper of the New Red Sandstone, is protected by the red marls of the formation, and has never been washed out. It is now worked as an important industry in Cheshire.

Wells in sand.

Perhaps the most instructive cases of nearly uniform percolation in nature are those which occur in some islands or peninsulas formed wholly of sea sand. Here water is maintained above the sea-level by the annual rainfall, and may be drawn off by wells or borings. On such an island, in the centre of which a borehole is put down, brackish water may be reached far below the sea-level; the salt water forming a saucer, as it were, in which the fresh water lies. Such a salt-water saucer of fresh water is maintained full to overflowing by the rainfall, and owing to the frictional resistance of the sand and to capillary action and the fact that a given column of fresh water is balanced by a shorter column of sea water, the fresh water never sinks to the mean sea-level unless artificially abstracted.

Although such uniformly permeable sand is rarely met with in great masses, it is useful to consider in greater detail so simple a case. Let the irregular thick line in fig. 5 be the section of a circular island a mile and a quarter in diameter, of uniformly permeable sand.



Vertical scale 13 times longitudinal scale
Diameter of island 1¼ Miles
Surface of Ground
Sea level
b
b
a
a
d
d
C
C
Fresh Water in sand.
Salt Water in sand.
Salt Water in sand.
Older and less permeable strata.

Fig. 5.

The mean sea-level is shown by the horizontal line *aa*, dotted where it passes through the land, and the natural mean level of saturation *bb*, above the sea-level, by a curved dot and dash line. The water, contained in the interstices of the sand above the mean sea-level, would (except in so far as a film, coating the sand particles, is held up by capillary attraction) gradually sink to the sea-level if there were no rainfall. The resistance to its passage through the sand is, however, sufficiently great to prevent this from occurring while percolation of annual rainfall takes place.

Hence we may suppose that a condition has been attained in which the denser salt water below and around the saucer *CC* (greatly exaggerated in vertical scale) balances the less dense, but deeper fresh water within it. Next suppose a well to be sunk in the middle of the island, and a certain quantity of water to be drawn therefrom daily. For small supplies such a well may be perfectly successful; but however small the quantity drawn, it must obviously have the effect of diminishing the volume of fresh water, which contributes to the maintenance of the level of saturation above the sea-level; and with further pumping the fresh water would be so far drawn upon that the mean level of saturation would sink, first to a curved figure—a cone of depression—such as that represented by the new level of saturation *dd*, and later to the figure represented by the lines *ee*, in which the level of saturation has everywhere been drawn below the mean sea-level. Before this stage the converse process begins, the reduced column of fresh water is no longer capable of balancing the sea water in the sand, inflow occurs at *c* and *e*, resulting finally in the well water becoming saline. The figure, in this case of uniform percolation, assumed by the water in the neighbourhood of a deep well is a surface of revolution, and, however irregular the percolation and the consequent shape of the figure, it is commonly, but somewhat incorrectly, called the "cone of depression." It cannot have straight, or approximately straight, sides in any vertical plane, but in nature is an exceedingly irregular figure drawn about curves—not unlike those in fig. 5. In this case, as in that of a level plane of uniformly porous sand, the vertical section of the figure is tangential to the vertical well and to the natural level of the subsoil water.

The importance of this illustration is to be found elsewhere than in islands, or peninsulas, or in uniformly porous sand. Where the strata are not uniformly porous, they may resist the passage of water from the direction of the sea or they may assist it; and round the whole coast of England, in the Magnesian limestone to the north-east, in the Chalk and Greensand to the east and south, and in the New Red Sandstone to the west, the number of wells which have been abandoned as sources of potable supply, owing to the percolation of sea water, is very great. Perhaps the first important cases occurred in the earlier part of the 19th century on the Lancashire shore of the Mersey estuary, where, one after another, deep wells in the New Red Sandstone had to be abandoned for most purposes. On the opposite side, in the Cheshire peninsula, the total quantity of water drawn has been much less, but even here serious warnings have been received. In 1895 the single well then supplying Eastbourne was almost suddenly rendered unfit for use, and few years pass without some similar occurrence of a more or less serious kind. The remarkable suddenness with which such changes are brought about is not to be wondered at when the true cause is considered. The action of sandstone in filtering salt waters was investigated in 1878 by Dr Isaac Roberts, F.R.S., who showed that when salt water was allowed to percolate blocks of sandstone, the effluent was at first nearly fresh, the salt being filtered out and crystallized for the most part near the surface of ingress to the sandstone. As the process continued the salt-saturated layer, incapable of further effective filtration, grew in thickness downwards, until in the process of time it filled the whole mass of sandstone. But before this was accomplished the filtration of the effluent became defective, and brackish water was received, which rapidly increased nearly to the saltness of the inflow. Into such blocks, charged with salt crystals and thoroughly dried, fresh water was then passed, and precisely the converse process took place. A thickness of only 12 in. of Bunter sandstone proved at first to be capable of removing more than 80% of the chlorides from sea water; but, after the slow passage of only 0·6 gallon through 1 cub. ft. of stone, the proportion removed fell to 8·51%. The general lesson to be learned from these facts is, that if the purity of the water of any well not far removed from the sea is to be maintained, that water must not be pumped down much below the sea-level. In short, the quantity of water drawn must in no case be allowed to exceed the quantity capable of being supplied to the well through the medium of the surrounding soil and rock, by rain falling upon the surface of the land. If it exceeds this, the stock of fresh water held in the interstices of the rock, and capable of flowing towards the well, must disappear; and the deficit between the supply and demand can only be made up by water filtering from the sea and reaching the well at first quite free from salt, but sooner or later in a condition unfit for use.

DAMS

Earthen dams.

Any well-made earthen embankment of moderate height, and of such thickness and uniformity of construction as to ensure freedom from excessive percolation at any point, will in the course of time become almost impermeable to surface water standing against it; and when permeable rocks are covered with many feet of soil, the leakage through such soil from standing water newly placed above it generally diminishes rapidly, and in process of time often ceases entirely. Even the beds of sluggish rivers flowing over porous strata generally become so impermeable that excavations made in their neighbourhood, though freely collecting the subsoil water, receive no river water whatever. Thus natural or artificial surfaces which are completely permeable to rainfall may become almost impermeable when protected by surface water from drought and frost, and from earth-worms, vegetation and artificial disturbance. The cause of this choking of the pores is precisely the same as that described below in the case of sand filters. But in order that the action may be complete the initial resistance to percolation of water at every part of the soil must be such that the motion of the water through it shall be insufficient to disturb the water-borne mineral and organic particles lodged on the surface or in the interstices of the soil. If, therefore, a reservoir so formed survives the first few years without serious leakage, it is not likely, in the absence of artificial disturbance, to succumb owing to leakage at a later period. Hence, as the survival of the fittest, there are many artificial waters, with low dams consisting exclusively of earth—and sometimes very sandy earth—satisfactorily performing their functions with no visible leakage. But it is never advisable to rely upon this action, where, as in the case of a reservoir for water supply, large portions of naturally permeable bottom are liable to be uncovered and exposed to the weather.

Construction.

The most important dams are those which close the outlets of existing valleys, but a dam may be wholly below ground, and according to the commoner method of construction in Great Britain, wherever sufficiently impermeable rising ground is not met with at the intended boundary of a reservoir, a trench is cut along such portion, and carried down to rock or such other formation as, in the engineer's opinion, forms a sufficiently impermeable sheet beneath the whole surface to be covered with water. Into this trench so-called "puddled clay," that is, clay rendered plastic by kneading with water, is filled and thoroughly worked with special tools, and trodden in layers. In this manner an underground compartment is formed, the bottom of which is natural, and the sides partly natural and partly artificial, both offering high resistance to the passage of water. Above ground, if the water level is to be higher than the natural boundary, the same puddle walls or cores are carried up to the required level, and are supported as they rise by embankments of earth on either side.

Fig. 6 is a typical section of a low dam of this class, impounding water upon gravel overlying impermeable clay. In such a structure the whole attention as regards water-tightness should be concentrated upon the puddle wall or core. When, as may happen in dry seasons, the puddle wall remains long above the water level, it parts with moisture and contracts. It is essential that this contraction shall not proceed to such an extent as may possibly produce cracking. Drying is retarded, and the contraction due to a given degree of drying is greatly reduced, by the presence of sand and small stones among the clay. Nearly all clays, notably those from the Glacial deposits, naturally contain sand and stones, 40 to 50% by weight of which is not too much if uniformly distributed and if the clay is otherwise good. But in the lower parts of the trench, where the clay can never become dry, plasticity and ductility are, for reasons to be explained below, the first consideration, and there the proportion of grit should be lower. The resistance of clay to percolation by water depends chiefly upon the density of the clay, while that density is rapidly reduced if the clay is permitted to absorb water. Thus, if dry clay is prevented from expanding, and one side be subjected to water pressure while the other side is held up by a completely porous medium, the percolation will be exceedingly small; but if the pressure preventing the expansion is reduced the clay will swell, and the percolation will increase. On the restoration of the pressure, the density will be again increased by the reduction of the

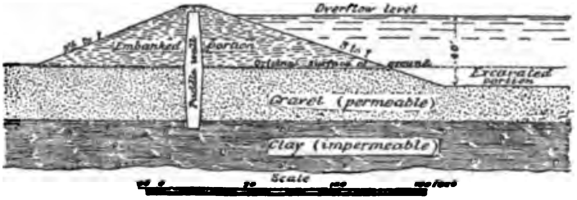


FIG. 6.—Section of Typical Low Earth Embankment in Flat Plain.

water-filled interstices, and the percolation will be correspondingly checked. Hence the extreme importance in high dams with clay cores of loading the clay well for some time before water pressure is brought against it. If this is done, the largest possible quantity of clay will be slowly but surely forced into any space, and, being prevented from expanding, it will be unable subsequently to absorb more water. The percolation will then be very small, and the risk of disintegration will be reduced to a minimum. The embankments on either side of the puddle wall are merely to support the puddle and to keep it moist above the ground level when the reservoir is low. They may be quite permeable, but to prevent undue settlement and distortion they must, like the puddle, be well consolidated. In order to prevent a tendency to slip, due to sudden and partial changes of saturation, the outer embankment should always be permeable, and well drained at the base except close to the puddle. The less permeable materials should be confined to the inner parts of the embankments; this is especially important in the case of the inner embankment in order that, when the water level falls, they may remain moist without becoming liable to slip. The inner slope should be protected from the action of waves by so-called "hand-pitching," consisting of roughly-squared stonework, bedded upon a layer of broken stone to prevent local disturbance of the embankment by action of the water between the joints of the larger stones.

In mountain valleys, rock or shale, commonly the most impermeable materials met with in such positions, are sometimes not reached till considerable depths are attained. There are several cases in Great Britain where it has been necessary to carry down the puddle trench to about 200 ft. below the surface of the ground vertically above those parts. The highest dams of this class in the British islands impound water to a level of about 110 ft. above the bottom of the valley. Such great works have generally been well constructed, and there are many which after fifty years of use are perfectly sound and water-tight, and afford no evidence of deterioration. On the other hand, the partial or total failure of smaller dams of this description, to retain the reservoir water, has been much more common in the past than is generally supposed. Throughout Great Britain there are still many reservoirs, with earthen dams, which cannot safely be filled; and others which, after remaining for years in this condition, have been repaired. From such cases and their successful repair valuable experience of the causes of failure may be derived.

Erosion by leakage.

Most of these causes are perfectly well understood by experienced engineers, but instances of malconstruction of recent date are still met with. A few such cases will now be mentioned. The base of a puddle trench is often found to have been placed upon rock, perfectly sound in itself, but having joints which are not impermeable. The loss of water by leakage through such joints or fissures below the puddle wall may or may not be a serious matter in itself; but if at any point there is sufficient movement of water across the base of the trench to produce the slightest erosion of the clay above it, that movement almost invariably increases. The finer particles of clay in the line of the joint are washed away, while the sandy particles, which nearly all natural clays contain, remain behind and form a constantly deepening porous vein of sand crossing the base of the puddle. Percolation through this sand is thus added to the original leakage. Having passed through the puddle core the leaking water sometimes rises to the surface of the ground, producing a visibly turbid spring. As erosion proceeds, the contraction of the space from which the clay is washed continues, chiefly by the sinking down of the clay above the sand. Thus the permeable vein grows vertically rather than horizontally, and ultimately assumes the form of a thin vertical sheet traversing the puddle wall, often diagonally in plan, and having a thickness which has varied in different cases from a few inches to a couple of feet or more, of almost clean sand rising to an observed height of 30 or 40 ft., and only arrested in its upward growth by the necessary lowering of the reservoir water to avoid serious danger. The settlement of the plastic clay above the eroded portion soon produces a surface depression at the top of the embankment over or nearly over the leakage, and thus sometimes gives the first warning of impending danger. It is not always possible to prevent any leakage whatever through the strata below the bottom or beyond the ends of the trench, but it is always possible to render such leakage entirely harmless to the work above it, and to carry the water by relief-pipes to visible points at the lower toe of the dam. Wherever the base of a puddle wall cannot be worked into a continuous bed of clay or shale, or tied into a groove cut in sound rock free from water-bearing fissures, the safest course is to base it on an artificial material at once impermeable and incapable of erosion, interposed between the rock and the puddled clay. Water-tight concrete is a suitable material for the purpose; it need not be made so thick as the puddle core, and is therefore sometimes used with considerable advantage in lieu of the puddle for the whole depth below ground. In fig. 7 a case is shown to be so treated. Obviously, the junction between the puddle and the concrete might have been made at any lower level.

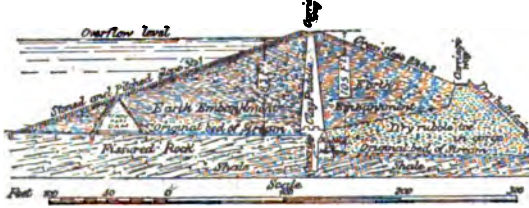


FIG. 7.—Earth Embankment, with stone toe and concrete trench.

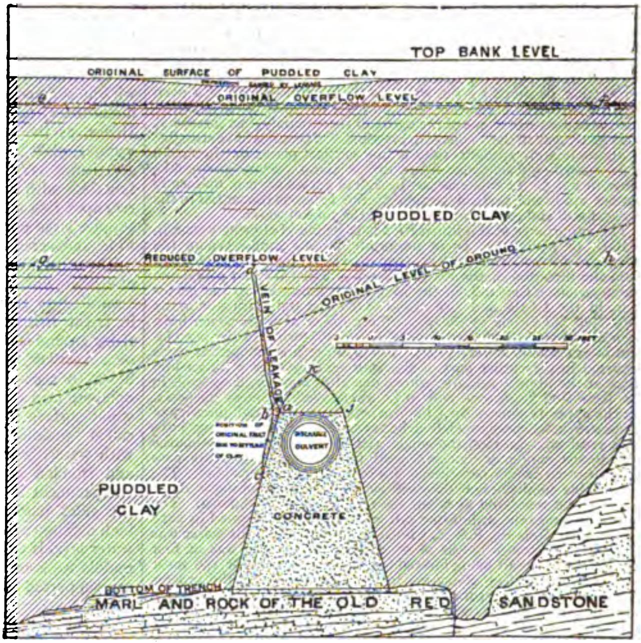
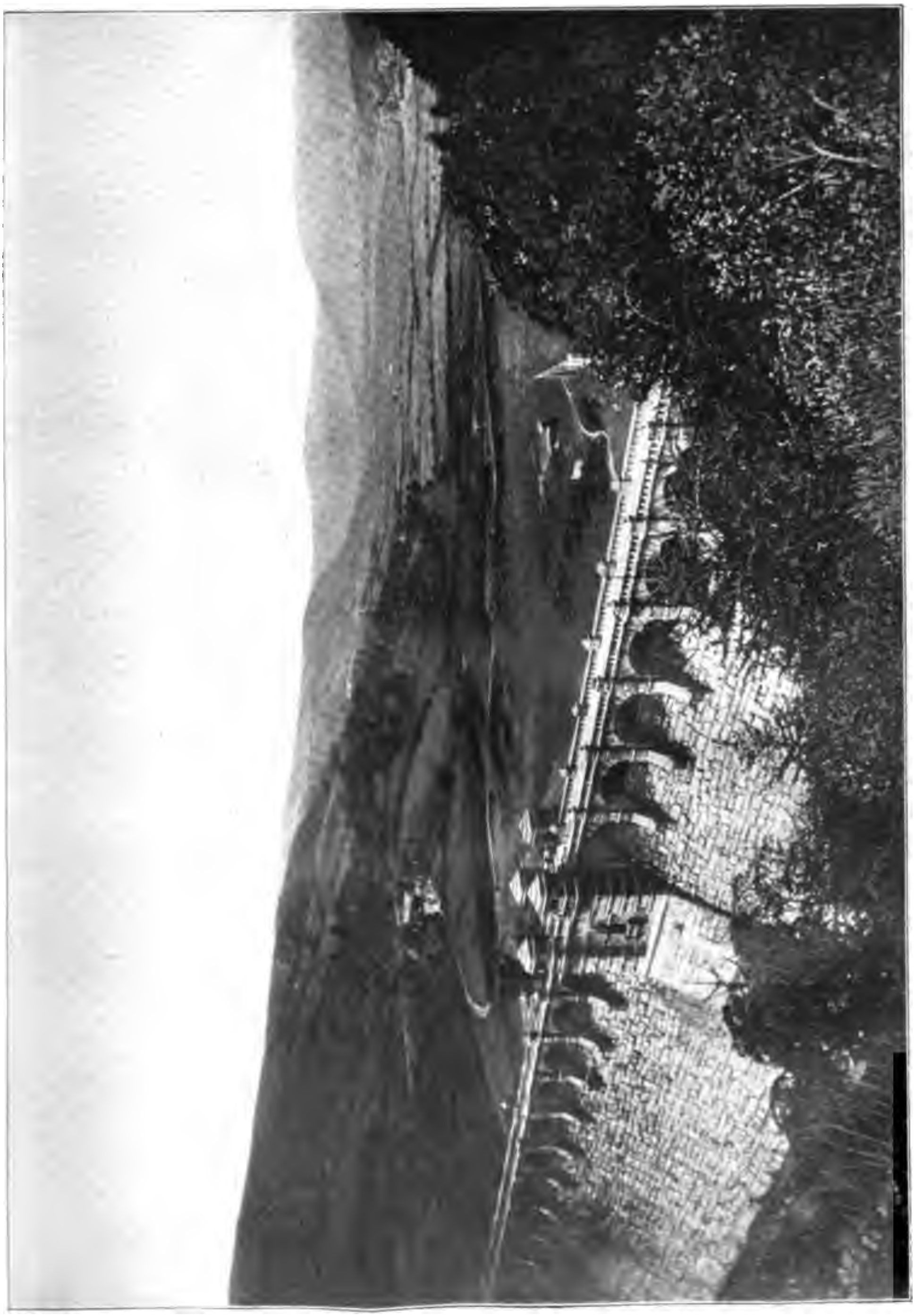


FIG. 8.—Leakage due to improperly formed discharge culvert through puddle wall of reservoir.

Unequal settlement.

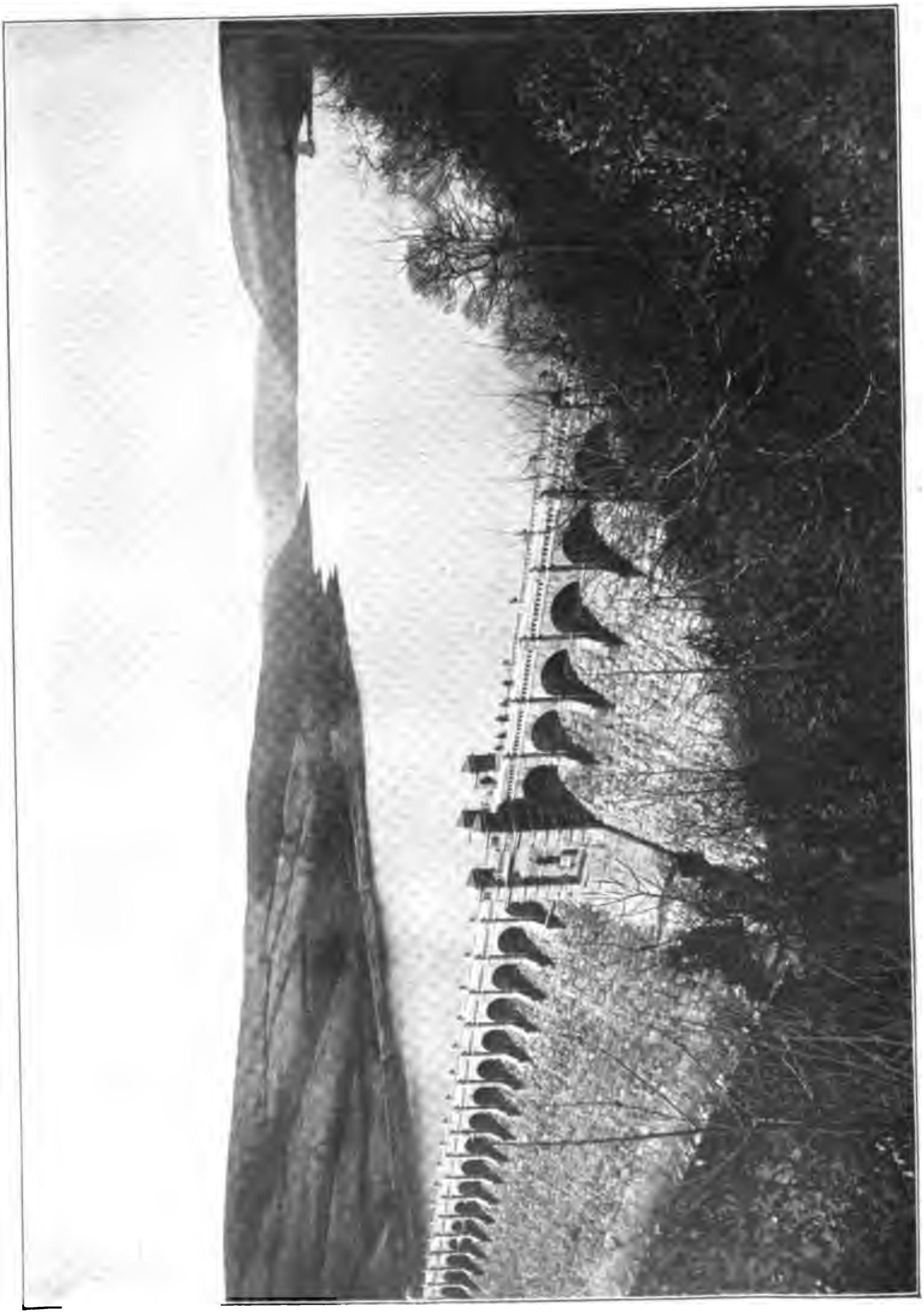
However well the work may be done, the lower part of a mass of puddled clay invariably settles into a denser mass when weighted with the clay above. If, therefore, one part is held up, by unyielding rock for example, while an adjoining part has no support but the clay beneath it, a fracture—not unlike a geological fault—must result. Fig. 8 is a part longitudinal section through the puddle wall of an earthen embankment. The puddle wall is crossed by a pedestal of concrete carrying the brick discharge culvert. The puddle at *a* was originally held up by the flat head of this pedestal; not so the puddle at *b*, which under the superincumbent weight settled down and produced the fault *bc*, accompanied with a shearing or tangential strain or, less probably, with actual fracture in the direction *bd*. Serious leakage at once began between *c* and *b* and washed out the clay, particle by particle, but did not wash out the sand associated with it, which remained



From Photograph by J. Maclardy.

The Vyrnwy Valley, Montgomeryshire, June 1888.

PLATE II. WATER SUPPLY



Lake Vyrnwy, December 1889.

From Photograph by J. Maclardy.

behind in the crevice. The clay roof, rather than the walls of this crevice of sand, gave way and pressed down to fill the vacancy, and the leakage worked up along the weakened plane of tangential strain *bd*. On the appearance of serious leakage the overflow level of the water originally at *ef* was lowered for safety to *gh*; and for many years the reservoir was worked with its general level much below *gh*. The sand-filled vein, several inches in width, was found, on taking out the puddle, to have terminated near the highest level to which the water was allowed to rise, but not to have worked downwards. There can be little doubt that the puddle at the right-hand angle *j* was also strained, but not to the point of rupture, as owing to the rise of the sandstone base there was comparatively little room for settlement on that side. In repairing this work the perfectly safe form shown by the dotted lines *ka*, *kj* was substituted for the flat surface *aj*, and this alone, if originally adopted, would have prevented dangerous shearing strains. As an additional precaution, however, deep tongues of concrete like those in fig. 7 were built in the rock throughout the length of the trench, and carried up the sides and over the top of the pedestal. The puddle was then replaced, and remains sensibly watertight. The lesson taught by fig. 8 applies also to the ends of puddle walls where they abut against steep faces of rock. Unless such faces are so far below the surface of the puddle, and so related to the lower parts of the trench, that no tension, and consequent tendency to separation of the puddle from the rock, can possibly take place, and unless abundant time is given, before the reservoir is charged, for the settlement and compression of the puddle to be completed, leakage with disastrous results may occur.

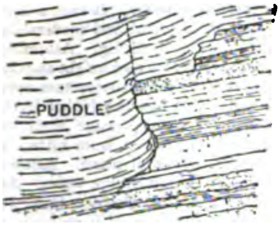


Fig. 9.—Overhanging Rock Leakage.

In other cases leakage and failure have arisen from allowing a part of the rock bottom or end of a puddle trench to overhang, as in fig. 9. Here the straining of the original horizontal puddle in settling down is indicated in a purposely exaggerated way by the curved lines. There is considerable distortion of the clay, resulting from combined shearing and tensile stress, above each of the steps of rock, and reaching its maximum at and above the highest rise *ab*, where it has proved sufficient to produce a dangerous line of weakness *ac*, the tension at *a* either causing actual rupture, or such increased porosity as to permit of percolation capable of keeping open the wound. In such cases as are shown in figs. 8 and 9 the growth of the sand vein is not vertical, but inclined towards the plane of maximum shearing strain. Fig. 9 also illustrates a weak place at *b* where the clay either never pressed hard against the overhanging rock or has actually drawn away therefrom in the process of settling towards the lower part to the left. When it is considered that a parting of the clay, sufficient to allow the thinnest film of water to pass, may start the formation of a vein of porous sand in the manner above explained, it will be readily seen how great must be the attention to details, in unpleasant places below ground, and below the water level of the surrounding area, if safety is to be secured. In cases like fig. 9 the rock should always be cut away to a slope, such as that shown in fig. 10.

If no considerable difference of water-pressure had been allowed between the two sides of the puddle trench in figs. 8 or 9 until the clay had ceased to settle down, it is probable that the interstices, at first formed between the puddle and the concrete or rock, would have been sufficiently filled to prevent injurious percolation at any future time. Hence it is always a safe precaution to afford plenty of time for such settlement before a reservoir is charged with water. But to all such precautions should be added the use of concrete or brickwork tongues running longitudinally at the bottom of the trench, such as those shown at a higher level in fig. 7.

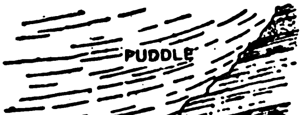


Fig. 10.—Proper Figure for Rock Slope.

In addition to defects arising out of the condition or figure of the rock or of artificial work upon which the puddle clay rests, the puddle wall itself is often defective. The original material may have been perfectly satisfactory, but if, for example, in the progress of the work a stream of water is allowed to flow across it, fine clay is sometimes washed away, and the gravel or sand associated with it left to a sufficient extent to permit of future percolation. Unless such places are carefully dug out or re-puddled before the work of filling is resumed, the percolation may increase along the vertical plane where it is greatest, by the erosion and falling in of the clay roof, as in the other cases cited. Two instances probably originating in some such cause are shown in fig. 11 in the relative positions in which they were found, and carefully measured, as the puddle was removed from a crippled reservoir dam. These fissures are in vertical planes stretching entirely across the puddle trench, and reaching in one case, *aa*, nearly to the highest level at which the reservoir had been worked for seventeen years after the leakage had been discovered. The larger and older of these veins was 44½ ft. high, of which 14 ft. was above the original ground level, and it is interesting to note that this portion, owing probably to easier access for the water from the reservoir and reduced compression of the puddle, was much wider than below. The little vein to the left marked *bb*, about 3½ ft. deep, is curious. It looks like the beginning of success of an effort made by a slight percolation during the whole life of the reservoir to increase itself materially by erosion.

Defects in puddle wall.

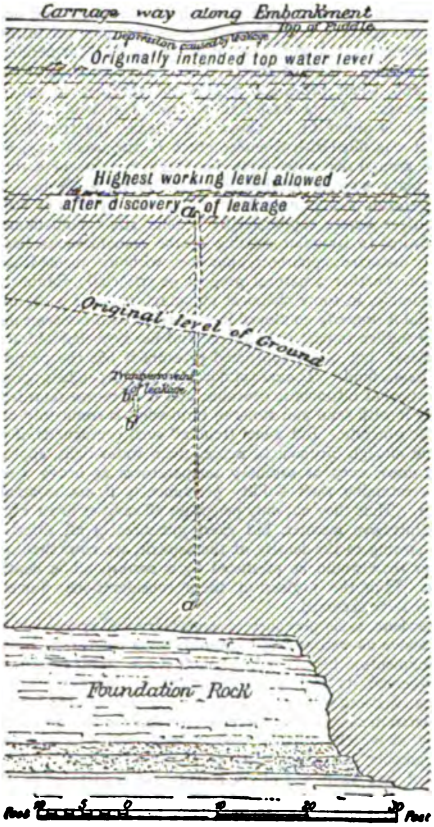

Carriage way along Embankment
Top of Puddle
Depression caused by leakage
Originally intended top water level
Highest working level allowed after discovery of leakage
a
Original level of Ground
b
b
a
Foundation Rock
Feet 10 5 0 10 20 30 Feet

Fig. 11.—Vertical Vein of Leakage.

There is no reason to believe that the initial cause of such a leakage could be developed except during construction, and it is certain that once begun it must increase. Only a knowledge of the great loss of capital that has resulted from abortive reservoir construction justifies this notice of defects which can always be avoided, and are too often the direct result, not of design, but of parsimony in providing during the execution of such works, and especially below ground, a sufficiency of intelligent, experienced and conscientious supervision.

In some cases, as, for example, when a high earthen embankment crosses a gorge, and there is plenty of stone to be had, it is desirable to place the outer bank upon a toe or platform of rubble stonework, as in fig. 7, by which means the height of the earthen portion is reduced and complete drainage secured. But here again great care must be exercised in the packing and consolidation of the stones, which will otherwise crack and settle.

As with many other engineering works, the tendency to slipping either of the sides of the valley or of the reservoir embankment itself has often given trouble, and has sometimes led to serious disaster, This, however, is a kind of failure not always attributable to want of proper supervision during construction, but rather to improper choice of the site, or treatment of the case, by those primarily responsible.

Dams with diaphragms of wood, steel, concrete, &c.

In countries where good clay or retentive earth cannot be obtained, numerous alternative expedients have been adopted with more or less success. In the mining districts of America, for example, where timber is cheap, rough stone embankments have been lined on the water face with timber to form the water-tight septum. In such a position, even if the timber can be made sufficiently water-tight to begin with, the alternate immersion and exposure to air and sunshine promotes expansion and contraction, and induces rapid disintegration, leakage and decay. Such an expedient may be justified by the doubtful future of mining centres, but would be out of the question for permanent water supply. Riveted sheets of steel have been occasionally used, and, where bedded in a sufficient thickness of concrete, with success. At the East Cañon Creek dam, Utah, the height of which is about 61 ft. above the stream, the trench below ground was filled with concrete much in the usual way, while above ground the water-tight diaphragm consists of a riveted steel plate varying in thickness from $\frac{5}{16}$ in. to $\frac{1}{16}$ in. This steel septum was protected on either side by a thin wall of asphaltic concrete supported by rubble stone embankments, and owing to irregular settling of the embankments became greatly distorted, apparently, however, without causing leakage. Asphalt, whether a natural product or artificially obtained, as, for example, in some chemical manufactures, is a most useful material if properly employed in connexion with reservoir dams. Under sudden impact it is brittle, and has a conchoidal fracture like glass; but under continued pressure it has the properties of a viscous fluid. The rate of flow is largely dependent upon the proportion of bitumen it contains, and is of course retarded by mixing it with sand and stone to form what is commonly called asphalt concrete. But given time, all such compounds, if they contain enough bitumen to render them water-tight, appear to settle down even at ordinary temperatures as heavy viscous fluids, retaining their fluidity permanently if not exposed to the air. Thus they not only penetrate all cavities in an exceedingly intrusive manner, but exert pressures in all directions, which, owing to the density of the asphalt, are more than 40 % greater than would be produced by a corresponding depth of water. From the neglect of these considerations numerous failures have occurred.

Elsewhere, a simple concrete or masonry wall or core has been used above as well as below ground, being carried up between embankments either of earth or rubble stone. This construction has received its highest development in America. On the Titicus, a tributary of the Croton river, an earthen dam was completed in 1895, with a concrete core wall 100 ft. high—almost wholly above the original ground level, which is said to be impermeable; but other dams of the same system, with core walls of less than 100 ft. in height, are apparently in their present condition not impermeable. Reservoir No. 4 of the Boston waterworks, completed in 1885, has a concrete core wall. The embankment is 1800 ft. long and 60 ft. high. The core wall is about 8 ft. thick at the bottom and 4 ft. thick at the top, and in the middle of the valley nearly 100 ft. in height. At irregular intervals of 150 ft. or more buttresses 3 ft. wide and 1 ft. thick break the continuity on the water side. That this work has been regarded as successful is shown by the fact that Reservoir No. 6 of the same waterworks was subsequently constructed and completed in 1894 with a similar core wall. There is no serious difficulty in so constructing walls of this kind as to be practically water-tight while they remain unbroken; but owing to the settlement of the earthen embankments and the changing level of saturation they are undoubtedly subject to irregular stresses which cannot be calculated, and under which, speaking generally, plastic materials are much safer. In Great Britain masonry or concrete core walls have been generally confined to positions below ground. Thus placed, no serious strains are caused either by changes of temperature or of moisture or by movements of the lateral supports, and with proper ingredients and care a very thin wall wholly below ground may be made water-tight.

Masonry dams.

The next class of dam to be considered is that in which the structure as a whole is so bound together that, with certain reservations, it may be considered as a monolith subject chiefly to the overturning tendency of water-pressure resisted by the weight of the structure itself and the supporting pressure of the foundation. Masonry dams are, for the most part, merely retaining walls of exceptional size, in which the overturning pressure is water. If such a dam is sufficiently strong, and is built upon sound and moderately rough rock, it will always be incapable of sliding. Assuming also that it is incapable of crushing under its own weight and the pressure of the water, it must, in order to fail entirely, turn over on its outer toe, or upon the outer face at some higher level. It may do this in virtue of horizontal water-pressure alone, or of such pressure combined with upward pressure from intrusive water at its base or in any higher horizontal plane. Assume first, however, that there is no uplift from intrusive water. As the pressure of water is *nil* at the surface and increases in direct proportion to the depth, the overturning moment is as the cube of the depth; and the only figure which has a moment of resistance due to gravity, varying also as the cube of its depth, is a triangle. The form of stability having the least sectional area is therefore a triangle. It is obvious that the angles at the base of such a hypothetical dam must depend upon the relation between its density and that of the water. It can be shown, for example, that for masonry having a density of 3, water being 1, the figure of minimum section is a right-angled triangle, with the water against its vertical face; while for a greater density the water face must lean towards the water, and for a less density away from the water, so that the water may lie upon it. For the sections of masonry dams actually used in practice, if designed on the condition that the centre of all vertical pressures when the reservoir is full shall be, as hereafter provided, at two-thirds the width of the base from the inner toe, the least sectional area for a density of 2 also has a vertical water face. As the density of the heaviest rocks is only 3, that of a masonry dam must be below 3, and in practice such works if well constructed vary from 2·2 to 2·6. For these densities, the deviation of the water face from the vertical in the figure of least sectional area is, however, so trifling that, so far as this consideration is concerned, it may be neglected.

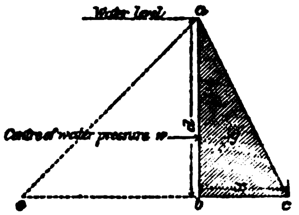


FIG. 12.—Diagram of Right-Angled Triangle Dam.

If the right-angled triangle *abc*, fig. 12, be a profile 1 ft. thick of a monolithic dam, subject to the pressure of water against its vertical side to the full depth $ab = d$ in feet, the horizontal pressure of water against the section of the dam, increasing uniformly with the depth, is properly represented by the isosceles right-angled triangle *abe*, in which *be* is the maximum water-pressure due to the full depth *d*, while the area $abe = \frac{d^2}{2}$ is the total horizontal pressure against the dam, generally stated in cubic feet of water, acting at one-third its depth above the base. Then $\frac{d^2}{2}$ is the resultant horizontal pressure with an overturning moment of

$$\frac{d^3}{6}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

If x be the width of the base, and ρ the density of the masonry, the weight of the masonry in terms of a cubic foot of water will be $\frac{\rho x d}{2}$ acting at its centre of gravity g, situated at $\frac{2}{3}x$ from the outer toe, and the moment of resistance to overturning on the outer toe,

$$\frac{\rho x^2 d}{3}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Equating the moment of resistance (2) to the overturning moment (1), we have

$$\frac{\rho x^2 d}{3} = \frac{d^3}{6}$$

and

$$x = \frac{d}{\sqrt{2\rho}} \quad . \quad . \quad . \quad . \quad . \quad (3)$$

That is to say, for such a monolith to be on the point of overturning under the horizontal pressure due to the full depth of water, its base must be equal to that depth divided by the square root of twice the density of the monolith. For a density of 2·5 the base would therefore be 44·7% of the height.

Factors of safety.

We have now to consider what are the necessary factors of safety, and the modes of their application. In the first place, it is out of the question to allow the water to rise to the vertex *a* of such a masonry triangle. A minimum thickness must be adopted to give substance to the upper part; and where the dam is not used as a weir it must necessarily rise several feet above the water, and may in either event have to carry a roadway. Moreover, considerable mass is required to reduce the internal strains caused by changes of temperature. In the next place, it is necessary to confine the pressure, at every point of the masonry, to an intensity which will give a sufficient factor of safety against crushing. The upper part of the dam having been designed in the light of these conditions, the whole process of completing the design is simple enough when certain hypotheses have been adopted, though somewhat laborious in its more obvious form. It is clear that the greatest crushing pressure must occur, either, with the reservoir empty, near the lower part of the water face *ab*, or with the reservoir full, near the lower part of the outer face *ac*. The principles hitherto adopted in designing masonry dams, in which the moment of resistance depends upon the figure and weight of the masonry, involve certain assumptions, which, although not quite true, have proved useful and harmless, and are so convenient that they may be continued with due regard to the modifications which recent investigations have suggested. One such assumption is that, if the dam is well built, the intensity of vertical pressure will (neglecting local irregularities) vary nearly uniformly from face to face along any horizontal plane. Thus, to take the simplest case, if *abce* (fig. 13) represents a rectangular mass already designed for the superstructure of the dam, and *g* its centre of gravity, the centre of pressure upon the base will be vertically under *g*, that is, at the centre of the base, and the load will be properly represented by the rectangle *bfgc*, of which the area represents the total load and the uniform depth of its uniform intensity. At this high part of the structure the intensity of pressure will of course be much less than its permissible intensity. If now we assume the water to have a depth *d* above the base, the total water pressure represented by the triangle *kbh* will have its centre at *d*/3 from the base, and by the parallelogram of forces, assuming the density of the masonry to be 2·5, we find that the centre of pressure upon the base *bc* is shifted from the centre of the base to a point *i* nearer to the outer toe *c*, and adopting our assumption of uniformly varying intensity of stress, the rectangular diagram of pressures will thus be distorted from the figure *bfgc* to the figure of equal area *bjlc*, having its centre *o* vertically under the point at which the resultant of all the forces cuts the base *bc*. For any lower level the same treatment may, step by step, be adopted, until the maximum intensity of pressure *cl* exceeds the assumed permissible maximum, or the centre of pressure reaches an assigned distance from the outer toe *c*, when the base must be widened until the maximum intensity of pressure or the centre of pressure, as the case may be, is brought within the prescribed limit. The resultant profile is of the kind shown in fig. 14.

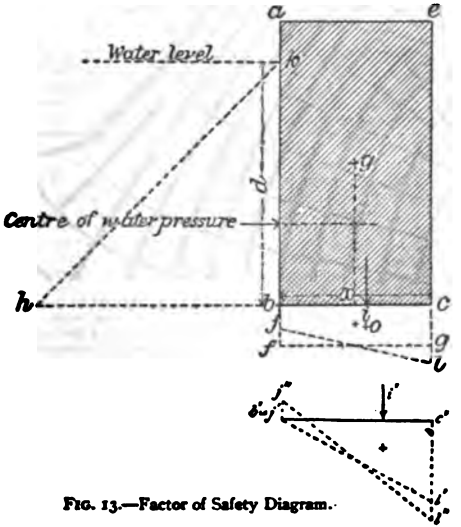
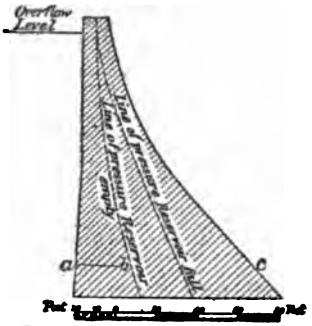


FIG. 13.—Factor of Safety Diagram.

Having thus determined the outer profile under the conditions hitherto assumed, it must be similarly ascertained that the water face is everywhere capable of resisting the vertical pressure of the masonry when the reservoir is empty, and the base of each compartment must be widened if necessary in that direction also. Hence in dams above 100 ft. in height, further adjustment of the outer profile may be required by reason of the deviation of the inner profile from the vertical. The effect of this process is to give a series of points in the horizontal planes at which the resultants of all forces above those planes respectively cut the planes. Curved lines, as dotted in fig. 14, drawn through these points give the centre of pressure, for the reservoir full and empty respectively, at any horizontal plane. These general principles were recognized by Messrs Graeff and Delocre of the Ponts et Chaussées, and about the year 1866 were put into practice in the Furens dam near St Etienne. In 1871 the late Professor Rankine, F.R.S., whose remarkable perception of the practical fitness or unfitness of purely theoretical deductions gives his writings exceptional value, received from Major Tulloch, R.E., on behalf of the municipality of Bombay, a request to consider the subject generally, and with special reference to very high dams, such as have since been constructed in India. Rankine pointed out that before the vertical pressure reached the maximum pressure permissible, the pressure tangential to the slope might do so. Thus conditions of stress are conceivable in which the maximum would be tangential to the slope or nearly so, and would therefore increase the vertical stress in proportion to the cosecant squared of the slope. It is very doubtful whether this pressure is ever reached, but such a limit rather than that of the vertical stress must be considered when the height of a dam demands it. Next, Rankine pointed out that, in a structure exposed to the overturning action of forces which fluctuate in amount and direction, there should be no appreciable tension at any point of the masonry. But there is a still more important reason why this condition should be strictly adhered to as regards the inner face. We have hitherto considered only the *horizontal* overturning pressure of the water; but if from originally defective construction, or from the absence of vertical pressure due to weight of masonry towards the water edge of any horizontal bed, as at *ab* in fig. 14, water intrudes beneath that part of the masonry more readily than it can obtain egress along *bc*, or in any other direction towards the outer face, we shall have the uplifting and overturning pressure due to the full depth of water in the reservoir over the width *ab* added to the horizontal pressure, in which case all our previous calculations would be futile. The condition, therefore, that there shall be no tension is important as an element of design; but when we come to construction, we must be careful also that no part of the wall shall be less permeable than the water face. In fig. 13 we have seen that the varying depth of the area *bjlc* approximately represents the varying distribution of the vertical stress. If, therefore, the centre of that became so far removed to the right as to make *j* coincident with *b*, the diagram of stresses would become the triangle *j'l'c'*, and the vertical pressure at the inner face would be nil. This will evidently happen when the centre of pressure *i'* is two-thirds from the inner toe *b'* and one-third from the outer toe *c'*; and if we displace the centre of pressure still further to the right, the condition that the centre of figure of the diagram shall be vertically under that centre of pressure can only be fulfilled by allowing the point *j'* to cross the base to *j''* thus giving a negative pressure or tension at the inner toe. Hence it follows that on the assumption of uniformly varying stress the line of pressures, when the reservoir is full, should not at any horizontal plane fall outside the middle third of the width of that plane.



Overflow Level
Line of pressure Reservoir Full
Line of pressure Reservoir empty
a
b
c
Feet
Feet

FIG. 14.—Diagram showing lines of pressure in Masonry Dam.

Rankine in his report adopted the prudent course of taking as the safe limits certain pressures to which, at that time, such structures were known to be subject. Thus for the inner face he took, as the limiting vertical pressure, 320 ft. of water, or nearly 9 tons per sq. ft., and for the outer face 250 ft. of water, or about 7 tons per sq. ft.

For simplicity of calculation Rankine chose logarithmic curves for both the inner and outer faces, and they fit very well with the conditions. With one exception, however—the Beetaloo dam in Australia 110 ft. high—there are no practical examples of dams with logarithmically curved faces.

After Rankine, a French engineer, Bouvier, gave the ratio of the maximum stress in a dam to the maximum vertical stress as 1 to the cosine squared of the angle between the vertical and the resultant which, in dams of the usual form, is about as 13 is to 9.

During the last few years attention has been directed to the stresses—including shearing stresses—on planes other than horizontal. M. Levy contributed various papers on the subject which will be found in the *Comptes rendus de l'Académie des Sciences* (1895 and 1898) and in the *Annales des Ponts et Chaussées* (1897). He investigated the problem by means of the general differential equations of static equilibrium for dams of triangular and rectangular form considered as isotropic elastic solids. In one of these papers Levy formulated the requirement now generally adopted in France that the vertical pressure at the upstream end of any joint, calculated by the law of uniformly varying stress, should not be less than that of the water pressure at the level of that joint in order to prevent intrusive water getting into the structure.

These researches were followed by those of Messrs L. W. Atcherley and Karl Pearson, F.R.S.,[1] and by an approximate graphical treatment by Dr W. C. Unwin, F.R.S.[2] Dr Unwin took two horizontal planes, one close above the other, and calculated the vertical stresses on each by the law of uniformly varying stresses. Then the difference between the normal pressure on a rectangular element in the lower plane and that on the upper plane is the weight of the element and the difference between the shears on the vertical faces of that element. The weights being known, the principal stresses may be determined. These researches led to a wide discussion of the sufficiency of the law of uniformly varying stress when applied to horizontal joints as a test of the stability of dams. Professor Karl Pearson showed that the results are dependent upon the assumption that the distribution of the vertical stresses on the base of the structure also followed the law of uniformly varying stress. In view of the irregular forms and the uncertainties of the nature of the materials at the foundation, the law of uniformly varying stress was not applicable to the base of the dam. He stated that it was practically impossible to determine the stresses by purely mathematical means. The late Sir Benjamin Baker, F.R.S., suggested that the stresses might be measured by experiments with elastic models, and among others, experiments were carried out by Messrs Wilson and Gore[3] with indiarubber models of plane sections of dams (*including the foundations*) who applied forces to represent the gravity and water pressures in such a manner that the virtual density of the rubber was increased many times without interfering with the proper ratio between gravity and water pressure, and by this means the strains produced were of sufficient magnitude to be easily measured.

The more important of their results are shown graphically in figs. 15 and 16, and prove that the law of uniformly varying stress is generally applicable to the upper two-thirds of a dam, but that at parts in or near the foundations that law is departed from in a way which will be best understood from the diagrams.

Fig. 15 shows a section of the model dam. The maximum principal stresses are represented by the directions and thicknesses of the two systems of intersecting lines mutually at right angles.

Tensile stresses (indicated by broken lines on the diagram) are shown at the upstream toe notwithstanding that the line of resistance is well within the middle third of the section. It is important to notice that the maximum value of the tension at the toe lies in a direction approximately at 45° to the vertical, but at points lower down in the foundation this tension, while less in magnitude, becomes much more horizontal. This feature indicates that in the event of a crack occurring at the upstream toe, its extension would tend to turn downwards and follow a direction nearly parallel with the maximum pressure lines, in which direction it would not materially affect the stability of the structure.

As a matter of fact, the foundations of most dams are carried down in vertical trenches, the lower part only being in sound materials so that actual separation almost corresponding with the hypothetical crack is allowed in the first instance with no harmful effects. Similar experiments upon models with rounded toes but otherwise of the same form showed a considerable reduction in the magnitude of the tensile stresses.

On examining the diagram it will be observed that the maximum compressive stresses are parallel to and near to the down stream face of the section, which values are approximately equal to the maximum value of the vertical stress determined by the law of uniformly varying stress divided by the cosine squared of the angle between the vertical and the resultant.

The distributions of stress on the base line of the model for "reservoir empty" and "reservoir full" are shown in fig. 16 by ellipses of stress and by diagrams of stress on vertical and horizontal sections.

Arrow heads at the ends of an axis of an ellipse indicate tension as distinct from compression, and the semi-axes in magnitude and direction represent the principal stresses.

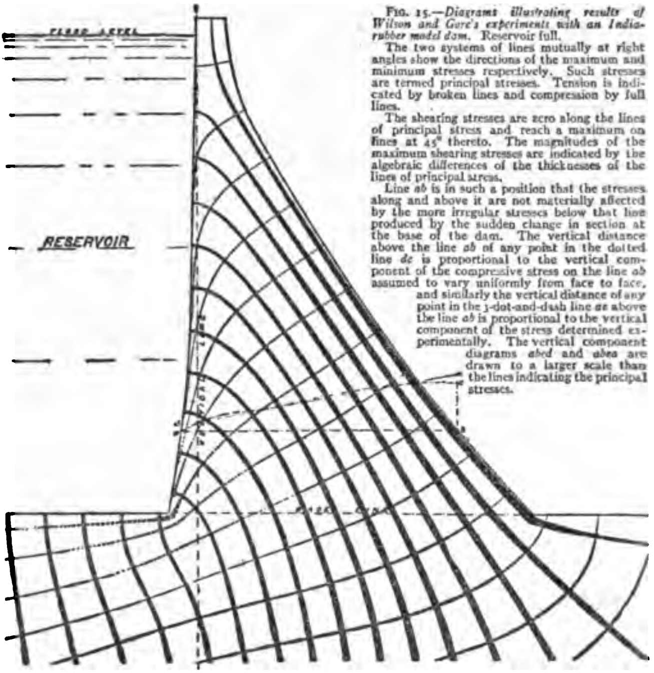


FIG. 15.—*Diagrams illustrating results of Wilson and Gore's experiments with an Indiarubber model dam.* Reservoir full.

The two systems of lines mutually at right angles show the directions of the maximum and minimum stresses respectively. Such stresses are termed principal stresses. Tension is indicated by broken lines and compression by full lines.

The shearing stresses are zero along the lines of principal stress and reach a maximum on lines at 45° thereto. The magnitudes of the maximum shearing stresses are indicated by the algebraic differences of the thicknesses of the lines of principal stress.

Line *ab* is in such a position that the stresses along and above it are not materially affected by the more irregular stresses below that line produced by the sudden change in section at the base of the dam. The vertical distance above the line *ab* of any point in the dotted line *dc* is proportional to the vertical component of the compressive stress on the line *ab* assumed to vary uniformly from face to face, and similarly the vertical distance of any point in the 3-dot-and-dash line *ae* above the line *ab* is proportional to the vertical component of the stress determined experimentally. The vertical component diagrams *abcd* and *abea* are drawn to a larger scale than the lines indicating the principal stresses.

It is obvious that experiments of the kind referred to cannot take into account all the conditions of the problem met with in actual practice, such as the effect of the rock at the sides of the valley and variations of temperature, &c., but deviations in practice from the conditions which mathematical analyses or experiments assume are nearly always present. Such analyses and experiments are not on that account the less important and useful.

So far we have only considered water-pressure against the reservoir side of the dam; but it sometimes happens that the water and earth pressure against the outer face is considerable enough to modify the lower part of the section. In dams of moderate height above ground and considerable depth below ground there is, moreover, no reason why advantage should not be taken of the earth resistance due either to the downstream face of the trench against which the foundations are built, or to the materials excavated and properly embanked against that face above the ground level or to both. We do not always know the least resistance which it is safe to give to a retaining wall subject to the pressure of earth, or conversely, the maximum resistance to side-thrust which natural or embanked earth will afford, because we wisely neglect the important but very variable element of adhesion between the particles. It is notorious among engineers that retaining walls designed in accordance with the well-known theory of conjugate pressures in earth are unnecessarily strong, and this arises mainly from the assumption that the earth is merely a loose granular mass without any such adhesion. As a result of this theory, in the case of a retaining wall supporting a vertical face of earth beneath an extended horizontal plane level with the top of the wall, we get

$$p = \frac{wx^2}{2} \cdot \frac{1-\sin\phi}{1+\sin\phi}.$$

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[1] *On Some Disregarded Points in the Stability of Masonry Dams*, Drapers' Company Research Memoir (London, 1904).

[2] *Engineering* (May 12th, 1905).

[3] *Proceedings of the Institution of Civil Engineers*, vol. 172, p. 107.

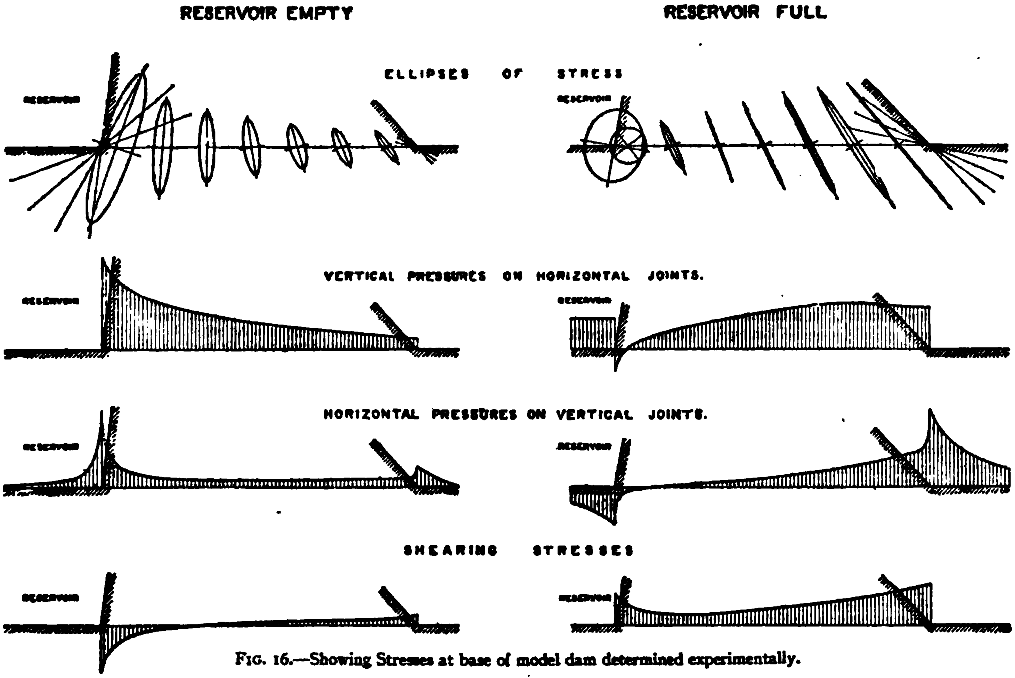

FIG. 16.—Showing Stresses at base of model dam determined experimentally.

where P is the horizontal pressure of the earth against the wall exerted at one-third its height, w the weight of unit volume of the material, x the height of the wall, and ϕ the angle of repose of the material. That the pressure so given exceeds the maximum possible pressure we do not doubt; and, conversely, if we put

$$P' = \frac{wx^2}{2} \cdot \frac{1 + \sin\phi}{1 - \sin\phi},$$

we may have equal confidence that P' will be less than the maximum pressure which, if exerted by the wall against the earth, will be borne without disturbance. But like every pure theory the principles of conjugate pressures in earth may lead to danger if not applied with due consideration for the angle of repose of the material, the modifications brought about by the limited width of artificial embankments, the possible contraction away from the masonry, of clayey materials during dry weather for some feet in depth and the tendency of surface waters to produce scour between the wall and the embankment. Both the Neuadd and the Fisher Tarn dams are largely dependent upon the support of earthen embankments with much economy and with perfectly satisfactory results.

In the construction of the Vyrnwy masonry dam Portland cement concrete was used in the joints. When more than six months old, 9 in. cubes of this material never failed under compression below 111 tons per sq. ft. with an average of 167 tons; and the mean resistance of all the blocks tested between two and three years after moulding exceeded 215 tons per sq. ft., while blocks cut from the concrete of the dam gave from 181 to 329 tons per sq. ft. It has been shown that the best hydraulic lime, or volcanic puzzuolana and lime, if properly ground while slaking, and otherwise treated in the best-known manner, as well as some of the so-called natural (calcareous) cements, will yield results certainly not inferior to those obtained from Portland cement. The only objection that can in any case be urged against most of the natural products is that a longer time is required for induration; but in the case of masonry dams sufficient time necessarily passes before any load, beyond that of the very gradually increasing masonry, is brought upon the structure. The result of using properly treated natural limes is not to be judged from the careless manner in which such limes have often been used in the past. Any stone of which it is desirable to build a masonry dam would certainly possess an average strength at least as great as the above figures for concrete; the clay slate of the Lower Silurian formation, used in the case of the Vyrnwy dam, had an ultimate crushing strength of from 700 to 1000 tons per sq. ft. If, therefore, with such materials the work is well done, and is not subsequently liable to be wasted or disintegrated by expansion or contraction or other actions which in the process of time affect all exposed surfaces, it is clear that 15 to 20 tons per sq. ft. must be a perfectly safe load. There are many structures at present in existence bearing considerably greater loads than this, and the granite ashlar masonry of at least one, the Bear Valley dam in California, is subject to compressive stresses, reaching, when the reservoir is full, at least 40 to 50 tons per sq. ft., while certain brickwork linings in mining shafts are subject to very high circumferential stresses, due to known water-pressures. In one case which has been investigated this circumferential pressure exceeds 26 tons per sq. ft., and the brickwork, which is 18 in. thick and 20 ft. internal diameter, is perfectly sound and water-tight. In portions of the structure liable to important changes of pressure from the rise and fall of the water and subject to the additional stresses which expansion and contraction by changes of temperature and of moisture induce, and in view of the great difficulty of securing that the average modulus of elasticity in all parts of the structure shall be approximately the same, it is probably desirable to limit the calculated load upon any external work, even of the best kind, to 15 or 20 tons per sq. ft. It is clear that the material upon which any high masonry dam is founded must also have a large factor of safety against crushing under the greatest load that the dam can impose upon it, and this consideration unfits any site for the construction of a masonry dam where sound rock, or at least a material equal in strength to the strongest shale, cannot be had; even in the case of such a material as shale the foundation must be well below the ground.

Materials.

The actual construction of successful masonry dams has varied from the roughest rubble masonry to ashlar work. It is probable, however, that, all things considered, random rubble in which the flattest side of each block of stone is dressed to a fairly uniform surface, so that it may be bedded as it were in a tray of mortar, secures the nearest approach to uniform elasticity. Such stones may be of any size subject to each of them covering only a small proportion of the width of the structure (in the Vyrnwy dam they reached 8 or 10 tons each), and the spaces between them, where large enough, must be similarly built in with smaller, but always the largest possible, stones; spaces too small for this treatment must be filled and rammed with concrete. All stones must be beaten down into their beds until the mortar squeezes up into the joints around them. The faces of the work may be of squared masonry, thoroughly tied into the hearting; but, in view of the expansion and contraction mentioned below, it is better that the face masonry should not be coursed. Generally speaking, in the excavations for the foundations springs are met with; these may be only sufficient to indicate a continuous dampness at certain beds or joints of the rock, but all such places should be connected by relief drains carried to visible points at the back of the dam. It should be impossible, in short, for any part of the rock beneath the dam to become charged with water under pressure, either directly from the water in the reservoir or from higher places in the mountain sides. For similar reasons care must be taken to ensure that the structure of the water face of the dam shall be the least permeable of any part. In the best examples this has been secured by bedding the stones near to the water face in somewhat finer mortar than the rest, and sometimes also by placing pads to fill the joints for several inches from the water face, so that the mortar was kept away from the face and was well held up to its work. On the removal of the pads, or the cutting out of the face of the mortar where pads were not used, the vacant joint was gradually filled with almost dry mortar, a hammer and caulking tool being used to consolidate it. By these means practical impermeability was obtained. If the pores of the water face are thus rendered extremely fine, the surface water, carrying more or less fine detritus and organic matter, will soon close them entirely and assist in making that face the least permeable portion of the structure.

But no care in construction can prevent the compression of the mass as the superincumbent weight comes upon it. Any given yard of height measured during construction, or at any time after construction, will be less than a yard when additional weight has been placed upon it; hence the ends of such dams placed against rock surfaces must move with respect to those surfaces when the superincumbent load comes upon them. This action is obviously much reduced where the rock sides of the valley rise slowly; but in cases where the rock is very steep, the safest course is to face the facts, and not to depend for water-tightness upon the cementing of the masonry to the rock, but rather to provide a vertical key, or dowel joint, of some material like asphalt, which will always remain water-tight. So far as the writer has been able to observe or ascertain, there are very few masonry dams in Europe or America which have not been cracked transversely in their higher parts. They generally leak a little near the junction with the rock, and at some other joints in intermediate positions. In the case of the Neuadd dam this difficulty was met by deliberately omitting the mortar in transverse joints at regular intervals near the top of the dam, except just at their faces, where it of course cracks harmlessly, and by filling the rest with asphalt. Serious movement from expansion and contraction does not usually extend to levels which are kept moderately damp, or to the greater mass of the dam, many feet below high-water level.

The first masonry dam of importance constructed in Great Britain was that upon the river Vyrnwy, a tributary of the Severn, in connexion with the Liverpool water-supply (Plate I.). Its height, subject to water-pressure, is about 134 ft., and a carriage-way is carried on arches at an elevation of about 18 ft. higher. As this dam is about 1180 ft. in length from rock to rock, it receives practically no support from the sides of the valley. Its construction drew much attention to the subject of masonry dams in England—where the earthwork dam, with a wall of puddled clay, had hitherto been almost universal—and since its completion nine more masonry dams of smaller size have been completed. In connexion with the Elan and Claerwen works, in Mid-Wales, for the supply of Birmingham, six masonry dams were projected, three of which are completed, including the Caban Goch dam, 590 ft. long at the water level, and subject to a water-pressure of 152 ft. above the rock foundations and of 122 ft. above the river bed, and the Craig-yr-allt Goch dam, subject to a head of 133 ft. The latter dam is curved in plan, the radius being 740 ft. and the chord of the arc 515 ft. In the Derwent Valley scheme, in connexion with the water supplies of Derby, Leicester, Nottingham and Sheffield, six more masonry dams have received parliamentary sanction. Of these the highest is the Hagglee, on the Ashop, a tributary of the Derwent, which will impound water to about 136 ft. above the river bed, the length from rock to rock being 980 ft. Two of these dams are now in course of construction, one of which, the Howden, will be 1080 ft. in length and will impound water to a depth of 114 ft. above the river bed. In 1892 the excavation was begun for the foundations of a masonry dam across the Croton river, in connexion with the supply of New York. The length of this dam from rock to rock at the overflow level is about 1500 ft. The water face, over the maximum depth at which that face cuts the rock foundations, is subject to a water-pressure of about 260 ft., while the height of the dam above the river bed is 163 ft. The section, shown in fig. 17, has been well considered. The hearting is of rubble masonry, and the faces are coursed ashlar. So-called "natural cement" has been used, except during frosty weather, when Portland cement was substituted on account of its more rapid setting. An important feature in connexion with this dam is the nature of the foundation upon which it stands. Part of the rock is schist, but the greater portion limestone, similar in physical qualities to the Carboniferous limestone of Great Britain. The lowest part of the surface of this rock was reached after excavating through alluvial deposits to a depth of about 70 ft., but owing to its fissured and cavernous nature it became necessary to excavate to much greater depths, reaching in places more than 120 ft. below the original bottom of the valley. Great pains appear to have been taken to ascertain that the cavernous portions of the rock had been cut out and built up before the building was begun.

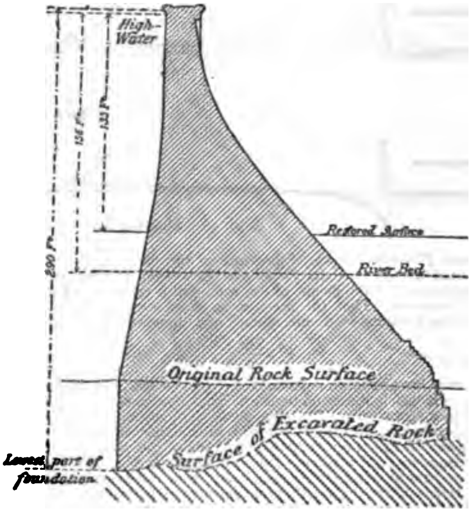

FIG. 17.—Section of Croton Dam.

The Furens dam, already referred to as the earliest type of a scientifically designed structure of the kind, is subject to a pressure of about 166 ft. of water; the valley it crosses is only about 300 ft. wide at the water level, and the dam is curved in plan to a radius of 828 ft. Much discussion has taken place as to the utility of such curvature. The recent investigations already referred to indicate the desirability of curving dams in plan in order to reduce the possibility of tension and infiltration of water at the upstream face. In narrow rock gorges extremely interesting and complex problems relating to the combined action of horizontal and vertical stresses arise, and in some such cases it is evident that much may be done by means of horizontal curvature to reduce the quantity of masonry without reduction of strength. The Bear Valley dam, California, is the most daring example in existence of the employment of the arch principle. Its height from the rock bed is 64 ft., and it is subject during floods to a head of water not much less. The length of the chord of the arc across the valley is about 250 ft. and the radius 335 ft. The dam was begun in 1883, with a base 20 ft. thick, narrowing to 13 ft. at a height of 16 ft. The cost of this thickness being regarded as too great, it was abruptly reduced to 8 ft. 6 in., and for the remaining 48 ft. it was tapered up to a final width of about 3 ft. The masonry is described by Mr Schuyler as "a rough uncut granite ashlar, with a hearting of rough rubble all laid in cement mortar and gravel." This dam has been in satisfactory use since 1885, and the slight filtration through the masonry which occurred at first is said to have almost entirely ceased.

In New South Wales thirteen thin concrete dams, dependent upon horizontal curvature for their resistance to water pressure, have been constructed in narrow gorges at comparatively small cost to impound water for the use of villages. The depth of water varies from 18 ft. to 76 ft. and five of them have cracked vertically, owing apparently to the impossibility of the base of the dam partaking of the changes of curvature induced by changes of temperature and of moisture in the upper parts. It is stated, however, that these cracks close up and become practically water-tight as the water rises.

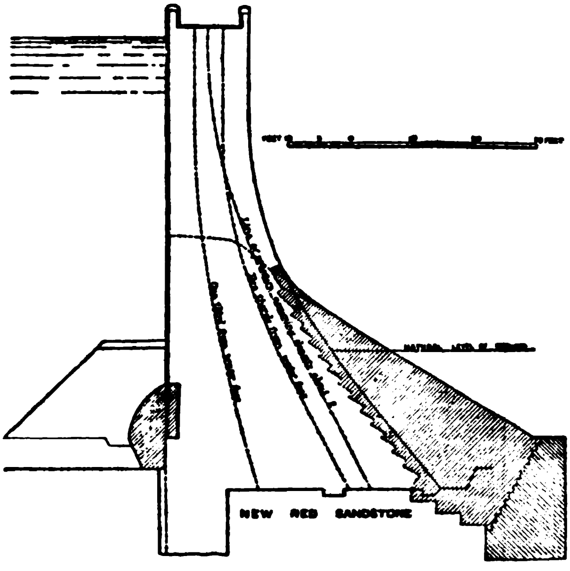

FIG. 18.—Section of Bouzey Dam.

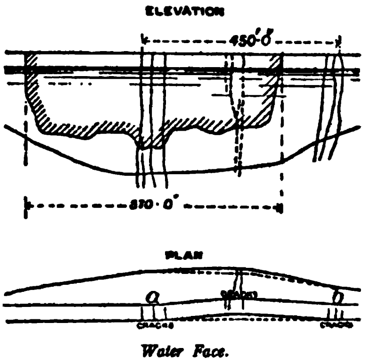

FIG. 19.—Elevation and Plan of Bouzey Dam.

Failures.

Something has been said of the failures of earthen dams. Many masonry dams have also failed, but, speaking generally, we know less of the causes which have led to such failures. The examination of one case, however, namely, the bursting in 1895 of the Bouzey dam, near Épinal, in France, by which many lives were lost, has brought out several points of great interest. It is probably the only instance in which a masonry dam has slipped upon its foundations, and also the only case in which a masonry dam has actually overturned, while curiously enough there is every probability that the two circumstances had no connexion with each other. A short time after the occurrence of the catastrophe the dam was visited by Dr W. C. Unwin, F.R.S., and the writer, and a very careful examination of the work was made by them. Some of the blocks of rubble masonry carried down the stream weighed several hundred tons. The original section of the dam is shown by the continuous thick line in fig. 18, from which it appears that the work was subject to a pressure of only about 65 ft. of water. In the year 1884 a length of 450 ft. of the dam, out of a total length of 1706 ft., slipped upon its foundation of soft sandstone, and became slightly curved in plan as shown at *a*, *b*, fig. 19, the maximum movement from the original straight line being about 1 ft. Further sliding on the base was prevented by the construction of the cross-lined portions in the section (fig. 18). These precautions were perfectly effective in securing the safety of the dam up to the height to which the counterfort was carried. As a consequence of this horizontal bending of the dam the vertical cracks shown in fig. 19 appeared and were repaired. Eleven years after this, and about fifteen years after the dam was first brought into use, it overturned on its outer edge, at about the level indicated by the dotted line just above the counterfort; and there is no good reason to attribute to the movement of 1884, or to the vertical cracks it caused, any influence in the overturning of 1895. Some of the worst cracks were, indeed, entirely beyond the portion overturned, which consisted of the mass 570 ft. long by 37 ft. in depth, and weighing about 20,000 tons, shown in elevation in fig. 19. The line of pressures as generally given for this dam with the reservoir full, on the hypothesis that the density of the masonry was a little over 2, is shown by long and short dots in fig. 18. Materials actually collected from the dam indicate that the mean density did not exceed 1·85 when dry and 2·07 when saturated, which would bring the line of pressures even closer to the outer face at the top of the counterfort. In any event it must have approached well within 3½ ft. of the outer face, and was more nearly five-sixths than two-thirds of the width of the dam distant from the water face; there must, therefore, have been considerable vertical tension at the water face, variously computed according to the density assumed at from 1¼ to 1⅝ ton per square foot. This, if the dam had been thoroughly well constructed, either with hydraulic lime or Portland cement mortar, would have been easily borne. The materials, however, were poor, and it is probable that rupture by tension in a roughly horizontal plane took place. Directly this occurred, the front part of the wall was subject to an additional overturning pressure of about 35 ft. of water acting upwards, equivalent to about a ton per square foot, which would certainly, if it occurred throughout any considerable length of the dam, have immediately overturned it. But, as a matter of fact, the dam actually stood for about fifteen years. Of this circumstance there are two possible explanations. It is known that more or less leakage took place through the dam, and to moderate this the water face was from time to time coated and repaired with cement. Any cracks were thus, no doubt, temporarily closed; and as the structure of the rest of the dam was porous, no opportunity was given for the percolating water to accumulate in the horizontal fissures to anything like the head in the reservoir. But in reservoir work such coatings are not to be trusted, and a single horizontal crack might admit sufficient water to cause an uplift. Then, again, it must be remembered that although the full consequences of the facts described might arise in a section of the dam 1 ft. thick (if that section were entirely isolated), they could not arise throughout the length unless the adjoining sections were subject to like conditions. Any horizontal fissure in a weak place would, in the nature of things, strike somewhere a stronger place, and the final failure would be deferred. Time would then become an element. By reason of the constantly changing temperatures and the frequent filling and emptying of the reservoir, expansion and contraction, which are always at work tending to produce relative movements wherever one portion of a structure is weaker than another, must have assisted the water-pressure in the extension of the horizontal cracks, which, growing slowly, during the fifteen years, provided at last the area required to enable the intrusive water to overbalance the little remaining stability of the dam.

RESERVOIRS

From very ancient times in India, Ceylon and elsewhere, reservoirs of great area, but generally of small depth, have been built and used for the purposes of irrigation; and in modern times, especially in India and America, comparatively shallow reservoirs have been constructed of much greater area, and in some cases of greater capacity, than any in the United Kingdom.

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[1] See *Proc. Inst. C.E.* vol. cxxvi. pp. 91-95.

Yet the hilly parts of the last-named country are rich in magnificent sites at sufficient altitudes for the supply of any parts by gravitation, and capable, if properly laid out, of affording a volume of water, throughout the driest seasons, far in excess of the probable demand for a long future. Many of the great towns had already secured such sites within moderate distances, and had constructed reservoirs of considerable size, when, in 1879, 1880 and 1892 respectively, Manchester, Liverpool and Birmingham obtained statutory powers to draw water from relatively great distances, viz. from Thirlmere in Cumberland, in the case of Manchester; from the river Vyrnwy, Montgomeryshire, a tributary of the Severn, in the case of Liverpool; and from the rivers Elan and Claerwen in Radnorshire, tributaries of the Wye, in the case of Birmingham. Lake Vyrnwy, completed in 1889, includes a reservoir which is still by far the largest in Europe.

Lake Vyrnwy.

This reservoir is situated in a true Glacial lake-basin, and having therefore all the appearance of a natural lake, is commonly known as Lake Vyrnwy. It is 825 ft. above the sea, has an area of 1121 acres, an available capacity exceeding 12,000 million gallons, and a length of nearly 5 m. Its position in North Wales is shown in black in fig. 20, and the two views on Plate I. show respectively the portion of the valley visible from the dam before impounding began, and the same portion as a lake on the completion of the work. Before the valves in the dam were closed, the village of Llanwddyn, the parish church, and many farmsteads were demolished. The church was rebuilt outside the watershed, and the remains from the old churchyard were removed to a new cemetery adjoining it. The fact that this valley is a post-Glacial lake-basin was attested by the borings and excavations made for the foundations of the dam. The trench in which the masonry was founded covered an area 120 ft. wide at the bottom, and extending for 1172 ft. across the valley. Its site had been determined by about 190 borings, probings and shafts, which, following upon the indications afforded by the rocks above ground, proved that the rock bed crossing the valley was higher at this point than elsewhere. Here then, buried in alluvium at a depth of 50 to 60 ft. from the surface, was found the rock bar of the post-Glacial lake; at points farther up the valley, borings nearly 100 ft. deep had failed to reach the rock. The Glacial striae, and the dislocated rocks—moved a few inches or feet from their places, and others, at greater distances, turned over, and beginning to assume the sub-angular form of Glacial boulders—were found precisely as the glacier, receding from the bar, and giving place to the ancient lake, had left them, covered and preserved by sand and gravel washed from the terminal morain. Later came the alluvial silting-up. Slowly, but surely, the deltas of the tributary streams advanced into the lake, floods deposited their burdens of detritus in the deeper places, the lake shallowed and shrank and in its turn yielded to the winding river of an alluvial strath, covered with peat, reeds and alders, and still liable to floods. It is interesting to record that during the construction of the works the implements of Neolithic man were found, near the margin of the modern lake, below the peat, and above the alluvial clay on which it rested. Several of the reservoir sites in Wales, shown by shaded lines in fig. 20, are in all probability similar post-Glacial lake-basins, and in the course of time some of them may contain still greater reservoirs. They are provided with well-proportioned watersheds and rainfall, and being nearly all more than 500 ft. above the sea, may be made available for the supply of pure water by gravitation to any part of England. In 1892 the Corporation of Birmingham obtained powers for the construction of six reservoirs on the rivers Elan and Claerwen, also shown in fig. 20, but the sites of these reservoirs are long narrow valleys, not lake-basins. The three reservoirs on the Elan were completed in 1904. Their joint capacity is 11,320 million gallons, and this will be increased to about 18,000 millions when the remaining three are built.

Of natural lakes in Great Britain raised above their ordinary levels that the upper portions may be utilized as reservoirs, Loch Katrine supplying Glasgow is well known. Whitehaven is similarly supplied from Ennerdale, and in the year 1894 Thirlmere in Cumberland was brought into use, as already mentioned, for the supply of Manchester. The corporation have statutory power to raise the lake 50 ft., at which level it will have an available capacity of about 8000 million gallons; to secure this a masonry dam has been constructed, though the lake is at present worked at a lower level.

Overflow.

It is obvious that the water of a reservoir must never be allowed to rise above a certain prescribed height at which the works will be perfectly safe. In all reservoirs impounding the natural flow of a stream, this involves the use of an overflow. Where the dam is of masonry it may be used as a weir; but where earthwork is employed, the overflow, commonly known in such a case as the "bye-wash," should be an entirely independent work, consisting of a low weir of sufficient length to prevent an unsafe rise of the water level, and of a narrow channel capable of easily carrying away any water that passes over the weir. The absence of one or both of these conditions has led to the failure of many dams. Reservoirs unsafe from this cause still exist in the United Kingdom. Where the contributory drainage area exceeds 5000 acres, the discharge, even allowing for so-called "cloud-bursts," rarely or never exceeds the rate of about 300 cub. ft. per second per 1000 acres, or 1500 times the minimum dry weather flow, taken as one-fifth of a cubic foot; and if we provide against such an occasional discharge, with a possible maximum of 400 cub. ft. at much more distant intervals, a proper factor of safety will be allowed. But when a reservoir is placed upon a smaller area the conditions are materially changed. The rainfall which produces, as the average of all the tributaries in the larger area, 300 cub. ft. per second per 1000 acres, is made up of groups of rainfall of very varying intensity, falling upon different portions of that area, so that upon any section of it the intensity of discharge may be much greater.

The height to which the water is permitted to rise above the sill of the overflow depends upon the height of the embankment above that level (in the United Kingdom commonly 6 or 7 ft.), and this again should be governed by the height of possible waves. In open places that height is seldom more than about one and a half times the square root of the "fetch" or greatest distance in nautical miles from which the wave has travelled to the point in question; but in narrow reaches or lakes it is relatively higher. In lengths not exceeding about 2 m., twice this height may be reached, giving for a 2-mile "fetch" about 3½ ft., or 1¾ ft. above the mean level. Above this again, the height of the wave should be allowed for "wash," making the embankment in such a case not less than 5¼ ft. above the highest water-level. If, then, we determine that the depth of overflow shall not exceed 1½ ft., we arrive at 6¾ ft. as sufficient for the height of the embankment above the sill of the overflow. Obviously we may shorten the sill at the cost of extra height of embankment, but it is rarely wise to do so.

The overflow sill or weir should be a masonry structure of rounded vertical section raised a foot or more above the waste-water course, in which case for a depth of 1½ ft. it will discharge, over every foot of length, about 6 cub. ft. per second. Thus, if the drainage area exceeds 5000 acres, and we provide for the passage of 300 cub. ft. per second per 1000 acres, such a weir will be 50 ft. long for every 1000 acres. But, as smaller areas are approached, the excessive local rainfalls of short duration must be provided for, and beyond these there are extraordinarily heavy discharges generally over and gone before any exact records can be made; hence we know very little of them beyond the bare fact that from 1000 acres the discharge may rise to two or three times 300 cub. ft. per second per 1000 acres. In the writer's experience at least one case has occurred where, from a mountain area of 1300 acres, the rate per 1000 was for a short time certainly not less than 1000 cub. ft. per second. Nothing but long observation and experience can help the hydraulic engineer to judge of the configuration of the ground favourable to such phenomena. It is only necessary, however, to provide for these exceptional discharges during very short periods, so that the rise in the water-level of the reservoir may be taken into consideration; but subject to this, provision must be made at the bye-wash for preventing such a flood, however rare, from filling the reservoir to a dangerous height.

From the overflow sill the bye-wash channel may be gradually narrowed as the crest of the embankment is passed, the water being prevented from attaining undue velocity by steps of heavy masonry, or, where the gradient is not very steep, by irregularly set masonry.

PURIFICATION

Sand filtration.

When surface waters began to be used for potable purposes, some mode of arresting suspended matter, whether living or dead, became necessary. In many cases gauze strainers were at first employed, and, as an improvement upon or addition to these, the water was caused to pass through a bed of gravel or sand, which, like the gauze, was regarded merely as a strainer. As such strainers were further improved, by sorting the sand and gravel, and using the fine sand only at the surface, better clarification of the water was obtained; but chemical analysis indicated, or was at the time thought to indicate, that that improvement was practically confined to clarification, as the dissolved impurities in the water were certainly very little changed. Hence such filter beds, as they were even then called, were regarded as a luxury rather than as a necessity, and it was never suspected that, notwithstanding the absence of chemical improvement in the water, changes did take place of a most important kind. Following upon Dr Koch's discovery of a method of isolating bacteria, and of making approximate determinations of their number in any volume of water, a most remarkable diminution in the number of microbes contained in sand-filtered water was observed; and it is now well known that when a properly constructed sand-filter bed is in its best condition, and is worked in the best-known manner, nearly the whole of the microbes existing in the crude water will be arrested. The sand, which is nominally the filter, has interstices about thirty times as wide as the largest dimensions of the larger microbes; and the reason why these, and, still more, why organisms which were individually invisible under any magnifying power, and could only be detected as colonies, were arrested, was not understood. In process of time it became clear, however, that the worse the condition of a filter bed, in the then general acceptation of the term, the better it was as a microbe filter; that is to say, it was not until a fine film of mud and microbes had formed upon the surface of the sand that the best results were obtained.

Even yet medical science has not determined the effect upon the human system of water highly charged with bacteria which are not known to be individually pathogenic. In the case of the bacilli of typhoid and cholera, we know the direct effect; but apart altogether from the presence of such specific poisons, polluted water is undoubtedly injurious. Where, therefore, there is animal pollution of any kind, more especially where there is human pollution, generally indicated by the presence of *bacillus coli communis*, purification is of supreme importance, and no process has yet been devised which, except at extravagant cost, supersedes for public supplies that of properly-conducted sand filtration. Yet it cannot be too constantly urged that such filtration depends for its comparative perfection upon the surface film; that this surface film is not present when the filter is new, or when its materials have been recently washed; that it may be, and very often is, punctured by the actual working of the filters, or for the purpose of increasing their discharge; and that at the best it must be regarded as an exceedingly thin line of defence, not to be depended upon as a safeguard against highly polluted waters, if a purer source of supply can possibly be found. Such filters are not, and in the nature of things cannot be, worked with the precision and continuity of a laboratory experiment.

In fig. 21 a section is shown of an efficient sand-filter bed. The thickness of sand is 3 ft. 6 in. In the older filters it was usual to support this sand upon small gravel resting upon larger gravel, and so on until the material was sufficiently open to pass the water laterally to under-drains. But a much shallower and certainly not less efficient filter can be constructed by making the under-drains cover the whole bottom. In fig. 21 the sand rests on small gravel of such degree of coarseness that the whole of the grains would be retained on a sieve of ⅛-in. mesh and rejected by a sieve of ⅜-in. mesh in the clear, supported upon a 3-in. thickness of bricks laid close together, and constituting the roof of the under-drains, which are formed by other bricks laid on thin asphalt, upon a concrete floor. In this arrangement the whole of the materials may be readily removed for cleansing. In the best filters an automatic arrangement for the measurement of the supply to each separate filter, and for the regulation of the quantity within certain limits, is adopted, and the resistance at outflow is so arranged that not more than a certain head of pressure, about 2½ ft., can under any circumstances come upon the surface film, while a depth of several feet of water is maintained over the sand. It is essential that during the working of the filter the water should be so supplied that it will not disturb the surface of the sand. When a filter has been emptied, and is being re-charged, the water should be introduced from a neighbouring filter, and should pass upwards in the filter to be charged, until the surface of the sand has been covered. The unfiltered water may then be allowed to flow quietly and to fill the space above the sand to a depth of 2 or 3 ft. It would appear to be impossible with any water that requires filtration to secure that the first filtrate shall be satisfactory if filtration begins immediately after a filter is charged; and if the highest results are to be obtained, either the unfiltered water must be permitted to pass extremely slowly over the surface of the sand without passing through it, or to stand upon the sand until the surface film has formed. With waters giving little or no sediment, which are often the most dangerous, some change, as by the first method, is necessary. It has been proposed, on the other hand, to allow the filter to act slowly until the surface film is formed, and to discard the first effluent. This course can scarcely fail to introduce into the sand many bacteria, which may be washed through when the full working of the filters is begun; and it should not, therefore, be adopted when the source of the supply is known to be subject to human pollution. The time for the formation of an efficient surface films varies, according to the quality of the raw water, from a few hours to a few days. Judging from the best observations that have been made on a large scale, the highest rate of efficient filtration when the surface film is in good condition is about 4 in. downwards per hour of the water contained above the sand, equivalent to about 50 gallons per day from each square foot of sand. When the surface film has once been formed, and the filter has begun its work, it should continue without interruption until the resistance of that film becomes too great to permit of the necessary quantity of water being passed. That period will vary, according to the condition of the water, from eight or ten days to four weeks. The surface film, together with half an inch to an inch of sand, is then carefully scraped off and stored for subsequent washing and use. This process may be repeated many times until the thickness of the fine sand is reduced to about 18 in., when the filter bed should be restored to its full thickness.

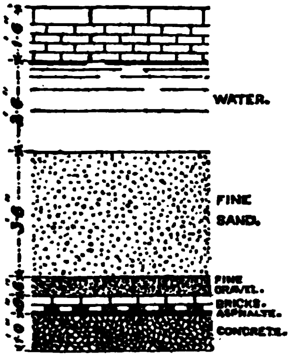


FIG. 21.—Section of Sand-Filter Bed.

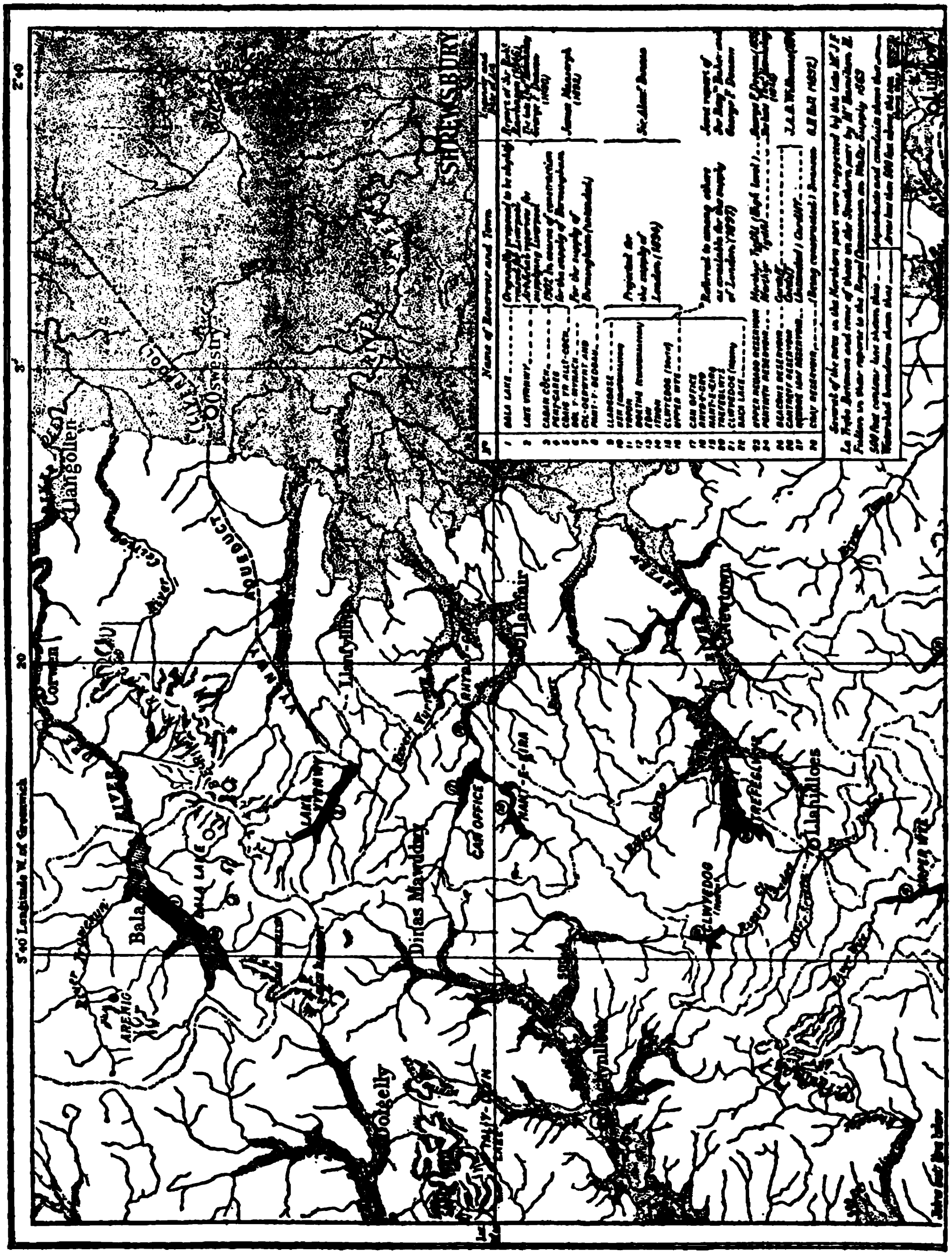
A lately discovered effect of sand filtration is a matter of great importance in connexion with the subject of aqueducts. A brown slimy sediment, having the appearance of coffee grounds when placed in clear water, has been long observed in pipes conveying surface waters from mountain moorlands. The deposit grows on the sides of the pipes and accumulates at the bottom, and causes most serious obstruction to the flow of water. The chemists and bacteriologists do not appear to have finally determined the true nature and origin of this growth, but it is found in the impounded waters, and passes into the pipes, where it rapidly increases. It is checked even by fine copper wire-gauze strainers, and where the water passes through sand-filter beds in the course of an aqueduct, the growth, though very great between the reservoir and the filter beds, is almost absent between the filter beds and the town. Even the growth of the well-known nodular incrustations in iron pipes is much reduced by sand filtration. From these facts it is clear that, other things being the same, the best position for the strainers and filter beds is as close as possible to the reservoir.

Some surface waters dissolve lead when bright, but cease to do so when the lead becomes tarnished. More rarely the action is continuous, and the water after being passed through lead cisterns and pipes produces lead poisoning—so called "plumbism." The liability to this appears to be entirely removed by efficient sand filtration.

Sand filtration, even when working in the best possible manner, falls short of the perfection necessary to prevent the passage of bacteria which may multiply after the filter is passed. Small, however, as the micro-organisms are, they are larger than the capillary passages in some materials through which water under pressure may be caused to percolate. It is therefore natural that attempts should have been made to construct filters which, while permitting the slow percolation of water, should preclude the passage of bacteria or their spores. In the laboratory of Pasteur probably the first filter which successfully accomplished this object was produced. In this apparatus, known as the Pasteur-Chamberland filter, the filtering medium is biscuit porcelain. It was followed by the Berkefield filter, constructed of baked infusorial earth. Both these filters arrest the organisms by purely mechanical action, and if the joints are water-tight and they receive proper attention and frequent sterilization, they both give satisfactory results on a small scale for domestic purposes. The cost, however—to say nothing of the uncertainty—where large volumes of water are concerned, much exceeds the cost of obtaining initially safe water. Moreover, if a natural water is so liable to pathogenic pollution as to demand filtration of this kind, it ought at once to be discarded for an initially pure supply; not necessarily pure in an apparent or even in a chemical sense, for water may be visibly coloured, or may contain considerable proportions both of organic and inorganic impurity, and yet be tasteless and free from pathogenic pollution.

There are several materials now in use possessing remarkable power to decolourize clarify, chemically purify and oxidize water; but they are too costly for use in connexion with public water supplies unless a rate of filtration is adopted quite inconsistent with the formation of a surface film capable of arresting micro-organisms. This fact does not render them less useful when applied to the arts in which they are successfully employed.

Attempts have been made, by adding certain coagulants to the water to be filtered, to increase the power of sand and other granular materials to arrest bacteria when passing through them at much higher velocities than are possible for successful filtration by means of the surface film upon sand. The effect is to produce between the sand or other grains a glutinous substance which does the work performed by the mud and microbes upon the surface of the sand filter. Elsewhere centrifugal force, acting somewhat after its manner in the cream separator, has been called in aid.



Sedimentation tanks.

The sedimentation tank forms a very important help to filtration. In the case of river waters liable to turbidity the water should always be passed through such tanks before being placed in the filters. They form, moreover, additional safeguards against organic impurity. Sedimentation tanks on a sufficient scale may effect the purification of the water to almost any desired extent. This is shown to be the case by the purity of some lake

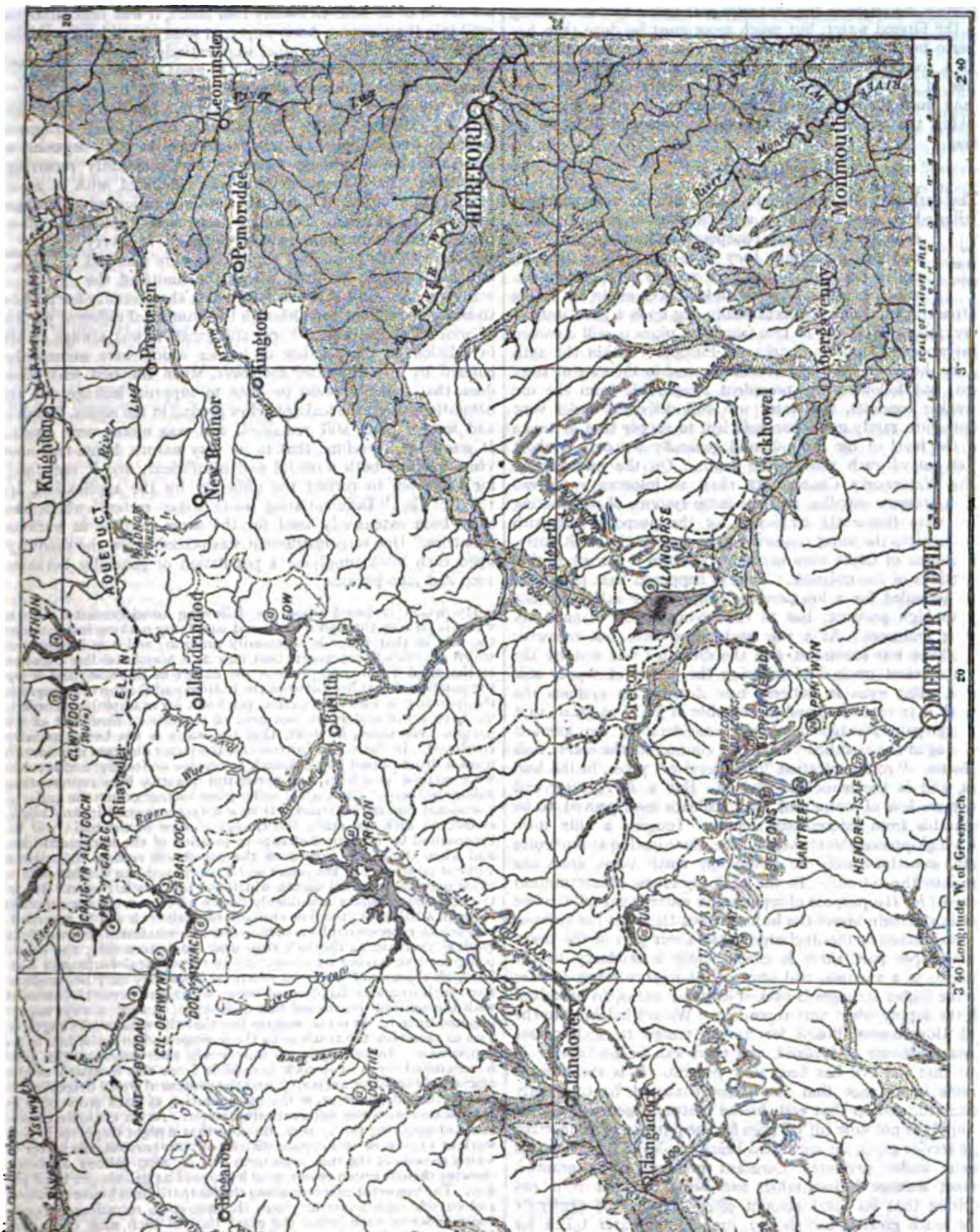


FIG. 20.—WELSH RESERVOIR SITES.

waters; but the first cost of the works and the subsequent removal of the sediment are in some cases a serious matter, and any approach to the comparatively perfect action of lakes is out of the question. By the use of such tanks, however, when the condition of the water demands it, and by passing the effluent water through sand filters when in good condition, the number of microbes is found to be reduced by as much as 97 or even 99%. This, when attained, is undoubtedly a most important reduction in the chance of pathogenic bacteria passing into the filtered water; but much more must be done than has hitherto in most places been done to ensure the constancy of such a condition before it can be assumed to represent the degree of safety attained. No public supply should be open to any such doubt as ought to, or may, deter people from drinking the water without previous domestic filtration or boiling.

DISTRIBUTION

Intermittent supply.

The earliest water supplies in Great Britain were generally distributed at low pressure by wooden pipes or stone or brick conduits. For special purposes the Romans introduced cast-lead pipes, but they were regarded as luxuries, not as necessaries, and gave way to cheaper conduits made, as pump barrels had long been made, by boring out tree trunks, which are occasionally dug up in a good state of preservation. This use of tree-trunks as pipes is still common in the wooded mountain districts of Europe. Within the 19th century, however, cast iron became general in the case of large towns; but following the precedent inseparable from the use of weaker conduits, the water was still delivered under very low pressure, rarely more than sufficient to supply taps or tanks near the level of the ground, and generally for only a short period out of each twenty-four hours. On the introduction of the Waterworks Clauses Act 1847, an impetus was given to high-pressure supplies, and the same systems of distributing mains were frequently employed for the purpose; but with few exceptions the water continued to be supplied intermittently, and cisterns or tanks were necessary to store it for use during the periods of intermission. Thus it happened that pipes and joints intended for a low-pressure supply were subjected, not only to high pressure, but to the trying ordeal of suddenly varying pressures. As a rule such pipes were not renewed: the leakage was enormous, and the difficulty was met by the very inefficient method of reducing the period of supply still farther. But even in entirely new distributing systems the network is so extensive, and the number of joints so great, that the aggregate leakage is always considerable; the greatest loss being at the so-called "ferrules" connecting the mains with the house "communication" or "service" pipes, in the lead pipes, and in the household fittings. But a far greater evil than mere loss of water and inconvenience soon proved to be inseparable from intermittent supply. Imagine a hilly town with a high-pressure water supply, the water issuing at numerous points, sometimes only in exceedingly small veins, from the pipes into the sub-soil. In the ordinary course of intermittent supply or for the purpose of repairs, the water is cut off at some point in the main above the leakages; but this does not prevent the continuance of the discharge in the lower part of the town. In the upper part there is consequently a tendency to the formation of a vacuum, and some of the impure sub-soil water near the higher leakages is sucked into the mains, to be mixed with the supply when next turned on. We are indebted to the Local Government Board for having traced to such causes certain epidemics of typhoid, and there can be no manner of doubt that the evil has been very general. It is therefore of supreme importance that the pressure should be constantly maintained, and to that end, in the best-managed waterworks the supply is not now cut off even for the purpose of connecting house-service pipes, an apparatus being employed by which this is done under pressure. Constant pressure being granted, constant leakage is inevitable, and being constant it is not surprising that its total amount often exceeds the aggregate of the much greater, but shorter, draughts of water taken for various household purposes. There is therefore, even in the best cases, a wide field for the conservation and utilization of water hitherto entirely wasted.

Constant supply.

Detection of waste.

Following upon the passing of the Waterworks Clauses Act 1847, a constant supply was attempted in many towns, with the result in some cases that, owing to the enormous loss arising from the prolongation of the period of leakage from a fraction of an hour to twenty-four hours, it was impossible to maintain the supply. Accordingly, in some places large sections of the mains and service pipes were entirely renewed, and the water consumers were put to great expense in changing their fittings to new and no doubt better types, though the old fittings were only in a fraction of the cases actually causing leakage. But whether or not such stringent methods were adopted, it was found necessary to organize a system of house-to-house visitation and constantly recurring inspection. In Manchester this was combined with a most careful examination, at a depôt of the Corporation, of all fittings intended to be used. Searching tests were applied to these fittings, and only those which complied in every respect with the prescribed regulations were stamped and permitted to be fixed within the limits of the water supply. But this did not obviate the necessity for house-to-house inspection, and although the number of different points at which leakage occurred was still great, it was always small in relation to the number of houses which were necessarily entered by the inspector; moreover, when the best had been done that possibly could be done to suppress leakage due to domestic fittings, the leakage below ground in the mains, ferrules and service pipes still remained, and was often very great. It was clear, therefore, that in its very nature, house-to-house visitation was both wasteful and insufficient, and it remained for Liverpool to correct the difficulty by the application, in 1873, of the "Differentiating waste water meter," which has since been extensively used for the same purpose in various countries. One such instrument was placed below the roadway upon each main supplying a population of generally between 1000 and 2000 persons.

Its action is based upon the following considerations: When water is passing through a main and supplying nothing but leakage the flow of that water is necessarily uniform, and any instrument which graphically represents that flow as a horizontal line conveys to the mind a full conception of the nature of the flow, and if by the position of that line between the bottom and the top of a diagram the quantity of water (in gallons per hour, for example) is recorded, we have a full statement, not only of the rate of flow, but of its nature. We know, in short, that the water is not being usefully employed. In the actual instrument, the paper diagram is mounted upon a drum caused by clockwork to revolve uniformly; and is ruled with vertical hour lines, and horizontal quantity lines representing gallons per hour. Thus, while nothing but leakage occurs the uniform horizontal line is continued. If now a tap is opened in any house connected with the main, the change of flow in the main will be represented by a vertical change of position of the horizontal line, and when the tap is turned off the pencil will resume its original vertical position, but the paper will have moved like the hands of a clock over the interval during which the tap was left open. If, on the other hand, water is suddenly drawn off from a cistern supplied through a ball-cock, the flow through the ball-cock will be recorded, and will be represented by a sudden rise to a maximum, followed by a gradual decrease as the ball rises and the cistern fills; the result being a curve having its asymptote in the original horizontal line. Now, all the uses of water, of whatever kind they may be, produce some such irregular diagrams as these, which can never be confused with the uniform horizontal line of leakage, but are always superimposed upon it. It is this leakage line that the waterworks engineer uses to ascertain the truth as to the leakage and to assist him in its suppression. In well-equipped waterworks each house service pipe is controlled by a stop-cock accessible from the footpath to the officials of the water authority, and the process of waste detection by this method depends upon the manipulation of such stop-cocks in conjunction with the differentiating meter. As an example of one mode of applying the system, suppose that a night inspector begins work at 11.30 p.m. in a certain district of 2000 persons, the meter of which records at the time a uniform flow of 2000 gallons an hour, showing the not uncommon rate of leakage of 24 gallons per head per day. The inspector proceeds along the footpath from house to house, and outside each house he closes the stop-cock, recording opposite the number of each house the exact time of each such operation. Having arrived at the end of the district he retraces his steps, reopens the whole of the stop-cocks, removes the meter diagram, takes it to the night complaint office, and enters in the "night inspection book" the records he has made. The next morning the diagram and the "night inspection book" are in the hands of the day inspector, who compares them. He finds, for example, from the diagram that the initial leakage of 2000 gallons an hour has in the course of a 4½ hours' night inspection fallen to 400 gallons an hour, and that the 1600 gallons an hour is accounted for by fifteen distinct drops of different amounts and at different times. Each of these drops is located by the time and place records in the book and the time records on the diagram as belonging to a particular service pipe; so that out of possibly 300 premises the bulk of the leakage has been localized in or just outside fifteen. To each of these premises he goes with the knowledge that a portion of the total leakage of 2000 gallons an hour is almost certainly there, and that nust be found, which is a very different thing from visiting three : four hundred houses, in not one of which he has any particular reason to expect to find leakage. Even when he enters a house with previous knowledge that there is leakage, its discovery may be difficult. It is often hidden, sometimes underground, and may only be brought to light by excavation. In these cases, without some such system of localization, the leakage might go on for years or for ever. There are many and obvious variations of the system. That described requires a diagram revolving once in a few hours, otherwise the time scale will be too close; but the ordinary diagram revolving once in 24 hours is often used quite effectively in night inspections by only closing those stop-cocks which are actually passing water. This method was also first introduced in Liverpool. The night inspector carries with him a stethoscope, often consisting merely of his steel turning-rod, with which he sounds the whole of the outside stop-cocks, but only closes those through which the sound of water is heard. An experienced man, or even a boy, if selected as possessing the necessary faculty (which is sometimes very strongly marked), can detect the smallest dribble when the stop-cock is so far closed as to restrict the orifice. Similar examinations by means of the stop-valves on the mains are also made, and it often happens that the residual leakage (400 gallons an hour in the last case) recorded on the diagram, but not shut off by the house stop-cocks, is mentioned by the inspector as an "outside waste," and localized as having been heard at a stop-cock and traced by sounding the pavement to a particular position under a particular street. All leakages found on private property are duly notified to the water tenant in the usual way, and subsequent examinations are made to ascertain if such notices have been attended to. If this work is properly organized, nearly the whole of the leakage so detected is suppressed within a month. A record of the constantly fluctuating so-called "night readings" in a large town is most interesting and instructive. If, for example, in the case of a hundred such districts we watch the result of leaving them alone, a gradual growth of leakage common to most of the districts, but not to all, is observed, while here and there a sudden increase occurs, often doubling or trebling the total supply to the district. Upon the original installation of the system in any town, the rate of leakage and consequent total supply to the different districts is found to vary greatly, and in some districts it is usually many times as great per head as in others. An obvious and fruitful extension of the method is to employ the inspectors only in those districts which, for the time being, promise the most useful results.

Supply by meter.

In many European cities the supply of water, even for domestic purposes, is given through ordinary water meters, and paid for, according to the meter record, much in the same manner as a supply of gas or electricity. By the adoption of this method great reductions in the quantity of water used and wasted are in some cases effected, and the water tenant pays for the leakage or waste he permits to take place, as well as for the water he uses. The system, however, does not assist in the detection of the leakage which inevitably occurs between the reservoir and the consumer's meter; thus the whole of the mains, joints and ferrules connecting the service pipes with the mains, and the greater parts of the service pipes, are still exposed to leakage without any compensating return to the water authority. But the worst evil of the system, and one which must always prevent its introduction into the United Kingdom, is the circumstance that it treats water as an article of commerce, to be paid for according to the quantity taken. In the organization of the best municipal water undertakings in the United Kingdom the free use of water is encouraged, and it is only the leakage or occasional improper employment of the water that the water authority seeks, and that successfully, to suppress. The objection to the insanitary effect of the meter-payment system has, in some places, been sought to be removed by providing a fixed quantity of water, assumed to be sufficient, as the supply for a fixed minimum payment, and by using the meter records simply for the purpose of determining what additional payment, if any, becomes due from the water tenant. Clearly, if the excesses are frequent, the limit must be too low; if infrequent, all the physical and administrative complication involved in the system is employed to very little purpose.

The question of the distribution of water, rightly considered, resolves itself into a question of delivering water to the water tenant, without leakage on the way, and of securing that the fittings employed by the water tenant shall be such as to afford an ample and ready supply at all times of the day and night without leakage and without any unnecessary facilities for waste. If these conditions are complied with, it is probable that the total rate of supply will not exceed, even if it reaches, the rate necessary in any system, not being an oppressive and insanitary system, by which the water is paid for according to the quantity used. (G. F. D.)

WATERS, TERRITORIAL. In international law "territorial waters" are the belt of sea adjacent to their shores which states respect as being under their immediate territorial jurisdiction, subject only to a right of "inoffensive" passage through them by vessels of all nations. As to the breadth of the belt and the exact nature of this inoffensive right of passage, however, there is still much controversy. The 3-miles' limit recognized and practised by Great Britain, France and the United States seems to have been derived from the cannon range of the period, when it was adopted as between Great Britain and the United States, *i.e.* towards the close of the 18th century. Bynkershoek, a famous Dutch jurist, whose authority at one time was almost as great in England as in his own country, in a dissertation on the Dominion of the Sea (1702), had devised a plausible juridical theory to support a homogeneous jurisdiction over environing waters in the place of the quite arbitrary claims made at that time, to any distance seawards, from whole seas to range of vision. Starting from the fact that fortresses can give effective protection within range of their cannon, and that in practice this effective protection was respected, he argued that the respect was not due to the reality of the presence of cannon, but to the fact that the state was in a position to enforce respect. This it could do from any point along its shore. Hence his well-known doctrine: *terrae dominium finitur, ubi finitur armorum vis.* The doctrine satisfied a requirement of the age and became a maxim of international law throughout northern Europe, both for the protection of shore fisheries and for the assertion of the immunity of adjacent waters of neutral states from acts of war between belligerent states. Germany still holds in principle to this varying limit of cannon range. Norway has never agreed to the 3 m., maintaining that the special configuration of her coast necessitates the exercise of jurisdiction over a belt of 4 m. Spain lays claim to jurisdiction over 6 m. from her shores. The writers and specialists on the subject are quite as much divided. A British Fishery Commission in 1893 reported that "the present territorial limit of 3 m. is insufficient, and that, for fishery purposes alone, this limit should be extended, provided such extension can be effected upon an international basis and with due regard to the rights and interests of all nations." The committee recommended that "a proposition on these lines should be submitted to an international conference of the powers who border on the North Sea." There is already an international convention, dated 6th May 1882, between Great Britain, France, Belgium, Holland, Germany and Denmark, relating to the regulation of the fisheries in the North Sea, which has fixed the limit of territorial waters as between the contracting parties at 3 m. measured from low-water mark and from a straight line drawn from headland to headland at the points where they are 10 m. across. In the British Act of 29th June 1893, giving effect to a subsequent convention (16th November 1887) between the same parties for the regulation of the liquor traffic in the North Sea, "territorial waters" are declared to be as defined in the Territorial Waters Jurisdiction Act 1878. In this Act the definition is as follows:—

> The territorial waters of Her Majesty's dominions in reference to the sea means such part of the sea adjacent to the coast of the United Kingdom, or the coast of some other part of Her Majesty's dominions, as is deemed by international law to be within the territorial sovereignty of Her Majesty; and for the purpose of any offence declared by this act to be within the jurisdiction of the admiral, any part of the open sea within one marine league of the coast measured from low-water mark shall be deemed to be open sea within the territorial waters of Her Majesty's dominions.

This definition only restricts the operation of the 3 m. limit to offences dealt with in the act, and does not deal with bays. The act of 1893 declares that the articles of the convention "shall be of the same force as if they were enacted in the body of the act," but this convention gives no definition of territorial waters.

The jurisdiction exercised in British territorial waters under the Territorial Waters Jurisdiction Act of 1878[1] is asserted without distinction between them and inland waters. "All offences" committed by any person, whether a British subject or not, and whether or not committed "on board or by means of a foreign ship," "within the territorial waters of Her Majesty's dominions," are made punishable under it. No exception is made for offences committed on merely passing foreign vessels, except that there is this attenuation in their case, that no prosecution can take place without a special authorization given by certain high officers of state.[2] It is doubtful whether any Continental state would recognize so complete a jurisdiction. The subject has been exhaustively dealt with by both the Institute of International Law and the International Law Association, which, at the suggestion of the *rapporteur* of the two committees, decided that the subjects of fisheries and neutrality should be dealt with separately. The following considerations and rules were adopted in 1894 by the institute and afterwards by the association:—

Whereas there is no reason to confound in a single zone the distance necessary for the exercise of sovereignty and protection of coast fisheries and the distance necessary to guarantee the neutrality of non-belligerents in time of war; And whereas the distance most commonly adopted of 3 m. from low-water mark has been recognized as insufficient for the protection of coast fisheries; And whereas, moreover, this distance does not correspond to the real range of cannon placed on the coast; The following dispositions are adopted:—

Art. I. The state has the right of sovereignty over a belt of sea along its coast subject to the right of inoffensive passage reserved in article 5. This belt is called territorial waters (*mer territoriale*).

Art. II. Territorial waters extend for 6 sea m. (60 to 1 degree of latitude) from low-water mark along the whole extent of its coasts.

Art. III. For bays, territorial waters follow the trend of the coast except that it is measured from a straight line drawn across the bay from the two points nearest the sea where the opening of the bay is of 12 marine m. in width, unless a greater width shall have become recognized by an immemorial usage.

Art. IV. In case of war the adjacent neutral state shall have the right to extend by its declaration of neutrality or by special notification its neutral zone from 6 m. to cannon range from the coast.

Art. V. All ships, without distinction, have the right of inoffensive passage through territorial waters, subject to the belligerent right to regulate, and for purposes of defence to bar, the passage through the said waters for every ship, and subject to the right of neutrals to regulate the passage through the said waters for ships of war of all nationalities.

Art. VI. Crimes and offences committed on board foreign ships passing through territorial waters by persons on board such ships, upon persons or things on board the same ships, are, as such, beyond the jurisdiction of the adjacent state, unless they involve a violation of the rights or interests of the adjacent state, or of its subjects or citizens not forming part of its crew or its passengers.

Art. VII. Ships passing through territorial waters must conform to the special rules laid down by the adjacent state, in the interest and for the security of navigation and for the police of the sea.

Art. VIII. Ships of all nationalities, by the simple fact of being in territorial waters, unless merely passing through them, are subject to the jurisdiction of the adjacent state.

The adjacent state has the right to continue upon the high seas the pursuit of a ship commenced within territorial waters, and to arrest and try it for an offence committed within the limits of its waters. In case of capture on the high seas the fact shall, however, be notified without delay to the state to which the ship belongs. The pursuit is interrupted from the moment the ship enters the territorial waters of its own state or of a third power. The right of pursuit ceases from the moment the ship enters a port either of its own country or of a third power.

Art. IX. The special position of ships of war and of ships assimilated to them is reserved

Art. X. The provisions of the preceding articles are applicable to straits not exceeding 12 m. in width, with the following modifications and exceptions:—

(1) Straits, the coast of which belong to different powers, form part of the territorial waters of the adjacent states, their jurisdiction respectively extending to the middle line of the straits;

(2) Straits whose coasts belong to the same state, and which are indispensable for maritime communication between two or more states other than the state in question, form part of the territorial waters of the said state whatever the proximity of the two coasts may be;

(3) Straits serving as a passage between one open sea and another can never be closed.

Art. XI. The position of straits already regulated by conventions or special usage is reserved.

The Dutch government in 1896 brought these rules to the notice of the leading European governments, and suggested the desirability of concluding an international convention on the subject. The only government which was unfavourable to the proposal was that of Great Britain. (See as to the Moray Firth Fisheries controversy, NORTH SEA FISHERIES CONVENTION.)

In the Hague Convention of 1907 respecting the rights and duties of neutral powers in naval war, the existing practice in regard to territorial waters is confirmed (see arts. 2, 3, 9, 10, 12, 13 and 18), but no definition of what constitutes the distance of these waters seawards is given. This question is among those which the next Hague Conference may deal with, inasmuch as for purposes of neutrality the difficulties connected with fishery questions do not arise.[3]

AUTHORITIES.—Sir Thomas Barclay, *Question de la mer territoriale* (published by the Association Internationale de la Marine, Paris, 1902); *Idem*, as *rapporteur* on the subject in the *Annuaires de l'institut de droit international* for 1893 and 1894; *Idem*, Special Report of the International Law Association (replies to Questionnaire, 1893), and Report and Discussion (1895); Idem, *Problems of International Practice and Diplomacy* (London, 1907), pp. 109 et seq. See also Coulson and Forbes, *Law relating to Waters* (London, 1910), 3rd ed., pp. 5 et seq. (T. BA.)

WATER-THYME, known botanically as *Elodea canadensis*, a small submerged water-weed, native of North America. It was introduced into Co. Down, Ireland, about 1836, and appeared in England in 1841, spreading through the country in ponds, ditches and streams, which were often choked with its rank growth. *Elodea* is a member of the monocotyledonous natural order Hydrocharideae (*q.v.*).

WATERTON, CHARLES (1782–1865), English naturalist and traveller, was born at Walton Hall, near Pontefract, Yorkshire, on the 3rd of June 1782. After being educated at the Roman Catholic college of Stonyhurst, and travelling a short time in Spain, he went to Demerara to manage some estates belonging to his family. He continued in this occupation for about eight years, when he began those wanderings upon the results of which his fame as a naturalist principally rests. In his first journey, which began in 1812, and the principal object of which was to collect the poison known as curare, he travelled through British Guiana by the Demerara and Essequibo rivers to the frontiers of Brazil, making many natural history collections and observations by the way. After spending some time in England he returned to South America in 1816, going by Pernambuco and Cayenne to British Guiana, where again he devoted his time to the most varied observations in natural history. For the third time, in 1820, he sailed from England for Demerara, and again he spent his time in similar pursuits. Another sojourn in England of about three years was followed by a visit to the United States in 1824; and, having touched at several of the West India islands, he again went on to Demerara, returning to England at the end of the year. In 1828 he published the results of his four journeys, under the title of *Wanderings in South America* —consisting largely of a collection of observations on the appearance, character and habits of many of the animals to be found in British Guiana. Waterton was a keen and accurate observer, and his descriptions are of a graphic and humorous character, rarely to be found in works on natural history. He married in 1829, and from that time lived mostly at Walton Hall, devoting himself to the improvement of his estate, to country pursuits, and to natural history observations. He also published three series of *Essays in Natural History* (1838, 1844, 1857). He died at Walton Hall on the 27th of May 1865, from the result of an accident. His only son, Edmund Waterton (1830–1887), was an antiquary, who paid special attention to rings; some of those he collected are in the Victoria and Albert Museum.

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[1] This act was passed to meet what was thought to be a defect in British law, the decision in the well-known "Franconia" case having been that territorial waters were "out of the realm," and that criminal jurisdiction within them over a foreign ship could be exercised only in virtue of an act of parliament.

[2] Proceedings, says § 3 of the act, for the trial and punishment of a person who is not a British subject, and who is charged with any offence as is declared by this act to be within the jurisdiction of the admiral, shall not be instituted in any Court of the United Kingdom, except with the consent of one of the principal Secretaries of State, and on his certificate that the institution of such proceedings is in his opinion expedient, and shall not be instituted in any British dominions outside of the United Kingdom except with the leave of the governor of the part of the dominions in which such proceedings are proposed to be instituted, and on his certificate that it is expedient that such proc [illegible] tituted.

[3] The question of revising the limits fixed for Territorial Waters in the Convention of 1882 (see above) was the subject of an animated discussion at the conference at Hull of the National Sea Fisheries Protection Association in 1906, when a resolution was adopted in favour of maintaining the present 3-miles limit on grounds of expediency, which deserve serious consideration.

WATERTOWN, a township of Middlesex county, Massachusetts, U.S.A., on the Charles river, about 6 m. W. of Boston. Pop. (1890) 7073; (1900) 9706, of whom 2885 were foreign-born and 53 were negroes; (1910 census) 12,875. Area, 4·1 sq. m. Watertown is served by the Fitchburg division of the Boston & Maine railway, and is connected with Boston, Cambridge, Newton (immediately adjacent and served by the New York, New Haven & Hartford railway) and neighbouring towns by electric railways. It is a residential and manufacturing suburb of Boston. The township is at the head of navigation on the Charles, and occupies the fertile undulating plains along the river running back to a range of hills, the highest of which are Whitney Hill (200 ft.) and Meeting House Hill (250 ft.). Within the township are several noteworthy examples of colonial architecture. There are several small parks and squares, including Central Square, Beacon Square, about which the business portion of the township is centred, and Saltonstall Park, in which is a monument to the memory of Watertown's soldiers who died in the Civil War, and near which are the Town House and the Free Public Library, containing a valuable collection of 60,000 books and pamphlets and historical memorials. There are two interesting old burying-grounds: one on Grove Street, near the Cambridge line, first used in 1642, contains a monument to John Coolidge, killed during the British retreat from Concord and Lexington on the 19th of April 1775; the other is near the centre of the village about the former site of the First Parish Church. In Coolidge's Tavern (still standing) Washington was entertained on his New England tour in 1789; and in a house recently moved from Mt Auburn Street to Marshall Street the Committee of Safety met in 1775. Within the township are mounds and earthworks which Professor E. N. Horsford thought were the remains of a Norse settlement in the 11th century, and which include a semicircular amphitheatre of six tiers or terraces which he thought was an assembly place, and a portion of a stone wall or dam. The Federal government maintains at Watertown one of its principal arsenals, occupying grounds of about 100 acres along the river. Several of the original low brick buildings, built between 1816 and 1820, still stand. In 1905 the value of Watertown's factory products was $15,524,675.

Watertown was one of the earliest of the Massachusetts Bay settlements, having been begun early in 1630 by a group of settlers led by Sir Richard Saltonstall and the Rev. George Phillips. The first buildings were upon land now included within the limits of Cambridge. For the first quarter century Watertown ranked next to Boston in population and area. Since then its limits have been greatly reduced. Thrice portions have been added to Cambridge, and it has contributed territory to form the new townships of Weston (1712), Waltham (1738), and Belmont (1859). In 1632 the residents of Watertown protested against being compelled to pay a tax for the erection of a stockade fort at Cambridge; this was the first protest in America against taxation without representation and led to the establishment of representative government in the colony. As early as the close of the 17th century Watertown was the chief horse and cattle market in New England and was known for its fertile gardens and fine estates. Here about 1632 was erected the first grist mill in the colony, and in 1662 one of the first woollen mills in America was built here. In the First Parish Church, the site of which is marked by a monument, the Provincial Congress, after adjournment from Concord, met from April to July 1775; the Massachusetts General Court held its sessions here from 1775 to 1778, and the Boston town meetings were held here during the siege of Boston, when many of the well-known Boston families made their homes in the neighbourhood. For several months early in the War of Independence the Committees of Safety and Correspondence made Watertown their headquarters and it was from here that General Joseph Warren set out for Bunker Hill. In 1832–1834 Theodore Parker conducted a private school here and his name is still preserved in the Parker School.

See S. A. Drake, *History of Middlesex County* (2 vols., Boston, 1880); Convers Francis, *A Historical Sketch of Watertown to the close of its Second Century* (Cambridge, 1830); S. F. Whitney, *Historical Sketch of Watertown* (Boston, 1906); and "Watertown," by S. F. Whitney, in vol. iii. of D. Hamilton Hurd's *History of Middlesex County* (Philadelphia, 1890). The *Watertown Records* (4 vols., Watertown and Boston, 1894–1906) have been published by the Historical Society of Watertown (organized in 1888 and incorporated in 1891).

WATERTOWN, a city and the county-seat of Jefferson county, New York, U.S.A., 73 m. (by rail) N. of Syracuse, on the Black river. Pop. (1890) 14,725; (1900) 21,696, of whom 5119 were foreign-born and 75 were negroes; (1910 census) 26,730. Watertown is served by the New York Central & Hudson River railway. The city has several squares and public parks, one of them, City Park, having an area of about 300 acres. Among the public buildings and institutions are the city hall, the Federal building, the county court house, a state armoury, the Flower Memorial Library (erected as a memorial to Roswell P. Flower, governor of New York in 1892–1895, by his daughter, Mrs J. B. Taylor) with 25,514 vols. in 1910, the Immaculate Heart Academy (Roman Catholic), the Jefferson County Orphan Asylum (1859), the St Patrick's Orphanage (1897; under the Sisters of St Joseph), the Henry Keep Home (1879), for aged men and women, St Joachim's Hospital (1896; under the Sisters of Mercy), and the House of the Good Samaritan (1882). Watertown is situated in a fertile agricultural and dairying region, of which it is a distributing centre, and it ships large quantities of farm produce and dairy products (especially cheese). The Black river furnishes water-power which is utilized by manufacturing establishments of diversified character. In 1905 the city's factory product was valued at $8,371,618. Watertown was settled during the late years of the 18th century. It became the county-seat in 1805, was incorporated as a village in 1816 and was first chartered as a city in 1869.

WATERTOWN, a city of Dodge and Jefferson counties, Wisconsin, U.S.A., on both banks of the Rock river, about 45 m. W.N.W. of Milwaukee. Pop. (1890) 8755; (1900) 8437, including 2447 foreign-born; (1905, state census) 8623; (1910) 8829. Watertown is served by the Chicago & North-Western and the Chicago, Milwaukee & St Paul railways, and by an interurban electric line, connecting with Milwaukee. It is the seat of North-western University (1865; Lutheran), which includes collegiate, preparatory and academic departments, and had in 1908–1909 11 instructors and 283 students, and of the Sacred Heart College (Roman Catholic, opened in 1872 and chartered in 1874), under the Congregation of the Holy Cross. There are also a Carnegie library, a Lutheran Home for the Feeble-Minded, and a City Hospital. The Rock river furnishes water-power which is utilized for manufacturing. The value of the factory product in 1905 was $2,065,487. The city is situated in a dairying and farming region. The municipality owns and operates its waterworks. Watertown was founded about 1836 by settlers who gave it the name of their former home, Watertown, New York. Afterwards there was a great influx of Germans, particularly after the Revolution of 1848, among them being Carl Schurz, who began the practice of law here. Germans by birth or descent still constitute a majority of the population. Watertown was incorporated as a village in 1849, and was chartered as a city in 1853.

WATERVILLE, a city of Kennebec county, Maine, U.S.A., on the Kennebec river, 19 m. above Augusta. Pop. (1900)

9477, of whom 2087 were foreign-born; (1910 census) 11,458. It is served by the Wiscasset, Waterville & Farmington railway, and two lines of the Maine Central railroad. The Ticonic Falls in the river afford excellent water-power, which is used in the manufacture of cotton and woollen goods, &c. In Winslow (pop. in 1910, 2709), on the opposite side of the river and connected by bridges with Waterville, are large paper and pulp mills. Waterville has a Carnegie library and is the seat of Colby College (Baptist), which was incorporated as the Maine Literary and Theological Institution in 1813, was renamed Waterville College in 1821, was named Colby University in 1867, in honour of Gardner Colby (1810–1879), a liberal benefactor, and received its present name in 1899. Since 1871 women have been admitted on the same terms as men. In 1910 the college library contained 51,000 volumes. Waterville was settled about the middle of the 18th century. It was a part of the township of Winslow from 1771 to 1802, when it was incorporated as a separate township. It was first chartered as a city in 1883.

WATERVLIET, a city of Albany county, New York, U.S.A., on the W. bank of the Hudson river opposite Troy and about 5 m. N. of Albany. Pop. (1890) 12,967; (1900) 14,321, of whom 2754 were foreign-born and 59 were negroes; (1910 census) 15,074. Watervliet is served by the Delaware & Hudson railway and by steamboat lines on the Hudson river, and is connected with Troy by bridges and ferries, and with Albany, Troy, Cohoes and Schenectady by electric lines. The Erie and Champlain canals have their terminals a short distance above the city. The city has a city hall and a public library. Watervliet is situated in a good farming country, but is chiefly a manufacturing place; in 1905 its factory products were valued at $1,884,802 (25% more than in 1900), not including the product of the United States Arsenal (1807), on the river, an important manufactory of heavy ordnance. The place was originally called West Troy and was incorporated as a village in 1836; in 1897 it was chartered as a city under its present name; at the same time the township of Watervliet in which it was situated was divided into the townships of Colonie and Green Island. In 1776 the first settlement of Shakers (*q.v.*) in America was made in the township by " Mother Ann " Lee and her followers, who named it Niskayuna. Here " Mother Ann " died and is buried.

WATFORD, a market town in the Watford parliamentary division of Hertfordshire, England, 17½ m. N.W. of London by the London & North-Western railway. Pop. of urban district (1891) 17,063; (1901) 29,327. It lies on the small river Colne in a pleasant undulating and well wooded district. The church of St Mary, with embattled tower and spire, is of various dates, and contains good examples of monumental work of the early 17th century; and in the churchyard is buried Robert Clutterbuck (d. 1831), author of the *History and Antiquities of the County of Hertford.* There are several modern churches and chapels. The chief building within the town is the Watford Public Library and School of Art. There are large breweries, also corn-mills, malt-kilns and an iron foundry. Bushey, on the south side of the Colne, lying for the most part high above it, is a suburb, chiefly residential, with a station on the North-Western line. The church of St James, extensively restored by Sir Gilbert Scott, is Early English in its oldest part, the chancel. Here a school of art was founded by Sir Hubert von Herkomer, R.A., but it was closed in 1904, and subsequently revived in other hands. Other institutions are the Royal Caledonian Asylum and the London Orphan Asylum. At Aldenham, 2 m. N.E., the grammar school founded in 1599 now ranks as one of the minor English public schools.

WATKIN, SIR EDWARD WILLIAM, 1st Bart. (1819–1901), English railway manager, was born in Manchester on the 26th of September 1819. He was the son of Absalom Watkin, a merchant in Manchester, and was employed in his father's counting-house, ultimately becoming a partner; but in 1845 he was appointed secretary of the Trent Valley railway, which was soon afterwards absorbed by the London & North-Western Company. He next joined the Manchester & Sheffield Company, of [illegible] general manager and then chairman, subsequently combining with the duties thus entailed the chairmanship of the South-Eastern (1867) and of the Metropolitan (1872). His connexion with these three railways was maintained to within a short time of his death, and they formed the material of one of his most ambitious schemes—the establishment of a through route under one management from Dover to Manchester and the north. This was the end he had in view in his successful fight for the extension of the Manchester, Sheffield & Lincolnshire railway (now the Great Central) to London; and his persistent advocacy of the Channel tunnel (*q.v.*) between Dover and Calais was really a further development of the same idea, for its construction would have enabled through trains to be run from Paris to Lancashire and Scotland, via the East London (of which also he was for a time chairman) and the Metropolitan. The latter scheme, however, failed to obtain the necessary public and political support. Other projects had even less success. His plans for a tunnel between Scotland and Ireland under the North Channel, and for a ship canal across Ireland from Galway to Dublin, did not come to anything; while the great tower at Wembley Park (near Harrow), intended to surpass the Eiffel Tower at Paris, stopped at an early stage. It was in the realms of railway politics that Watkin showed to best advantage; for the routine work of administration pure and simple he had no aptitude. He entered parliament as a Liberal, and after representing Stockport from 1864 to 1868, sat as member for Hythe for twenty-one years from 1874, becoming a Liberal-Unionist at the time of the Home Rule split, and subsequently acting as a " free lance." In 1868 he received a knighthood, and in 1880 he was created a baronet. His death occurred at Northenden, Cheshire, on the 13th of April 1901.

WATKINS, a village and the county-seat of Schuyler county, New York, U.S.A., at the head (south end) of Seneca Lake, about 22 m. N.N.W. of Elmira. Pop. (1890) 2604; (1900) 2943; (1905) 2957; (1910) 2817. Watkins is served by the New York Central & Hudson River, the Northern Central (Pennsylvania) and the Lehigh Valley railways, by an electric line to Elmira and by a steamer line on the lake. There are mineral springs, whose waters, notably those of an iodo-bromated brine spring, are used in bath treatment for rheumatism, gout, heart, kidney and liver diseases, &c. Partly within the village limits is Watkins Glen, a narrow winding gorge about 2 m. long, with walls and precipices from 100 to 300 ft. high, through which flows a small stream, forming many falls, cascades and pools. The Glen property, about 103 acres, was opened as an excursion resort in 1863, and in 1906 was made a free state reservation or park and was placed in the custody of the American Scenic and Historic Preservation Society. About 3 m. S.E. is Havana Glen, about 1½ m. long. The first settlement here was made in 1788, and Watkins was incorporated as a village in 1842.

WATLING STREET, the Early English name for the great road made by the Romans from London past St Albans (Roman *Verulamium*) to Wroxeter (Roman *Viroconium*) near Shrewsbury and used by the Anglo-Saxons, just as a great part of it is used to-day. According to early documents the name was at first Wæclinga (or Wætlinga) stræt; its derivation is unknown, but an English personal name may lie behind it. After the Conquest the road was included in the list of four Royal Roads which the Norman lawyers recorded or invented (see ERMINE STREET). Later still, in the Elizabethan period and after it, the name Watling Street seems to have been applied by antiquaries to many Roman or reputed Roman roads in various parts of Britain, and English map-makers and inferior writers on Roman roads still perpetuate the fictions. In particular, the Roman "North Road" which ran from York through Corbridge and over Cheviot to Newstead near Melrose, and thence to the Wall of Pius, and which has largely been in use ever since Roman times, is now not unfrequently called Watling Street, though there is no old authority for it and throughout the middle ages the section of the road between the Tyne and the Forth was called Dere Street. (F. J. H.)

WATSON, RICHARD (1737–1816), English divine, was born in August 1737 at Heversham in Westmorland. His father, a schoolmaster, sent him to Trinity College, Cambridge, where he was elected a fellow in 1760. About the same time he had the offer of the post of chaplain to the factory at Bencoolen, in the Straits Settlements. "You are too good," said the master of Trinity, "to die of drinking punch in the torrid zone"; and Watson, instead of becoming, as he had flattered himself, a great orientalist, remained at home to be elected professor of chemistry, a science of which he did not at the time possess the simplest rudiments. "I buried myself," he says, "in my laboratory, and in fourteen months read a course of chemical lectures to a very full audience." One of his discoveries led to the black-bulb thermometer. Not the least of his services was to procure an endowment for the chair, which served as a precedent in similar instances. In 1771 he was appointed regius professor of divinity, but did not entirely renounce the study of chemistry. In 1768 he had published *Institutiones metallurgicae*, intended to give a scientific form to chemistry by digesting facts established by experiment into a connected series of propositions. In 1781 he followed this up with an introductory manual of *Chemical Essays*. In 1776 he answered Gibbon's chapters on Christianity, and had the honour of being one of the only two opponents whom Gibbon treated with respect. The same year he offended the court by a Whig sermon, but in 1779 became archdeacon of Ely. He had always opposed the American War, and on the accession of Lord Shelburne to power in 1782 was made bishop of Llandaff, being permitted to retain his other preferments on account of the poverty of the see. Shelburne expected great service from him as a pamphleteer, but Watson proved from the ministerial point of view a most impracticable prelate. He immediately brought forward a scheme for improving the condition of the poorer clergy by equalizing the incomes of the bishops, the reception of which at the time may be imagined, though it was substantially the same as that carried into effect by Lord Melbourne's government fifty years later. Watson now found that he possessed no influence with the minister, and that he had destroyed his chance of the great object of his ambition, promotion to a better diocese. Neglecting both his see and his professorship, to which latter he appointed a deputy described as highly incompetent, he withdrew to Calgarth Park, in his native county, where he occupied himself in forming plantations and in the improvement of agriculture. He also frequently came forward as a preacher and as a speaker in the House of Lords. His advice to the government in 1787 is said to have saved the country £100,000 a year in gunpowder. In 1796 he published, in answer to Thomas Paine, an *Apology for the Bible*, perhaps the best known of his numerous writings. Watson continued to exert his pen with vigour, and in general to good purpose, denouncing the slave trade, advocating the union with Ireland, and offering financial suggestions to Pitt, who seems to have frequently consulted him. In 1798 his *Address to the People of Great Britain*, enforcing resistance to French arms and French principles, ran through fourteen editions, but estranged him from many old friends, who accused him, probably with injustice, of aiming to make his peace with the government. Though querulous because of his non-preferment, De Quincey tells us that "his lordship was a joyous, jovial, and cordial host." He died on the 2nd of July 1816, having occupied his latter years in the composition and revision of an autobiography (published in 1817), which, with all its egotism and partiality, is a valuable work, and the chief authority for his life.

WATSON, THOMAS (*c.* 1557-1592), English lyrical poet, was born in London, probably in 1557. He proceeded to Oxford, and while quite a young man enjoyed a certain reputation, even abroad, as a Latin poet. His *De remedio amoris*, which was perhaps his earliest important composition, is lost, and so is his "piece of work written in the commendation of women-kind," which was also in Latin verse. He came back to London and became a law-student. The earliest publication by Watson which has survived is a Latin version of the *Antigone* of Sophocles, issued in 1581. It is dedicated to Philip Howard, earl of Arundel, who was perhaps the patron of the poet, who seems to have spent some part of this year in Paris. Next year Watson appears for the first time as an English poet in some verses pref
stone's *Heptameron*, and also in a far more imp
as the author of the 'Εκατομπαθία or *Passionate Ce*
This is a collection or cycle of 100 pieces, in tl
Petrarch, celebrating the sufferings of a lover
farewell to love. The technical peculiarity of the
poems is that, although they appear and profess t
they are really written in triple sets of common si
and therefore have eighteen lines each. It seem
Watson, who courted comparison with Petrar
desired to recommend this form to future sonne
this he had no imitators.[1] Among those who were
the friends of Watson we note Matthew Royder
Peele. In 1585 he published a Latin translati
pastoral play of *Aminta*, and his version was afte
lated into English by Abraham Fraunce (1587).
now, as the testimony of Nashe and others prov
the best Latin poet of England. In 1590 he
English and Latin verse, his *Meliboeus*, an elegy
of Sir Francis Walsingham, and a collection of *Itali*
put into English by Watson and set to music by I
remainder of Watson's career nothing is known, sa
26th of September 1592 he was buried in the
Bartholomew the Less, and that in the following y
and best book, *The Tears of Fancie*, or *Love Disa*
was posthumously published. This is a collect
sonnets, regular in form, so far at least as to have
each. Spenser is supposed to have alluded to the u
of Watson in *Colin Clout's Come Home Again*, wh

> "Amyntas quite is gone and lies full low
> Having his Amaryllis left to moan."

He is mentioned by Meres in company with Shak
and Marlowe among "the best for tragedie," but
work of his except the translations above mentic
down to us. It is certain that this poet enjoyed a
tion in his lifetime, and that he was not without a di
upon the youth of Shakespeare. He was the fi
original experiment made by Wyat and Surrey,
the pure imitation of Petrarch into English poetry.
read in Italian, French and Greek literature. Watso
and he had not escaped from a certain languor a
which prevent his graceful verses from producing tl
This demerit is less obvious in his later than in his
and with the development of the age, Watson,
temporaries regarded him as a poet of true excellenc
ably have gained power and music. As it is, he has
being one of the direct forerunners of Shakespeare
Adonis and in the *Sonnets*), and of being the lead
procession of Elizabethan sonnet-cycle writers.

The English works of Watson, excepting the madri
collected by Edward Arber in 1870. *Thomas Wat*
Madrigals Englished" (1590) were reprinted (ed. F
from the *Journal of Germanic Philology* (vol. ii., No.
the original Italian, in 1899. See also Mr Sidney Lee'
(pp. xxxii.-xli.) to *Elizabethan Sonnets* in the new ed
An English Garner.

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[1] Speaking of the *Hecatompathia*, Mr Sidney Lee s
deprecates all claim to originality. To each poem
prose introduction in which he frankly indicates,
ample quotations, the French, Italian or classical po
the source of his inspiration" (*Elizabethan Sonnets*,
a footnote (p. xxxix.) he adds: "Eight of Watson'
according to his own account, renderings from Pe
are from Serafino dell' Aquila (1466-1500); four ea
Strozza, the Ferrarese poet, and from Ronsard; t
Italian poet, Agnolo Firenzuola (1493-1548); two
French poet, Étienne Forcadel, known as Forcatulus
the Italian Girolamo Parabosco (fl. 1548), and A
while many are based on passages from such authors
Greeks) Sophocles, Theocritus, Apollonius of Rhodes
epic *Argonautica*); or (among the Latins), Virgil, T
Horace, Propertius, Seneca, Pliny, Lucan, Martial
Flaccus; or (among the modern Italians) Angelo P
1494) and Baptista Mantuanus (1448-1516); or
modern Frenchmen) Gervasius Sepinus of Saumur, w
after the manner of Virgil and Mantuanus."

WATSON, WILLIAM (*c.* 1559–1603), English conspirator, was a native of the north of England, and was born probably on the 23rd of April 1559. In 1586 he became a Roman Catholic priest in France, and during the concluding years of Elizabeth's reign he paid several visits to England; he was imprisoned and tortured more than once. He became prominent as a champion of the secular priests in their dispute with the Jesuits, and in 1601 some writings by him on this question appeared which were answered by Robert Parsons. When Elizabeth died, Watson hastened to Scotland to assure James I. of the loyalty of his party, and to forestall the Jesuits, who were suspected of intriguing with Spain. The new king did not, however, as was hoped, cease to exact the necessary fines; and the general dissatisfaction felt by the Roman Catholics gave rise to the "Bye plot," or "Watson's plot," in which connexion this priest's name is best known, and to its sequel the Main or Cobham's, plot. Watson discussed the grievances of his co-religionists with another priest, William Clark, with Sir Griffin Markham and Anthony Copley, and with a disappointed Protestant courtier, George Brooke; they took another Protestant, Thomas, 15th Lord Grey de Wilton, into their confidence, and following many Scottish precedents it was arranged that James should be surprised and seized; while they talked loudly about capturing the Tower of London, converting the king to Romanism, and making Watson lord keeper. One or two of the conspirators drew back; but Watson and his remaining colleagues arranged to assemble at Greenwich on the 24th of June 1603, and under the pretence of presenting a petition to carry out their object. The plot was a complete failure; Henry Garnet and other Jesuits betrayed it to the authorities, and its principal authors were seized, Watson being captured in August at Hay on the Welsh border. They were tried at Winchester and found guilty; Watson and Clark were executed on the 9th of December 1603, and Brooke suffered the same fate a week later. Grey and Markham were reprieved. Before the executions took place, however, the failure of the Bye plot had led to the discovery of the Main plot. Brooke's share in the earlier scheme caused suspicion to fall upon his brother Henry Brooke, Lord Cobham, the ally and brother-in-law of Sir Robert Cecil, afterwards earl of Salisbury. Cobham appears to have been in communication with Spain about the possibility of killing "the king and his cubs" and of placing Lady Arabella Stuart on the throne. He was seized, tried and condemned to death, but although led out to the scaffold he was not executed. It was on suspicion of being associated with Cobham in this matter that Sir Walter Raleigh was arrested and tried.

See the documents printed by T. G. Law in *The Archpriest controversy* (1896–1898); the same writer's *Jesuits and Seculars* (1889), and S. R. Gardiner, *History of England*, vol. i. (1905).

WATSON, WILLIAM (1858–), English poet, was born on the 2nd of August 1858 at Burley-in-Wharfedale, Yorkshire, and was brought up at Liverpool, whither his father moved for business. In 1880 he published his first book *The Prince's Quest*, a poem showing the influence of Keats and Tennyson, but giving little indication of the author's mature style. It attracted no attention until it was republished in 1893 after Mr Watson had made a name by other work. In 1884 appeared *Epigrams of Art, Life and Nature*, a remarkable little volume, which already showed the change to Mr Watson's characteristic restraint and concision of manner. But it passed unnoted. Recognition came with the publication of *Wordsworth's Grave* in 1890; and fame with the publication of the second edition in 1891, and the appearance in the *Fortnightly Review*, August 1891, of an article by Grant Allen entitled "A New Poet." *Wordsworth's Grave*, which marked a reversion from the current Tennysonian and Swinburnian fashion to the meditative note of Matthew Arnold, exhibited in full maturity Mr Watson's poetical qualities; his stately diction, his fastidious taste, his epigrammatic turn, his restrained yet eloquent utterance, his remarkable gift of literary criticism in poetic form. Besides *Wordsworth's Grave* the volume contained *Ver tenebrosum* (originally published in the *National Review* for June 1885), a series of political sonnets indicating a fervour of political conviction which was later to find still more impassioned expression; also a selection with additions from the *Epigrams* of 1884, and among other miscellaneous pieces his tribute to Arnold, "In Laleham Churchyard." During the years 1890–1892 he contributed articles to the *National Review, Spectator, Illustrated London News, Academy, Bookman* and *Atalanta*, which were collected and republished in 1893 as *Excursions in Criticism*. In 1893 he also published *Lacrymae Musarum*, the poem which gave the title to the volume being a fine elegy on the death of Tennyson; and it included the poem on "Shelley's Centenary" (both of these printed privately in 1892), and "The Dream of Man," the earliest of his philosophical poems. The same year, too, saw the publication of *The Eloping Angels*, a serio-comic trifle of small merit, dedicated to Grant Allen. During this year Mr Gladstone bestowed on him the Civil List pension of £200 available on the death of Tennyson. In 1894 followed *Odes and Other Poems*, and in 1895 *The Father of the Forest*, which contained also the fine "Hymn to the Sea" in English elegiacs (originally contributed to the *Yellow Book*), "The Tomb of Burns," and "Apologia," a piece of candid and just self-criticism. The volume contained also a sonnet "To the Turk in Armenia," a prelude to the series of sonnets about Armenia contributed to the *Westminster Gazette* and republished in a brochure called *The Purple East* in 1896. These sonnets were republished with revision and considerable additions, and a preface by the bishop of Hereford, in *The Year of Shame* in 1897. Whatever view was taken of the poet's incursion into politics, no one doubted his passionate sincerity, or the excellence of the poetical rhetoric it inspired. In 1898 were published his *Collected Poems* and a volume of new poetry *The Hope of the World*, which opened with his three chief philosophical poems, the title piece, "The Unknown God," and "Ode in May." In 1902 he printed privately 50 copies of *New Poems*, and published his "Ode on the Coronation of King Edward VII.," a favourable specimen of its class; and in 1903 besides a volume of *Selected Poems* a collection of poems contributed to various periodicals and called *For England: Poems Written During Estrangement*, a poetical defence of his impugned patriotism during the Boer War. In 1909 appeared an important volume of *New Poems*.

Mr Watson's poetry falls chiefly into the classes above indicated—critical, philosophical and political—to which may be added a further class of Horatian epistles to his friends. This classification indicates the high character and also the limitations of his poetry. It is contemplative, not dramatic, and only occasionally lyrical in impulse. In spite of the poet's plea in his "Apologia" that there is an ardour and a fire other than that of Eros or Aphrodite, ardour and fire are not conspicuous qualities of his verse. Except in his political verse there is more thought than passion. Bearing trace enough of the influence of the romantic epoch, his poetry recalls the earlier classical period in its epigrammatic phrasing and Latinized diction. By the distinction and clarity of his style and the dignity of his movement William Watson stands in the true classical tradition of great English verse, in a generation rather given over to lawlessness and experiment.

See also section on William Watson in *Poets of the Younger Generation*, by William Archer (1902); and for bibliography up to Aug. 1903, *English Illustrated Magazine*, vol. xxix. (N.S.), pp. 542 and 548. (W. P. J.)

WATT, JAMES (1736–1819), Scottish engineer, the inventor of the modern condensing steam-engine, was born at Greenock on the 19th of January 1736. His father was a small merchant there, who lost his trade and fortune by unsuccessful speculation, and James was early thrown on his own resources. Having a taste for mechanics he made his way to London, at the age of nineteen, to learn the business of a philosophical-instrument maker, and became apprenticed to one John Morgan, in whose service he remained for twelve months. From a child he had been extremely delicate, and the hard work and frugal living of his London pupilage taxed his strength so severely that he was forced at the end of a year to seek rest at home, not, however, until he had gained a fair knowledge of the trade and become handy in the use of tools. Before going to London he had made the acquaintance of some of the professors in Glasgow college, and on his return to Scotland in 1756 he sought them out and obtained work in repairing astronomical instruments. He next tried to establish himself as an instrument maker in Glasgow, but the city gilds would not recognize a craftsman who had not served the full term of common apprenticeship, and Watt was forbidden to open shop in the burgh. The college, however, took him under its protection, and in 1757 he was established in its precincts with the title of mathematical-instrument maker to the university.

Before many months Joseph Black, the discoverer of latent heat, then lecturer on chemistry, and John Robison, then a student, afterwards professor of natural philosophy at Edinburgh, became his intimate friends, and with them he often discussed the possibility of improving the steam-engine, of which at that time Thomas Newcomen's was the most advanced type. The engine was then applied only to pumping water—chiefly in the drainage of mines; and it was so clumsy and wasteful of fuel as to be but little used. Some early experiments of Watt in 1761 or 1762 led to no positive result, but in 1764 his attention was seriously drawn to the matter by having a model of Newcomen's engine, which formed part of the college collection of scientific apparatus, given him to repair. Having put the model in order, he was at once struck with its enormous consumption of steam, and set himself to examine the cause of this and to find a remedy.

In Newcomen's engine the cylinder stood vertically under one end of the main lever or "beam" and was open at the top. Steam, at a pressure scarcely greater than that of the atmosphere, was admitted to the under side; this allowed the piston to be pulled up by a counterpoise at the other end of the beam. Communication with the boiler was then shut off, and the steam in the cylinder was condensed by injecting a jet of cold water from a cistern above. The pressure of the air on the top of the piston then drove it down, raising the counterpoise and doing work. The injection water and condensed steam which had gathered in the cylinder were drained out by a pipe leading down into a well.

Watt at once noticed that the alternate heating and cooling of the cylinder in Newcomen's engine made it work with tedious slowness and excessive consumption of steam. When steam was admitted at the beginning of each stroke, it found the metal of the cylinder and piston chilled by contact with the condensed steam and cold injection water of the previous stroke, and it was not until much steam had been condensed in heating the chilled surfaces that the cylinder was able to fill and the piston to rise. His first attempt at a remedy was to use for the material of the cylinder a substance that would take in and give out heat slowly. Wood was tried, but it made matters only a little better, and did not promise to be durable. Watt observed that the evil was intensified whenever, for the sake of making a good vacuum under the piston, a specially large quantity of injection water was supplied.

He then entered on a scientific examination of the properties of steam, studying by experiment the relation of its density and pressure to the temperature, and concluded that two conditions were essential to the economic use of steam in a condensing steam-engine. One was that the temperature of the condensed steam should be as low as possible, 100° F. or lower, otherwise the vacuum would not be good; the other was, to quote his own words, "that the cylinder should be always as hot as the steam which entered it." In Newcomen's engine these two conditions were incompatible, and it was not for some months that Watt saw a means of reconciling them. Early in 1765, while walking on a Sunday afternoon in Glasgow Green, the idea flashed upon him that, if the steam were condensed in a vessel distinct from the cylinder, it would be practicable to make the temperature of condensation low, and still keep the cylinder hot. Let this separate vessel be kept cold, either by injecting cold water or by letting it stream over the outside, and let a vacuum be maintained in the vessel. Then, whenever communication was made between it and the cylinder, steam would pass over from the cylinder and be condensed; the pressure in the cylinder would be as low as the pressure in the condenser, but the temperature of the metal of the cylinder would remain high, since no injection water need touch it. Without delay Watt put this idea to the test, and found that the separate condenser did act as he had anticipated. To maintain the vacuum in it he added another new organ, namely, the air-pump, the function of which is to remove the condensed steam and water of injection along with any air that gathers in the condenser.

To further his object of keeping the cylinder as hot as the steam that entered it, Watt supplemented his great invention of the separate condenser by several less notable but still important improvements. In Newcomen's engine a layer of water over the piston had been used to keep it steam-tight; Watt substituted a tighter packing lubricated by oil. In Newcomen's engine the upper end of the cylinder was open to the air; Watt covered it in, leading the piston-rod through a steam-tight stuffing box in the cover, and allowed steam instead of air to press on the top of the piston. In Newcomen's engine the cylinder had no clothing to reduce loss of heat by radiation and conduction from its outer surface; Watt not only cased it in non-conducting material, such as wood, but introduced a steam-jacket, or layer of steam, between the cylinder proper and an outer shell.

All these features were specified in his first patent (see STEAM-ENGINE), which, however, was not obtained till January 1769, nearly four years after the inventions it covers had been made. In the interval Watt had been striving to demonstrate the merits of his engine by trial on a large scale. His earliest experiments left him in debt, and, finding that his own means were quite insufficient to allow him to continue them, he agreed that Dr John Roebuck, founder of the Carron ironworks, should take two-thirds of the profits of the invention in consideration of his bearing the cost. An engine was then erected at Kinneil, near Linlithgow, where Roebuck lived, and this gave Watt the opportunity of facing many difficulties in details of construction. But the experiments made slow progress, for Roebuck's affairs became embarrassed, and Watt's attention was engaged by other work. He had taken to surveying, and was fast gaining reputation as a civil engineer. In 1767 he was employed to make a survey for a Forth and Clyde canal—a scheme which failed to secure parliamentary sanction. This was followed during the next six years by surveys for a canal at Monkland, for another through the valley of Strathmore from Perth to Forfar, and for others along the lines afterwards followed by the Crinan and Caledonian canals. He prepared plans for the harbours of Ayr, Port-Glasgow and Greenock, for deepening the Clyde, and for building a bridge over it at Hamilton. In the course of this work he invented a simple micrometer for measuring distances, consisting of a pair of horizontal hairs placed in the focus of a telescope, through which sights were taken to a fixed and movable target on a rod held upright at the place whose distance from the observer was to be determined. The micrometer was varied in a number of ways; and another fruit of his ingenuity about the same time was a machine to facilitate drawing in perspective.

Meanwhile the engine had not been wholly neglected. Watt had secured his patent; the Kinneil trials had given him a store of valuable experience; Roebuck had failed, but another partner was ready to take his place. In 1768 Watt had made the acquaintance of Matthew Boulton, a man of energy and capital, who owned the Soho engineering works at Birmingham. Boulton agreed to take Roebuck's share in the invention, and to join Watt in applying to parliament for an act to prolong the term of the patent. The application was successful. In 1775 an act was passed continuing the patent for twenty-five years. By this time the inventor had abandoned his civil engineering work and had settled in Birmingham, where the manufacture of steam-engines was begun by the firm of Boulton & Watt. The partnership was a singularly happy one. Boulton had the good sense to leave the work of inventing to Watt, in whose genius he had the fullest faith; on the other hand, his substantial means, his enterprise, resolution and business capacity supplied what was wanting to bring the invention to commercial success.

During the next ten years we find Watt assiduously engaged in developing and introducing the engine. Its first and for a time its only application was in pumping; it was at once put to this use in the mines of Cornwall, where Watt was now frequently engaged in superintending the erection of engines. Further inventions were required to fit it for other uses, and these followed in quick succession. Watt's second steam-engine patent is dated 1781. It describes five different methods of converting the reciprocating motion of the piston into motion of rotation, so as to adapt the engine for driving ordinary machinery. The simplest way of doing this, and the means now universally followed, is by a crank and fly-wheel; this had occurred to Watt, but had meanwhile been patented by another, and hence he devised the "sun and planet wheels" and other equivalent contrivances. A third patent, in 1782, contained two new inventions of the first importance. Up to this time the engine had been single-acting; Watt now made it double-acting; that is to say, both ends of the cylinder, instead of only one, were alternately put in communication with the boiler and the condenser. Up to this time also the steam had been admitted from the boiler throughout the whole stroke of the piston; Watt now introduced the system of expansive working, in which the admission valve is closed after a portion only of the stroke is performed, and the steam enclosed in the cylinder is then allowed to expand during the remainder of the stroke, doing additional work upon the piston without making any further demand upon the boiler until the next stroke requires a fresh admission of steam. He calculated that, as the piston advanced after admission had ceased, the pressure of the steam in the cylinder would fall in the same proportion as its volume increased—a law which, although not strictly true, does accord very closely with the actual behaviour of steam expanding in the cylinder of an engine. Recognizing that this would cause a gradual reduction of the force with which the piston pulled or pushed against the beam, Watt devised a number of contrivances for equalizing the effort throughout the stroke. He found, however, that the inertia of the pump-rods in his mine engines, and the fly-wheel in his rotative engines, served to compensate for the inequality of thrust sufficiently to make these contrivances unnecessary. His fourth patent, taken out in 1784, describes the well-known "parallel motion," an arrangement of links by which the top of the piston-rod is connected to the beam so that it may either pull or push, and is at the same time guided to move in a sensibly straight line. "I have started a new hare," he writes to Boulton in June of that year; "I have got a glimpse of a method of causing a piston-rod to move up and down perpendicularly by only fixing it to a piece of iron upon the beam, without chains or perpendicular guides or untowardly frictions, arch-heads, or other pieces of clumsiness. I think it a very probable thing to succeed, and one of the most ingenious simple pieces of mechanism I have contrived."

A still later invention was the throttle-valve and centrifugal governor, by which the speed of rotative engines was automatically controlled. One more item in the list of Watt's contributions to the development of the steam-engine is too important to be passed without mention: the indicator, which draws a diagram of the relation of the steam's pressure to its volume as the stroke proceeds, was first used by Boulton & Watt to measure the work done by their engines, and so to give a basis on which the charges levied from their customers were adjusted. It would be difficult to exaggerate the part which this simple little instrument has played in the evolution of the steam-engine. The eminently philosophic notion of an indicator diagram is fundamental in the theory of thermodynamics; the instrument itself is to the steam engineer what the stethoscope is to the physician, and more, for with it he not only diagnoses the ailments [illegible] faulty machine, whether in one or another of its organs, [illegible] power in health.

[illegible] success of the engine was not long in being established. By 1783 all but one of the Newcomen pumping-engines in Cornwall had been displaced by Watt's. The mines were then far from thriving; many were even on the point of being abandoned through the difficulty of dealing with large volumes of water; and Watt's invention, which allowed this to be done at a moderate cost, meant for many of them a new lease of life. His engine used no more than a fourth of the fuel that had formerly been needed to do the same work, and the Soho firm usually claimed by way of royalty a sum equivalent to one-third of the saving—a sum which must have been nearly equal to the cost of the fuel actually consumed. Rival manufacturers came forward, amongst whom Edward Bull and Jonathan Carter Hornblower are the most conspicuous names. They varied the form of the engine, but they could not avoid infringing Watt's patent by the use of a separate condenser. When action was taken against them on that ground, they retaliated by disputing the validity of the fundamental patent of 1769. In the case of *Boulton & Watt* v. *Bull* the court was divided on this point, but in an action against Hornblower the patent was definitely affirmed to be valid by a unanimous finding of the Court of King's Bench. This was in 1799, only a year before the monopoly expired, but the decision enabled the firm to claim a large sum as arrears of patent dues. In connexion with these trials Watt himself, as well as his early friends Black and Robison, drew up narratives of the invention of the steam-engine, which are of much interest to the student of its history.[1]

Before Watt's time the steam-engine was exclusively a steam-pump, slow-working, cumbrous and excessively wasteful of fuel. His first patent made it quick in working, powerful and efficient, but still only as a steam-pump. His later inventions adapted it to drive machinery of all kinds, and left it virtually what it is to-day, save in three respects. In respect of mechanical arrangement the modern engine differs from Watt's chiefly in this, that the beam, an indispensable feature in the early pumping-engines, and one which held its place long after the need for it had vanished, has gradually given way to more direct modes of connecting the piston with the crank. Another difference is in the modern use of high-pressure steam. It is remarkable that Watt, notwithstanding the fact that his own invention of expansive working must have opened his eyes to the advantage of high-pressure steam, declined to admit it into his practice. He persisted in the use of pressures that were little if at all above that of the atmosphere. His rivals in Cornwall were not so squeamish. Richard Trevithick ventured as far as 120 lb on the square inch, and a curious episode in the history of the steam-engine is an attempt which Boulton & Watt made to have an act of parliament passed forbidding the use of high pressure on the ground that the lives of the public were endangered. The third and only other respect in which a great improvement has been effected is in the introduction of compound expansion. Here, too, one cannot but regret to find the Soho firm hostile, though the necessity of defending their monopoly makes their action natural enough. Hornblower had in fact stumbled on the invention of the compound engine, but as his machine employed Watt's condenser it was suppressed, to be revived after some years by Arthur Woolf (1766–1837). In one of his patents (1784) Watt describes a steam locomotive, but he never prosecuted this, and when William Murdoch, his chief assistant (famous as the inventor of gas-lighting), made experiments on the same lines, Watt gave him little encouragement. The notion then was to use a steam carriage on ordinary roads; its use on railways had not yet been thought of. When that idea took form later in the last years of Watt's life, the old man refused to smile upon his offspring; it is even said that he put a clause in the lease of his house that no steam carriage should on any pretext be allowed to approach it.

On the expiry in 1800 of the act by which the patent of 1769 had been extended, Watt gave up his share in the business of engine-building to his sons, James, who carried it on along with a son of Boulton for many years, and Gregory, who died in 1804. The remainder of his life was quietly spent at Heathfield Hall, his house near Birmingham, where he devoted his time, with scarcely an interruption, to mechanical pursuits. His last work was the invention of machines for copying sculpture

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[1] Another narrative of the utmost interest was written by Watt in 1814 in the form of a footnote to Robison's article "Steam-Engine," from the fourth edition of the *Encyclopaedia Britannica*, which Watt revised before it was reprinted in the collected edition of Robison's works. See Robison's *Mechanical Philosophy*, vol. ii.

—one for making reduced copies, another for taking facsimiles by means of a light stiff frame, which carried a pointer over the surface of the work while a revolving tool fixed to the frame alongside of the pointer cut a corresponding surface on a suitable block. We find him in correspondence with Sir Francis Chantrey about this machine not many months before his death, and presenting copies of busts to his friends as the work "of a young artist just entering on his eighty-third year." His life drew to a tranquil close, and the end came at Heathfield on the 19th of August 1819. His remains were interred in the neighbouring parish church of Handsworth.

Watt was twice married—first in 1763 to his cousin Margaret Miller, who died ten years later. Of four children born of the marriage. two died in infancy; another was James (1769–1848), who succeeded his father in business; the fourth was a daughter who lived to maturity, but died early, leaving two children. His second wife, Anne Macgregor, whom he married before settling in Birmingham in 1775, survived him; but her two children, Gregory and a daughter, died young.

Some of Watt's minor inventions have been already noticed. Another, which has proved of great practical value, was the letter-copying press, for copying manuscript by using a glutinous ink and pressing the written page against a moistened sheet of thin paper. He patented this in 1780, describing both a roller press, the use of which he seems to have preferred in copying his own correspondence, and also the form of screw press now found in every merchant's office.

In the domain of pure science Watt claims recognition not only as having had ideas greatly in advance of his age regarding what is now called energy, but as a discoverer of the composition of water. Writing to Joseph Priestley in April 1783, with reference to some of Priestley's experiments, he suggests the theory that "water is composed of dephlogisticated air and phlogiston deprived of part of their latent or elementary heat." It is difficult to determine the exact meaning attached to these antiquated terms, and to say how far Watt's suggestion anticipated the fuller discovery of Cavendish. Watt's views were communicated to the Royal Society in 1783, Cavendish's experiments in 1784, and both are printed in the same volume of the *Philosophical Transactions*.

The early and middle part of Watt's life was a long struggle with poor health: severe headache prostrated him for days at a time; but as he grew old his constitution seems to have become more robust. His disposition was despondent and shrinking; he speaks of himself, but evidently with unfair severity, as "indolent to excess." "I am not enterprising," he writes; "I would rather face a loaded cannon than settle an account or make a bargain; in short, I find myself out of my sphere when I have anything to do with mankind." He was a man of warm friendships, and has left a personal memorial of the greatest interest in his numerous letters. They are full of sagacity and insight: his own achievements are told with a shrewd but extremely modest estimate of their value, and in a style of remarkable terseness and lucidity, lightened here and there by a touch of dry humour. In his old age Watt is described by his contemporaries as a man richly stored with the most various knowledge, full of anecdote, familiar with most modern languages and their literature, a great talker. Scott speaks of "the alert, kind, benevolent old man, his talents and fancy overflowing on every subject, with his attention alive to every one's question, his information at every one's command."

See J. P. Muirhead, *Origin and Progress of the Mechanical Inventions of James Watt* (3 vols., 1854; vols. i. and ii. contain a memoir and Watt's letters; vol. iii. gives a reprint of his patent specifications and other papers); Muirhead, *Life of Watt* (1858), Smiles, *Lives of Boulton and Watt*; Williamson, *Memorials of the Lineage, &c., of James Watt*, published by the Watt Club (Greenock, 1856); *Correspondence of the late James Watt on his Discovery of the Theory of the Composition of Water*, edited by Muirhead (1846); Cowper, "On the Inventions of James Watt and his Models preserved at Handsworth and South Kensington," *Proc. Inst. Mech. Eng.* (1883); article "Watt" in the *Encyclopaedia Britannica* (6th edition, 1823), by James Watt, junior; Robison, *Mechanical Philosophy*, vol ii. (1822) (letters and notes by Watt on the History of the Steam-Engine). (J. A. E.)

WATTEAU, ANTOINE (1684–1721), French painter, was born in Valenciennes, of humble Flemish origin. Comte de Caylus, his staunch friend of later years, and his first biographer, refers to Watteau's father as a hard man, strongly disinclined to accede to his son's wish to become a painter; but other accounts show him in a kinder light—as a poor, struggling man, a tiler by trade, who secured for his son the best possible education. Certain it is that at the age of fourteen Watteau was placed with Gérin, a mediocre Valenciennes painter, with whom he remained until 1702. It is to be assumed that he learnt far more from the study of Ostade's and Teniers's paintings in his native town than from his first master's teaching. Not only in subject-matter, but in their general tonality, his earliest works, like "La Vraie Gaieté," which was in the collection of Sir Charles Tennant, suggest this influence. Gérin died in 1702, and Watteau, almost penniless, went to Paris, where he found employment with the scene-painter Métayer. Things, however, went badly with his new master, and Watteau, broken down in health and on the verge of starvation, was forced to work in a kind of factory where devotional pictures were turned out in wholesale fashion. Three francs a week and meagre food were his reward, but his talent soon enabled him to paint the St Nicolas, the copying of which was allotted to him, without having to refer to the original. Meanwhile he spent his rare leisure hours and the evenings in serious study, sketching and drawing his impressions of types and scenes. His drawings attracted the attention of Claude Gillot, an artist imbued with the spirit of the Renaissance, who after having successfully tried himself in the mythological and historical genre, was just at that time devoting himself to the characters and incidents of the Italian comedy. Gillot took Watteau as pupil and assistant, but the young man made such rapid progress that he soon equalled and excelled his master, whose jealousy led to a quarrel, as a result of which Watteau, and with him his fellow-student and later pupil, Lancret, severed his connexion with Gillot and entered about 1708 the studio of Claude Audran, a famous decorative painter who was at that time keeper of the collections at the Luxembourg Palace. From him Watteau acquired his knowledge of decorative art and ornamental design, the garland-like composition which he applied to the designing of screens, fans and wall panels. At the same time he became deeply imbued with the spirit of Rubens and Paolo Veronese, whose works he had daily before him at the palace; and he continued to work from nature and to collect material for his formal garden backgrounds among the fountains and statues and stately avenues of the Luxembourg gardens. His *chinoiseries* and *singeries* date probably from the years during which he worked with Audran.

Perhaps as a recreation from the routine of ornamental design, Watteau painted at this time "The Departing Regiment," the first picture in his second and more personal manner, in which the touch reveals the influence of Rubens's technique, and the first of a long series of camp pictures. He showed the painting to Audran, who, probably afraid of losing so talented and useful an assistant, made light of it, and advised him not to waste his time and gifts on such subjects. Watteau, suspicious of his master's motives, determined to leave him, advancing as excuse his desire to return to Valenciennes. He found a purchaser, at the modest price of 60 livres, in Sirois, the father-in-law of his later friend and patron Gersaint, and was thus enabled to return to the home of his childhood. In Valenciennes he painted a number of the small camp-pieces, notably the "Camp-Fire," which was again bought by Sirois, the price this time being raised to 200 livres; this is now in the collection of Mr W. A. Coats in Glasgow. Two small pictures of the same type are at the Hermitage in St Petersburg.

Returning to Paris after a comparatively short sojourn at Valenciennes, he took up his abode with Sirois, and competed in 1709 for the Prix de Rome. He only obtained the second prize, and, determined to go to Rome, he applied for a crown pension and exhibited the two military pictures which he had sold to Sirois, in a place where they were bound to be seen by the academicians. There they attracted the attention of de la Fosse, who, struck by the rare gifts displayed in these works, sent for Watteau and dissuaded him from going to Italy, where he had nothing to learn. It was to a great extent due to de la Fosse and to Rigaud that Watteau was made an associate of the Academy in 1712, and a full member in 1717, on the completion of his diploma picture, "The Embarkment for Cythera," now at the Louvre. A later, and even more perfect, version of the same subject is in the possession of the German emperor. It is quite possible that the superb portrait of Rigaud by Watteau belonging to Mr Hodgkins, was painted in acknowledgment of Rigaud's friendly action.

Watteau now went to live with Crozat, the greatest private art collector of his time, for whom he painted a set of four decorative panels of "The Seasons," one of which, "Summer," is now in the collection of Mr Lionel Phillips. Crozat left at his death some 400 paintings and 19,000 drawings by the masters. It is easy to imagine how Watteau roamed among these treasures, and became more and more familiar with Rubens and the great Venetians. In 1719 or 1720 the state of his health had become so alarming that he went to London to consult the famous doctor Richard Mead. But far from benefiting by the journey, he became worse, the London fog and smoke proving particularly pernicious to a sufferer from consumption. On his return to Paris he lived for six months with his friend Gersaint, for whom he painted in eight mornings the wonderful signboard depicting the interior of an art dealer's shop, which is now—cut into two parts—in the collection of the German emperor. His health made it imperative for him to live in the country, and in 1721 he took up his abode with M. le Fèvre at Nogent. During all this time, as though he knew the near approach of the end and wished to make the best of his time, he worked with feverish haste. Among his last paintings were a "Crucifixion" for the curé of Nogent, and a portrait of the famous Venetian pastellist Rosalba Carriera, who at the same time painted her portrait of Watteau. His restlessness increased with the progress of his disease; he wished to return to Valenciennes, but the long journey was too dangerous; he sent for his pupil Pater, whom he had dismissed in a fit of ill-temper, and whom he now kept by his side for a month to give him the benefit of his experience; and on the 18th of July 1721 he died in Gersaint's arms.

Watteau's position in French art is one of unique importance, for, though Flemish by descent, he was more French in his art than any of his French contemporaries. He became the founder—and at the same time the culmination—of a new school which marked a revolt against the pompous decaying classicism of the Louis XIV. period. The vitality of his art was due to the rare combination of a poet's imagination with a power of seizing reality. In his treatment of the landscape background and of the atmospheric surroundings of the figures can be found the germs of impressionism. All the later theories of light and its effect upon the objects in nature are foreshadowed by Watteau's *fêtes champêtres*, which give at the same time a characteristic, though highly idealized, picture of the artificiality of the life of his time. He is the initiator of the Louis XV. period, but, except in a few rare cases, his paintings are entirely free from the licentiousness of his followers Lancret and Pater, and even more of Boucher and Fragonard. During the last years of his life Watteau's art was highly esteemed by such fine judges as Sirois, Gersaint, the comte de Caylus, and M. de Julienne, the last of whom had a whole collection of the master's paintings and sketches, and published in 1735 the *Abrégé de la vie de Watteau*, an introduction to the four volumes of engravings after Watteau by Cochin, Thomassin, Le Bas, Liotard and others. From the middle of the 18th century to about 1875, when Edmond de Goncourt published his *Catalogue raisonné* of Watteau's works and Caylus's discourse on Watteau delivered at the Academy in 1748, the discovery of which is also due to the brothers de Goncourt, Watteau was held in such slight esteem that the prices realized by his paintings at public auction rarely exceeded £100. Then the reaction set in, and in 1891 the "Occupation according to Age" realized 5200 guineas at Christie's, and "Perfect Harmony" 3500 guineas. At the Bourgeois sale at Cologne in 1904 "The Village Bride" fetched £5000.

The finest collection of Watteau's works is in the possession of the German emperor, who owns as many as thirteen, all of the best period, and mostly from M. de Julienne's collection. At the Kaiser Friedrich museum in Berlin are two scenes from the Italian and French comedy and a *fête champêtre*. In the [illegible] Collection are nine of his paintings, among them "Rustic [illegible]" "The Return from the Chase," "Gilles and his [illegible]" "A Lady at her Toilet" and "Harlequin and Columbine." The Louvre owns, besides the diploma picture, the "Antiope," "The Assemblage in the Park," "Autumn," "Indifference," "La Finette," "Gilles," "A Reunion" and "The False Step," as well as thirty-one original drawings. Other paintings of importance are at the Dresden, Glasgow, Edinburgh, St Petersburg and Vienna galleries; and a number of drawings are to be found at the British Museum and the Albertina in Vienna. Of the few portraits known to have been painted by Watteau, one is in the collection of the late M. Groult in Paris.

AUTHORITIES.—Since the resuscitation of Watteau's fame by the de Goncourts, an extensive literature has grown around his life and work. The basis for all later research is furnished by Caylus's somewhat academic *Life*, Gersaint's *Catalogue raisonné* (Paris, 1744), and Julienne's *Abrégé*. For Watteau's childhood, the most trustworthy information will be found in Cellier's *Watteau, son enfance, ses contemporains* (Valenciennes, 1867). Of the greatest importance is the *Catalogue raisonné de l'œuvre de Watteau*, by E. de Goncourt (1875), and the essay on Watteau by the brothers de Goncourt in *L'Art du XVIII^e siècle*. See also *Watteau* by Paul Mantz (Paris, 1892); "Antoine Watteau," by G. Dargenty (*Les Artistes célèbres*, Paris, 1891); *Watteau*, by Gabriel Séailles (Paris, 1892); *Antoine Watteau* by Claude Phillips (London, 1895; reprinted without alterations or corrections by the author, 1905); and Camille Mauclair's brilliant monograph *Antoine Watteau* (London, 1905), which is of exceptional interest as a physiological study, since the author establishes the connexion between Watteau's art and character and the illness to which he succumbed in the prime of his life. (P.G.K.)

WATTENBACH, WILHELM (1819–1897), German historian, was born at Ranzau in Holstein on the 22nd of September 1819. He studied philology at the universities of Bonn, Göttingen and Berlin, and in 1843 he began to work upon the *Monumenta Germaniae historica*. In 1855 he was appointed archivist at Breslau; in 1862 he became professor of history at Heidelberg, and ten years later professor at Berlin, where he was a member of the directing body of the *Monumenta* and a member of the Academy. He died at Frankfort on the 21st of September 1897 Wattenbach was distinguished by his thorough knowledge of the chronicles and other original documents of the middle ages, and his most valuable work was done in this field.

His principal book, *Deutschlands Geschichtsquellen im Mittelalter bis zur Mitte des 13. Jahrhunderts*, is unrivalled as a guide to the sources of the history of Germany in the middle ages; this was first published in 1858, and has passed through several editions. Cognate works are his *Anleitung zur lateinischen Paläographie* (Leipzig, 1869, and again 1886); and *Das Schriftwesen im Mittelalter* (Leipzig, 1871, and again 1896). Wattenbach also wrote *Beiträge zur Geschichte der christlichen Kirche in Bohmen und Mähren* (Vienna, 1849); *Geschichte des römischen Papsttums* (Berlin, 1876); and *Anleitung zur griechischen Paläographie* (Leipzig, 1867, and again 1895).

WATTERSON, HENRY (1840–), American journalist, was born in Washington, D.C., on the 16th of February 1840. His father, Harvey McGee Watterson (1811–1891), was a journalist and lawyer, and was a Democratic representative in Congress in 1839–1843. The son was educated by private tutors, and between 1858 and 1861 was editor of the Washington *States* and of the Democratic *Review*. During the Civil War he served in the Confederate army as aide-de-camp to General Nathan B. Forrest and to General Leonidas Polk in 1861–1862; he was editor of the Chattanooga *Rebel* in 1862–1863, and was chief of scouts in General Joseph E. Johnston's army in 1864. In 1865–1867 he was an editor of the *Republican Banner*, at Nashville, Tennessee, and in 1867–1868 was editor of the *Journal* at Louisville, Kentucky. In 1868, with W. N. Haldeman, he founded and became editor of the Louisville *Courier-Journal*, a consolidation of the *Courier* (1843), the *Democrat* (1844), and the *Journal* (1830), and it soon became one of the most influential of Southern newspapers. He was a Democratic representative in Congress from August 1876 to March 1877, and was delegate at large to the National Democratic Conventions of 1876, 1880, 1884, 1888 and 1892, serving as temporary chairman in 1876, and as chairman of the platform committee in 1880 and 1888. He became widely known as a lecturer and orator. His publications include *History of the Spanish-American War* (1899) and *The Compromises of Life* (1902).

WATTIGNIES, a village of France 5½ m. S.S.E. of Maubeuge, the scene of a battle in the French Revolutionary Wars (*q.v.*), fought on the 15th-16th October 1793. The Allied army, chiefly Austrians, under Coburg, was besieging Maubeuge, and the Revolutionary army, preparing to relieve it, gathered behind Avesnes. Coburg disposed a covering force of 21,000 astride the Avesnes-Maubeuge road, 5000 on the right with their flank on the Sambre, 9000 in the centre, on a ridge in an amphitheatre of woods, and 6000 on the left, chiefly on the plateau of Wattignies. A long line of woods enabled the Republican commander, Jourdan, to deploy unseen; 14,000 men were to attack the right, 16,000 were sent towards Wattignies, and 13,000 were to demonstrate in the centre till the others had succeeded and then to attack. Meantime (though this part of the programme miscarried) the Maubeuge garrison, which was almost as strong as its besiegers, was to sally out. Even without the Maubeuge garrison Jourdan had a two-to-one superiority. But the French were still the undisciplined enthusiasts of Hondschoote. Their left attack progressed so long as it could use "dead ground" in the valleys, but when the Republicans reached the gentler slopes above, the volleys of the Austrian regulars crushed their swarms; and the Austrian cavalry, striking them in flank, rode over them. The centre attack, ordered by Carnot on the assumption that all was well on the flanks, was premature; like the left, it progressed while the slopes were sharp, but when the Republicans arrived on the crest they found a gentle reverse slope before them, at the foot of which were Coburg's best troops. Again the disciplined volleys and a well-timed cavalry charge swept back the assailants. The French right reached, but could not hold, Wattignies But these reverses were, in the eyes of Carnot and Jourdan, mere mishaps. Jourdan wished to renew the left attack, but Carnot, the engineer, considered the Wattignies plateau the key of the position and his opinion prevailed. In the night the nearly equal partition of force, which was largely responsible for the failure, was modified, and the strength of the attack massed opposite Wattignies. Coburg meanwhile strengthened his wings. He heard that Jourdan had been reinforced up to 100,000. But he called up few fresh battalions, and put into line only 23,000 men. In reality Jourdan had not received reinforcements, and the effects of the first failure almost neutralized the superiority of numbers and enthusiasm over discipline and confidence. But at last, after a long fight had eliminated the faint-hearted, enough brave men remained in the excited crowds held together by Carnot and Jourdan to win the plateau. Coburg then drew off. His losses were 2500 out of 23,000, Jourdan's 3000 out of 43,000.

WATTLE AND DAB, a term in architecture (Lat. *cratitius*) applied to a wall made with upright stakes with withes twisted between them and then plastered over. It is probably one of the oldest systems of construction; the Egyptians employed the stems of maize for the upright stakes; these were secured together with withes and covered over with mud, the upper portions of the maize stems being left uncut at the top, to increase the height of the enclosure; and these are thought by Professor Petrie to have given the origin for the cavetto cornice of the temples, the torus moulding representing the heavier coil of withes at the top of the fence wall. Vitruvius (ii. 8) refers to it as being employed in Rome. In the middle ages in England it was employed as a framework for clay chimneys.

WATTMETER, an instrument for the measurement of electric power, or the rate of supply of electric energy to any circuit. The term is generally applied to describe a particular form of electrodynamometer, consisting of a fixed coil of wire and an embracing or neighbouring coil of wire suspended so as to be movable. In general construction the instrument resembles a Siemens electrodynamometer (see AMPEREMETER). The fixed coil is called the current coil, and the movable coil is called the potential coil, and each of these coils has its ends brought to separate terminals on the base of the instrument. The principle on which the instrument works is as follows: Suppose any circuit, such as an electric motor, lamp or transformer, is receiving electric current; then the power given to that circuit reckoned in watts is measured by the product of the current flowing through the circuit in amperes and the potential difference of the ends of that circuit in volts, multiplied by a certain factor called the power factor in those cases in which the circuit is inductive and the current alternating.

Take first the simplest case of a non-inductive power-absorbing circuit. If an electro-dynamometer, made as above described, has its fixed circuit connected in series with the power-absorbing circuit and its movable coil (wound with fine wire) connected across the terminals of the power-absorbing circuit, then a current will flow through the fixed coil which is the same or nearly the same as that through the power-absorbing circuit, and a current will flow through the high resistance coil of the wattmeter proportional to the potential difference at the terminals of the power-absorbing circuit. The movable coil of the wattmeter is normally suspended so that its axis is at right angles to that of the fixed coil and is constrained by the torsion of a spiral spring. When the currents flow through the two coils, forces are brought into action compelling the coils to set their axes in the same direction, and these forces can be opposed by another torque due to the control of a spiral spring regulated by moving a torsion head on the instrument. The torque required to hold the coils in their normal position is proportional to the mean value of the product of the currents flowing through two coils respectively, or to the mean value of the product of the current in the power-absorbing circuit and the potential difference at its ends, that is, to the power taken up by the circuit. Hence this power can be measured by the torsion which must be applied to the movable coil of the wattmeter to hold it in the normal position against the action of the forces tending to displace it. The wattmeter can therefore be calibrated so as to give direct readings of the power reckoned in watts, taken up in the circuit; hence its name, wattmeter. In those cases in which the power-absorbing circuit is inductive, the coil of the wattmeter connected across the terminals of the power-absorbing circuit must have an exceedingly small inductance, else a considerable correction may become necessary This correcting factor has the following value. If T_s stands for the time-constant of the movable circuit of the wattmeter, commonly called the potential coil, the time constant being defined as the ratio of the inductance to the resistance of that circuit, and if T_R is the time-constant similarly defined of the power-absorbing circuit, and if F is the correcting factor, and $p=2\pi$ times the frequency n, then,[1]

$$F=\frac{1+p^2T_s^2}{1+p^2T_sT_R}.$$

Hence an electrodynamic wattmeter, applied to measure the electrical power taken up in a circuit when employing alternating currents, gives absolutely correct readings only in two cases—(i.) when the potential circuit of the wattmeter and the power-absorbing circuit have negligible inductances, and (ii.) when the same two circuits have equal time-constants. If these conditions are not fulfilled, the wattmeter readings, assuming the wattmeter to have been calibrated with continuous currents, may be either too high or too low when alternating currents are being used.

In order that a wattmeter shall be suitable for the measurement of power taken up in an inductive circuit certain conditions of construction must be fulfilled. The framework and case of the instrument must be completely non-metallic, else eddy currents induced in the supports will cause disturbing forces to act upon the movable coil. Again the shunt circuit must have practically zero inductance and the series or current coil must be wound or constructed with stranded copper wire, each strand being silk covered, to prevent the production of eddy currents in the mass of the conductor. Wattmeters of this kind have been devised by J. A. Fleming, Lord Kelvin and W. Duddell and Mather. W. E. Sumpner, however, has devised forms of wattmeter of the dynamometer type in which iron cores are employed, and has defined the conditions under which these instruments are available for accurate measurements. See "New Alternate Current Instruments," *Jour. Inst. Elec. Eng.*, 41, 227 (1908).

There are methods of measuring electrical power by means of electrostatic voltmeters, or of quadrant electrometers adapted for the purpose, which when so employed may be called electrostatic wattmeters. If the quadrants of an electrometer (*q.v.*) are connected to the ends of a non-inductive circuit in series with the power-absorbing circuit, and if the needle is connected to the end of this last circuit opposite to that at which the inductionless resistance is connected; then the deflexion of the electrometer will be proportional to the power taken up in the circuit, since it is proportional to the mean value of $(A-B)\{C-\frac{1}{2}(A+B)\}$, where A and B are the potentials of the quadrants and C is that of the needle. This expression, however, measures the power taken up in the power-absorbing circuit. In the case of the voltmeter method of measuring power devised by W. E. Ayrton and W. E. Sumpner in 1891, an electrostatic voltmeter is employed to measure the fall of potential V_1 down any inductive circuit in which it is desired to measure the power absorption, and also the volt-drop V_2 down an inductionless resistance R in series with it, and also the volt-drop V_3 down the two together. The power absorption is then given by the expression $(V_3^2-V_1^2-V_2^2)/2R$. For methods of employing the heating power of a current to construct a wattmeter see a paper by J. T. Irwin on "Hot-wire Wattmeters," *Jour. Inst. Elec. Eng.* (1907), 39, 617.

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[1] For the proof of this formula see J. A. Fleming, *The Alternate Current Transformer in Theory and Practice*, i. 168.

For the details of these and many other methods of employing wattmeters to measure the power absorption in single and polyphase circuits the reader is referred to the following works: J. A. Fleming, *Handbook for the Electrical Laboratory and Testing Room* (1903); Id., *The Alternate Current Transformer in Theory and Practice* (1905); G. Aspinall Parr, *Electrical Engineering Measuring Instruments* (1903); A. Gray, *Absolute Measurements in Electricity and Magnetism* (1900); E. Wilson, "The Kelvin Quadrant Electrometer as a Wattmeter," *Proc. Roy. Soc.* (1898), 62, 356; J. Swinburne, "The Electrometer as a Wattmeter," *Phil. Mag.* (June 1891); W. E. Ayrton and W. E. Sumpner, "The Measurement of the Power given by an Electric Current to any Circuit," *Proc. Roy. Soc.* (1891), 49, 424; Id., "Alternate Current and Potential Difference Analogies in the Method of Measuring Power," *Phil. Mag.* (August 1891); W. E. Ayrton, "Electrometer Methods of Measuring Alternating Current Power," *Journ. Inst. Elec. Eng.* (1888), 17, 164; T. H. Blakesley, "Further Contributions to Dynamometry or the Measurement of Power," *Phil. Mag.* (April 1891); G. L. Addenbrooke, "The Electrostatic Wattmeter and its Calibration and Adaptation for Polyphase Measurements," *Electrician* (1903), 51, 811; W. E. Sumpner, "New Iron-cored Instruments for Alternate Current Working," *Jour. Inst. Elec. Eng.*, 36, 421 (1906). (J. A. F.)

WATTS, ALARIC ALEXANDER (1797–1864), English journalist and poet, was the son of John Mosley Watts and grandson of William Watts, a Leicester physician of repute. After leaving school he made his living for a short time by teaching, and in 1818 joined the staff of the *New Monthly Magazine* in London, becoming about the same time a contributor to the *Literary Gazette*. In 1822 he was made editor of the *Leeds Intelligencer*, in the columns of which he was one of the first to advocate measures for protecting workers in factories against accidents from machinery. In 1823 he published his first volume of verse, *Poetical Sketches*, and in 1824 he became the editor of the *Literary Souvenir*, of which he also became the proprietor two years later, and in the conduct of which he secured the co-operation of some of the most famous men of letters of the period. In 1825 he went to Manchester as editor of the *Manchester Courier*, a position which he resigned a year later; in 1827 he assisted in founding the *Standard*, of which the first editor was Stanley Lees Giffard; and in 1833 he started the *United Service Gazette*, which he edited for several years. Watts was also interested in a number of provincial Conservative newspapers which were not financially successful, and he became bankrupt in 1850, but was awarded a civil service pension by Lord Aberdeen in 1854. In 1856 he edited the first edition of *Men of the Time*. Watts died in London on the 5th of April 1864. In 1867 a collection of his poems was published in a volume entitled *The Laurel and the Lyre*.

See A. A. Watts, *Alaric Watts* (2 vols., London, 1884).

WATTS, GEORGE FREDERICK (1817–1904), English painter and sculptor, was born in London on the 23rd of February 1817. While hardly more than a boy he was permitted to enter the schools of the Royal Academy; but his attendance was short-lived, and his further art education was confined to personal experiment and endeavour, guided and corrected by a constant appeal to the standard of ancient Greek sculpture. There are portraits of himself, painted in 1834; of Mr James Weale, about 1835; of his father, "Little Miss Hopkins," and Mr Richard Jarvis, painted in 1836; and in 1837 he was already far enough advanced to be an exhibitor at the Academy with a picture of "The Wounded Heron" and two portraits. His first exhibited figure-subject, "Cavaliers," appeared on the Academy walls in 1839, and was followed in 1840 by "Isabella e Lorenzo," in 1841 by "How should I your true love know?" and in 1842 by a scene from *Cymbeline* and a portrait of Mrs Ionides. The Royal Commission appointed for the decoration of the new [illegible] offered prizes in 1842 to those artists [illegible] should be adjudged best adapted to [illegible] exhibition in Westminster Hall next year [illegible] for a design of "Caractacus led in triumph through the streets of Rome." This enabled him to visit Italy in 1844, and he remained there during the greater portion of the three following years, for the most part in Florence, where he enjoyed the patronage and personal friendship of Lord Holland, the British ambassador. For him he painted a portrait of Lady Holland, exhibited in 1848, and in his Villa Careggi, near the city, a fresco, after making some experimental studies in that medium, fragments of which are now in the Victoria and Albert Museum. To Lord Holland's encouragement, also, it was chiefly due that in 1846 the artist took part in another competition, the third organized by the Royal Commissioners, who on this occasion announced a further list of prizes for works in oil. Watts sent in a cartoon depicting "Alfred inciting his subjects to prevent the landing of the Danes, or the first naval victory of the English," which, after obtaining a first-class prize of £500 at the exhibition in Westminster Hall, was purchased by the government, and hangs in one of the committee rooms of the House of Commons. It led, moreover, to a commission for the fresco of "St George overcomes the Dragon," which, begun in 1848 and finished in 1853, forms part of the decorations of the Hall of the Poets in the Houses of Parliament. He next proposed to adorn gratuitously the interior of the Great Hall of Euston railway station with a series of frescoes illustrating "The Progress of the Cosmos," but the offer was refused. A similar proposition made shortly afterwards to the Benchers of Lincoln's Inn was received in a less commercial spirit, and was followed by the execution of the fresco, "Justice: a Hemicycle of Lawgivers," on the north side of their hall.

While this large undertaking was still in progress, Watts was working steadily at pictures and portraits. In 1849 the first two of the great allegorical compositions which form the most characteristic of the artist's productions were exhibited—"Life's Illusions," an elaborate presentment of the vanity of human desires, and "The people that sat in darkness," turning eagerly towards the growing dawn. In 1850 he first gave public expression to his intense longing to improve the condition of humanity in the picture of "The Good Samaritan" bending over the wounded traveller; this, as recorded in the catalogue of the Royal Academy, was "painted as an expression of the artist's admiration and respect for the noble philanthropy of Thomas Wright, of Manchester," and to that city he presented the work. In 1856 Watts paid a visit to Lord Holland at Paris, where he was then ambassador, and through him made the acquaintance and painted the portraits of Thiers, Prince Jerome Bonaparte and other famous Frenchmen; while other celebrities who sat to him during these years were Guizot (1848), Colonel Rawlinson, C.B., Sir Henry Taylor and Thomas Wright (1851), Lord John Russell (1852), Tennyson (1856, and again in 1859), John Lothrop Motley the historian (1859), the duke of Argyll (1860), Lord Lawrence and Lord Lyndhurst (1862), Lord Wensleydale (1864), Mr Gladstone (1858 and 1865), Sir William Bowman and Swinburne (1865), Panizzi (1866) and Dean Stanley and Dr Joachim in 1867. Notable pictures of the same period are "Sir Galahad" (1862), "Ariadne in Naxos" (1863), "Time and Oblivion" (1864), originally designed for sculpture to be carried out "in divers materials after the manner of Pheidias," and "Thetis" (1866).

In spite of these and many other evidences of his importance, it was not until 1867 that Watts was elected an Associate of the Royal Academy, but the council then conferred upon him the rare distinction of promoting him, in the course of the same year, to full Academicianship. Thenceforward he continued to exhibit each year, with a few exceptions, at the Academy, even after his retirement in 1896, and he was also a frequent contributor to the Grosvenor Gallery, and subsequently to the New Gallery, at which last a special exhibition of his works was held in the winter of 1896–1897. Though he travelled abroad to some extent, going to Asia Minor in 1857 with the expedition sent to investigate the ruins of Halicarnassus, and visiting in later years Italy, Greece and Egypt, the greater part of his life was passed in the laborious seclusion of his studio either at Little Holland House, Melbury Road, Kensington, where he settled in 1859, or in the country at Limnerslease, Compton, Surrey. Apart from his art, his life was happily uneventful, the sole facts necessary to record being his marriage in 1886 with Miss Mary Fraser-Tytler, an early union with Miss Ellen Terry having been dissolved many years before; his twice receiving (1885 and 1894), but respectfully declining, the offer of a baronetcy; and his inclusion in June 1902 in the newly founded Order of Merit. He died on the 1st of July 1904.

The world is exceptionally well provided with opportunities of judging of the qualities of G. F. Watts's art, for with a noble generosity he presented to his country a representative selection of the best work of his long life. A prominent element in it, and one which must prove of the greatest value to posterity, is the inestimable series of portraits of his distinguished contemporaries, a series no less remarkable for its artistic than for its historical interest. A glance through the list of his subjects shows the breadth of his sympathies and his superiority to creed or party. Among politicians are the duke of Devonshire (1883), Lords Salisbury (1884), Sherbrooke (1882), Campbell (1882), Cowper (1877), Ripon (1896), Dufferin (1897) and Shaftesbury (1882), Mr Gerald Balfour (1899) and Mr John Burns (1897); poets—Tennyson, Swinburne (1884), Browning (1875), Matthew Arnold (1881), Rossetti (1865, and subsequent replica) and William Morris (1870); artists—himself (1864, 1880, and eleven others), Lord Leighton (1871 and 1881), Calderon (1872), Prinsep (1872), Burne-Jones (1870), Millais (1871), Walter Crane (1891), and Alfred Gilbert (1896); literature is represented by John Stuart Mill (exhibited 1874), Carlyle (1869), George Meredith (1893), Max Müller (1895) and Mr Lecky (1878); music, by Sir Charles Hallé; while among others who have won fame in diverse paths are Lords Napier (1886) and Roberts (1899), General Baden-Powell (1902), Garibaldi, Sir Richard Burton (1882), Cardinal Manning (1882), Dr Martineau (1874), Sir Andrew Clark (1894), George Peabody, Mr Passmore Edwards, Claude Montefiore (1894). Even more significant from an artistic point of view is the great collection of symbolical pictures in the Tate Gallery which forms the artist's message to mankind. Believing devoutly in the high mission of didactic art, he strove ever to carry out his part of it faithfully. To quote his own words: "My intention has not been so much to paint pictures that charm the eye, as to suggest great thoughts that will appeal to the imagination and the heart, and kindle all that is best and noblest in humanity"; and his tenet is that the main object of the painter should be "demanding noble aspirations, condemning in the most trenchant manner prevalent vices, and warning in deep tones against lapses from morals and duties."

There are not wanting critics who radically dissent from this view of the proper functions of art. It must be admitted that there is force in their objection when the inner meaning of a picture is found to be exceedingly obscure, if not incomprehensible, without a verbal explanation. In the female figure, for instance, bending blindfolded on the globe suspended in space and sounding the sole remaining string upon her lyre, while a single star shines in the blue heavens, it is not obvious to every one that the idea of "Hope" (1885) is suggested. There can be few, nevertheless, who will maintain that his aim is not a lofty one; and the strongest evidence of the artist's greatness, to those who accept his doctrine, is the fact that he has not only striven untiringly for his own ideals, but has very often gloriously attained them. Moreover, in so doing he has not failed on occasion to impart to his work much of that very charm which is to him a secondary consideration, or to exhibit an assured and accomplished mastery of the technical achievement which is to some the primary object and essential triumph of painting. It was, in short, the rare combination of supreme handicraft with a great imaginative intellect which secured to Watts his undisputed place in the public estimation of his day. The grandeur and dignity of his style, the ease and purposefulness of his brushwork, the richness and harmoniousness of his colouring—qualities partly his own, partly derived from his study of Italian masters at an early and impressionable age—are acknowledged even by those to whom his elevated educational intentions are a matter of indifference, if not of absolute disapprobation; while many, to whom his exceptional artistic attainment is a sealed book, have gathered courage or consolation from the grave moral purpose and deep human sympathy of his teaching. He expresses his ideas for the most part in terms of beauty, an idealized, classical beauty of form, a glowing, Venetian beauty of colour, though his conviction of the deadly danger of heaped-up riches, which he vindicated in his life as well as in his work, has, in such cases as "The Minotaur" (exhibited in 1896), "Mammon" (1885) and "Jonah" (1895), where the unveiled vileness of Cruelty and Greed is fearlessly depicted, driven him to the presentment of sheer ugliness or brutality. Far oftener a vast, all-embracing tenderness inspires his work; it is the sorrow, not the sin, that stirs him. When he would rebuke the thoughtless inhumanity which sacrifices its annual hecatombs of innocent birds to fashionable vanity and grasping commerce, it is not upon the blood and cruelty that he dwells, but the pity of it that he typifies in "Dedication" or "The Shuddering Angel" (1892) weeping over the altar spread with Woman's spoils.

Yet it is as a teacher that the artist is seen at his highest: he would sooner point out the true way to those who seek it than admonish those who have wandered. He never wearies of emphasizing the reality of the power of Love, the fallacy underlying the fear of Death. To the early masters Death was a bare and ghastly skeleton, above all things to be shunned; to Watts it is a grand, impressive figure, awful indeed but not horrible, irresistible but not ruthless, a bringer of rest and peace, not to be rashly sought but to be welcomed when the inevitable hour shall strike. "*Sic transit*" (1892) conveys most completely, perhaps, Watts's lesson on the theme of death. Stretched on a bier and reverently sheeted lies a corpse; strewn neglected on the ground lie the ermine robe of worldly rank, the weapons of the warrior, the lute of the musician, the book of human learning, the palmer's robe of late repentance and the roses of fleeting pleasures; the laurel crown remains as the one thing worth the winning, and the inscription "What I spent I had; what I saved I lost; what I gave I have," points the moral. Such is the significance of the still more masterly "Court of Death" (finally completed 1902 and now in the Tate Gallery). To the same early masters Love was usually a mere distributor of sensual pleasures, a tricksy spirit instinct with malice and bringing more harm than happiness to humanity, though neither was of much moment. Watts has not altogether ignored this view, and in "Mischief" (1878) has portrayed Man, love-led, entangled among the thorns of the world; but, in the main, Love to him is the chief guide and helper of mankind along the barren, rock-strewn path of life, through whom alone he can attain the higher levels, and who triumphs in the end over Death itself. To these views on the all-importance of love a trilogy of pictures in the Tate Gallery gives full expression. In the first, "Love and Life," exhibited in 1885, a replica of an earlier picture in the Metropolitan Museum, New York, and of another version presented by him to the Luxembourg, Paris, Love, a figure in the prime of manhood, leads and supports the slender, clinging girl who symbolizes Life up to the craggy mountain-top, while he partly shields her from the blast under a broad wing. Of this he himself said, "Probably 'Love and Life' best portrays my message to the age. Life, represented by the female figure, never could have reached such heights unless protected and guided by Love";[1] and in the prefatory note to the exhibition of his works in 1896 he wrote, "The slight female figure is an emblem of the fragile quality in humanity, at once its weakness and its strength; *sensibility*, aided by Love, sympathy, tenderness, self-sacrifice, and all that the range of the term implies, humanity ascends the rugged path from brutality to spirituality." The limitations of earthly love are shown in the second "Love and Death," one version of which was exhibited in 1877 and others in 1896, &c. In this, Love, a beautiful boy, striving vainly to bar the door to the mighty figure of Death, is thrust back with crushed wings powerless to stay the advance; but that the defeat is merely apparent and temporary is suggested rather than asserted by the third "Love Triumphant" (1898), where Time, with broken scythe, and Death lie prostrate, while the same youth, with widespread wings and face and arms upraised to heaven, stands between them on tiptoe as if preparing to soar aloft. Though the purely symbolical is the most distinctive side of Watts's art, it is by no means the only one. He has drawn inspiration largely from both the Old and New Testaments, more rarely from the poets and classical myths; still more rarely he has treated subjects of modern life, though even in these he has not abandoned his moral purpose, but has sought out such incidents, whether fictitious or historical, as will serve him in conveying some lesson or monition. The three pictures of the story of Eve in the Tate Gallery, "She shall be called woman" (1892), "Eve Tempted" and "Eve Repentant" (both exhibited in 1896), and "The Curse of Cain" (1872) in the Diploma Gallery, may be cited as examples of the first; "For he had great possessions" (1894) of the second; "Sir Galahad" (1862), "Orpheus and Eurydice" and "Psyche" (1880), of the third; and "The Irish Famine" (about 1847) and "A Patient Life of Unrewarded Toil" (1890), of the last of these. Never has he treated religion from a sectarian point of view.

Watts is before all things a painter with a grave and earnest purpose, painting because that form of expression was easier to him than writing, though he has published some few articles and pamphlets, chiefly on art matters; but he, too, has his lighter side, and has daintily treated the humorously fanciful in "Good luck to your fishing" (1889); "The habit does not make the monk" (1889), in which Cupid, half-hidden under the frock, taps maliciously at a closed door; and "Trifles Light as Air" (exhibited 1901), a swarm of little amorini drifting in the summer air like a cloud of gnats; while in "*Experientia docet B.C.*" (1890), a primeval woman watching with admiration, not unmixed with anxiety, the man who has first swallowed an oyster, he condescends, not very successfully, to the frankly comic. These must be regarded, however, as merely the relaxations of the serious mind that has left its impress even on the relatively few, but very admirable, landscapes he produced, in which, as for instance "The Carrara Mountains from Pisa" (1881), a sober dignity of treatment is conspicuous.

Watts's technique is as individual as his point of view. It is chiefly remarkable for its straightforwardness and simplicity, and its lack of any straining after purely technical effects. The idea to be expressed is of far higher importance to him than the manner of expressing it. The statement of it should be a matter of good, sound workmanship, not of artistic agility or manual dexterity. To say what he has to say as clearly and briefly as may be is his aim, and when he has achieved the effect he desires, the method of his doing so is of no further moment. In the use of paint as paint, in the intrinsic beauties of surface and handling, he would seem in his later years to take no delight. Thus in parts of the picture the rough, coarse canvas he prefers may be so thinly covered that every fibre of the material can be seen, while in others a richly modelled impasto loads the surface. He employs, as far as possible, pure colours laid on in direct juxtaposition or broken into and across each other, not blended and commingled on the palette. He eschews all elaboration of detail and, except in portraiture, works rarely from the living model, neglecting minor delicacies of form or passages of local colour, conventionalizing to a standard of his own rather than idealizing—a process not always unproductive of faults of drawing and proportion, as in the figure of "Faith" (1896), or of singularities of tint, as in the curious leaden face and prismatic background in "The Dweller in the Innermost" (1886). He avoids, as a rule, the use of definite outline, leaving the limits of his forms to melt imperceptibly into the background; nor does texture interest him greatly, and a uniform fresco-like surface is apt to represent flesh and foliage, distance and foreground alike. He intends deliberately that the things he depicts, be they what they may, shall be symbols, useful for their meaning alone, and he makes no attempt at conferring on them an accurate actuality, which might distract the attention from the paramount idea. That this reticence is intentional may be learned from an examination of his earliest works, in which the accessories are rendered with a precise, if sometimes a dry, truthfulness of observation; that it is not due to carelessness or indifference is shown by the inexhaustible patience with which each picture has been executed. His earlier pictures are unsurpassed in the art of England for fine technical qualities of colour and delicacy of handling. Though working unceasingly, Watts never hurried the completion of any canvas. Of two slightly differing versions of "Fata Morgana," both begun in 1847, the first was not finished before 1870, the second not until ten years later. Even after finishing a picture sufficiently for exhibition, he often subsequently worked further upon it. The portrait of Lord Leighton, exhibited in 1881, was repainted in 1888; the version of "Love and Death," exhibited in 1877, and 1883, and all the pictures presented to the Tate Gallery in 1897, were more or less retouched when hung there. Furthermore, he painted more than one version of several of his favourite subjects, a circumstance which, combined with the fact that he rarely added the year to his signature and kept no record of his annual production, makes the task of precisely dating his pictures for the most part impossible, while it renders any attempt to dispose his works in periods untrustworthy and artificial, since even the growth and inevitable decay of artistic power are to a considerable extent obscured.

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[1] *G. F. Watts, R.A.*, by Charles T. Bateman.

Founded admittedly on the Grecian monuments, there is a sculpturesque rather than pictorial quality in most of his compositions, a regulated disposition which, though imparting often a certain air of unreality and detachment, inspires them nevertheless with that noble impressiveness which forms their most conspicuous characteristic. It is natural, therefore, that in sculpture itself he should also take a high place. A taste for this he acquired as a boy; he was a constant visitor to the studio of Behnes, where he not infrequently made drawings from the casts, though he was never in any sense his pupil. Among his works in this branch of art are a bust of "Clytie" (1868), monuments to the marquis of Lothian, Bishop Lonsdale and Lord Tennyson, a large bronze equestrian statue of "Hugo Lupus" at Eaton Hall (1884), and a colossal one of a man on horseback, emblematical of "Physical Energy," originally intended for a place on the Embankment, but destined to stand among the Matoppo Hills as an enduring evidence of the artist's admiration for Cecil Rhodes; a replica has been placed in Kensington Gardens. It was the practical idealism of Rhodes that appealed to him, and in this quality Watts himself was by no means lacking. Much of his time and attention was given to the promotion of the Home Arts and Industries Association; he assisted Mrs Watts with both money and advice in the founding of an art pottery at Compton, and in the building at the same place of a highly decorated mortuary chapel, carried out almost entirely by local labour; and it was entirely due to his initiative that the erection in Postmen's Park, Aldersgate Street, London, of memorial tablets to the unsung heroes of everyday life was begun.

—M. H. Spielmann, "The Works of Mr G. F.
Catalogue of his Pictures," *Pall Mall Gazette*
Julia Cartwright (Mrs Ady), "G. F. Watts,
His Life and Work," *Art Journal*, Extra
E. T.
Work of George Frederick
(1888 and 1889); Cosmo
(1889); Charles T. Bate-
ries of Painters (1901);
" *The Review of Reviews*
(M. Be.)

WATTS, ISAAC (1674–1748), English theologian and hymn writer, son of a clothier, was born at Southampton on the 17th of July 1674. The father, who afterwards had a boarding-school at Southampton, also wrote poetry, and a number of his pieces were included by mistake in vol. i. of the son's *Posthumous Works*. Isaac Watts is stated to have begun to learn Latin when only in his fifth year, and at the age of seven or eight to have composed some devotional pieces to please his mother. His nonconformity precluded him from entering either of the universities, but in his sixteenth year he went to study at the nonconformist academy at Stoke Newington, of which the Rev. Thomas Rowe, minister of the Independent meeting at Girdlers' Hall, was then president. On leaving the academy he spent more than two years at home, and began to write his hymns, but in the autumn of 1696 he became tutor in the family of Sir John Hartopp at Stoke Newington, where he probably prepared the materials of his two educational works—*Logick, or the Right Use of Reason in the Enquiry after Truth* (1725), and *The Knowledge of the Heavens and the Earth made easy, or the First Principles of Geography and Astronomy Explained* (1726). In his twenty-fourth year Watts was chosen assistant to Dr Isaac Chauncy (1632–1712), pastor of the Independent congregation in Mark Lane, London, and two years later he succeeded as sole pastor. The state of his health, which he had injured by overwork, led to the appointment of an assistant in 1703. In 1704 the congregation removed to Pinner's Hall, and in 1708 they built a new meeting-house in Bury Street. In 1712 Watts was attacked by fever, which incapacitated him for four years from the performance of his duties. In 1712 he went to live with Sir Thomas Abney of Abney Park, where he spent the remainder of his life, the arrangement being continued by Lady Abney after her husband's death. Watts preached only occasionally, devoting his leisure chiefly to the writing of hymns (see HYMNS), the preparation of his sermons for publication, and the composition of theological work. In 1706 appeared his *Horae Lyricae*, of which an edition with memoir by Robert Southey forms vol. ix. of *Sacred Classics* (1834); in 1707 a volume of *Hymns*; in 1719 *The Psalms of David*; and in 1720 *Divine and Moral Songs for Children*. His Psalms are free paraphrases, rather than metrical versions, and some of them ("O God, our help in ages past," for instance) are amongst the most famous hymns in the language. His religious opinions were more liberal in tone than was at that time common in the community to which he belonged; his views regarding Sunday recreation and labour were scarcely of puritanical strictness; and his Calvinism was modified by his rejection of the doctrine of reprobation. He did not hold the doctrine of the Trinity as necessary to salvation, and he wrote several works on the subject in which he developed views not far removed from Arianism. He died on the 25th of November 1748, and was buried at Bunhill Fields, where a tombstone was erected to his memory by Sir John Hartopp and Lady Abney. A memorial was also erected to him in Westminster Abbey, and a memorial hall, erected in his honour at Southampton, was opened in 1875.

Among the theological treatises of Watts, in addition to volumes of sermons, are *Doctrine of the Trinity* (1722); *Discourses on the Love of God and its Influence on all the Passions* (1729); *Catechisms for Children and Youth* (1730); *Essays towards a Proof of a Separate State for Souls* (1732); *Essay on the Freedom of the Will* (1732); *Essay on the Strength and Weakness of Human Reason* (1737); *Essay on the Ruin and Recovery of Mankind* (1740); *Glory of Christ as God-Man Unveiled* (1746); and *Useful and Important Questions concerning Jesus, the Son of God* (1746). He was also the author of a variety of miscellaneous treatises. His *Posthumous Works* appeared in 1773, and a further instalment of them in 1779. *The Works of . . . Issac Watts* (6 vols.), edited by Dr Jennings and Dr Doddridge, with a memoir compiled by G. Burder, appeared in 1810–1811. His poetical works were included in Johnson's *English Poets*, where they were accompanied by a *Life*, and they appear in subsequent similar collections. See also *The Life, Times and Correspondence of Isaac Watts* (1834) by Thomas Milner.

WATTS-DUNTON, WALTER THEODORE (1832–), English man of letters, was born at St Ives, Huntingdon, on the 12th of October 1832, his family surname being Watts, to which he added in 1897 his mother's name of Dunton. He was originally educated as a naturalist, and saw much of the East Anglian gypsies, of whose superstitions and folk-lore he made careful study. Abandoning natural history for the law, he qualified as a solicitor and went to London, where he practised for some years, giving his spare time to his chosen pursuit of literature. He contributed regularly to the *Examiner* from 1874 and to the *Athenaeum* from 1875 until 1898, being for more than twenty years the principal critic of poetry in the latter journal. His article on "Poetry" in the ninth edition of the *Ency. Brit.* (vol. xix., 1885) was the principal expression of his views on the first principles of the subject, and did much to increase his reputation, which was maintained by other articles he wrote for the *Encyclopaedia Britannica* and for the chief periodicals and reviews. Mr Watts-Dunton had considerable influence as the friend of many of the leading men of letters of his time; he enjoyed the confidence of Tennyson, and contributed an appreciation of him to the authorized biography. He was in later years Rossetti's most intimate friend. He was the bosom friend of Swinburne (*q.v.*), who shared his home for nearly thirty years before he died in 1909. The obituary notices and appreciations of the poets of the time, which he contributed to the *Athenaeum* and other periodicals, bore testimony to his sympathy, insight and critical acumen. It was not, however, until 1897 that he published a volume under his own name, this being his collection of poems called *The Coming of Love*, portions of which he had printed in periodicals from time to time. In the following year his prose romance *Aylwin* attained immediate success, and ran through many editions in the course of a few months. Both *The Coming of Love* and *Aylwin* set forth, the one in poetry, the other in prose, the romantic and passionate associations of Romany life, and maintain the traditions of Borrow, whom Mr Watts-Dunton had known well in his own early days. Imaginative glamour and mysticism are their prominent characteristics, and the novel in particular has had its share in restoring the charms of pure romance to the favour of the general public. He edited George Borrow's *Lavengro* (1893) and *Romany Rye* (1900); in 1903 he published *The Renascence of Wonder*, a treatise on the romantic movement; and his *Studies of Shakespeare* appeared in 1910. But it was not only in his published work that Mr Watts-Dunton's influence on the literary life of his time was potent. His long and intimate association with Rossetti and Swinburne made him, no doubt, a unique figure in the world of letters; but his own grasp of metrical principle and of the historic perspective of the glories of English poetry made him, among the younger generation, the embodiment of a great tradition of literary criticism which could never cease to command respect. In 1905 he married. His life has been essentially one of devotion to letters, faithfully and disinterestedly followed.

WAUGH, BENJAMIN (1839–1908), English social reformer, was born at Settle, Yorkshire, on the 20th of February 1839. He passed the early years of his life in business, but in 1865 entered the congregational ministry. Settling at Greenwich he threw himself with ardour into the work of social reform, devoting himself especially to the cause of the children. He served on the London School Board from 1870 to 1876. In 1884 he was responsible for the establishment of the London society for the prevention of cruelty to children, which four years later was established on a national basis. He was elected its honorary secretary, and it was largely owing to information obtained by him that the Criminal Law Amendment Act of 1885 was passed, while by his personal effort he secured the insertion of a clause giving magistrates power to take the evidence of children too young to understand the nature of an oath. In 1889 he saw the work accomplished by his society (of which he had been made director the same year) recognized by the passing of an act for the prevention of cruelty to children, the first stepping-stone to the act of 1908 (see CHILDREN, LAW RELATING TO). In 1895 a charter of incorporation was conferred on the society, but in 1897 it was the object of a serious attack on its administration. An inquiry was demanded by Waugh, and the commission of inquiry, which included Lord Herschell and others, completely vindicated the society and its director. Waugh had given up pastoral work in 1887 to devote his whole time to the society, and he retained his post as director until 1905, when the state of his health compelled his retirement. He remained consulting director until his death at Westcliff, near Southend, Essex, on the 11th of March 1908. Waugh edited the *Sunday Magazine* from 1874 to 1896, but he had otherwise little leisure for literary work. His *The Gaol Cradle, who rocks it?* (1873) was a plea for the abolition of juvenile imprisonment.

WAUGH, EDWIN (1817–1890), known as "The Lancashire Poet," was born at Rochdale, on the 29th of January 1817, the son of a shoemaker. For several years he earned his living as a journeyman printer in various parts of the country. In 1855 he published his first book, *Sketches of Lancashire Life and Localities*, following this up with reprinted *Poems and Songs* (1859). His rendering of the Lancashire dialect was most happy, and his rude lyrics, full of humour and pathos, were great favourites with his countrymen. He died on the 30th of April 1890.

See Milner's *Memoir* in an edition of Waugh's selected works (1892–1893).

WAUKEGAN, a city and the county-seat of Lake county, Illinois, U.S.A., on the W. shore of Lake Michigan, about 36 m. N. of Chicago. Pop. (1890) 4915; (1900) 9426, of whom 2506 were foreign-born; (1910 census) 16,069. It is served by the Elgin, Joliet & Eastern (of which it is a terminus) and the Chicago & North Western railways, by an interurban electric line, and by lake steamers. In 1880 the United States government undertook the formation of an artificial harbour with a channel 13 ft. deep, and in 1902–1904 the depth was increased to 20 ft. The main portion of the city is situated about 100 ft. above the level of the lake. There are a number of parks and mineral springs, and along the lake front a fine driveway, Sheridan Road. The city is a residential suburb of Chicago. The principal buildings are the Federal building, the Court House, a Carnegie library, the Masonic Temple and McAlister Hospital. At the village of North Chicago (pop. in 1910, 3306), about 3 m. S. of Waukegan, there is a United States Naval Training Station. Waukegan is the commercial centre of an agricultural and dairying region, and has various manufactures. The total value of the factory product in 1905 was $3,961,513. Waukegan was settled about 1835, and until 1849 was known as Little Fort, which is supposed to be the English equivalent of the Indian name Waukegan. It became the county-seat of Lake county in 1841, was incorporated as a town in 1849, and first chartered as a city in 1859.

WAUKESHA, a city and the county-seat of Waukesha county, Wisconsin, U.S.A., about 19 m. W. of Milwaukee on the Little Fox river. Pop. (1890) 6321; (1900) 7419, including 1408 foreign-born; (1905 state census) 6949; (1910) 8740. Waukesha is served by the Minneapolis, St Paul & Sault Ste Marie, the Chicago & North-Western and the Chicago, Milwaukee & St Paul railways, and by interurban electric railways connecting it with Milwaukee, Oconomowoc and Madison. The medicinal mineral springs (Bethesda, White Rock, &c.) are widely known. Among the public buildings are the county court house and the public library. Waukesha is the seat of the State Industrial School for Boys (established as a house of refuge in 1860) and of Carroll College (Presbyterian, co-educational, 1846). Waukesha was first settled in 1834, was named Prairieville in 1839, was incorporated as a village under its present name (said to be a Pottawatomi word meaning "fox") in 1852, and chartered as a city in 1896. In 1851 the first railway in the state was completed between Milwaukee and Waukesha, but the village remained only a farming community until the exploitation of the mineral springs was begun about 1868. About 15 m. S. of Waukesha, near Mukwonago (pop. in 1910, 615), in 1844–1845, there was an unsuccessful communistic agricultural settlement, the Utilitarian Association, composed largely of London mechanics led by Campbell Smith, a London bookbinder.

WAURIN (or WAVRIN), **JEHAN** (or JEAN DE) (d. *c.* 1474), French chronicler, belonged to a noble family of Artois, and was present at the battle of Agincourt. Afterwards he fought for the Burgundians at Verneuil and elsewhere, and then occupying a high position at the court of Philip the Good, duke of Burgundy, was sent as ambassador to Rome in 1463. Jehan wrote, or rather compiled, the *Recueil des croniques et anchiennes istories de la Grant Bretaigne*, a collection of the sources of English history from the earliest times to 1471. For this work he borrowed from Froissart, Monstrelet and others; but for the period between 1444 and 1471 the *Recueil* is original and valuable, although somewhat untrustworthy with regard to affairs in England itself.

From the beginning to 688 and again from 1399 to 1471 the text has been edited for the Rolls Series (5 vols., London, 1864–1891), by W. and E. L. C. P. Hardy, who have also translated the greater part of it into English. The section from 1325 to 1471 has been edited by L. M. E. Dupont (Paris, 1858–1863).

WAUSAU, a city and the county-seat of Marathon county, Wisconsin, U.S.A., on both banks of the Wisconsin river, about 185 m. N.W. of Milwaukee. Pop. (1890) 9253; (1900) 12,354, of whom 3747 were foreign-born; (1910 census) 16,560. There is a large German element in the population, and two German semi-weekly newspapers are published here. Wausau is served by the Chicago, Milwaukee & St Paul and the Chicago & North-Western railways. The city is built for the most part on a level plateau above the river and extends to the top of high bluffs on either side. It has a fine city hall, a Carnegie library, the Marathon County Court House, a hospital, built by the Sisters of the Divine Saviour, and a Federal Building. In Wausau are a U.S. land office, the Marathon County Training School for Teachers, the Marathon County School of Agriculture and Domestic Science, and a County Asylum for the Chronic Insane. Valuable water-power furnished by the Big Bull Falls of the Wisconsin (in the city) is utilized for manufacturing, and in 1910 water-power sites were being developed on the Wisconsin river immediately above and below the city. In 1905 the factory products were valued at $4,644,457. Wausau had its origin in a logging-camp, established about 1838. In 1840 a saw-mill was built here, and in 1858 the village was incorporated under its present name. After 1880, when Wausau was chartered as a city, its growth was rapid.

WAUTERS, EMILE (1848–   ), Belgian painter, was born in Brussels, 1848. Successively the pupil of Portaels and Gérôme, he produced in 1868 "The Battle of Hastings: the Finding of the body of Harold by Edith," a work of striking, precocious talent. A journey was made to Italy, but that the study of the old masters in no wise affected his individuality was proved by "The Great Nave of St Mark's" (purchased by the king of the Belgians). As his youth disqualified him for the medal of the Brussels Salon, which otherwise would have been his, he was sent, by way of compensation, by the minister of fine arts, as artist-delegate to Suez for the opening of the canal—a visit that was fruitful later on. In 1870, when he was yet only twenty-two years of age, Wauters exhibited his great historical picture of "Mary of Burgundy entreating the Sheriffs of Ghent to pardon the Councillors Hugonet and Humbercourt" (Liége Museum) which created a veritable furore, an impression which was confirmed the following year at the London International Exhibition. It was eclipsed by the celebrated "Madness of Hugo van der Goes" (1872, Brussels Museum), a picture which led to the commission for the two large works decorating the Lions' staircase of the Hôtel de Ville—"Mary of Burgundy swearing to respect the Communal Rights of Brussels, 1477" and "The Armed Citizens of Brussels demanding the Charta from Duke John IV. of Brabant." His other large compositions comprise "Sobieski and his Staff before Besieged Vienna" (Brussels Museum) and the harvest of a journey to Spain and Tangiers, "The Great Mosque," and "Serpent Charmers of Sokko," and a souvenir of his Egyptian travel, "Cairo, from the Bridge of Kasr-el-Nil" (Antwerp Museum). His vast panorama [illegible] and most artistic work of this class ever [illegible] the Banks of the Nile" (1881), 380 ft. [illegible] months, was exhibited with extra- [illegible] Munich, and the Hague. Wauters [illegible], in his earliest period exhibiting, [illegible] and subtle grip, but later on developing into the whole range of a brilliant, forceful palette, and then into brighter and more delicate colours, encouraged thereto, in his more recent work, by his adoption of pastel as a medium even for life-size portraits, mainly of ladies. His portraits, numbering over two hundred, include many of the greatest names in Belgium, France, and America (Wauters having for some years made Paris his chief home). Among these may be named the Baron Goffinet, the Baroness Goffinet, Madame Somzée (standing at a piano), Master Somzée (on horseback by the sea-shore), the Princess Clementine of Belgium (Brussels Museum), Lady Edward Sassoon, Baron de Bleichroder, Princess de Ligne, Miss Lorillard, a likeness of the artist in the Dresden Museum, and M. Schollaert (president of the Chamber of Deputies)—the last named an amazing example of portraiture, instinct with character and vitality. The vigour of his male, and the grace and elegance of his female, portraits are unsurpassable, the resemblance perfect and the technical execution such as to place the artist in the front rank. Between 1889 and 1900 the painter contributed to the Royal Academy of London. Few artists have received such a succession of noteworthy distinctions and recognitions. His "Hugo van der Goes," the work of a youth of twenty-four, secured the grand medal of the Salon. He has been awarded no fewer than six "medals of honour"—at Paris in 1878 and 1889; Munich, 1879; Antwerp, 1885; Vienna, 1888; and Berlin, 1883. He is a member of the academy of Belgium, and honorary member of the Vienna, Berlin, and Munich academies, and corresponding member of the Institut de France and of that of Madrid. He has received the order of merit of Prussia, and is Commander of the order of Leopold, and of that of St Michael of Bavaria, officer of the Legion of Honour, &c.

See M. H. Spielmann, *Magazine of Art* (1887); A. J. Wauters, *Magazine of Art* (1894); Joseph Anderson, *Pall Mall Magazine* (1896); G. Serαé ("Wauters as a Painter of Architecture") *Architectural Record* (1901). (M. H. S.)

WAVE.[1] It is not altogether easy to frame a definition which shall be precise and at the same time cover the various physical phenomena to which the term "wave" is commonly applied. Speaking generally, we may say that it denotes a process in which a particular *state* is continually handed on without change, or with only gradual change, from one part of a medium to another. The most familiar instance is that of the waves which are observed to travel over the surface of water in consequence of a local disturbance; but, although this has suggested the name[1] since applied to all analogous phenomena, it so happens that water-waves are far from affording the simplest instance of the process in question. In the present article the principal types of wave-motion which present themselves in physics are reviewed in the order of their complexity. Only the leading features are as a rule touched upon, the reader being referred to other articles for such developments as are of interest mainly from the point of view of special subjects. The theory of water-waves, on the other hand, will be treated in some detail.

§ 1. *Wave-Propagation in One Dimension.*

The simplest and most easily apprehended case of wave-motion is that of the transverse vibrations of a uniform tense string. The axis of x being taken along the length of the string in its undisturbed position, we denote by y the transverse displacement at any point. This is assumed to be infinitely small; the resultant lateral force on any portion of the string is then equal to the tension (P, say) multiplied by the total curvature of that portion, and therefore in the case of an element δx to $Py''\delta x$, where the accents denote differentiations with respect to x. Equating this to $\rho\delta x.\ddot{y}$, where ρ is the line-density, we have

$$\ddot{y} = c^2 y'', \qquad (1)$$

where

$$c = \sqrt{(P/\rho)}. \qquad (2)$$

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[1] The word "wave," as a substantive, is late in English, not occurring till the Bible of 1551 (Skeat, *Etym. Dict.*, 1910). The proper O. Eng. word was *wǣg*, which became *wawe* in M. Eng.; it is cognate with Ger. *Woge*, and is allied to "wag," to move from side to side, and is to be referred to the root *wegh*, to carry, Lat. *vehere*, Eng. "weigh," &c. The O. Eng. *wafian*, M. Eng. *waven*, to fluctuate, to waver in mind, cf. *waefre*, restless, is cognate with M.H.G. *wabelen*, to move to and fro, cf. Eng. "wabble" of which the ultimate root is seen in "whip," and in "quaver."

The general solution of (1) was given by J. le R. d'Alembert in 1747: it is

$$y=f(ct-x)+F(ct+x), \quad . \quad . \quad . \quad . \quad (3)$$

where the functions f, F are arbitrary. The first term is unaltered in value when x and ct are increased by equal amounts; hence this term, taken by itself, represents a wave-form which is propagated without change in the direction of x-positive with the constant velocity c. The second term represents in like manner a wave-form travelling with the same velocity in the direction of x-negative; and the most general free motion of the string consists of two such wave-forms superposed. In the case of an initial disturbance confined to a finite portion of an unlimited string, the motion finally resolves itself into two waves travelling unchanged in opposite directions. In these separate waves we have

$$\dot{y}=\mp cy', \quad . \quad . \quad . \quad . \quad . \quad (4)$$

as appears from (3), or from simple geometrical considerations. It is to be noticed, in this as in all analogous cases, that the wave-velocity appears as the square root of the ratio of two quantities, one of which represents (in a generalized sense) the elasticity of the medium, and the other its inertia.

The expressions for the kinetic and potential energies of any portion of the string are

$$T=\tfrac{1}{2}\rho\int\dot{y}^2dx, \quad V=\tfrac{1}{2}P\int y'^2dx, \quad . \quad . \quad . \quad (5)$$

where the integrations extend over the portion considered. The relation (4) shows that in a single progressive wave the total energy is half kinetic and half potential.

When a point of the string (say the origin O) is fixed, the solution takes the form

$$y=f(ct-x)-f(ct+x). \quad . \quad . \quad . \quad . \quad (6)$$

As applied (for instance) to the portion of the string to the left of O, this indicates the superposition of a reflected wave represented by the second term on the direct wave represented by the first. The reflected wave has the same amplitudes at corresponding points as the incident wave, as is indeed required by the principle of energy, but its sign is reversed.

The reflection of a wave at the junction of two strings of unequal densities ρ, ρ' is of interest on account of the optical analogy. If A, B be the ratios of the amplitudes in the reflected and transmitted waves, respectively, to the corresponding amplitudes in the incident wave, it is found that

$$A=-(\mu-1)/(\mu+1), \ B=2\mu/(\mu+1), \quad . \quad . \quad . \quad (7)$$

where μ, $=\sqrt{(\rho'/\rho)}$, is the ratio of the wave-velocities. This is on the hypothesis of an abrupt change of density; if the transition be gradual there may be little or no reflection.

The theory of waves of longitudinal vibration in a uniform straight rod follows exactly the same lines. If ξ denote the displacement of a particle whose undisturbed position is x, the length of an element of the central line is altered from δx to $\delta x+\delta\xi$, and the elongation is therefore measured by ξ'. The tension across any section is accordingly $E\omega\xi'$, where ω is the sectional area, and E denotes Young's modulus for the material of the rod (see ELASTICITY). The rate of change of momentum of the portion included between two consecutive cross-sections is $\rho\omega\delta x.\ddot{\xi}$, where ρ now stands for the volume-density. Equating this to the difference of the tensions on these sections we obtain

$$\ddot{\xi}=c^2\xi'', \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8)$$

where

$$c=\sqrt{(E/\rho)}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (9)$$

The solution and the interpretation are the same as in the case of (1). It may be noted that in an iron or steel rod the wave-velocity given by (9) amounts roughly to about five kilometres per second.

The theory of plane elastic waves in an unlimited medium, whether fluid or solid, leads to differential equations of exactly the same type. Thus in the case of a fluid medium, if the displacement ξ normal to the wave-fronts be a function of t and x, only, the equation of motion of a thin stratum initially bounded by the planes x and $x+\delta x$ is

$$\rho_0\frac{\partial^2\xi}{\partial t^2}=-\frac{\partial p}{\partial x} \quad . \quad . \quad . \quad . \quad . \quad . \quad (10)$$

where p is the pressure, and ρ_0 the undisturbed density. If p depends only on the density, we may write, for small disturbances,

$$p=p_0+ks, \quad . \quad . \quad . \quad . \quad . \quad . \quad (11)$$

where s, $=(\rho-\rho_0)/\rho_0$, is the "condensation," and k is the coefficient of cubic elasticity. Since $s=-\partial\xi/\partial x$, this leads to

$$\frac{\partial^2\xi}{\partial t^2}=c^2\frac{\partial^2\xi}{\partial x^2} \quad . \quad . \quad . \quad . \quad . \quad . \quad (12)$$

with

$$c=\sqrt{(k/\rho)}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (13)$$

The latter formula gives for the velocity of sound in water a value (about 1490 metres per second at 15° C.) which is in good agreement with direct observation. In the case of a gas, if we neglect variations of temperature, we have $k=p_0$ by Boyle's Law, and therefore $c=\sqrt{(p_0/\rho_0)}$. This result, which is due substantially to Sir I. Newton, gives, however, a value considerably below the true velocity of sound. The discrepancy was explained by P. S. Laplace (about 1806?). The temperature is not really constant, but rises and falls as the gas is alternately compressed and rarefied. When this is allowed for we have $k=\gamma p_0$, where γ is the ratio of the two specific heats of the gas, and therefore $c=\sqrt{(\gamma p_0/\rho_0)}$. For air, $\gamma=1{\cdot}41$, and the consequent value of c agrees well with the best direct determinations (332 metres per second at 0° C.).

The potential energy of a system of sound waves is $\tfrac{1}{2}ks^2$ per unit volume. As in all cases of propagation in one dimension, the energy of a single progressive system is half kinetic and half potential.

In the case of an unlimited isotropic elastic solid medium two types of plane waves are possible, viz. the displacement may be normal or tangential to the wave-fronts. The axis of x being taken in the direction of propagation, then in the case of a normal displacement ξ the traction normal to the wave-front is $(\lambda+2\mu)\partial\xi/\partial x$, where λ, μ are the elastic constants of the medium, viz. μ is the "rigidity," and $\lambda=k-\tfrac{2}{3}\mu$, where k is the cubic elasticity. This leads to the equation

$$\ddot{\xi}=a^2\xi'', \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (14)$$

where

$$a=\sqrt{\{(\lambda+2\mu)/\rho\}}=\sqrt{\{(k+\tfrac{4}{3}\mu)/\rho\}}. \quad . \quad . \quad (15)$$

The wave-velocity is greater than in the case of the longitudinal vibrations of a rod, owing to the lateral yielding which takes place in the latter case. In the case of a displacement η parallel to the axis of y, and therefore tangential to the wave-fronts, we have a shearing strain $\partial\eta/\partial x$, and a corresponding shearing stress $\mu\partial\eta/\partial x$. This leads to

$$\ddot{\eta}=b^2\eta'' \quad . \quad . \quad . \quad . \quad . \quad . \quad (16)$$

with

$$b=\sqrt{(\mu/\rho)}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (17)$$

In the case of steel ($k=1{\cdot}841 \,.\, 10^{12}$, $\mu=8{\cdot}19 \,.\, 10^{11}$, $\rho=7{\cdot}849$ C.G.S.) the wave-velocities a, b come out to be 6·1 and 3·2 kilometres per second, respectively.

If the medium be crystalline the velocity of propagation of plane waves will depend also on the aspect of the wave-front. For any given direction of the wave-normal there are in the most general case three distinct velocities of wave-propagation, each with its own direction of particle-vibration. These latter directions are perpendicular to each other, but in general oblique to the wave-front. For certain types of crystalline structure the results simplify, but it is unnecessary to enter into further details, as the matter is chiefly of interest in relation to the now abandoned elastic-solid theories of double-refraction. For the modern electric theory of light see LIGHT, and ELECTRIC WAVES.

Finally, it may be noticed that the conditions of wave-propagation without change of type may be investigated in another manner. If we impress on the whole medium a velocity equal and opposite to that of the wave we obtain a "steady" or "stationary" state in which the circumstances at any particular point of space are constant. Thus in the case of the vibrations of an inextensible string we may, in the first instance, imagine the string to run through a fixed smooth tube having the form of the wave. The velocity c being constant there is no tangential acceleration, and the tension P is accordingly uniform. The resultant of the tensions on the two ends of an element δs is $P\delta s/R$, in the direction of the normal, where R denotes the radius of curvature. This will be exactly sufficient to produce the normal acceleration c^2/R in the mass $\rho\delta s$, provided $c^2=P/\rho$. Under this condition the tube, which now exerts no pressure on the string, may be abolished, and we have a free stationary wave on a moving string. This argument is due to P. G. Tait.

The method was applied to the case of air-waves by W. J. M. Rankine in 1870. When a gas flows steadily through a straight tube of unit section, the mass m which crosses any section in unit time must be the same; hence if u be the velocity we have

$$\rho u=m. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (18)$$

Again, the mass which at time t occupies the space between two fixed sections (which we will distinguish by suffixes) has its momentum increased in the time δt by $(mu_2-mu_1)\,\delta t$, whence

$$p_1-p_2=m(u_2-u_1). \quad . \quad . \quad . \quad . \quad (19)$$

Combined with (18) this gives

$$p_1+m^2/\rho_1=p_2+m^2/\rho_2. \quad . \quad . \quad . \quad . \quad . \quad (20)$$

Hence for absolutely steady motion it is essential that the expression $p+m^2/\rho$ should have the same value throughout the wave. This condition is not accurately fulfilled by any known substance, whether subject to the "isothermal" or "adiabatic" condition; but in the case of *small* variations of pressure and density the relation is equivalent to

$$m^2=\rho^2dp/d\rho, \quad . \quad . \quad . \quad . \quad . \quad (21)$$

and therefore by (18), if c denote the general velocity of the current,

$$c^2=dp/d\rho=k/\rho, \quad . \quad . \quad . \quad . \quad (22)$$

in agreement with (13). The fact that the condition (20) can only be satisfied approximately shows that some progressive change of type must inevitably take place in sound-waves of finite amplitude. This question has been examined by S. D. Poisson (1807), Sir G. G. Stokes (1848), B. Riemann (1858), S. Earnshaw (1858), W. J. M. Rankine (1870), Lord Rayleigh (1878) and others. It appears that and it is therefore usual to fix attention in the first place on the case of an infinitely extended wave-system of simple-harmonic profile, say

$$\eta = \beta \sin k(x-ct). \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

The corresponding value of ϕ is

$$\phi = \frac{g\beta}{kc}\frac{\cos \mathrm{h}\, k(y+h)}{\cos \mathrm{h}\, kh}\cos k(x-ct), \quad . \quad . \quad . \quad (6)$$

where h denotes the depth; it is in fact easily verified that this satisfies (1), and makes $\partial\phi/\partial y = 0$, for $y = -h$, and that it fulfils the pressure-condition (3) at the free surface. The kinematic condition (4) will also be satisfied, provided

$$c^2 = \frac{g}{k}\tan \mathrm{h}\, kh = \frac{g\lambda}{2\pi}\tan \mathrm{h}\frac{2\pi h}{\lambda}, \quad . \quad . \quad . \quad . \quad (7)$$

λ denoting the wave-length $2\pi/k$. It appears, on calculating the component velocities from (6), that the motion of each particle is elliptic-harmonic, the semi-axes of the orbit, horizontal and vertical, being

$$\beta\frac{\cos \mathrm{h}\, k(y+h)}{\sin \mathrm{h}\, kh}, \; \beta\frac{\sin \mathrm{h}\, k(y+h)}{\sin \mathrm{h}\, kh}, \quad . \quad . \quad . \quad (8)$$

where y refers to the mean level of the particle. The dimensions of the orbits diminish from the surface downwards. The direction of motion of a surface-particle is forwards when it coincides with a crest, and backwards when it coincides with a trough, of the waves.

When the wave-length is anything less than double the depth we have $\tan \mathrm{h}\, kh = 1$, practically, and the formula (6) reduces to

$$\phi = \frac{g\beta}{kc}e^{ky}\cos k(x-ct) \quad . \quad . \quad . \quad . \quad . \quad (9)$$

with

$$c^2 = \frac{g}{k} = \frac{g\lambda}{2\pi}, \quad . \quad . \quad . \quad . \quad . \quad . \quad (10)$$

the same as if the depth were infinite. The orbits of the particles are now circles of radii βe^{ky}. When, on the other hand, λ is moderately large compared with h, we have $\tan \mathrm{h}\, kh = kh$, and $c = \sqrt{(gh)}$, in agreement with the preceding theory of "long" waves. These results date from G. Green (1839) and Sir G. B. Airy (1845).

The energy of our simple-harmonic wave-train is, as usual, half kinetic and half potential, the total amount per unit area of the free surface being $\frac{1}{2}g\rho\beta^2$. This is equal to the work which would be required to raise a stratum of fluid, of thickness equal to the surface-amplitude β, through a height $\frac{1}{2}\beta$.

It has been assumed so far that the upper surface is free, the pressure there being uniform. We might also consider the case of waves on the common surface of two liquids of different densities. For wave-lengths which are less than double the depth of either liquid the formula (10) is replaced by

$$c^2 = \frac{g\lambda}{2\pi}\cdot\frac{\rho-\rho'}{\rho+\rho'}, \quad . \quad . \quad . \quad . \quad . \quad (11)$$

where ρ, ρ' are the densities of the lower and upper fluids respectively. The diminution in the wave-velocity c has, as the formula indicates, a twofold cause; the potential energy of a given deformation of the common surface is diminished by the presence of the upper fluid in the ratio $(\rho-\rho')/\rho$, whilst the inertia is increased in the ratio $(\rho+\rho')/\rho$. When the two densities are very nearly equal the waves have little energy, and the oscillations of the common surface are very slow. This is easily observed in the case of paraffin oil over water.

To examine the progress, over the surface of deep water, of a disturbance whose initial character is given quite arbitrarily it would be necessary to resolve it by Fourier's theorem into systems of simple-harmonic trains. Since each of these is propagated with the velocity proper to its own wave-length, as given by (10), the resulting wave-profile will continually alter its shape. The case of an initial local impulse has been studied in detail by S. D. Poisson (1816), A. Cauchy (1815) and others. At any subsequent instant the surface is occupied on either side by a train of waves of varying height and length, the wave-length increasing, and the height diminishing, with increasing distance (x) from the origin of the disturbance. The longer waves travel faster than the shorter, so that each wave is continually being drawn out in length, and its velocity of propagation therefore continually increases as it advances. If we fix our attention on a particular point of the surface, the level there will rise and fall with increasing rapidity and increasing amplitude. These statements are all involved in Poisson's approximate formula

$$\eta \propto \frac{t}{x^{\frac{3}{2}}}\left(\cos\frac{gt^2}{4x} - \sin\frac{gt^2}{4x}\right), \quad . \quad . \quad . \quad . \quad (12)$$

which, however, is only valid under the condition that x is large compared with $\frac{1}{4}gt^2$. This shows moreover that the occurrence of a particular wave-length λ is conditioned by the relation

$$\frac{x}{t} = \frac{1}{2}\sqrt{}$$ [illegible]

The foregoing description [illegible] case of an initial [illegible]

band of the surface. The corresponding results for the more practical case of a band of finite breadth are to be inferred by superposition. The initial stages of the disturbance at a distance x, which is large compared with the breadth b of the band, will have the same character as before, but when, owing to the continual diminution of the length of the waves emitted, λ becomes comparable with or smaller than b, the parts of the disturbance which are due to the various parts of the band will no longer be approximately in the same phase, and we have a case of "interference" in the optical sense. The result is in general that in the final stages the surface will be marked by a series of groups of waves of diminishing amplitude separated by bands of comparatively smooth water.

The fact that the wave-velocity of a simple-harmonic train varies with the wave-length has an analogy in optics, in the propagation of light in a dispersive medium. In both cases we have a contrast with the simpler phenomena of waves on a tense string or of light-waves *in vacuo*, and the notion of "group-velocity," as distinguished from wave-velocity, comes to be important. If in the above analysis of the disturbance due to a local impulse we denote by U the velocity with which the locus of any particular wave-lengths λ travels, we see from (13) that $U = \frac{1}{2}c$. The actual fact that when a limited group of waves of approximately equal wave-length travels over relatively deep water the velocity of advance of the group as a whole is less than that of the individual waves composing it seems to have been first explicitly remarked by J. Scott Russell (1844). If attention is concentrated on a particular wave, this is seen to progress through the group, gradually dying out as it approaches the front, whilst its former place in the group is occupied in succession by other waves which have come forward from the rear. General explanations, not restricted to the case of water-waves, have been given by Stokes, Rayleigh, and others. If the wave-length λ be regarded as a function of x and t, we have

$$\frac{\partial\lambda}{\partial t} + U\frac{\partial\lambda}{\partial x} = 0, \quad . \quad . \quad . \quad . \quad . \quad . \quad (14)$$

since λ does not vary in the neighbourhood of a geometrical point travelling with velocity U, this being in fact the definition of U. Again, if we imagine a second geometrical point to move with the *waves*, we have

$$\frac{\partial\lambda}{\partial t} + c\frac{\partial\lambda}{\partial x} = \frac{\partial c}{\partial x}\lambda = \lambda\frac{dc}{d\lambda}\cdot\frac{\partial\lambda}{\partial x}, \quad . \quad . \quad . \quad . \quad (15)$$

the second member expressing the rate at which two consecutive wave-crests are separating from one another. Comparing (14) and (15), we have

$$U = c - \lambda\frac{dc}{d\lambda}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (16)$$

If a curve be constructed with λ as abscissa and c as ordinate, the group-velocity U will be represented by the intercept made by the tangent on the axis of c. This is illustrated by the annexed figure, which refers to the case of deep-water waves; the curve is a parabola, and the intercept is half the ordinate, in accordance with the relation $U = \frac{1}{2}c$, already remarked. The physical importance of the motion of group-velocity was pointed out by O. Reynolds (1877), who showed that the rate at which energy is propagated is only half that which would be required for the transport of the group as a whole with the velocity c.

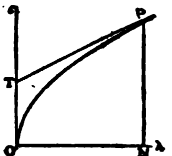


FIG. 2.

The preceding investigations enable us to infer the effect of a pressure-disturbance travelling over the surface of still water with, say, a constant velocity c in the direction of x-negative. The abnormal pressure being supposed concentrated on an infinitely narrow band of the surface, the elevation η at any point P may be regarded as due to a succession of infinitely small impulses delivered over bands of the surface at equal infinitely short intervals of time on equidistant lines parallel to the (horizontal) axis of z. Of the wave-systems thus successively generated, those only will combine to produce a sensible effect at P which had their origin in the neighbourhood of a line Q whose position is determined by the consideration that the phase at P is "stationary" for variations in the position of Q. Now if t be the time which the source of disturbance has taken to travel from Q to its actual position O, it appears from (12) that the phase of the waves at P, originated at Q, is $gt^2/4x + \frac{1}{4}\pi$, where $x = \mathrm{QP}$. The condition for stationary phase is therefore

$$\dot{x} = 2x/t. \qquad (17)$$

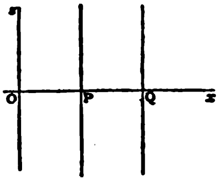


FIG. 3.

In this differentiation, O and P are [illegible] regarded as fixed; hence $\dot{x} = c$, and therefore $\mathrm{OQ} = ct = 2\mathrm{PQ}$. [illegible] already seen that the wave-length at P is such that [illegible] where U is the corresponding group-velocity. Hence the wave-length λ at points to the right of O is uniform, being that proper to a wave-velocity *c*, viz. $\lambda = 2\pi c^2/g$. The disturbance is therefore followed by a train of waves of approximately simple-harmonic profile, of the length indicated. An approximate calculation shows that, except in the immediate neighbourhood of the source of disturbance, the surface-elevation is given by

$$\eta = -\frac{2P_0}{\rho c^2}\sin\frac{gx}{c^2}, \quad . \quad . \quad . \quad . \quad (18)$$

where *x* is now measured from O, and $P_0 (= \int p\,dx)$ represents the integral of the disturbing surface pressure over the (infinitely small) breadth of the band on which it acts. The case of a diffused pressure can be inferred by integration. The annexed figure gives a representation of a particular case, obtained by a more exact process. The pressure is here supposed uniformly distributed over a band of breadth AB.

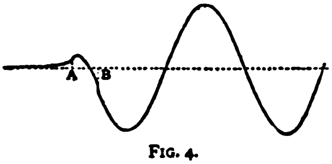


FIG. 4.

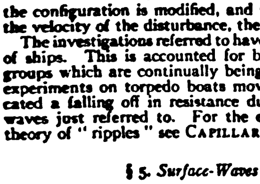
A similar argument can be applied to the case of finite depth (*h*), but since the wave-velocity cannot exceed $\sqrt{(2gh)}$ the results are modified if the velocity *c* of the travelling pressure exceeds this limit. There is then no train of waves generated, the disturbance of level being purely local. It hardly needs stating that the investigation applies also to the case of a stationary surface disturbance on a running stream, and that similar results follow when the disturbance consists in an equality of the bottom. In both cases we have a train of standing waves on the down-stream side, of length corresponding to a wave-velocity equal to that of the stream.

The effect of a disturbance confined to the neighbourhood of a *point* of the surface (of deep water) was also included in the investigations of Cauchy and Poisson already referred to. The formula analogous to (12), in the case of a local impulse, is

$$\zeta \propto \frac{t^2}{r^3}\sin\frac{gt^2}{4r}, \quad . \quad . \quad . \quad . \quad (19)$$

where *r* denotes distance from the source. The interpretation is similar to that of the two-dimensional case, except that the amplitude of the annular waves diminishes outwards, as was to be expected, in a higher ratio.

The effect of a pressure-point travelling in a straight line over the surface of deep water is interesting, as helping us to account in some degree for the peculiar system of waves which is seen to accompany a ship. The configuration of the wave-system is shown by means of the lines of equal phase in the annexed diagram, due to V. W. Ekman (1906), which differs from the drawing originally given by Lord Kelvin (1887) in that it indicates the difference of phase between the transverse and diverging waves at the common boundary of the two series. The two systems of waves are due to the fact that at any given instant there are *two* previous positions of the moving pressure-point which have transmitted vibrations of stationary phase to any given point P within the range of the figure. When the depth is finite the configuration is modified, and if it be less than c^2/g, where *c* is the velocity of the disturbance, the transversal waves disappear.



After V. Walfrid Ekman, *On Stationary Waves in Running Water.*

FIG. 5.

The investigations referred to have a bearing on the wave-resistance of ships. This is accounted for by the energy of the new wave-groups which are continually being started and left behind. Some experiments on torpedo boats moving in shallow water have indicated a falling off in resistance due to the absence of transversal waves just referred to. For the effect of surface-tension and the theory of "ripples" see CAPILLARY ACTION.

§ 5. *Surface-Waves of Finite Height.*

The foregoing results are based on the assumption that the amplitude may be treated as infinitely small. Various interesting investigations have been made in which this restriction is, more or less, abandoned, but we are far from possessing a complete theory.

A system of exact equations giving a possible type of wave-motion on deep water was obtained by F. J. v. Gerstner in 1802, and rediscovered by W. J. M. Rankine in 1863. The orbits of the particles, in this type, are accurately circular, being defined by the equations

$$x = a + k^{-1}e^{kb}\sin k(a-ct),\ y = b - k^{-1}e^{kb}\cos k(a-ct), \quad . \quad (1)$$

where (*a*, *b*) is the mean position of the particle, $k = 2\pi/\lambda$; and the wave-velocity is

$$x = \sqrt{(g/k)} = \sqrt{(g\lambda/2\pi)}. \quad . \quad . \quad . \quad . \quad (2)$$

The lines of equal pressure, among which is included of course the surface-profile, are trochoidal curves. The extreme form of wave-profile is the cycloid, with the cusps turned upwards. The mathematical elegance and simplicity of the formulae (1) are unfortunately counterbalanced by the fact that the consequent motion of the fluid elements proves to be "rotational" (see HYDROMECHANICS), and therefore not such as could be generated in a previously quiescent liquid by any system of forces applied to the surface.

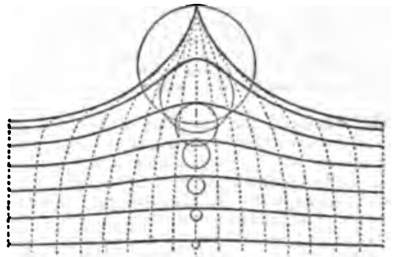


FIG. 6.

Sir G. Stokes, in a series of papers, applied himself to the determination of the possible "irrotational" wave-forms of finite height which satisfy the conditions of uniform propagation without change of type. The equation of the profile, in the case of infinite depth, is obtained in the form of a Fourier series, thus

$$y = a\cos kx + \tfrac{1}{2}ka^2\cos 2kx + \tfrac{3}{8}k^2a^3\cos 3kx + \dots, \quad . \quad (3)$$

the corresponding wave-velocity being approximately

$$c = \sqrt{\left\{\frac{g\lambda}{2\pi}\left(1 + \frac{4\pi^2a^2}{\lambda^2}\right)\right\}}, \quad . \quad . \quad . \quad . \quad . \quad (4)$$

where $\lambda = 2\pi/k$. The equation (3), so far as we have given the development, agrees with that of a trochoid (fig. 7). As in the case of Gerstner's waves the outline is sharper near the crests and flatter in the troughs than in the case of the simple-harmonic curve, and these features become accentuated as the ratio of the amplitude to the wave-length increases. It has been shown by Stokes that the extreme form of irrotational waves differs from that of the rotational Gerstner waves in that the crests form a blunt angle of 120°. According to the calculations of J. H. Michell (1893), the height is then about one-seventh of the wave-length, and the wave-velocity exceeds that of very low waves of the same length in the ratio 6:5. It is to be noticed further that in these waves of permanent type the motion of the water-particles is not purely oscillatory, there being on the whole a gradual drift at the surface in the direction of propagation. These various conclusions appear to agree in a general way with what is observed in the case of sea-waves.

FIG. 7.

In the case of finite depth the calculations are more difficult, and we can only here notice the limiting type which is obtained when the wave-length is supposed very great compared with the depth (*h*). We have then practically the "solitary wave" to which attention was first directed by J. Scott Russell (1844) from observation. The theory has been worked out by J. Boussinesq (1871) and Lord Rayleigh. The surface-elevation is given by

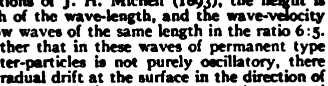


FIG. 8.

$$\eta = a\,\mathrm{sech}^2\,\tfrac{1}{2}(x/b), \quad . \quad . \quad . \quad . \quad . \quad (5)$$

provided

$$b^2 = h^2(h+a)/3a, \quad . \quad . \quad . \quad . \quad . \quad (6)$$

and the velocity of propagation is

$$c = \sqrt{\{g(h+a)\}} \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

In the extreme form $a = h$ and the crest forms an angle of 120°. It appears that a solitary wave of depression, of permanent type, is impossible.

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WAVELLITE, a mineral consisting of hydrated aluminium phosphate, $Al_3(OH)_3(PO_4)_2 + 4\frac{1}{2}H_2O$, crystallizing in the orthorhombic system. Distinct crystals are of rare occurrence, the mineral usually taking the form of hemispherical or globular aggregates with an internal radiated structure. It is translucent and varies in colour from grey or white to greenish, yellowish, &c. The hardness is 3½, and the specific gravity 2·32. It was first found, at the end of the 18th century, by Dr W. Wavell near Barnstaple in Devonshire, where it lines crevices in a black slaty rock. It has also been found in Ireland (Tipperary and Cork), Arkansas, &c. (L. J. S.)

WAVERLY, a village of Tioga county, New York, U.S.A., about 18 m. S.E. of Elmira, on the Cayuta Creek, near the Chemung and the Susquehanna rivers, which unite several miles S. of the village. Pop. (1890) 4123; (1900) 4465, of whom 295 were foreign-born; (1905) 4915; (1910) 4855. It is served by the Delaware, Lackawanna & Western, the Erie and the Lehigh Valley railways. With South Waverly (pop. in 1910 1084)—separated from Waverly only by the state line and really a part of the village—Sayre, and Athens, Pennsylvania, it is connected by electric railway and the three form practically an industrial unit. Waverly is also connected by electric line with Elmira. The village is a railway centre of some importance, distributes coal from the Wyoming Valley mines, and ships the dairy products of a large farming district and small fruits and garden products. Waverly was settled about 1804 by settlers from Connecticut and the Hudson River Valley, and was incorporated as a village in 1854.

WAVRE, a town of Belgium, in the province of Brabant, 14 m. S.E. of Brussels. Pop. (1904) 8517. It was on this place that Grouchy advanced on the day of Waterloo, gaining a useless success here over a Prussian corps while the fate of the campaign was being decided elsewhere. The Prussians erected here a fine monument by Van Oemberg in 1859.

WAX, a solid fatty substance of animal and vegetable origin, allied to the fixed oils and fats. From these it is distinguished by the fact that while oils and fats are glycerides, a true wax contains no glycerin, but is a combination of fatty acids with certain solid monatomic alcohols (see Oils).

WAX FIGURES. Beeswax is possessed of properties which render it a most convenient medium for preparing figures and models, either by modelling or by casting in moulds. At ordinary temperatures it can be cut and shaped with facility; it melts to a limpid fluid at a low heat; it mixes with any colouring matter, and takes surface tints well; and its texture and consistency may be modified by the addition of earthy matters and oils or fats. When molten, it takes the minutest impressions of a mould, and it sets and hardens at such a temperature that no ordinary climatic influences affect the form it assumes, even when it is cast in thin laminae. The facilities which wax offers for modelling have been taken advantage of from the remotest times. Figures in wax of their deities were used in the funeral rites of the ancient Egyptians, and deposited among other offerings in their graves; many of these are now preserved in museums. That the Egyptians also modelled fruits can be learned from numerous allusions in early literature. Among the Greeks during their best art period wax figures were largely used as dolls for children; [illegible] were modelled for votive offerings and [illegible] to which magical [illegible] the people. Wax [illegible] place [illegible] patrician families, this *jus imaginum* being one of the privileges of the nobles, and these masks were exposed to view on ceremonial occasions, and carried in their funeral processions. The closing days of the Saturnalia were known as *Sigillaria*, on account of the custom of making, towards the end of the festival, presents of wax models of fruits and waxen statuettes which were fashioned by the *Sigillarii* or manufacturers of small figures in wax and other media. The practice of wax modelling can be traced through the middle ages, when votive offerings of wax figures were made to churches, and the memory and lineaments of monarchs and great personages were preserved by means of wax masks as in the days of Roman patricians. In these ages malice and superstition found expression in the formation of wax images of hated persons, into the bodies of which long pins were thrust, in the confident expectation that thereby deadly injury would be induced to the person represented; and this belief and practice continued till the 17th century. Indeed the superstition still survives in the Highlands of Scotland, where as recently as 1885 a clay model of an enemy was found in a stream, having been placed there in the belief that, as the clay was washed away, so would the health of the hated one decline. With the renaissance of art in Italy, modelling in wax took a position of high importance, and it was practised by some of the greatest of the early masters. The bronze medallions of Pisano and the other famous medallists owe their value to the art qualities of wax models from which they were cast by the *cire perdue* process; and indeed all early bronzes and metal work were cast from wax models. The *tête de cire* in the Wicar collection at Lille is one of the most lovely examples of artistic work in this medium in existence. Wicar, one of Napoleon's commissaries, brought this figure from Italy. It represents the head and shoulders of a young girl. It has been claimed as a work of Greek or Roman art, and has been assigned to Leonardo da Vinci and to Raphael, but all that can be said is that it probably dates from the Italian Renaissance. In 1909 Dr Bode, the director of the Kaiser Friedrich Museum at Berlin, purchased in England, for (it was stated) £8000, a life-sized half-length female figure in wax, which he attributed to Leonardo da Vinci or his school. The figure was shown to have once been in the possession of Richard Cockle Lucas (1800–1883), a sculptor and worker in ivory, wax, &c. It was claimed that the figure was really Lucas's work and was a reproduction in wax of a picture of "Flora" attributed to Leonardo da Vinci, now in the possession of the Morrison family at Basildon Park, near Pangbourne; this view was repudiated by Dr Bode, but was generally accepted in England (see *The Times*, Oct.–Dec. 1909; and particularly the *Burlington Magazine*, May, June, August, 1910). Till towards the close of the 18th century modelling of medallion portraits and of relief groups, the latter frequently polychromatic, was in considerable vogue throughout Europe. About the end of the 18th century Flaxman executed in wax many portraits and other relief figures which Josiah Wedgwood translated into pottery for his jasper ware. The modelling of the soft parts of dissections, &c., for teaching illustrations of anatomy was first practised at Florence, and is now very common. Such preparations formed part of a show at Hamburg in 1721, and from that time wax-works, on a plane lower than art, have been popular attractions. These exhibitions consist principally of images of historical or notorious personages, made up of waxen masks on lay figures in which sometimes mechanism is fitted to give motion to the figure. Such an exhibition of *wax-works* with mechanical motions was shown in Germany early in the 18th century, and is described by Steele in the *Tatler*. The most famous modern wax-work exhibition is that of Madame Tussaud (*q.v.*) in London.

WAX-TREE, Wax Myrtle, Candleberry, popular names of species of *Myrica*, especially *M. cerifera*, a North American plant, the fruits of which have a waxy covering and are used as a source of vegetable wax. *M. Gale* is the native British gale (*q.v.*) or sweet-gale.

WAXWING, a bird first so called apparently by P. J. Selby in 1825 (*Illustr. Brit. Ornithology*, p. 87), having been before known as the "silk-tail" (*Philos. Transactions*, 1685, p. 1161)—a literal rendering of the German *Seidenschwans*—or "chatterer"—the prefix "German," "Bohemian" or "waxen" being often also applied. Selby's convenient name has now been generally adopted, since the bird is readily distinguished from almost all others by the curious expansion of the shaft of some of its wing-feathers at the tip into a flake that looks like scarlet sealing-wax, while its exceedingly silent habit makes the name "chatterer" wholly inappropriate, and indeed this last arose from a misinterpretation of the specific term *garrulus*, meaning a jay (from the general resemblance in colour of the two birds), and not referring to any garrulous quality. It is the *Ampelis garrulus* of Linnaeus and of more recent ornithologists, and is the type of the Passerine family *Ampelidae*.

The waxwing is a bird that for many years excited vast interest. An irregular winter-visitant, sometimes in countless hordes, to the whole of the central and some parts of southern Europe, it was of old time looked upon as the harbinger of war, plague or death, and, while its harmonious coloration and the grace of its form were attractive, the curiosity with which its irregular appearances were regarded was enhanced by the mystery which enshrouded its birthplace, and until the summer of 1856 defied the searching of any explorer. In that year, however, all doubt was dispelled through the successful search in Lapland, organized by John Wolley, as briefly described by him to the Zoological Society (*Proceedings*, 1857, pp. 55, 56, pl. cxxii.).[1] In 1858 H. E. Dresser found a small settlement of the species on an island in the Baltic near Uleåborg, and with his own hands took a nest. It is now pretty evident that the waxwing, though doubtless breeding yearly in some parts of northern Europe, is as irregular in the choice of its summer-quarters as in that of its winter-retreats. Moreover, the species exhibits the same irregular habits in America. It has been found in Nebraska in "millions," as well as breeding on the Yukon and on the Anderson river.

Beautiful as is the bird with its full erectile crest, its cinnamon-brown plumage passing in parts into grey or chestnut, and relieved by black, white and yellow—all of the purest tint—the external feature which has invited most attention is the "sealing-wax" (already mentioned) which tips some of the secondary or radial quills, and occasionally those of the tail. This is nearly as much exhibited by the kindred species, *A. cedrorum*—the well-known cedar-bird of the English in North America—which is easily distinguished by its smaller size, less black chin-spot, the yellower tinge of the lower parts and the want of white on the wings. In the *A. phoenicopterus* of southern-eastern Siberia and Japan, the remiges and rectrices are tipped with red in the ordinary way without dilatation of the shaft of the feathers.

Both the waxwing and cedar-bird seem to live chiefly on insects in summer, but are marvellously addicted to berries during the rest of the year, and will gorge themselves if opportunity allow. They are pleasant cage-birds, quickly becoming tame. The erratic habits of the waxwing are probably due chiefly to the supplies of food it may require, prompted also by the number of mouths to be fed, for there is some reason to think that this varies greatly from one year to another, according to season. The flocks which visit Britain and other countries outside the breeding range of the species naturally contain a very large proportion of young birds. (A. N.)

WAYCROSS, a city and the county-seat of Ware county, Georgia, U.S.A., about 96 m. S.W. of Savannah and about 60 m. W. of Brunswick. Pop. (1880) 628; (1890) 3364, (1900) 5919 (2899 negroes); (1910) 14,485. Waycross is served by the Atlanta, Birmingham & Atlantic, and the Atlantic Coast Line railways, several branches of the latter intersecting here. In the city is the Bunn-Bell Institute (Baptist, opened in 1909). There are large railway car construction and repair shops here, and Waycross is a commercial centre for the forest products (naval stores and lumber) and the cotton, sugar cane, sweet potatoes, melons and pears of the surrounding country. The municipality owns the water-works, the water-supply being obtained from artesian wells. Before the passage of the state prohibition law Waycross secured virtual prohibition of the sale of intoxicating liquors by requiring a large liquor license fee ($20,000 in 1883, increased to $30,000 in 1892). Waycross was settled in 1870, was first incorporated in 1874 and became a city in 1909.

WAYLAND, FRANCIS (1796–1865), American educationist, was born in New York City on the 11th of March 1796. His father was an Englishman of the same name, who was a Baptist pastor. The son graduated at Union College in 1813 and studied medicine in Troy and in New York City, but in 1816 entered Andover Theological Seminary, where he was greatly influenced by Moses Stuart. He was too poor to conclude his course in theology, and in 1817–1821 was a tutor at Union College, to which after five years as pastor of the First Baptist Church of Boston he returned in 1826 as professor of natural philosophy. In 1827 he became president of Brown University. In the twenty-eight years of his administration he gradually built up the college, improving academic discipline, formed a library and gave scientific studies a more prominent place. He also worked for higher educational ideals outside the college, writing text-books on ethics and economics, and promoting the free school system of Rhode Island and especially (1828) of Providence. His *Thoughts on the Present Collegiate System in the United States* (1842) and his *Report to the Corporation of Brown University* of 1850 pointed the way to educational reforms, particularly the introduction of industrial courses, which were only partially adopted in his lifetime. He resigned the presidency of Brown in 1855, and in 1857–1858 was pastor of the First Baptist Church of Providence. He died on the 30th of September 1865. He was an early advocate of the temperance and anti-slavery causes, for many years was "inspector of the state prison and Providence county jail," president of the Prison Discipline Society, and active in prison reform and local charities. He was one of the "law and order" leaders during the "Dorr Rebellion" of 1842, and was called "the first citizen of Rhode Island." His son Francis (1826–1904) graduated at Brown in 1846, and studied law at Harvard; he became probate judge in Connecticut in 1864, was lieutenant-governor in 1869–1870, and in 1872 became a professor in the Yale Law School, of which he was dean from 1873 to 1903.

Besides several volumes of sermons and addresses and the volumes already mentioned, he published *Elements of Moral Science* (1835, repeatedly revised and translated into foreign languages); *Elements of Political Economy* (1837), in which he advocated free-trade; *The Limitations of Human Responsibility* (1838); *Domestic Slavery Considered as a Scriptural Institution* (1845); *Memoirs of Harriet Ware* (1850); *Memoirs of Adoniram Judson* (1853); *Elements of Intellectual Philosophy* (1854); *Notes on the Principles and Practices of Baptist Churches* (1857); *Letters on the Ministry of the Gospel* (1863); and a brief *Memoir of Thomas Chalmers* (1864).

See *The Life and Labors of Francis Wayland* (2 vols., New York, 1867) by his sons Francis and Heman Lincoln; the shorter sketch (Boston, 1891) by James O. Murray in the "American Religious Leaders" series, and an article by G. C. Verplanck in vol. xiv. of the *American Journal of Education*.

WAYLAND THE SMITH (Scand. *Võlundr*, Ger. *Wieland*), hero of romance The legend of Wayland probably had its home in the north, where he and his brother Egill[2] were the types of the skilled workman, but there are abundant local traditions of the wonderful smith in Westphalia and in southern England. His story is told in one of the oldest songs of the Edda, the *Võlundarkiða*, and, with considerable variations, in the prose *Þiðrekssaga* (Thidrek's sage), while the Anglo-Saxon *Beowulf* and *Deor's Lament* contain allusions to it. The tale of Wayland falls naturally into two parts, the former of which contains obviously mythical features. He was the son of the giant sailor Wate and of a mermaiden. His grandfather was that Vilkinus, king of Norway, who lent his name to the *Vilkina-* or *Þiðrekssaga*. Three brothers Völundr, Egill and Slagfiþr seized the swan-maidens Hlaþguþr, Olrún and Hervor, who, divested of their feather dresses, stayed with them seven or eight years as their wives. The second part of the story concerns Volundr, lord of the elves, the cunning smith, who, after learning his art from Mime, then from the dwarfs, came to the court of King Niþoþr, and there defeated in fight the smith Amilias. Vòlundr's sword, Mimung, with which he won this victory, was one of the famous weapons in German epic poetry. In the Dietrich cycle it descended to

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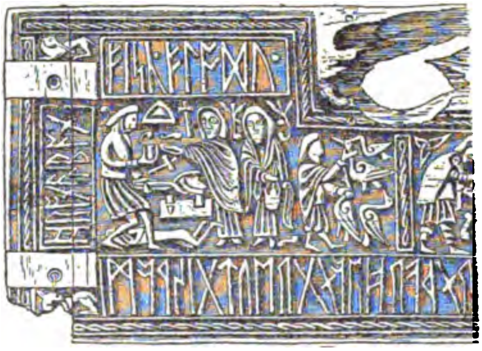
[1] A fuller account of his discovery, illustrated by Hewitson is given in *The Ibis* (1861, pp. 92-106, pl. iv).

[2] Egill was compelled to prove his skill as an archer by shooting an apple off the head of his three-year-old son; he is thus the prototype of William Tell.

Wayland's son Wittich, and was cunningly exchanged by Hildebrand for a commoner blade before Wittich's fight with Dietrich. Níþoþr, in order to secure Völundr's services, lamed him by cutting the sinews of his knees, and then established him in a smithy on a neighbouring island. The smith avenged himself by the slaughter of Níþoþr's two sons and the rape of his daughter Bodvildr. He then soared away on wings he had prepared. The story in its main outlines bears a striking resemblance to the myth of Daedalus. For the vengeance of Völundr there is a very close counterpart in the medieval versions of the vengeance of the Moorish slave on his master. The dénouement of this tale, which made its first appearance in European literature in the *De obedientia* (*Opera*, Venice, 3 vols., 1518–1519) of Jovianus Pontanus (d. 1503), is different, for the Moorish slave casts himself down from a high tower. The Aaron of the Shakespearian play of *Titus Andronicus* was eventually derived from this source.

Swords fashioned by Wayland are regular properties of medieval romance. King Rhydderich gave one to Merlin, and Rimenhild made a similar gift to Child Horn. English local tradition placed Wayland Smith's forge in a cave close to the White Horse in Berkshire. If a horse to be shod, or any broken tool were left with a sixpenny piece at the entrance of the cave the repairs would presently be executed.

The earliest extant record of the Wayland legend is the representation in carved ivory on a casket of Northumbrian workmanship of a date not later than the beginning of the 8th century. The fragments of this casket, known as the Franks casket, came into the possession of a professor at Clermont in Auvergne about the middle of the last century, and was presented to the British Museum by Sir A. W. Franks, who had bought it in Paris for a dealer. One fragment is in Florence. The left-hand compartment of the front of the casket shows Völundr holding with a pair of tongs the skull of one of Níþoþr's children, which he is fashioning into a goblet. The boy's body lies at his feet. Bodvildr and her attendant also appear, and Egill, who in one version made Völundr's wings, is depicted in the act of catching birds.



The Franks Casket.

See also Vigfússon and Powell, *Corpus poet. bor.* (i. pp. 168-174, Oxford, 1883); A. S. Napier, *The Franks Casket* (Oxford, 1901); G. Sarrazin, *Germanische Heldensage in Shakespere's Titus Andronicus* (Herrig's *Archiv*, xcvii., Brunswick, 1896); P. Maurus, *Die Wielandsage in der Literatur* (Erlangen and Leipzig, 1902); C. B. Depping and F. Michel, *Véland le Forgeron* (Paris, 1833). Sir Walter Scott handled the Wayland legend in *Kenilworth*; there are dramas on the subject by Borsch (Bonn, 1895), English version by A. Comyn (London, 1898), August Demmin (Leipzig, 1880), H. Drachmann (Copenhagen, 1898), and one founded on K. Simrock's heroic poem on Wieland is printed in Richard Wagner's *Gesammelte Schriften* (vol. iii. 2nd ed., Leipzig, 1887).

WAYNE, ANTHONY (1745–1796), American soldier, was born in the township of Easttown, Chester county, Pennsylvania, on the 1st of January 1745, of a Yorkshire family. As a boy [illegible] bent toward a military life. He was [illegible], and was a surveyor in Pennsylvania and (1765) in Nova Scotia, where he was agent for a proposed colony. He married in 1766 and passed the next few years on the Chester county farm inherited from his father, holding some minor offices and after 1774 taking an active part upon various patriotic committees. Having recruited and organized the Fourth Pennsylvania battalion of Continental troops, he first saw active service at its head in Canada during the retreat of Benedict Arnold after the Quebec campaign. His excellent behaviour at the skirmish of Three Rivers led Philip Schuyler to place him for some months in command of Ticonderoga. While at this post, on the 21st of February 1777, he was commissioned brigadier-general. In April Washington ordered him to take command of the "Pennsylvania Line" at Morristown, and he rendered distinguished service at Brandywine and Germantown, and by his coolness and courage at Monmouth, after the retreat of General Charles Lee, did much to save the day for the Americans. Later in 1778 political necessity led to his being superseded by St Clair, his ranking officer, in the command of the regular Pennsylvania troops, but upon Washington's recommendation he organized a new Light Infantry corps, with which he performed the most daring exploit of the War of Independence—the recapture of Stony Point by a midnight attack (15-16 July 1779) at the point of the bayonet. This well-planned enterprise aroused the greatest enthusiasm throughout the country and won for Wayne the popular soubriquet "Mad Anthony." Upon the disbanding of the Light Infantry corps, Wayne, again in command of the Pennsylvania line, rendered effective service in counteracting the effect of Benedict Arnold's treason and of the mutiny of the Pennsylvania troops. In 1781 he was sent south to join General Nathanael Greene, but in Virginia was deflected to aid Lafayette against Lord Cornwallis. After the American success at Yorktown, Wayne served with such marked success in Georgia, that the state rewarded him with a large rice plantation (which proved a financial failure) and Congress breveted him major-general. In 1792 Washington offered him the command of the regular army with the rank of major-general to fight the hostile Indians north-west of the Ohio, who had been rendered insolent by their successes over General Josiah Harmar in 1790 and General Arthur St Clair in 1791, and indirectly to compel the British to yield the posts they held on the American side of the lakes. Wayne spent the winter of 1792–1793 in recruiting his troops near Pittsburg and in drilling them for effective service in the reorganized army. The government continued its efforts to induce the Indians to allow white settlements beyond the Ohio, but a mission in 1793 ended in a failure. Meanwhile Wayne had transferred his troops to Fort Washington (Cincinnati), and upon learning of the failure of the negotiations, advanced the greater part of his forces to Greenville, a post on a branch of the Great Miami, about 80 m. north of Cincinnati. During the winter he also established an outpost at the scene of St Clair's defeat. The Indians attacked this post, Fort Recovery, in June 1794, but were repulsed with considerable slaughter. Late in July Wayne's legion of regulars, numbering about 2000, was reinforced by about 1600 Kentucky militia under General Charles Scott, and the combined forces advanced to the junction of the Auglaize and Maumee rivers, where Fort Defiance was constructed. Here Wayne made a final effort to treat with the Indians, and upon being rebuffed, moved forward and encountered them on the 20th of August in the battle of Fallen Timbers, fought near the falls of the Maumee, and almost under the walls of the British post Fort Miami. This decisive defeat, supplemented by the Treaty of Greenville, which he negotiated with the Indians on the 3rd of August 1795, resulted in opening the North-west to civilization. Wayne retained his position as commander of the army after its reorganization, and he rendered service in quelling the proposed filibustering expeditions from Kentucky against the Spanish dominions, and also took the lead in occupying the lake posts delivered up by the British. While engaged in this service he died at Erie, Pennsylvania, on the 15th of December 1796, and was interred there. In 1809 his remains were removed to St David's Churchyard, Radnor, Pennsylvania.

See Charles J. Stillé, *Major-General Anthony Wayne and the Pennsylvania Line* (Philadelphia, 1893); J. Munsell, (ed.), *Wayne's Orderly Book of the Northern Army at Fort Ticonderoga and Mount Independence* (Albany, 1859); Boyer, *A Journal of Wayne's Campaign* (Cincinnati, 1866); William Clark, *A Journal of Major-General Anthony Wayne's Campaign against the Shawnee Indians* (MSS. owned by R. C. Ballard Thruston); H. P. Johnston, *The Storming of Stony Point* (New York, 1900); J. R. Spears, *Anthony Wayne* (New York, 1903).

WAYNESBORO, a borough of Franklin county, Pennsylvania, U.S.A., near Antietam Creek, about 14 m. S.E. of Chambersburg, and about 65 m. S.W. of Harrisburg. Pop. (1890) 3811; (1900) 5396; (1910) 7199. Waynesboro is served by the Cumberland Valley and the Western Maryland railways. It lies at the foot of the South Mountain, and under the borough are many caves and caverns. A settlement was made here about 1734; it was called Mount Vernon for twenty years, and then Wallacetown (in honour of an early settler) until the close of the War of Independence, when it was named Waynesborough in honour of General Anthony Wayne; a village was platted in 1797; its charter as a borough, granted in 1818, was repealed in 1824 but was revived in 1830, the spelling being changed to "Waynesboro."

See Benjamin M. Nead, *Waynesboro* (Harrisburg, Pa., 1900).

WAYNFLETE, WILLIAM (1395–1486), English lord chancellor and bishop of Winchester, was the son of Richard Pattene or Patyn, alias Barbour, of Wainfleet, Lincolnshire (Magd. Coll. Oxon. Reg. f. 84b), whose monumental effigy, formerly in the church of Wainfleet, now in Magdalen College Chapel at Oxford, seems to be in the dress of a merchant. His mother was Margery, daughter of Sir William Brereton of that ilk in Cheshire (Ormerod's *Cheshire*, iii. 81). Of Waynflete's education it is only possible to assert that he was at Oxford University. It has been alleged that he was a Wykehamist, a scholar at Winchester College and New College, Oxford. But unless he was, as is improbable, the "Willelmus Pattney, de eadem, Sar. Dioc.," admitted in 1403, he was not a scholar of Winchester, and in any case was not a scholar of New College. Nor was he a commoner in college at Winchester or at New College, as his name does not appear in the Hall books, or lists of those dining in hall, at either college. That he was a day-boy commoner at Winchester is possible, but seems unlikely. He was never claimed in his lifetime by either college as one of its alumni. That he was at Oxford, and probably a scholar at one of the grammar schools there, before passing on to the higher faculties, is shown by a letter of the chancellor addressed to him when provost of Eton (Ep. Acad. Oxf. Hist. Soc. i. 158) which speaks of the university as his "mother who brought him forth into the light of knowledge and nourished him with the alimony of all the sciences." He is probably the William Barbour who was ordained acolyte by Bishop Fleming of Lincoln on the 21st of April 1420 and subdeacon on the 21st of January 1421; and as "William Barbour," otherwise Waynflete of Spalding, was ordained deacon on the 18th of March 1421, and priest on the 21st of January 1426, with title from Spalding Priory. He may have been the William Waynflete who was admitted a scholar of the King's Hall, Cambridge, on the 6th of March 1428 (Exch. Q. R. Bdle. 346, no. 31), and was described as LL.B. when receiving letters of protection on the 15th of July 1429 (*Proc. P.C.* iii. 347) to enable him to accompany Robert FitzHugh, D.D., warden of the hall, on an embassy to Rome. For the scholars of the King's Hall were what we should call fellows, as may be seen by the appointment to the hall on the 3rd of April 1360 of Nicholas of Drayton, B.C.L., and John Kent, B.A., instead of two scholars who had gone off to the French wars without the warden's leave (Cal. Close Rolls). William Waynflete, presented to the vicarage of Skendleby, Lincs, by the Priory of Bardney (Lincoln, Ep. Reg. f. 34, Chandler, 16), on the 14th of June 1430, may also have been our Waynflete. There was, however, another William Waynflete, who was instituted rector of Wroxhall, Somerset, on the 17th of May 1433 (Wells, Ep. Reg. Stafford), and was dead when his successor was appointed on the 18th of November 1436 (Wells, Ep. Reg. Stillington). A successor to the William Waynflete at the King's Hall was admitted on the 3rd of April 1434. Meanwhile, our Waynflete had become headmaster of Winchester; Mr William Wanneflete being paid 50s. as Informator scolarium, teacher of the scholars of the college, for the quarter beginning on the 24th of June 1430 (Win. Coll. Bursars' Roll 8-9 Hen. VI.) and so continuously, under many variants of spelling, at the rate of £10 a year until Michaelmas 1441 (*V.C.H.*, Bucks, ii. 154). He was collated by Bishop Beaufort at some date unascertainable (through the loss of the 2nd volume of Beaufort's Episcopal Register) to the mastership of St Mary Magdalen's Hospital, a leper hospital on St Giles' Hill, just outside the city of Winchester (Vet. Mon. iii. 5). The first recorded headmaster after the foundation of the college, John Melton, had been presented by Wykeham to the mastership of this hospital in 1393 shortly before his retirement. Its emoluments, amounting to £9, 12s. a year, nearly doubled the headmaster's income.

Under the influence of Archbishop Chicheley, who had himself founded two colleges in imitation of Wykeham, and Thomas Bekynton, king's secretary and privy seal, and other Wykehamists, Henry VI., on the 11th of October 1440, founded, in imitation of Winchester College, "a college in the parish church of Eton by Windsor not far from our birthplace," called the King's College of the Blessed Mary of Eton by Windsor, as "a sort of first-fruits of his taking the government on himself." The college was to consist of a provost, 10 priests, 6 choristers, 25 poor and needy scholars, 25 almsmen and a magister informator "to teach gratis the scholars and all others coming from any part of England to learn grammar." Only two fellows, 4 choristers, 2 scholars and 2 almsmen were named in the charter and probably were only colourably members. Waynflete was not, as alleged (*Dict. Nat. Biog.*), named a fellow. On the 5th of March 1440–1441, the king endowed the college out of alien priories with some £500 a year, almost exactly the amount of the original endowment of Winchester. On the 31st of July 1441 Henry VI. went for a week-end visit to Winchester College to see the school for himself. Here he seems to have been so much impressed with Waynflete, that at Michaelmas, 1441, Waynflete ceased to be headmaster of Winchester. In October he appears dining in the hall there as a guest, and at Christmas 1442 he received a royal livery, five yards of violet cloth, as provost of Eton. Though reckoned first headmaster of Eton, there is no definite evidence that he was. The school building was not begun till May 1442 (*V.C.H.*, Bucks, ii. 154). William Westbury, who left New College, "transferring himself to the king's service," in May 1442, and appears in the first extant Eton Audit Roll 1444–1445 as headmaster, was probably such from May 1442. If Waynflete was headmaster from October 1441 to May 1442, his duties must have been little more than nominal. As provost, Waynflete procured the exemption of the college from archidiaconal authority on the 2nd of May, and made the contract for completion of the carpenter's work of the eastern side of the quadrangle on the 30th of November 1443. On the 21st of December 1443 he was sworn to the statutes by Bishop Bekynton and the earl of Suffolk, the king's commissioners, and himself administered the oath to the other members of the foundation, then only five fellows and eleven scholars over fifteen years of age. He is credited with having taken half the scholars and fellows of Winchester to Eton to start the school there. In fact, five scholars and perhaps one commoner left Winchester for Eton in 1443, probably in July, just before the election. For three of them were admitted scholars of King's College, Cambridge, on the 19th of July, that college, by its second charter of the 10th of July 1443 having been placed in the same relation to Eton that New College bore to Winchester; *i.e.* it was to be recruited entirely from Eton. The chief part of Waynflete's duties as provost was the financing and completion of the buildings and establishment. The number of scholars was largely increased by an election of 25 new ones on the 26th of September 1444, the income being then £946, of which the king contributed £120 and Waynflete £18, or more than half his stipend of £30 a year. The full number of 70 scholars was not filled up till Waynflete's last year as provost, 1446–1447 (Eton Audit Roll). So greatly did Waynflete ingratiate himself raised but slightly above the river level. A "raghza" differs from a "wam" in being on a higher level and often beyond the reach of irrigation. Pasture is found abundantly in the hills, but cultivation only on the borders of the main streams. Passing up and down these main water-courses, there is an appearance of great fertility and wealth, which is entirely due to these thriving strips of verdure, their restricted and narrow limits being hardly visible from the river beds. From above, when viewed from the flanking ridges, the vast extent of hill country, neither high, nor imposing, nor difficult of access, but invariably stony and rough, compares strongly with the narrow bands of enclosed cultivation winding about like green ribbons, and marking the course of the main streams from the snow-covered peaks to the plains. The physiography of Waziristan is that of the Kurram to the north rather than that of the Suliman hills to the south.

The Waziris are the largest tribe on the frontier, but their state of civilization is very low. They are a race of robbers and murderers, and the Waziri name is execrated even by the neighbouring Mahommedan tribes. Mahommedans from a settled district often regard Waziris as utter barbarians, and seem inclined to deny their title to belong to the faith. They have been described as being "free-born and murderous, hot-headed and light-hearted, self-respecting but vain." The poverty of their country and the effort required to gain a subsistence in it have made the Waziris a hardy and enduring race. Their physique is uncommonly good, and though on the average short of stature, some extremely tall and large men are to be found amongst them. They are generally deep-chested and compact of build, with a powerful muscular development common to the whole body, and not confined to the lower limbs as is the case with some hill tribes of the Himalayas. As mountaineers the Waziris would probably hold their own with any other Pathan tribe of the frontier.

Except in a few of the highest hills, which are well-wooded, the Waziri country is a mass of rock and stones, bearing a poor growth of grass and thinly sprinkled with dark evergreen bushes; progress in every direction except on devious paths known to the natives is obstructed by precipices or by toilsome stony ascents; and knowledge of the topography, a mere labyrinth of intricate ranges and valleys, comes only as the result of long acquaintance. Broken ground and tortuous ravines, by making crime easy and precaution against attack difficult, have fostered violence among the people and developed in them an extraordinary faculty of prudence and alertness. In consequence of his isolation the Waziri has become independent, self-reliant and democratic in sentiment. Through the inaccessibility of his own country to lowlanders, combined with the proximity of open and fertile tracts inhabited by races of inferior stamina, he has developed into a confirmed raider; and the passage through his country of mountain footpaths, connecting India with Afghanistan, has made him by frequent opportunity a hereditary highwayman as well. The women enjoy more freedom than amongst most Pathan tribes, and are frequently unfaithful. The ordinary punishment of adultery is to put the woman to death, and to cut off half the right foot of the man. Amongst Waziris also, as amongst other Pathans, the blood-feud is a national institution.

The Waziris, who number some 40,000 fighting men altogether, are divided into two main sections, the Darwesh Khel (30,000) and the Mahsuds (8000), with two smaller sections. The Darwesh Khel, the more settled and civilized of the two, inhabit the lower hills bordering on Kohat and Bannu districts, and the ground lying on both sides of the Kurram river, between Thal on the north and the Tochi Valley on the south. The Mahsuds, who inhabit the tract of country lying between the Tochi Valley on the north and the Gomal river on the south, have earned for themselves an evil name as the most confirmed raiders on the border; but they are a plucky race, as active over the hills as the Afridis, and next to them the best-armed large tribe on the frontier. The Mahsud country, especially that part within reach of British posts, is more difficult even than Tirah. To [illegible] it is girt by an intricate belt of uninhabited, [illegible] hills and ravines. To the north a zone of [illegible], not less than 20 m. in width, hilly and difficult, separates the Mahsuds from the Tochi. The Tochi Valley is inhabited by a degraded Pathan tribe, known as Dauris, who have voluntarily placed themselves under British protection since 1895. In dealing with the Mahsuds it must be remembered that from Wana to Tank, from Tank to Bannu, and from Bannu to Datta Khel, or for a distance of over 200 m., British territory is open to Mahsud depredations. This length of frontier is equal to the whole Thal-Kohat-Peshawar-Malakand line, covering the eight or ten tribes that took part in the frontier risings of 1897. So that the Mahsuds should really be compared with the whole of those ten tribes, and not with any single one.

British expeditions were needed against various sections of the Waziris in 1852, 1859, 1860, 1880, 1881, 1894, 1897 and 1902.

The success of Sir Robert Sandeman in subduing the wild tribes of Baluchistan had led to a similar attempt to open up Waziristan to British civilization; but the Pathan is much more democratic and much less subject to the influence of his maliks than is the Baluchi to the authority of his chiefs; and the policy finally broke down in 1894, when the Waziris made a night attack upon the camp of the British Delimitation Commission at Wana. The Commission had been appointed to settle the boundary with the Afghans, and the Waziris regarded it as the final threat to their independence. The attack was delivered with such determination that the tribesmen penetrated into the centre of the camp, and it was only with the greatest difficulty that friend could be distinguished from foe. A large force of 11,000 British troops subsequently traversed the tribal country, destroyed their towers and dictated terms, one of which was that the Tochi Valley should be occupied by British garrisons. But still there was trouble, which led to the Tochi expedition of 1897; and, in spite of the further lessons taught the Waziris in two expeditions in 1902, the attempt to "Sandemanise" Waziristan was given up by Lord Curzon. The British garrisons in the Tochi and Gomal valleys were withdrawn, and two corps of tribal militia, from 1300 to 1500 strong, were gradually formed to replace the British troops.

See *Grammar and Vocabulary of Waziri Pashto*, by J. G. Lorimer (Calcutta, 1902); Paget and Mason's *Frontier Expeditions* (1884); *Mahsud Waziri Operations* (1902), Blue-book.

WAZZĀN, a small hillside town, 60 m. N.W. by N. of Fez, Morocco. It has a considerable trade with the country round, and manufactures a coarse white woollen cloth with rough surface from which the hooded cloaks (called *jellābs*) are made. Its proudest name is Dār D'manah—House of Safety—as it is sanctuary for any who gain its limits, on account of the tomb of a sainted Idrisi Sharif, who lived there in 1727. It is the headquarters of his descendants.

WEALD, THE, a district in the south-east of England. It includes the portions of Sussex, Kent and Surrey which are enclosed between the North and South Downs—a district of Lower Cretaceous rocks encircled by Upper Cretaceous hills. It extends from Frensham and Petersfield on the Hampshire borders to the English Channel between Folkestone and Eastbourne. With the exception of the easternmost part, it drains by rivers running northward and southward through gaps in the Downs, the origin of which is considered under that heading. The Weald was formerly covered by the forest of Andredesleah or Andredsweald ("the wood or forest without habitations"), which was 120 m. in length and about 30 in greatest breadth. About 1660 the total area under forest was estimated at over 200,000 acres. The chief remains of the ancient forests are Ashdown, St Leonards and Tilgate, and the nomenclature often indicates the former extent of woodland, as in the case of Hurstpierpoint (*hurst* meaning wood), Midhurst, Fernhurst, Billingshurst, Ashurst and many others. The forests were interspersed with lagoons; and the rainfall being very great caused marshes, but it abated in consequence of the cutting down of the Wealden forests for fuel in the extensive ironworks that formerly existed in the district. The locality best preserving the ancient character of the Weald is the hilly district in the centre, forming a picturesque broken range running east and west under the name of the Forest Ridges. This forms the main water-parting of the Weald, dividing the Vale of Sussex from the Vale of Kent; and was also the seat of the iron industry which was prosecuted by the Romans and probably earlier, reached its highest importance in the 16th and 17th centuries, and was maintained even till the early years of the 19th century. The Andredesleah had an early historical interest as forming a physical barrier which kept the South Saxons isolated from other Saxon kingdoms. Descending from over sea upon the coastal district of Sussex, to which they gave name, towards the close of the 5th century, they populated it thickly, and maintained independence, in face of the accretions of the West Saxon kingdom, for upwards of a hundred years.

WEALDEN, in geology, a thick series of estuarine and fresh-water deposits of Lower Cretaceous age, which derives its name from its development in the Weald of Kent and Sussex. In the type area it is exposed by the denudation of a broad anticlinal fold from which the higher Cretaceous beds have been removed. The Wealden rocks lie in the central part of this anticline between the escarpments of the North and South Downs; they extend eastwards from the neighbourhood of Haslemere and Elland Chapel to the west between Pevensey and Hythe. This formation is divisible into two portions, the Weald Clay above and the Hastings Sands below. The Weald Clay which occupies the central, upland part of the area from Horsham to the sea coast consists of dark brown and blue clays and shales, occasionally mottled in the neighbourhood of sandy lenticles, which together with calcareous sandstones, shelly limestones and nodular ironstones take a subordinate place in the series. About Horsham the Weald Clay is 1000 ft. thick, but it decreases in an eastward direction; at Tunbridge it is only 600 ft. Certain subordinate beds within the Weald Clay have received distinctive names. "Horsham stone" is a calcareous flaggy sandstone, often ripple marked, usually less than 5 ft. thick, which occurs at about 120 ft. above the base of the Clay. "Sussex marble" is the name given to more than one of the high limestone beds which are mainly composed of a large form of *Paludina* (*P. fluviorum*); some of the lower limestone layers contain a small species (*P. sussexiensis*). The Sussex marble (proper) occurs about 100 ft. below the top of the clays; it is the most important of the limestone bands, and its thickness varies from 6 ft. to 2 in.; it is known also as Bethersden marble, Petworth marble, Laughton stone, &c. It has been widely used in the Weald district in church architecture and for polished mantelpieces. The ironstones were formerly smelted in the western part of the area.

The Hastings Sands are divisible into three main subdivisions: the Tunbridge Wells Sand, the Wadhurst Clay and the Ashdown Sand. Like the overlying Weald Clay this series thickens as a whole towards the west. In the west, the Tunbridge Wells Sand is separated into an upper and lower division by the thickening of a bed of clay—the Grinstead Clay—which in the east, about Rye, &c., is quite thin; at Cuckfield a second clay bed 15 ft. thick divides the upper division. The upper beds of the lower Tunbridge Wells Sand cause good landscapes around West Hoathly and near East Grinstead. The Wadhurst Clay is very constant in character; near the base it frequently contains clay-ironstone, which in former times was the main source of supply for the Wealden iron industry. Much of the higher portion of the Hastings Sand country is made of the Ashdown Sands, consisting of sand, soft sandstones and subordinate clay bends; in the east, however, clay is strongly developed at the base of this group, and at Fairlight is more than 360 ft. thick, while the sandy portion is only 150 ft. These clays with sandy layers are known as the Fairlight Clays. Beds of lignite are found in these beds, and a calcareous sandstone, called Tilgate stone, occurs near the top of the Ashdown Sands and in the Wadhurst Clay. The old town of Hastings is built on Ashdown Sand, but St Leonards is mainly on Tunbridge Wells Sand.

Wealden beds occur on the southern side of the Isle of Wight and in the Isle of Purbeck in Dorsetshire. The Wealden anticline can be traced across the Channel into the Bas Boulonnais. A separate Wealden area exists in north Germany between Brunswick and Bentheim, in the Ostervald and Teutoberger Wald, where the Deister Sandstone (150 ft.) corresponds to the Hastings Sands and the Wälderthon (70–100 ft.) to the Weald Clay. The former contains valuable coal beds, worked in the neighbourhood of Obernkirchen, &c., and a good building stone.

The fossils of the Wealden beds comprise freshwater shellfish, *Unio*, *Paludina*, *Melanopsis*, *Cyrena*; and estuarine and marine forms such as *Ostrea*, *Exogyra* and *Mytilus*. An interesting series of dinosaurs and pterodactyles has been obtained from the Wealden of England and the continent of Europe, of which *Iguanodon* is the best known—a large number of almost entire skeletons of this genus were discovered in some buried Cretaceous valleys at Bernissart in Belgium; other forms are *Heterosuchus*, *Ornithocheirus*, *Ornithopsis*, *Cimoliosaurus* and *Titanosaurus*. Among the plant remains are *Chara*, *Bennettites*, *Equisitites*, *Fittonia*, *Sagenopteris* and *Thuyites*. The fishes, plants and reptiles of these formations possess a decidedly Jurassic aspect, and for this reason several authorities are in favour of retaining the Wealden rocks in that system, and the close relationship between this formation and the underlying Purbeckian, both in England and in Germany, tends to support this view.

See CRETACEOUS, NEOCOMIAN, PURBECKIAN; also W. Topley. "Geology of the Weald," *Mem. Geol. Survey* (London, 1875).

(J. A. H.)

WEALTH, etymologically the condition of well-being, prosperity in its widest sense. The word does not appear in Old English, but is a Middle English formation, *welthe*, on the O. Eng. *wela*, well-being, from *wel*, well, cognate with Dan. *vel*, Ger. *wohl*. The original meaning survives in the *Prayer for the King's Majesty* of the English Book of Common Prayer, "Grant him in health and wealth long to live," and in "commonwealth," *i.e.* good of the body politic, hence applied to the body politic itself.

In economics, wealth is most commonly defined as consisting of all useful and agreeable things which possess exchange value, and this again is generally regarded as coextensive with all desirable things except those which do not involve labour or sacrifice for their acquisition in the quantity desired. On analysis it will be evident that this definition implies, directly, preliminary conceptions of utility and value, and, indirectly, of sacrifice and labour, and these terms, familiar though they may appear, are by no means simple and obvious in their meaning. Utility, for the purposes of economic reasoning, is usually held to mean the capacity to satisfy a desire or serve a purpose (J. S. Mill), and in this sense is clearly a much wider term than wealth. Sunshine and fresh air, good temper and pleasant manners, and all the infinite variety of means of gratification, material and immaterial, are covered by utility as thus defined. Wealth is thus a species of utility, and in order to separate it from other species some *differentia* must be found. This, according to the general definition, is exchange value, but a little reflection will show that in some cases it is necessary rather to contrast value with wealth. "Value," says Ricardo, expanding a thought of Adam Smith, "essentially differs from riches, for value depends not on abundance but on the difficulty or facility of production." According to the well-known tables ascribed to Gregory King (1648–1712), a deficiency of a small amount in the annual supply of corn will raise its value far more than in proportion; but it would be paradoxical to argue that this rise in value indicated an increase in an important item of national wealth. Again, as the mines of a country are exhausted and its natural resources otherwise impaired, a rise in the value of the remainder may take place, and as the free gifts of nature are appropriated they become valuable for exchange; but the country can hardly be said to be so much the wealthier in consequence. And these difficulties are rather increased than diminished if we substitute for value the more familiar concrete term "money-price"—for the contrast between the quantity of wealth and its nominal value becomes more sharply marked. Suppose, for example, that in the total money value of the national inventory a decline were observed to be in progress, whilst at the same time, as is quite possible, an increase was noticed in the quantity of all the important items and an improvement in their quality, it would be in accordance with common sense to say that the wealth of the country was increasing and not decreasing.

So great are these difficulties that some economists (*e.g.* Ricardo) have proposed to take utility as the direct measure of wealth, and, as H. Sidgwick has pointed out, if double the quantity meant double the utility this would be an easy and natural procedure. But even to the same individual the increase in utility is by no means simply proportioned to the increase in quantity, and the utility of different commodities to different individuals, and à fortiori of different amounts, is proverbial. The very same things may to the same individual be productive of more utility simply owing to a change in his tastes or habits, and a different distribution of the very same things, which make up the wealth of a nation, might indefinitely change the quantity of utility; but it would be paradoxical to say that the wealth had increased because it was put to better uses.

We thus seem thrown back on value as the essential characteristic, allowance being made for any change in the standard of value; but there are still difficulties to be overcome. Some things that undoubtedly possess value or that can command a price are immaterial, *e.g.* the advice of a lawyer or physician or the song of a *prima donna*, and, although perhaps the skill of a workman (in any grade of the social scale) might be considered as attached to the man, as a coal mine is attached to a place, it is more in accordance with popular usage to consider skill as immaterial, whilst at the same time it seems equally natural prima facie to confine the term wealth to material things in the common sense. Again, the credit system of a country is a product of great labour and sacrifice, it is most closely connected with the production of its material wealth in the narrowest sense, and it certainly commands a pecuniary value, and yet credit is more generally held to be a representative rather than a part of wealth, owing apparently to its insubstantial character. Apart from the question of materiality some writers have insisted on relative permanence and possibility of accumulation as essential attributes of wealth, and have thus still further narrowed the scope of the definition.

There can be no doubt that it is on many grounds desirable in economics to use terms as far as possible in their popular acceptations; but this rule must always be subordinate to the primary object in view. In nearly every department of knowledge in which popular terms have been retained it has been found necessary either constantly to use qualifying adjectives where the context is not a sufficient guide, and in some cases, when analysis discloses very different elements, to make a selection. Sometimes it has been found convenient to use a term with some variation in the definition according to the branch of the subject in hand.[1] Applying these rules to the definition of wealth, perhaps the best solution is that which is generally connected with German economists (*e.g.* Adolf von Held). Wealth consists of utilities, and in the first great department of economics—the *consumption* of wealth— it is utility with which we are principally concerned—the idea of value, for example, being overshadowed. The most general law of the consumption of wealth is that successive portions of any stock give a diminishing amount of utility when consumed. Then in the department of the *production* of wealth the most important characteristics are the labour and sacrifice necessary to put the utilities desired into the things and to place the things where they are wanted. The idea of value is again secondary and subordinate. We can readily see the part played by nature, labour and capital respectively in the production of any commodity without considering the *effects* on its value of the various factors; we can understand the principles of division of labour and of the relative productiveness of large and small industries without entering into questions of value except in the most general manner. In the department of the *distribution* of wealth the fundamental conception is the right of appropriation; and accordingly J. S. Mill very properly commences this part of his subject by an account of the relative advantages of the socialistic and individual systems of property. It is quite possible under the former to conceive of all the distribution being made without any exchange and with reference simply to the wants or the deserts of the members of the society. Thus it is not until we arrive at the department of the *exchange* of wealth that the characteristic of value becomes predominant, although [illegible] value is closely connected with utility and labour and [illegible]

Usually, however, it will be found that in most cases anything which can fairly be classed as wealth in one department is also wealth in the others, and thus the definition is reached that wealth in general consists of all "consumable utilities which require labour for their production and can be appropriated and exchanged." It only remains to add that "utilities" may be divided into "inner" and "outer" (to translate the German literally)—the "inner" being such as are simply sources of personal gratification to their possessor, *e.g.* a good ear for music; the "outer" utilities again may be divided into "free" and "economic," the former, as a rule, *e.g* sunlight, not being the result of labour and not capable of appropriation or exchange, and the latter as a rule possessing each of these marks. It is these "economic utilities" which constitute wealth in the specific sense of the term, although its use may be extended by analogy to include almost all utilities.

See A. Marshall, *Principles of Economics* (1907); J. B. Clark, *Philosophy of Wealth* (1886) and *Distribution of Wealth* (1899); W. E. Hearn, *Plutology* (1864); F. A. Walker, *Political Economy* (1888); and J. S. Nicholson, *Principles of Political Economy* (1903). (J. S. N.)

WEAPON (O. Eng. *wǣpen*, cf. Du. *wapen*, Ger. *Waffe*, also *Wappen*, a coat of arms, heraldic shield), any instrument of offence or defence, more usually a term confined to offensive or attacking instruments. The general sketch of the history and development of weapons of offence and defence is given under ARMS AND ARMOUR; particular weapons are treated under such heads as HALBERD, LANCE, SPEAR, SWORD, GUN, PISTOL, RIFLE, ORDNANCE AND MACHINE-GUNS.

WEAR, a river of Durham, England, rising in the Pennine chain near the Cumberland border, and traversing a valley about 60 m. in length to the North Sea, with a drainage area of 458 sq. m. A series of streams draining from the hills between Killhope Law and Burnhope Seat (2452 ft.) are collected at Wearhead, up to which point the valley is traversed by a branch of the North-Eastern railway. Hence eastward, past the small towns of St John's Chapel and Stanhope, and as far as that of Wolsingham, Weardale is narrow and picturesque, sharply aligned by high-lying moorland. Below, it takes a south-easterly bend as far as Bishop Auckland, then turns northward and north-eastward, the course of the river becoming extremely sinuous. The scenery is particularly fine where the river sweeps round the bold peninsula which bears the cathedral and castle of the city of Durham. The valley line continues northerly until Chester-le-Street is passed, then it turns north-east; and soon the river becomes navigable, carrying a great traffic in coal, and having its banks lined with factories. At the mouth is the large seaport of Sunderland.

WEASEL (*Putorius nivalis*), the smallest European species of the group of mammals of which the polecat and stoat are well-known members (see CARNIVORA). The weasel is an elegant little animal, with elongated slender body, back much arched, head small and flattened, ears short and rounded, neck long and flexible, limbs short, five toes on each foot, all with sharp, compressed, curved claws, tail rather short, slender, cylindrical, and pointed at the tip, and fur short and close. The upper-parts, outside of limbs and tail, are uniform reddish brown, the under-parts white. In cold regions the weasel turns white in winter, but less regularly and only at a lower temperature than the stoat or ermine, from which it is distinguished by its smaller size and the absence of the black tail-tip. The length of the head and body of the male is usually about 8 in., that of the tail 2½ in.; the female is smaller. The weasel is generally distributed throughout Europe and Northern and Central Asia; and is represented by a closely allied animal in North America. It possesses all the active, courageous and bloodthirsty disposition of the rest of the genus, but its diminutive size prevents it attacking and destroying any but the smaller mammals and birds. Mice, rats, water-rats and moles, as well as frogs, constitute its principal food. It is generally found on or near the surface of the ground, but it can not only pursue its prey through holes and crevices of rocks and under dense tangled herbage, but follow it up the stems and branches of trees, or even into the water, swimming with perfect ease. It constructs a nest of dried leaves and herbage, placed in a hole in the ground or a bank or hollow tree, in which it brings up its litter of four to six (usually five) young ones. The mother will defend her young with the utmost desperation against any assailant, and has been known to sacrifice her own life rather than desert them. (R. L.*)

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[1] [illegible] difficulties of definitions in political economy [illegible] *Principles of Political Economy*, bk. i. ch. ii., [illegible] *Scope and Method of Political Economy*.

The Weasel (*Putorius nivalis*).

WEATHER (O. Eng. *weder*; the word is common to Teutonic languages; cf. Du. *weder*, Dan. *veir*, Icel. *veðr*, and Ger. *Wetter* and *Gewitter*, storm; the root is *wa-* to blow, from which is derived "wind"), the condition of the atmosphere in regard to its temperature, presence or absence of wind or cloud, its dryness or humidity, and all the various meteorological phenomena (see METEOROLOGY). The term "weathering" is used in geology of the gradual action of the weather upon rocks, and is also applied, in architecture, to the inclination or slope outwards given to cornices, string courses and window sills, to throw off the rain.

WEAVER, JAMES BAIRD (1833–), American lawyer and political leader, was born at Dayton, Ohio, on the 12th of June 1833. He studied law at Cincinnati, Ohio, and served on the Federal side in the Civil War, becoming colonel in November 1862; he was mustered out in May 1864, and in March 1865 was breveted brigadier-general of volunteers. He was district-attorney for the second Judicial District of Iowa in 1866–1870 and an assessor of internal revenue in Iowa in 1863–1873; and was a representative in Congress in 1879–1881 and in 1885–1889, being elected by a Greenback-Democratic fusion. In 1880 he was the candidate of the Greenback party for president and received a popular vote of 308,578; and in 1892 he was the candidate of the People's party, and received 22 electoral votes and a popular vote of 1,041,021.

WEAVER-BIRD, the name[1] by which a group of between 200 and 300 species are now usually called, from the elaborately interwoven nests that many of them build, some of the structures being of the most marvellous kind. By the older systematists such of these birds as were then known were distributed among the genera *Oriolus*, *Loxia*, *Emberiza* and *Fringilla*; and it was G. L. Cuvier who in 1817 first brought together these dissevered forms, comprising them in a genus *Ploceus*. Since his time others have been referred to its neighbourhood, and especially the genus *Vidua* with its allies, so as to make of them a subfamily *Ploceinae*, which in 1847 was raised by J. Cabanis to the rank of a family *Ploceidae*—a step the propriety of which has since been generally admitted, though the grounds for taking it are such as could not be held valid in any other order than that of *Passeres*. The *Ploceidae* are closely related to the *Fringillidae* (see FINCH), and are now divided into two subfamilies, the *Ploceinae* and *Viduinae*, the former chiefly found in Africa and its islands, the latter in the Ethiopian, Australian and Indian regions.

Perhaps the most typical Ploceine weaver-bird is *Hyphantornis cucullata*, an African species, and it is to the Ethiopian Region that by far the greatest number of these birds belong, and in it they seem to attain their maximum of development. They are all small, with, generally speaking, a sparrow-like build; but in richness of colouring the males of some are very conspicuous—glowing in crimson, scarlet or golden-yellow, set off by jet-black, while the females are usually dull in hue. Some species build nests that are not very remarkable, except in being almost invariably domed—others (such as the most typical Indian weaver-bird, *Ploceus baya*) fabricate singular structures[2] of closely and uniformly interwoven tendrils or fine roots, that often hang from the bough of a tree over water, and, starting with a solidly wrought rope, open out into a globular chamber, and then contract into a tube several inches in length, through which the birds effect their exit and entrance. But the most wonderful nests of all, and indeed the most wonderful built by birds, are those of the so-called sociable grosbeak, *Philhetaerus socius*, of Africa. These are composed wholly of grass, and are joined together to the number of 100 or 200—indeed 320 are said to have been found in one of these aggregated masses, which usually take the form of a gigantic mushroom,[3] affording a home and nursery to many pairs of the birds which have been at the trouble of building it. These nests, however, have been so often described and figured by South African travellers that there is no need here to dilate longer on their marvels. It may be added that this species of weaver-bird, known to French writers as the *Républicain*, is of exceptionally dull plumage.

The group of widow-birds,[4] *Viduinae*, is remarkable for the extraordinary growth of the tail-feathers in the males at the breeding-season. In the largest species, *Vidua* (sometimes called *Chera*) *progne*, the cock-bird, which, with the exception of a scarlet and buff bar on the upper wing-coverts, is wholly black, there is simply a great elongation of the rectrices; but in *V. paradisea* the form of the tail is quite unique. The middle pair of feathers have the webs greatly widened, and through the twisting of the shafts their inferior surfaces are vertically opposed. These feathers are comparatively short, and end in a hair-like filament. The next pair are produced to the length of about a foot—the bird not being so big as a sparrow—and droop gracefully in the form of a sickle. But this is not all: each has attached to its base a hair-like filament of the same length as the feather, and this filament originally adhered to and ran along the margin of the outer web, only becoming detached when the feather is full grown.[5] In another species, *V. principalis*, the middle two pairs of rectrices are equally elongated, but their webs are convex, and the outer pair contains the inner, so that when the margins of the two pairs are applied a sort of cylinder is formed.[1] The females of all the widow-birds differ greatly in appearance from the males, and are generally clothed in a plumage of mottled brown.

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[1] First bestowed in this form apparently by J. F. Stephens in 1826 (G. Shaw's *Gen. Zoology*, xiv. pt. i. p. 34); but in 1782 J. Latham (*Synopsis*, i. p. 435) had called the "*Troupiale du Sénégal*" of Buffon the "weever oriole," from its habit of entwining the wires of the cage in which it was kept with such vegetable fibres as it could get, and hence in 1788 Gmelin named it *Oriolus textor*. In 1800 F. M. Daudin used the term "*Tisserin*" for several species of the Linnaean genus *Loxia*, and this was adopted some years later by Cuvier as the equivalent of his *Ploceus*, as mentioned in the text.

[2] These differ from those built by some of the ORIOLES (*q.v.*) and other birds, whose nests may be compared to pensile pockets, while those of these weaver-birds can best be likened to a stocking hung up by the "toe," with the "heel" enlarged to receive the eggs, while access and exit are obtained through the "leg."

[3] But at a distance they may often be mistaken for a native hut, with its grass-roof.

[4] It has been ingeniously suggested that this name should be more correctly written Whydah bird—from the place on the West Coast of Africa so named; but Edwards, who in 1745 figured one of the species, states that he was informed that "the Portuguese call this bird the widow, from its colour and long train" (*Nat. Hist. Birds*, i. p. 86).

[5] This curious structure was long ago described by Brisson (*Ornithologie*, iii. p. 123), and more recently by Strickland (*Contr. Ornithology* (1850), pp. 88 and 149, pl. 59).

Usually classed with the weaver-birds is a vast group of small seed-eating forms, often called *Spermestinae*, but for which *Estreldinae* would seem to be a more fitting name. These comprehend the numerous species so commonly seen in cages, and known as amadavats, *Estrelda amandava*, nutmeg-birds, *Munia punctularia*, waxbills, *Pytelia melba* and *phoenicoptera*, cutthroats, *Amadina fasciata*, the Java sparrow, *Munia oryzivora* and many others. Many of these genera are common to Africa and India, and some also to Australia. (A. N.)

WEAVING. The process of weaving consists in interlacing, at right angles, two or more series of flexible materials, of which the longitudinal are called warp and the transverse weft. Weaving, therefore, only embraces one section of the textile industry, for felted, plaited, netted, hosiery and lace fabrics lie outside this definition. Felting consists in bringing masses of loose fibres, such as wool and hair, under the combined influences of heat, moisture and friction, when they become firmly interlocked in every direction. Plaited fabrics have only one series of threads interlaced, and those at other than right angles. In nets all threads are held in their appointed places by knots, which are tied wherever one thread intersects another. Hosiery fabrics, whether made from one or many threads, are held together by intersecting a series of loops; while lace fabrics are formed by passing one set of threads between and round small groups of a second set of threads, instead of moving them from side to side. Notwithstanding the foregoing limitations, woven fabrics are varied in texture and have an enormous range of application. The demands made by prehistoric man for fabrics designed for clothing and shelter were few and simple, and these were fashioned by interlacing strips of fibrous material and grasses, which in their natural condition were long enough for the purpose in hand. But, as he passed from a state of savagery into a civilized being, his needs developed with his culture, and those needs are still extending. It no longer suffices to minister to individual necessities; luxury, commerce and numerous industries must also be considered.

The invention of spinning (*q.v.*) gave a great impetus to the introduction of varied effects; previously the use of multicoloured threads provided ornament for simple structures, but the demand for variety extended far beyond the limits of colour, and different materials were employed either separately or conjointly, together with different schemes of interlacing. Eventually the weaver was called upon to furnish articles possessing lustre, softness and delicacy; or those that combine strength and durability with diverse colourings, with a snowy whiteness, or with elaborate ornamentation. In cold countries a demand arose for warm clothing, and in hot ones for cooler materials; while commerce and industry have requisitioned fabrics that vary from normal characteristics to those that exceed an inch in thickness. In order to meet these and other requirements the world has been searched for suitable raw materials. From the animal kingdom, wool, hair, fur, feathers, silk and the pinna fibre have long been procured. From the vegetable kingdom, cotton, flax, hemp, jute, ramie and a host of other less known but almost equally valuable materials are derived. Amongst minerals there are gold, silver, copper, brass, iron, glass and asbestos. In addition, strips of paper, or skin, in the plain, gilt, silvered and painted conditions are available as well as artificial fibres. All of the foregoing may be used alone or in combination.

From such varied raw materials it is not surprising that woven fabrics should present an almost endless variety of effects; yet these differences are only in part due to the method of weaving. The processes of bleaching (*q.v.*), mercerizing (*q.v.*), dyeing (*q.v.*), printing (see **Textile Printing**) and finishing (*q.v.*) contribute almost as [illegible] and effect of the resultant product [illegible] fabric of threads spun in di[illegible] origin, with paper, [illegible]

Industrial Technicology

All weaving schemes are reducible to a few elementary principles, but no attempted classification has been quite successful, for fabrics are constantly met with that possess characteristics supposed to be peculiar to one class, but lack others which are deemed equally typical. Nevertheless, since some classification is essential, the following will be adopted, namely: Group 1, to include all fabrics made from one warp and one weft, provided both sets of threads remain parallel in the finished article and are intersected to give the requisite feel and appearance. Group 2, to include (*a*) fabrics constructed from two warps and one weft, or two wefts and one warp, as in those that are backed, reversible and figured with extra material; (*b*) two or more distinct fabrics built simultaneously from two or more warps and wefts, as in two, three and other ply cloths; (*c*) fabrics built by so intersecting two or more warps and wefts that only one texture results, as in loom-made tapestries and figured repps. Group 3, to include fabrics in which a portion of the weft or warp rises vertically from the groundwork of a finished piece, as in velveteens, velvets, plushes and piled carpets. Groups 4, to embrace all fabrics in which one portion of the warp is twisted partially, or wholly, round another portion, as in gauzes and lappet cloths. Although some fabrics do not appear to fall into any of the above divisions, and in others the essential features of two or more groups are combined, yet the grouping enumerated above is sufficiently inclusive for most purposes.

The fabrics included in Group 1 are affected by the nature and closeness of the yarns employed in their construction, by colour, or by the scheme of intersecting the threads. The most important section of this group is *Plain Cloth*, in which the warp and weft threads are approximately equal in thickness and closeness, and pass over and under each other alternately, as in fig. 1, which shows a design, plan and two sections of plain cloth. Such a fabric would, therefore, appear to admit of but slight ornamentation, yet this is by no means the case, for if thick and thin threads of warp and weft alternate, the resultant fabric may be made to assume a corrugated appearance on the face, while beneath it remains flat, as in poplins, repps and cords. A plan and a longitudinal section of a repp cloth is shown at fig. 2. Colour may also be employed to ornament plain fabrics, and its simplest application produces stripes and checks. But colour may convert these fabrics into the most artistic and costly productions of the loom, as is the case with tapestries, which are at once the oldest and most widely diffused of ornamented textiles. Tapestries only differ from simple plain cloth in having each horizontal line of weft made up of numerous short lengths of parti-coloured thread. Many fine specimens of this art have been recovered from ancient Egyptian and Peruvian tombs, and many are still produced in the Gobelins and other celebrated manufactories of Europe.

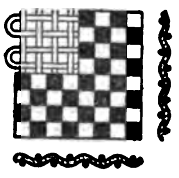


Fig. 1.—Plain Cloth.

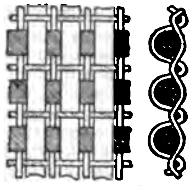


Fig. 2.—Repp Cloth.

Twills are next in importance to plain cloth on account of their wide range of application and great variety of effects; in elaborately figured goods their use is as extensive as where they provide the only ornament. Twills invariably form diagonal ribs in fabrics, and these are due to the intervals at which the warp and weft are intersected; thus two or more warp threads are passed over or under one or more than one weft thread in regular succession. Twills are said to be equal when similar quantities of warp and weft are upon the face of a fabric, unequal when one set of threads greatly preponderates over the other set, as in figs. 3, 4, which require four warp and weft threads to complete the scheme of intersections. If the ribs form angles of 45 degrees, the warp and weft threads per inch are about equal in number, but for an unequal twill the material most in evidence should be closest and finest. The angle formed may be greater or less than 45 degrees, as in figs. 5, 6; if greater, the warp preponderates, if less, the weft preponderates. Twills are *simple* and *fancy*; both terms refer to the schemes of intersecting. In the

[1] [illegible] described and figured [illegible] from pictures sent [illegible]

former the same number of warp threads are placed successively above or below each weft thread, and the ribs are of uniform width, as in figs. 3, 4. In the latter more warp threads may be above one pick than another, the ribs may vary in width and small ornament may be introduced between the ribs, as in figs. 5, 6 and 7, where the dark squares represent warp upon the surface. Twills may be broken up into zigzags, lozenges, squares and other geometrical designs; all of which may be produced by reversings in the diagonal lines, or by reversing the weave of an unequal twill. Fig. 8 is a zigzag, namely, a twill reversed in one direction. Fig. 9 is a diamond, or a twill reversed in two directions, and fig. 10 is a diaper, or an unequal twill which gives a warp face in one place and a weft face in another. *Satins* and *sateens* form another important section of Group 1. In a satin the bulk of the warp, and in a sateen the bulk of the weft, is on the face of a fabric. If perfect in construction both present a smooth, patternless appearance, which is due in part to the scheme of intersections, in part to using fine material for the surface threads and placing it close enough together to render the points of intersection invisible; the threads of the other set being coarser and fewer in number. Satins differ from twills in having each warp thread lifted, or depressed, separately, but not successively. From five to upwards of thirty threads of warp and weft are required to complete the various schemes of intersecting. If the intervals between the intersections are equal the weave is said to be perfect, as in fig. 11, but if the intervals are irregular it is said to be imperfect, as in fig. 12. In *Damasks* a satin is combined with a sateen weave, and since any desired size and shape of either weave may be produced, great facilities are offered for the development of all kinds of ornamentation. But in combination neither the satin nor the sateen can be perfect in construction, for one requires a preponderance of warp, the other a preponderance of weft; as a sequence every point of intersection is distinctly visible on both surfaces. *Brocades* are fabrics in which both sets of threads may be floated irregularly upon the surface to produce ornamental effects, and they may be taken as typical of all one warp and one weft fabrics that are figured by irregularly floated materials, whether the threads are uniformly or irregularly distributed, and whether one weave or several weaves be employed.

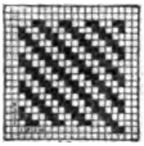


FIG. 3.—Four-thread $\frac{2}{2}$ Twill.

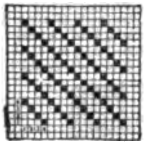


FIG. 4.—Four-thread $\frac{1}{3}$ Twill.

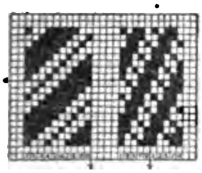


FIG. 5.—Upright Twill.

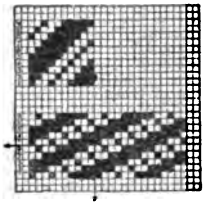


FIG. 6.—Reclining Twill.

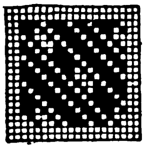


FIG. 7.—Fancy Twill.

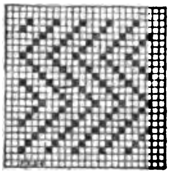


FIG. 8.—Zigzag.

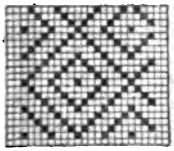


FIG. 9.—Diamond.

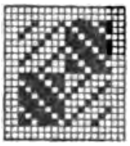


FIG. 10.—Diaper.

Group 2 includes all backed and reversible fabrics, as well as those ornamented with extra material and compounded. Cloths intended for men's wear are often *backed*, the object of which is to give weight and bulk to a thin texture without interfering with the face effects. Either warp or weft may be used as backing; if the former there are two series of warp to one series of weft threads, while in the latter there are two series of weft to one series of warp threads. The face material is superposed upon that of the back, but the ratio of face threads may be one or two to one of back. In order to avoid disturbing the face weave, only those threads are used to bind the backing that are hidden on the face, as in fig. 13, which gives the design and a transverse section of a backed fabric; A is face weft; B back weft, and the circles are warp threads; of the latter C, D, are beneath both B and A. This diagram will serve equally as a longitudinal section of a warp-backed fabric, if A represents a thread of face warp, B a thread of back warp and the circles are weft threads. Weft backing is capable of giving a more spongy feel to a fabric than warp, because softer materials may be used, but in these fabrics the length output of loom is reduced by reason of the wefts being superposed. Warp-backed fabrics, whether uniformly coloured or striped, do not materially reduce the output of a loom, for every weft thread adds to the cloth length. *Reversible* fabrics may have either two series of differently coloured wefts or warps to one of the other series, in which event they may be similarly figured on both sides by causing the threads of the double series to change places, as in the design and transverse section, fig. 14; or, by allowing one series to remain constantly above the other, as in backed cloths, both sides may be similar or dissimilar in colour and pattern. *Fabrics figured with extra material* may have two series of warp or weft threads to one series of the other set, and they may yield reversible or one-sided cloths. A ground texture may have extra material placed above or below it, as in fig. 15, where a design and transverse section of the cloth are given; the waved lines and circles represent a cross-section of plain cloth and A is a thread of extra material; or ordinary and extra material may be used conjointly for figuring. *Compound cloths* must have at least two textures, and be as distinct in character as if woven in separate looms; they have many advantages over backed cloths, thus: the same design and colouring may be produced on both sides; where bulk and weight are required a fine surface texture may be formed over a ground of inferior material, and soft weft be passed between the upper and lower textures. The fabric is more perfect and admits of either simple or elaborate patterns being wrought upon the surface, with simple ones beneath, as in piqués and matelassés. One texture may be constantly above the other and connected at the selvages only, as in hose pipes and pillow slips; or at intervals a thread may pass from one texture into the other, in which event both are united, as in many styles of bed-covers and vestings. If differently coloured, the textures may change places at pleasure, as in Kidderminster carpets; or, from three to twelve textures may be woven simultaneously, and united, as in belting cloth. There may be from one to three threads of face warp to one of back, and the wefting may or may not correspond with the warping. Fig. 16 shows the face and

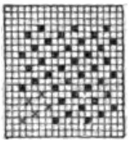


FIG. 11.—Five-thread Satteen.

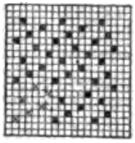


FIG. 12.—Six-thread Satteen.

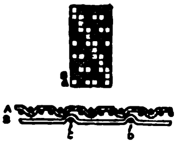


FIG. 13.—Weft-backed Fabric.

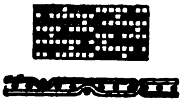


FIG. 14.—Weft Reversible Fabric.

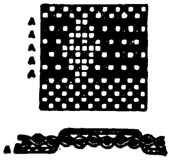


FIG. 15.—Figuring with Extra Weft.

back weaves, the design, and a transverse section of a compound cloth with two threads of face warp and weft to one of back, and both are stitched together. The circles in the upper and lower lines represent face and back warps respectively, and A, B, C are weft threads placed in the upper and lower textures. *Loom-made tapestries and figured repps* form another section of Group 2. As compared with true tapestries, the loom-made articles have more limited colour schemes, and their figured effects may be obtained from warp as well as weft, whether interlaced to form a plain face, or left floating more or less loosely. Every weft thread, in passing from selvage to selvage, is taken to the surface where required, the other portions being bound at the back. Some specimens are reversible, others are one-sided, but, however numerous the warps and wefts, only one texture is produced. When an extra warp of fine material is used to bind the wefts firmly together a plain or twill weave shows on both sides. If a single warp is employed, two or more wefts form the figure, and the warp seldom floats upon the surface. Where warps do assist to form figure it rarely happens that more than three can be used without overcrowding the reed. Fig. 17 gives the design, and a transverse section of a reversible tapestry in four colours, two of which are warps and two wefts. If either warp or weft is on the surface, corresponding threads are beneath. The bent lines represent weft and the circles warp. *Figured repps* differ from plain ones in having threads of one, or more than one, thick warp floated over thick and thin weft alike; or, in having several differently coloured warps from which a fixed number of threads are lifted over each thick weft thread; the face of the texture is then uniform, and the figure is due to colour.

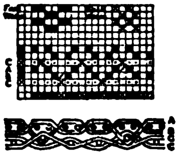


FIG. 16.—Compound Fabric.

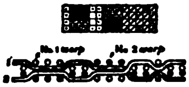


FIG. 17.—Tapestry with Two Warps and Two Wefts.

Group 3. *Piled Fabrics.*—In all methods of weaving hitherto dealt with the warp and weft threads have been laid in longitudinal and transverse parallel lines. In piled fabrics, however, portions of the weft or warp assume a vertical position. If the former there are two series of weft threads, one being intersected with the warp to form a firm ground texture, the other being bound into the ground at regular intervals, as in the design and transverse section of a velveteen, fig. 18; the circles and waved lines form plain cloth, and the loose thread A is a pile pick. After leaving the loom all threads A are cut by pushing a knife lengthwise between the plain cloth and the pile. As each pick is severed both pieces rise vertically and the fibres open out as at B. Since the pile threads are from two to six times as numerous as those of the ground, and rise from an immense number of places, a uniform brush-like surface is formed. Raised figures are produced by carrying the threads A beneath the ground cloth, where no figure is required, so that the knife shall only cut those portions of the pile weft that remain on the surface. The effect upon the face varies with the distribution of the binding points, and the length of pile is determined by the distance separating one point from another.

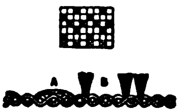


FIG. 18.—Velveteen.

Chenille.—When chenille is used in the construction of figured weft-pile fabrics, it is necessary to employ two weaving operations, namely, one to furnish the chenille, the other to place it in the final fabric. Chenille is made from groups of warp threads that are separated from each other by considerable intervals; then, multi-coloured wefts are passed from side to side in accordance with a predetermined scheme. This fabric is next cut midway between the groups of warp into longitudinal strips, and, if reversible fabrics such as table-covers and curtains are required, each strip is twisted axially until the protruding ends of weft radiate from the core of warp, and form a cylinder of pile. In the second weaving this chenille is folded backward and forward in a second warp to lay the colours in their appointed places and pile projects on both sides of the fabric. If chenille is intended for carpets, the ends of pile weft are bent in one direction, and then woven into the upper surface of a strong ground texture.

Warp-piled Fabrics have at least two series of warp threads to one of weft, and are more varied in structure than weft-piled fabrics, because they may be either plain or figured, and have their surfaces cut, looped or both.

Velvets and Plushes are woven single and double. In the former case both ground and pile warps are intersected with the weft, but at intervals of two or three picks the pile threads are lifted over a wire, which is subsequently withdrawn; if the wire is furnished with a knife at its outer extremity, in withdrawing it the pile threads are cut, but if the wire is pointed a line of loops remains, as in terry velvet. Fig. 19 is the design, and two longitudinal sections of a Utrecht velvet. The circles at A are weft threads, and the bent line is a pile thre [illegible] cut, another part being looped over a wire. At B the circles are repeated to show how the ground warp intersects the weft.

Double Plushes consist of two distinct ground textures which are kept far enough apart to ensure the requisite length of pile. As weaving proceeds the pile threads are interlaced with each series of weft threads, and passed from one to the other. The uniting pile material is next severed midway between the upper and lower textures, and two equal fabrics result. Fig. 20 gives three longitudinal sections of a double pile fabric. The circles A, B are weft threads in the upper and lower fabrics respectively; the lines that interlace with these wefts are pile warp threads which pass vertically from one fabric to the other. At C, D the circles are repeated to show how the ground warps intersect the wefts, and at E the arrows indicate the cutting point.

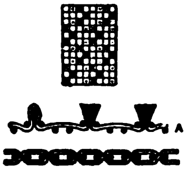


FIG. 19.—Utrecht Velvet.

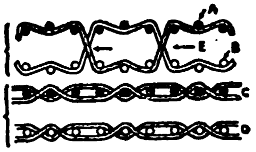


FIG. 20.—Double Plush.

Figured Warp-pile Fabrics are made with regular and irregular cut and looped surfaces. If regular, the effect is due to colour, and this again may be accomplished in various ways, such as (*a*) by knotting tufts of coloured threads upon a warp, as in Eastern carpets; (*b*) by printing a fabric after it leaves the loom; (*c*) by printing each pile thread before placing it in a loom, so that a pattern shall be formed simultaneously with a pile surface, as in tapestry carpets; (*d*) by providing several sets of pile threads, no two of which are similar in colour; then, if five sets are available, one-fifth of all the pile warp must be lifted over each wire, but any one of five colours may be selected at any place, as in Brussels and Wilton carpets. Fig. 21 is the design, and a longitudinal section of a Brussels carpet. The circles represent two tiers of weft, and the lines of pile threads, when not lifted over a wire to form loops, are laid between the wefts; the ground warp interlaces with the weft to bind the whole together. When the surface of a piled fabric is irregular, also when cut and looped pile are used in combination, design is no longer dependent upon colour, for in the former case pile threads are only lifted over wires where required, at other places a flat texture is formed. In the latter case the entire surface of a fabric is covered with pile, but if the figure is cut and the ground looped the pattern will be distinct.

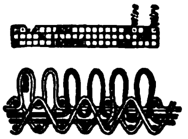


FIG. 21.—Brussels Carpet.

Group 4. *Crossed Weaving.*—This group includes all fabrics in which the warp threads intertwist amongst themselves to give intermediate effects between ordinary weaving and lace, as in gauzes. Also those in which some warp threads are laid transversely in a piece to imitate embroidery, as in lappets.

Plain Gauze embodies the principles that underlie the construction of all crossed woven textiles. In these fabrics the twisting of two warp threads together leaves large interstices between both warp and weft. But although light and open in texture, gauze fabrics are the firmest that can be made from a given quantity and quality of material. One warp thread from each pair is made to cross the other at every pick, to the right and to the left alternately, therefore the same threads are above every pick, but since in crossing from side to side they pass below the remaining threads, all are bound securely together, as in fig. 22, where A is a longitudinal section and B a plan of gauze.

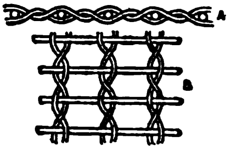


FIG. 22.—Plain Gauze.

Leno is a muslin composed of an odd number of picks of a plain weave followed by one pick of gauze. In texture it is heavier than gauze, and the cracks are farther apart transversely.

Fancy Gauze may be made in many ways, such as (*a*) by using crossing threads that differ in colour or count from the remaining threads, provided they are subjected to slight tensile strain; (*b*) by causing some to twist to the right, others to the left simultaneously; (*c*) by combining gauze with another weave, as plain, twill, satin, brocade or pile; (*d*) by varying the number of threads that cross, and by causing those threads to entwine several ordinary threads; (*e*) by passing two or more weft threads into each crossing, and operating any assortment of crossing threads at pleasure.

Lappet weaving consists in diapering the surface of a plain or gauze fabric with simple figures. This is done by drawing certain warp threads into a transverse position and then lifting them over a thread of weft to fix them in the texture; after which they are moved in the opposite direction and lifted over the following pick. The material between one binding point and another must float loosely, and this limits the usefulness of lappet figuring. In fig. 23, the thick lines show a lappet spot upon a plain texture. Notwithstanding diverse structure, intricate mechanisms are not essential to the production of either simple or complex textures; the most elaborate and beautiful specimens of the weaver's art have been manufactured upon simple machinery.

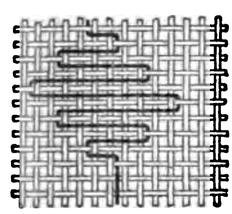


Fig. 23.—Lappet Fabric.

Weaving Machinery.

The longitudinal threads of a fabric are called warp, caine, twist and organzine, and the transverse threads are weft, shoot, woof, filling and tram. A loom for intersecting these several threads must provide for: (1) Shedding; namely, raising and lowering the warp threads in a predetermined sequence so as to form two lines between which the weft may be passed. (2) Picking, or placing lines of weft between the divided warp. (3) Beating-up, or striking each weft thread into its appointed position in the fabric. (4) Letting-off, or holding the warp tense and delivering it as weaving proceeds. (5) Taking-up, or drawing away the cloth as manufactured. (6) Temples, for stretching the fabric widthwise in order to prevent the edge threads of a warp from injuring the reed, and from breaking. Power looms require the above-named contrivances to act automatically, and in addition: (7) A weft-fork, to stop a loom when the weft becomes exhausted or breaks. (8) Mechanism for stopping a loom when the shuttle fails to reach its appointed box. (9) For weaving cross stripes, multiple shuttle boxes are needed to bring different colours, or counts of weft, into use at the proper time. (10) In some looms a device for automatically ejecting a spent cop, pirn or shuttle, and inserting a full one, is requisite. (11) If a weaver has to attend to a greater number of looms than usual, a device for stopping a loom when a warp thread fails is essential.

The Hand-Loom.—During the 17th and the first half of the 18th centuries it was observed that wherever any branch of the textile industry had been carried to a high state of excellence the looms used to manufacture a given fabric were similar in essentials, although in structural details they differed greatly. Prior to the invention of the fly shuttle by John Kay, in 1733, no far-reaching invention had for generations been applied to the hand-loom, and subsequently the Jacquard machine and multiple shuttle boxes represent the chief changes. A hand-loom as used in Europe at the present time (see fig. 24) has the warp coiled evenly upon a beam whose gudgeons are laid in open steps formed in the loom framing. Two ropes are coiled round this beam, and weighted to prevent the warp from being given off too freely. From the beam the threads pass alternately over and under two lease rods, then separately through the eyes of the shedding harness, in pairs between the dents of a reed, and finally they are attached to a cloth roller. For small patterns healds are used to form sheds, but for large ones a Jacquard machine is required. Healds may be made of twine, of wire or of twine loops into which metal eyes, called mails, are threaded. But they usually consist of a number of strings which are secured above and below upon wooden laths called shafts, and each string is knotted near the middle to form a small eye. From two to twenty-four pairs of shafts may be employed, but the healds they carry must collectively equal the number of threads in the warp. These healds will be equally or unequally distributed upon the shafts according to the nature of the pattern to be woven, and the threads will be drawn through the eyes in a predetermined order. The upper shafts are suspended from pulleys or levers, and the lower ones are attached directly or indirectly to treadles placed near the floor. The weaver depresses these treadles with his feet in a sequence suited to the pattern, and the scheme of drawing the warp through the healds. When a treadle is pressed down, at least one pair of shafts will be lifted above the others, and the warp threads will ascend or descend with the healds to form a shed for a shuttle, containing weft, to be passed through (see SHUTTLE). The reed (fig. 25) is the instrument by which weft is beaten into position in the cloth; it also determines the closeness of the warp threads, and guides a moving shuttle from side to side. It is made by placing strips of flattened wire between two half round ribs of wood, and binding the whole together by passing tarred twine between the wires and round the ribs. Such a reed is placed in the lower portion of a batten, which is suspended from the upper framework of the loom. In front of the reed, and immediately below the warp, the projecting batten forms a race for the shuttle to travel upon from side to side. Before Kay's invention a shuttle was thrown between the divided warp and caught at the opposite selvage, but Kay continued the projecting batten on both sides of the warp space, and constructed boxes at each end. Over each box he mounted a spindle, and upon it a driver, or picker. Bands connected both pickers to a stick which the weaver held in his right hand, while with the left hand he controlled the batten. Thus: a treadle is pressed down by one foot to form a shed; the batten is pushed back till a sufficient portion of the shed is brought in front of the reed, and the depressed threads lie upon the shuttle race; a clear way is thus provided for the shuttle. A quick movement of the stick tightens the cord attached to a picker and projects the shuttle from one box to the other. The batten is now drawn forward, and the reed beats up the weft left by the shuttle. As the next treadle is depressed to form another division of the warp for the return movement of the shuttle, the last length of weft is enwrapped between intersecting warp threads, and the remaining movements follow in regular succession (see fig. 26).

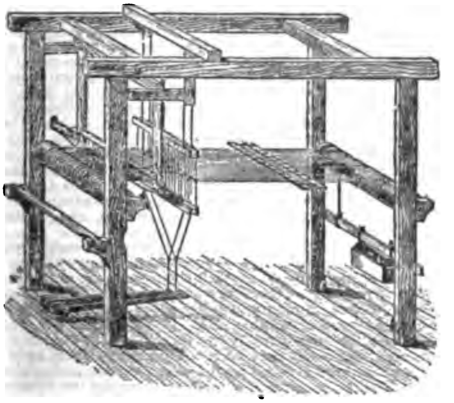


Fig. 24.—Diagram of Hand-Loom.

Fig. 25.—Weaver's Reed.

In cases where the weft forms parti-coloured stripes across a fabric, also where different counts of weft are used, shuttles, equal in number to the colours, counts or materials, must be provided. By Robert Kay's invention of multiple shuttle boxes, in 1760, much of the time lost through changing shuttles by hand was prevented. His drop boxes consist of trays formed in tiers and fitted into the ordinary shuttle boxes. Each tray is capable of holding a shuttle, and by operating a lever and plug with the forefinger and thumb of the left hand, the trays may be raised and lowered at pleasure to bring that shuttle containing the colour next needed into line with the picker.

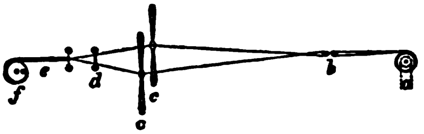


Fig. 26.—Section of Plain Web in Process of Weaving on the Loom.

a, The warp beam.
b, The lease rods by which the warp is divided and crossed.
c, *c*, Two pairs of shafts containing healds.
d, The reed in position for picking, and also for beating-up.
e, Woven cloth.
f, The cloth beam.

The Draw Loom.—Large figured effects were formerly produced in draw looms, where the warp threads were so controlled by separate strings that any assortment could be lifted when required. Thus: to the lower end of each string a dead weight, called a lingoe, was attached, and a few inches above the lingoe a mail was fixed for the control of a warp thread. The strings passed through a drilled board which held the mails and warp threads facing the proper reed dents. Still higher up, groups of strings were connected to neck cords; each group consisted of all strings required to rise and fall together constantly. If, for example, in the breadth of a fabric there were twelve repeats of a design, twelve strings would be tied to the same neck cord, but taken to their respective places in the comber board. The foregoing parts of a draw loom harness are clearly shown in fig. 27: A are lingoes, and the dots represent mails. B is the comber board; between B and C are mounting strings and neck cords, two strings being attached to each cord; and C is the bottom board. Each neck cord, after being led through a perforated bottom board C, and over a grooved pulley, was threaded through a ring on the top of a vertical cord called the simple, and passed horizontally to, and tied upon a bar rigidly fixed near the ceiling of the weaving room. The simple cords were similarly attached to a bar placed near the floor. From one hundred to several thousands of neck and simple cords could be used in one harness. The design to be reproduced in cloth was read into the parallel lines of the simple by looping a piece of string round each cord that governed warp threads to be lifted for a given shed; after which all the loops were bunched together. By pulling at a bunch of loops the simple cords were deflected and they caused all warp threads controlled by them to be lifted above the level of those undisturbed. Similar bunches of loops were formed for every shed required for one repeat of a design, and they were pulled in succession by the draw-boy, while the weaver attended to the batten and picking.

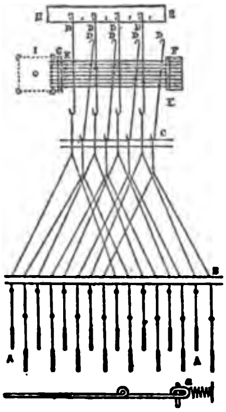


FIG. 27.—Diagram of Jacquard Machine and Harness.

The *Jacquard machine* is the most important invention ever applied to the hand-loom, but it is not the work of one man; it represents the efforts of several inventors whose labours extended over three-quarters of a century. This apparatus has taken the places of the simple, the loops, the pulleys and the draw-boy of the older shedding motion, but other parts of the harness remain unchanged. In 1725 Basile Bouchon substituted for the bunches of looped string an endless band of perforated paper by which the simples for any shed could be selected. In 1728 M. Falcon constructed the machine since known as the Jacquard and operated it through the medium of perforated cards, but it was attached to the simple cords and required a draw-boy to manipulate it. In 1745 Jacques de Vaucanson united in one machine Bouchon's band of paper and the mechanism of Falcon. He placed this machine where the pulley box previously stood, and invented mechanism for operating it from one centre.

It is said that about the year 1801 J. M. Jacquard was called upon to correct the defects of a certain loom belonging to the state, in doing which he asserted that he could produce the desired effects by simpler means, and this he undoubtedly accomplished. In or about 1804 he discarded the simple and all but a few inches of the vertical neck cords; he placed Falcon's apparatus immediately over the centre of the loom and severally attached the upper portions of the neck cords to the hooks; all of which Vaucanson had previously done. He then perforated each face of a quadrangular frame—used by Falcon to guide the cards to the draw-boy, and since known as the cylinder—and invented means whereby the cylinder could be made to slide horizontally to and fro, and at each outward journey make one-quarter of a revolution. Cards were so held upon this cylinder by pegs that at each rotatory movement one was brought into action and another moved away. By means of two treadles placed beneath the warp one weaver could operate the entire loom. The cylinder was controlled with one foot, the selecting parts with the other, and both hands were free to attend to picking and beating-up.

In a Jacquard machine the warp threads are raised by [illegible] upright wires called hooks. See D, fig. 27. These are [illegible] extremities and are normally supported upon a [illegible] which is perforated to permit the neck cords from [illegible] beneath to be attached to the hooks. Each of a series [illegible] needles E—one of which is shown enlarged [illegible] foot of the drawing—is [illegible] former to permit [illegible] hook. The [illegible] of an inch [illegible] rest upon bars [illegible] of the needles [illegible] lateral movement, and small helical springs, *a*, enclosed in a box F, impinge upon the loops of the needles with sufficient force to press them and their hooks forward. A frame H, called a griffe, is made to rise and fall vertically by a treadle which the weaver actuates with one foot. This frame contains a blade for each line of hooks, and when the blades are in their lowest position the hooks are free and vertical with their heads immediately over the blades, hence, an upward movement given to the griffe would lift all the hooks and thereby all the warp threads. Only certain hooks, however, must be lifted with the griffe, and the selection is made by a quadrangular block of wood, I, called a cylinder, and cards which are placed upon it. Thus, each face of the cylinder has a perforation opposite each needle, so that if the cylinder be pressed close to the needle board the needle points will enter the holes in the cylinder and remain undisturbed. But if a card, which is not perforated in every possible place, is interposed between the cylinder and the needles, the unpunctured parts of the card close up some of the holes in the cylinder, and prevent corresponding needles from entering them. Each needle so arrested is thrust back by the advancing card; its spiral spring *a* is contracted and its hook D is tilted as shown in the figure. If at this instant the griffe H ascends, its blades will engage the heads of all vertical hooks and lift them, but those dislocated by being tilted will remain unlifted So soon as the pressing force of a card is removed from the needles the elasticity of the springs restores both needles and hooks to their normal positions. Cards are perforated by special machinery from a painted design, after which they are laced into a chain and passed over conical pegs upon the cylinder; the number required to weave any pattern equals the number of weft threads in that pattern. The cylinder is generally drawn out and turned by each upward movement of the griffe, and restored to the needles by each downward movement, so that each face in succession is presented to the needles, and each rotatory movement brings forward a fresh card. As the griffe rises with vertical hooks a shed is formed, and a thread of weft is passed across the warp. The griffe then descends and the operation is repeated but with a new combination of lifted threads for each card. A Jacquard may contain from 100 to 1200 hooks and needles, and two or more machines may be mounted upon the same loom.

Since Jacquard's time attempts have been made to dispense with hooks, needles, springs, cards, the cylinder and several other parts; machines have also been specially designed for effecting economies in the manufacture of certain fabrics; but although some of these devices are used in different sections of the industry, the single lift Jacquard remains unchanged, except in its details, which have been modified to give greater certainty of action to the moving parts. The most far-reaching changes are directly due to efforts made to adapt the Jacquard to fast running power looms. Alfred Barlow, John and William Crossley, and others, devised means whereby two hooks could control the same warp thread, and they provided the machine with two griffes, each capable of actuating alternate rows of hooks. One griffe was caused to ascend as the other descended, therefore, if one of the two hooks that operate a warp thread is lifted for the first shed, the other hook can begin to rise for a second shed immediately the first begins to fall. About half the time originally needed for shedding is thus saved, and as a result Jacquards can now be run at 210 to 220 picks per minute.

Preparing Warp and Weft for Weaving.—The power loom is only one of a series of machines which revolutionized weaving. Although early inventors of the power loom did much to perfect its various movements, the commercial results were disappointing, chiefly because means had not been devised for preparing warp and weft in a suitable manner for such a machine. William Radcliffe, of Stockport, perceived these shortcomings, and concluded that, by division of labour, weaving could be brought into line with, the then recently invented, spinning machinery. He, therefore, set himself the task of solving the problems involved, and by inventing the beam warper, the dressing sizing machine, the shuttle tongue, and the pin cop, he enabled the power loom to become a factor in the textile industry. The term preparation embraces winding, warping, sizing, Yorkshire dressing, drawing-in, twisting and occasionally other operations.

Weft Winding.—Weft yarns invariably receive simpler treatment than warp yarns; in many cases none at all. Cops and ring spools pass direct to the loom unless their dimensions are unsuited to the shuttles, in which case they, together with wefts bleached or dyed in banks or used in a saturated condition, require winding upon pirns, or into cops of suitable sizes. Pirn winders differ greatly in construction, but the majority are furnished with conical shapers, consisting either of [illegible], or of cone rollers mounted upon studs. A pirn, whose [illegible] to fit inside a shaper, is slipped over a spindle [illegible], either vertically or horizontally, [illegible] end of the spindle being flattened to [illegible] wharve which is driven from a central [illegible] to a rotating pirn, and a vibrating [illegible] the shaper. Both spindle and pirn [illegible] the pirn is full, when they become [illegible] by ryces, and cops and ring spools [illegible] used for coarse yarns, which [illegible] a greater length of weft [illegible] are used.

Warp winding consists in transferring yarn from cops, ring spools or hanks, either to warpers, bobbins or cheeses (see COTTON-SPINNING MACHINERY). Machines for this purpose are of two kinds, which are known respectively as spindle and drum. In the former each bobbin is placed upon a vertical spindle and rotated by frictional contact; a yarn guider meanwhile rises and falls far enough to lay the threads in even coils between the bobbin flanges. In the latter each bobbin, or tube, is laid upon a rotating drum and a thread guide moves laterally to and fro; slowly for a bobbin, but quickly for a tube.

Warping. —The number of longitudinal threads in a web vary according to their closeness and its breadth. It is the function of a warper to provide a sufficient number of parallel threads for a web, all of equal length, and to retain their parallelism. Warpers are of three types, viz. mill, beam and sectional.

Mill warping is the oldest type now in extensive use. A mill warper has a creel in which from 50 to upwards of 300 bobbins or cheeses, are supported horizontally upon pegs, and the mill has a vertical axis which carries three wheels, upon whose rims vertical staves are fixed about 1 ft. apart to form a reel, from 5 to upwards of 20 yds. in circumference. The threads from the creel are threaded in succession through leasing needles, then passed in groups of four to twenty threads between runners, and, finally, fastened by a peg to the mill staves. The needles are mounted alternately in two frames which may be moved up inclined planes; one to elevate odd threads, the other even ones, and both separations thus formed are retained upon separate pegs; this is the lease which enables a weaver to readily fix the position of a broken thread. As the mill rotates the threads form a tape about 1 in. wide, and the leasing apparatus slides down a post to coil the threads spirally upon the reel. When the full length of warp has been made the mill is stopped, a half beer lease is picked by hand from the divisions formed by the runners, and also retained upon pegs. The mill next reverses its direction of rotation, and as the leasing apparatus ascends the threads are folded back upon themselves. Hence, if a reel is 20 yds. in circumference, and 200 threads are in use to make a warp 600 yds. long, and containing 2000 threads, the reel will make 30 revolutions (600+20=30) also 10 reversals, for at each reversal 200 additional threads will be added (2000+200=10). When a warp is complete, strings are passed through the leases, and it is coiled into a ball, loosely linked into a chain, or dropped into a sheet. If a mill has its axis horizontal the leasing apparatus must slide horizontally.

Winding on Frame.—After a ball warp has been bleached, dyed or sized, the half beers are laid amongst the teeth of a coarse comb to open out the threads to the necessary breadth, in which condition they are coiled upon a loom beam.

Beam warping is the system most extensively used in the cotton trade. The creels for these machines have an average capacity of about 600 bobbins, and are often V-shaped in plan. In each leg of the V the bobbins are arranged in tiers of 16 to 20, and row behind row. The threads are drawn separately between the dents of an adjustable reed, then under and over a series of rollers; from here they are dropped amongst the teeth of an adjustable comb and led down to a warpers beam, which rests upon the surface of a drum. As the drum rotates the threads are drawn from the bobbins and wrapped in even coils upon the beam. On most of these machines mechanism is attached for arresting motion on the fracture of a thread, and also for accurately measuring and recording the lengths of warp made. When full, a warpers beam holds threads of much greater length than are needed for any warp, but they are insufficient in number. Thus: If 500 threads are in use, and warps of the above-named particulars are required, four similar beams must be filled (2000+500=4) and the threads from all are subsequently united. The chief parts of a beam warper may be used as a substitute for a mill warper, provided that mechanism be employed to contract the threads to the form of a loose rope and coil them into a cylindrical ball, which will be subsequently treated as a mill warp. Or, one of these warpers may be furnished with parts which, when the threads are roped, links them loosely into a chain.

Sectional warping is chiefly employed for coloured threads and its outstanding features consist in contracting the threads to form a ribbon of from 3 in. to 12 in. wide. This ribbon is coiled upon a block placed between flanges, and when completed is set aside until a sufficient number of similar sections have been made; after which they are slipped upon a shaft and by endlong pressure converted into a compact mass. All the threads are then collected and transferred in the form of a sheet to a loom beam; each section contributing its own width to that of the warp. Sectional warps are also made upon horizontal mills by superposing the coils of a ribbon of yarn upon a portion of the staves. When the first section is formed a second is wound against it, and the operation continued until all the sections have been made; after which the yarn is run upon a loom beam.

Yorkshire dressing is used to make striped warps from balled warps which have been dyed in different colours. The operation is as follows: The requisite number of threads of any colour is split from a uniformly dyed ball and set aside until warps of the remaining colours have been similarly treated. The split sections from the several balls collectively contain as many threads as are needed for a warp, but those threads have still to be placed in their proper sequence. This is done by drawing them in groups of two or four between the dents of a reed to a predetermined colour scheme, then all are attached to a loom beam which is supported in a frame. The beam is rotated by stepped cones and gearing, and winds the threads upon itself. But in order to hold the threads taut they are passed between weighted rollers and deflected by bars arranged ladderwise; in passing from one part of the machine to another they are gradually opened out to the width of the beam.

Sizing.—In cases where single yarns are made from short fibrous materials, smooth surfaces are obtained by laying the outstanding ends of fibres upon the thread, and fastening the fibres together to impart sufficient strength to resist the strains of weaving. This is accomplished either by coating a thread or by saturating it with an adhesive paste. In hand-loom days the paste was applied by brushes to successive stretches of warp while in a loom. But with the advent of mechanical weaving it was found necessary to size a warp before placing it in a loom. Two systems were evolved, the one invented by William Radcliffe sizes, dries and beams a warp in one operation, the yarn is made to pass in the form of a sheet between a pair of rollers, the lower one being partly immersed in warm size. In rotating this roller carries upon its surface a film of size which it deposits upon the threads, while, by pressure, the upper roller distributes the size evenly. Brushes acting automatically smooth down the loose fibres and complete the distribution of size. As the yarn advances it is separated by reeds and lease rods, so that in passing over steam chests and fans the moisture contained in the threads may be quickly evaporated. This machine is a duplex one, for the warpers beams are divided into two sets and placed at opposite ends of the machine. Both halves receive similar treatment as they move to the centre, where the loom beam is placed.

The Ball Warp Sizer.—While efforts were being made to perfect Radcliffe's dressing machine a system of sizing ball warps was being gradually evolved and this system is still largely employed. The machine consists of a long trough, inside which a series of rollers are fitted, either in one horizontal plane or alternately in two horizontal planes; but over the front end of the trough a pair of squeezing rollers are mounted. The trough contains size, which is maintained at a boiling temperature and in sufficient quantity to submerge the rollers. Two warps, in the form of loose tapes, may be simultaneously led over, under and between the rollers. As the warps advance the threads become saturated with size, and the squeezing rollers press out all but a predetermined percentage, the latter being regulated by varying the pressure of the upper roller upon the lower one. If more size be required than can be put into the threads during one passage through the machine, they may be similarly treated a second time. This process does not lay all the loose fibres, but the threads remain elastic. After sizing, the warps are passed backward and forward, and over and under, a set of steam-heated cylinders by which the moisture contained in the threads is evaporated; they are next either reballed, or wound upon a loom beam.

Slasher Sizing.—For sizing cotton yarns Radcliffe's dressing machine has to a large extent been displaced by the slasher, but in some branches of the textile industry it is still retained under various modifications. In a slasher the threads from a number of warping beams are first combined into one sheet, then plunged into a trough filled with size which is kept at a boiling temperature by perforated steam pipes; and next squeezed between two pairs of rollers mounted in the trough. The under surfaces of the sizing rollers are in the size, but the upper squeezing rollers are covered with flannel, and rest by gravitation upon the lower ones. On leaving the size trough the sheet of yarn almost encircles two steam-heated cylinders whose diameters are respectively about 6 ft. and 4 ft.; these quickly expel moisture from the yarn, but so much heat is generated that fans have to be employed to throw cool air amongst the threads. The yarn is next measured, passed above and below rods which separate threads that have been fastened together by size, smeared with piece marks, and coiled upon a loom beam by means of a slipping friction gear. The last-named is employed so that the surface speed of winding shall not be affected by the increasing diameter of the loom beam. By means of mechanism which greatly reduces the velocities of the moving parts, much necessary labour may be performed without actually stopping the machine; this relieves the yarn of strain, and gives better sizing, yet slashed warps are less elastic than dressed, or balled sized ones, and they lack the smoothness of dressed warps.

Hank sizing is chiefly, but not exclusively, employed for bleached and coloured yarns. Machines for doing this work consist of a tank which contains size, flanged revolving rollers and two hooks. One hook is made to rotate a definite number of times in one direction, then an equal number the reverse way; the other has a weight suspended from its outer end and can be made to slide in and out. Size in the tank is kept at the required temperature by steam pipes, and "doles" of hanks are suspended from the rollers with about one-third their length immersed in size. As the hanks rotate all parts of the yarn enter the size, and when sufficiently treated they are removed from the rollers to the hooks where they are twisted to wring out excess, and force in required size. If sufficient size has not been added by one treatment, when untwisted, the wrung-out hanks are passed to a similar machine containing paste of greater density than the first there to be again treated; if necessary this may be followed by a third passage. On the completion of sizing the hanks are removed either to a drying stove or a drying machine. If to the former, they are suspended from fixed, horizontal poles in a specially heated and ventilated chamber. If to the latter, loose poles containing hanks are dropped into recesses in endless chains, and slowly carried through a large, heated and ventilated box, being partially rotated the while. On reaching the front of the box they are removed, brushed and made up into bundles. After which the yarn is wound, warped and transferred to a loom beam.

Drawing-in, or entering, is the operation of passing warp threads through the eyes of a shedding harness, in a sequence determined by the nature of the pattern to be produced, and the order of lifting the several parts. It is effected by passing a hook through each harness eye in succession, and each time a thread is placed in the hook by an attendant, it is drawn into an eye by the withdrawal of the hook.

Twisting or looming consists in twisting, between the finger and thumb, the ends of a new warp separately upon those of an old one, the remains of which are still in the eyes of the shedding harness. The twisted portions adhere sufficiently to permit of all being drawn through the eyes simultaneously.

The Power Loom.—Little is known of the attempts made before the beginning of the 17th century to control all parts of a loom from one centre, but it is certain the practical outcome was inconsiderable. In the year 1661, a loom was set up in Danzig, for which a claim was made that it could weave four or six webs at a time without human aid, and be worked night and day; this was probably a ribbon loom. In order to prevent such a machine from injuring the poor people, the authorities in Poland suppressed it, and privately strangled or drowned the inventor. M. de Gennes, a French naval officer, in 1678 invented a machine whose chief features consisted in controlling the healds by cams, the batten by cams and springs and the shuttle by a carrier. From 1678 to 1745 little of importance appears to have been done for the mechanical weaving of broadcloth. But in the last-named year M. Vaucanson constructed a very ingenious, self-acting loom, on which the forerunner of the Jacquard machine was mounted; he also adopted de Gennes's shuttle carrier. All early attempts to employ mechanical motive power for weaving failed, largely because inventors did not realize that success could only be reached through revolution. Mechanical preparing and spinning machinery had first to be invented, steam was needed for motive power, and the industry required reorganization, which included the abolition of home labour and the introduction of the factory system.

During the last quarter of the 18th century it was generally believed that, on the expiry of Arkwright's patents, so many spinning mills would be erected as to render it impossible to consume at home the yarns thus produced, and to export them would destroy the weaving industry. Many manufacturers also maintained it to be impossible to devise machinery which would bring the production of cloth up to that of yarn. It was as a protest against the last-named assertions that Dr Edmund Cartwright, a clergyman of the church of England, turned his attention to mechanical weaving. More fortunate than his predecessors, he attacked the problem after much initial work had been done, especially that relating to mechanical spinning and the factory system, for without these no power loom could succeed. In 1785 Dr Cartwright patented his first power loom, but it proved to be valueless. In the following year, however, he patented another loom which has served as the model for later inventors to work upon. He was conscious that for a mechanically driven loom to become a commercial success, either one person would have to attend several machines, or each machine must have a greater productive capacity than one manually controlled. The thought and ingenuity bestowed by Dr Cartwright upon the realization of his ideal were remarkable. He added parts which no loom, whether worked manually or mechanically, had previously been provided with, namely, a positive let-off motion, warp and weft stop motions, and sizing the warp while the loom was in action. With this machine he commenced, at Doncaster, to manufacture fabrics, and by so doing discovered many of its shortcomings, and these he attempted to remedy: by introducing a crank and eccentrical wheels to actuate the batten differentially; by improving the picking mechanism; by a device for stopping the loom when a shuttle failed to enter a shuttle box; by preventing a shuttle from rebounding when in a box; and by stretching the cloth with temples that acted automatically. In 1792 Dr Cartwright obtained his last patent for weaving machinery; this provided the loom with multiple shuttle boxes for weaving checks and cross stripes. But all his efforts were unavailing; it became apparent that no mechanism, however perfect, could succeed so long as warps continued to be sized while a loom was stationary. His plans for sizing them while a loom was in operation, and also before being placed in a loom, both follo[illegible] Still, provided continuity of action could be attained, the [illegible] of the power loom was assured, and means for the attainment [illegible] end were supplied in 1803, by William R[illegible] Thomas Johnson, by their inventi[illegible] dressing sizing machine. [illegible]

For upwards of thirty [illegible] numerous difficulties; th[illegible] organization, and the [illegible] unused to automati[illegible] to labour in their own homes refused employment in mills, owing to dislike of the factory system and the long hours of toil which it entailed, that spinners and manufacturers were compelled to procure assistants from workhouses; this rendered mill life more distasteful than it otherwise would have been to hand spinners and weavers. Their resentment led them to destroy machinery, to burn down mills, to ill-use mill workers and to blame the power loom for the distress occasioned by war and political disturbances. Yet improvements in every branch of the textile industry followed each other in quick successions, and the loom slowly assumed its present shape. By using iron instead of wood in its construction, and centring the batten, or slay, below instead of above the warp line, the power loom became more compact than the hand-loom.

Motion is communicated to all the working parts from a main shaft A (fig. 28), upon which two cranks are bent to cause the slay B to oscillate; by toothed wheels this shaft, drives a second shaft, C, at half its own speed. For plain weaving four tappets are fixed upon the second shaft, two, D, for moving the shuttle to and fro, and two others, E, for moving the healds, L, up and down through the medium of treadles M, M. For other schemes of weaving shedding tappets are more numerous, and are either loosely mounted upon the second shaft, or fixed upon a separate one. In either event they are driven by additional gearing, for the revolutions of the tappets to those of the crank shaft must be as one is to the number of picks in the repeat of the pattern to be woven. Also, when two or more shuttles are driven successively from the same side of a loom, if the picking tappets rotate with the second shaft, those tappets must be free to slide axially in order to keep one out of action so long as the other is required to act. The warp beam F is often put under the control of chains instead of ropes, as used in hand looms, and the chains are attached to adjustably weighted levers, G, whereby the effectiveness of the weights may be varied at pleasure. In the manufacture of heavy fabrics, however, it may be necessary to deliver the warp by positive gearing, which is either connected, or otherwise, to the taking-up motion. The cloth is drawn forward regularly as it is manufactured by passing it over the rough surface of a roller, I, and imparting to the roller an intermittent motion each time a pick of weft is beaten home. This motion is derived from the oscillating slay, and is communicated through a train of wheels. The loom is stopped when the weft fails by a fork-and-grid stop motion, which depends for its action on the lightly balanced prongs of a fork, N. These prongs come in contact with the weft, between the selvage of the web and the shuttle-box each time the shuttle is shot to the side at which the [illegible] is fixed. If the prongs meet no thread they are not [illegible] is formed with a vibrating [illegible] forward, and with it a second [illegible] On the other hand, if the [illegible] in action. If more than one [illegible] for each, instead of alternate [illegible] is placed beneath the centre [illegible] moving shuttle: if in falling it [illegible] the loom continues in motion, [illegible] prongs fall far enough beneath the

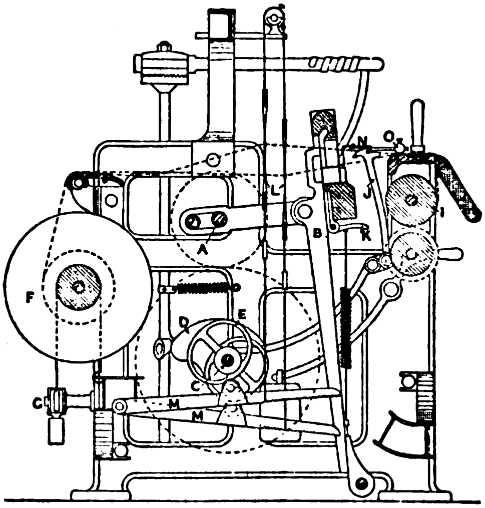


Fig. 28.—Vertical Section of a Power Loom.

shuttle race for a stop to act upon a lever and bring the loom to a stand. To prevent a complete wreck of the warp it is essential to arrest the loom when a shuttle fails to reach its appointed box. For this purpose there are two devices, which are known respectively as fast and loose reed stop motions. The first was invented in 1796 by Robert Miller, and its action depends upon the shuttle, as it enters a box, raising two blades, K, which if left down would strike against stops, and so disengage the driving gear. The second was invented in 1834 by W. H. Hornby and William Kenworthy; it is an appliance for liberating the lower part of a reed when a shuttle remains in the warp, thus relieving it, for the time being, of its function of beating up the weft. On the release of a reed from the motion of the slay, a dagger stops the loom. Temples must keep a fabric distended to the breadth of the warp in the reed, and be self-adjusting. This is usually accomplished by small rollers whose surfaces are covered with fine, closely set points. The rollers are placed near the selvages of a web which is prevented from contracting widthwise by being drawn tightly over the points.

Looms are varied in details to suit different kinds of work, but as a rule fabrics figured with small patterns are provided with healds for shedding as at L, while those with large patterns are provided with the Jacquard and its harness. Healds may be operated either by tappets or dobbies, but the range of usefulness in tappets is generally reached with twelve shafts of healds and with patterns having sixteen picks to a repeat; where they are unsuitable for heald shedding a dobby is used. A dobby may resemble, in construction and action, a small Jacquard; if so the selection of healds that rise and fall for any pick is made by cards. In other types of dobbies the selection is frequently made by lags, into which pegs are inserted to pattern in the same manner that cards are perforated. By acting upon levers the pegs bring corresponding hooks into contact with oscillating griffe bars, and these lift the required heald shafts. Such machines are made single and double acting, and some have rollers in place of pegs to form a pattern. When multiple shuttles are required for power looms one of two types is selected, namely, drop or rotating boxes; the former are applicable to either light or heavy looms, but the latter are chiefly confined to light looms. As previously stated, Robert Kay invented drop boxes in 1760, but they were not successfully applied to the power loom until 1845, when Squire Diggle patented a simple device for operating them automatically. Since his time many other methods have been introduced, the most successful of these being operated indirectly from the shedding motion. Revolving boxes were patented in 1843 by Luke Smith. They consist in mounting a series of shuttles in chambers formed in the periphery of a cylinder, and in moving the cylinder far enough, in each direction, to bring the required shuttle in line with the picker.

Automatic Weft Supply.—Many devices have been added to power looms with a view to reduce stoppages, amongst which those for the automatic supply of weft are probably the most important. These efforts originated with Charles Parker, who, in 1840, obtained the first patent, but no marked success was achieved until 1894, when J. H. Northrop patented a cop changer. By his plan a cylindrical hopper, placed over one shuttle box, is charged with cops or pirns. At the instant fresh weft becomes necessary the lowest cop in the hopper is pressed into a shuttle from above, the spent one is pressed out from beneath, and the new weft is led into the shuttle eye, while the loom is moving at its normal speed. The mechanism is controlled by the weft fork, or by a feeler which acts when only a predetermined quantity of weft remains inside a shuttle. Many inventions are designed to eject an empty shuttle and introduce a full one; others change a cop, but differ in construction and action from the Northrop, yet, at the time of writing, they have not been so successful as the last-named. By relieving a weaver of the labour of withdrawing, filling, threading and inserting shuttles it was seen that a large increase might be made in the number of looms allotted to one weaver, provided suitable mechanism could be devised for stopping a loom on the failure of a warp thread.

Warp Stopping Motions date from 1786, when Dr Cartwright suspended an independent detector from each warp thread until a fracture occurred, at which time a detector fell into the path of a vibrator and the loom was arrested. The demand for warp stop motions was, however, small until automatic weft supply mechanisms were adopted. The majority of those devices now in use are constructed upon Dr Cartwright's lines, but some are so attached to wire healds that, at one position in every shed, an unbroken thread supports both heald and detector until a thread fails, when a detector is engaged by a vibrator, and the driving mechanism is disengaged. In other warp stop motions pairs of threads are crossed between the lease rods, and a wire passed between them is held [illegible] threads until one breaks; the wire then [illegible]tact with a metal bar, and electro-mechanical [illegible]m.

[illegible] loom, which was for a long period operated [illegible] mechanical power could be applied, was [illegible] than a century before Dr Cartwright's in[illegible] as the Dutch engine loom, and was designed [illegible] to upwards of forty tapes or ribbons simultane[illegible] may be regarded as a series of looms mounted [illegible]aving a complete set of parts, and as the first practical effort to connect and control all the motions of weaving from one centre. The place and date of its invention are uncertain; but it is known that in some districts its use was entirely prohibited, in others it was strictly limited, and that it was worked in Holland about 1620. In England the first patent was obtained by John Kay and John Snell, in 1745, for additions which enabled it to be worked by hand, by water, or other force, and in 1760 John Snell appears to have added the draw harness for weaving flowered ribbons. In 1765 a factory in Manchester was filled with ribbon looms which were either invented by M. Vaucanson, or Kay and Snell, but one weaver could only attend to one machine. When worked by hand it was known as the bar loom, because the weaver oscillated by hand a horizontal bar that set in motion all parts of the machine. The shuttles and reeds are actuated from the batten, the former originally by pegs, but later by a rack and pinion arrangement, which in action shoot the shuttles simultaneously across a web, to the right and left alternately, each into the place vacated by its next neighbour. One small warp beam is required for each web, but tappets, dobbies, or Jacquards are available for dividing the threads. Where differently coloured wefts are needed in one web the shuttles are mounted in tiers and all raised or lowered at once to bring the proper colour in line with the shed.

In *Swivel Weaving* similar shuttles are added to the battens of broad looms in order to diaper small figure effects, in different colours or materials, over the surface of broad webs.

Pile Weaving.—Looms for weaving piled fabrics differ in certain important respects from those employed for ordinary weaving; they are also made to differ from each other to suit the type of fabric to be manufactured, as, for example, double and single, plain and figured, textures.

In *Double Pile Looms* the special features are those that control the pile threads, and those that sever the vertical lines of pile. Two ground warps are requisite, and unless they are kept a uniform distance apart the piled effects will be irregular. For plain goods the pile threads are wound upon two or more beams, and, as they move from web to web, cloth-covered rollers deliver them in fixed lengths. Meanwhile, a shuttle passes twice in succession through each ground warp, and the pile threads in moving above or beneath the wefts are bound securely. Both fabrics are furnished with taking-up rollers which draw the pieces apart and so stretch the uniting pile in front of a knife, which severs it, thus forming two pieces at once. A knife may consist of a short blade that merely moves to and fro across the webs, or of a disk mounted upon a spindle, which, in moving from side to side, revolves; in either case it is automatically sharpened. But if a knife is longer than the breadth of a fabric it receives only a slight lateral movement, and must be periodically removed for sharpening. In plain and printed goods healds control all the warps; but in figured goods, other than those made from printed warps, a Jacquard is needed to lift, and a creel to hold, the pile threads.

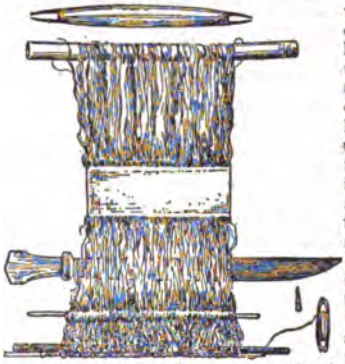
Single Pile Looms.—The chief feature which renders most single pile looms dissimilar from others is the mechanism by which wires are woven upon, and withdrawn automatically from, a ground texture. Wires are of two kinds, namely, without and with knives; the former, being flattened and somewhat pointed, are woven above the weft of a ground texture, but beneath the pile, hence, by withdrawing them, looped pile is formed. A wire terminating in a knife with a sloping blade, on being withdrawn, cuts the pile and produces a brush-like surface. The mechanism for operating the wires is placed at one end of a loom and consists of an arm which moves in and out; at each inward movement a wire is inserted, and at each outward movement one is withdrawn. In weaving tapestry carpets, and certain other fabrics, a wire and a shuttle move simultaneously, but a shuttle passes through the ground warp, while a wire passes beneath the pile. After several wires have been woven upon the ground texture the one first inserted is withdrawn by the vibrating arm, and at the next inward movement the same wire enters the warp near the reed, where it is beaten up with the weft, and, from this point, the operation is continuous. Tapestry carpets require three warps, one for the ground texture, a second, or stuffing warp, to give bulk and elasticity to the tread, and a third to form the pile. The last named is printed upon a large drum, thread by thread to the colour scheme of the design, then, when the colours have been fixed, and the threads accurately placed, they are wound upon a beam, and all the warps are operated by healds. For figured velvets, and Brussels and Wilton carpets, the pile warp beam is replaced by a creel, in order that each thread of pile may be wound upon a bobbin and separately tensioned. This is essential, because, in the weaving of a design, it is probable that no two threads of pile will be required in equal lengths. Creels are made in sections called frames, each of which usually carries as many bobbins as there are loops of pile across a web, and the number of sections equal the number of colours. In weaving these fabrics healds are used to govern the ground warp, but a Jacquard is needed for the pile. It must form two sheds, the lower one to receive a shuttle, the upper one to make a selection of threads beneath which the wire is to pass.

Terry Looms.—Looms for weaving piled textures, of the Turkish towel type, have the reed placed under the control of parts that prevent it from advancing its full distance for two picks [illegible] series that separate one line of loops from another. At such times the weft is not beaten home, but a broad crack is formed. So soon as the reed again moves through its normal space three picks of weft are simultaneously driven home, thus closing the gap, and causing part of the pile to loop upward, the remainder downward. The system is available for plain and figured effects.

Gauze Textures are woven in looms having a modified shedding harness, which, at predetermined intervals, draws certain warp threads crosswise beneath others, and lifts them while crossed. Also, a tensioning device to slacken the crossed threads and thus prevent breakages due to excessive strain. At other times the shedding is normal.

Lappet Looms have a series of needles fixed upright in laths, and placed in a groove cut in the slay, in front of the reed. Each needle carries a thread which does not pass through the reed, hence, by giving the laths an endlong movement of varying extent, and lifting the needles for each pick, their threads are laid crosswise in the web to pattern. (T. W. F.)

ARCHAEOLOGY AND ART



From Roth's *Natives of Sarawak*, by permission of Truslove and Hanson.

FIG. 29.—Loom from Sarawak.

The archaeology of shuttle-weaving shows that for ages the use of a loom for weaving plain, as distinct from ornamental or figured textiles, whether of fibres or of spun threads, has been practically universal, whilst the essential points of its construction have been almost uniform in character. An early stage in its development, anterior probably to that when the spinning of threads had been invented, is represented by the loom or frame (see fig. 29) used by a native of Sarawak to make a textile with shreds of grass. As will be seen, the shreds of grass for the warp are divided into groups by a flat sword-shaped implement which serves as the batten (Latin *spatha*). The shuttle is passed above it, leaving a weft of grass in between the warp; the batten is then moved upwards and compresses the weft into the warp; this method of pressing the weft upwards was usually employed by Egyptian and Greek weavers for their linen textiles of beautiful quality. Fig. 30 gives us an Indian Hill tribesman weaving with spun threads [illegible] the loom fitted with rudely constructed [illegible] weaver lifts and lowers alternate [illegible] he may throw his shuttle-carrier [illegible] Besides the headles there is a [illegible]

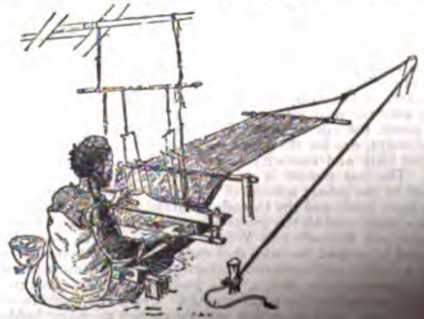


FIG. 30.—Indian Hill Tribesman's Loom.

the reeds of it the warp threads are passed and fastened to a roller or cylinder. After throwing his shuttle once or twice backwards and forwards, the weaver pulls the comb towards himself, thereby pressing his weft and warp together, thus making the textile which he gradually winds from time to time on to the roller. This advance in the construction of the loom is also virtually of undateable age; and except for more substantial construction, there is little difference in main principles between it and the medieval loom of fig. 31. With such looms, and by arranging coloured warp threads in a given order and then weaving into them coloured shuttle or weft threads, simple textiles with stripes and chequer patterns could be, and were, produced; but textiles of complex patterns and textures necessitated the more complicated apparatus that belongs to a later stage in the evolution of the loom. Fig. 32 is from a Chinese drawing, illustrating the description given in a Chinese book published in 1210 on the art of weaving intricate designs. The traditions and records of such figured weavings are far older than the date of this book. As spun silken threads were brought into use, so the development of looms with increasing numbers of headles and other mechanical facilities for this sort of weaving seems to have started. But as far back as 2690 B.C. the Chinese were the only cultivators of silk,[1] the delicacy and fineness of which must have postulated possibilities in weaving far beyond those of looms in which grasses, wools and flax were used. It therefore is probably correct to credit the Chinese with being the earlier inventors of looms for weaving [illegible] which in course of time other nations (acquainted [illegible] wool and flax textiles) saw with wonder. At the [illegible] 300 B.C. Chinese dexterity in [illegible] matured and was apparently in [illegible] Designs were being woven by the [illegible] 206 B.C. as elaborate almost [illegible]

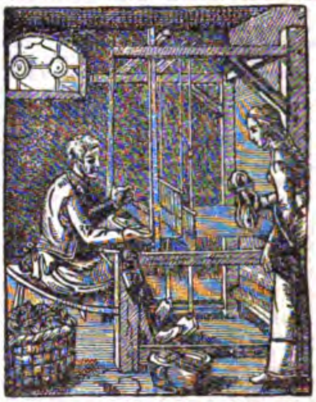


FIG. 31.—Medieval Loom, from a Cut by Jost Amman; middle of the 16th century.

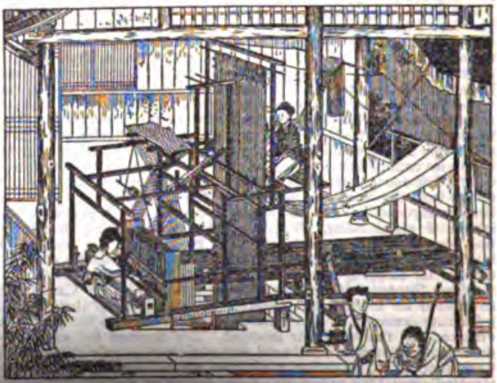


FIG. 32.—Chinese Loom for Figured Weaving (Photo).

[illegible] la soie (Paris, 1862).

as those of the present day, with dragons, phoenixes, mystical bird forms, flowers and fruits.[1] At that time even Egypt, Assyria or Babylonia, Greece and Rome, seem to have been only learning of the fact that there was such a material as silk.[2] Their shuttle-weaving had been and was then concerned with spun wool and flax and possibly some cotton, whilst the ornamentation of their textiles, although sparkling on occasion with golden threads, was done apparently not by shuttle-weaving but by either embroidery or a sort of compromise between darning and weaving from which tapestry weaving descended (see Tapestry). The range of their colours was limited, reds, purples and yellows being the chief; and their shuttle-weaving was principally concerned with plain stuffs, and in a much smaller degree with striped, spotted and chequered fabrics. Remains of these, whether made by Egyptians thousands of years B.C., by Scandinavians of the early Bronze Age, by lake dwellers, by Aztecs or Peruvians long before the Spanish Conquest, display little if any technical difference when compared with those woven by nomads in Asia, hill tribes in India and natives in Central Africa and islands of the Pacific. Such ornamental effect as is seen in them depends upon the repetition of stripes or very simple crossing forms, still this principle of repetition is a prominent factor in more intricate designs which are shuttle-woven in broad looms and lengths of stuff.

The world's apparent indebtedness to the Chinese for knowledge of figured shuttle-weaving leads to some consideration of their early overland commerce westwards. About 200 B.C. during the Han Dynasty Chinese trade had extended beyond inner Asia to the confines of the Graeco-Parthian empire, then at its zenith, and the protection of the route by which the Seres (Chinese) sent their merchandise was fully recognized as a matter of importance. Seventy years later the emperor of China sent a certain Chang Kien on a mission to the Indo-Scythians; and according to his records the people as far west as Bactria (adjacent to the Graeco-Parthian territory) were knowing traders, and amongst other things understood the preparation of silk. Chinese weavings had for some time been coming into Persia, and doubtless instigated the more skilled weavers there to adapt their shuttle looms in course of time to the weaving of stuffs with greater variety of effects than had been hitherto obtained by them; and into Persian designs were introduced details taken not only from Chinese textiles, but also from sculptured, embroidered and other ornament of Graeco-Parthian and earlier Babylonian styles. In A.D. 97 Chinese enterprise in still furthering their trade relations with the Far West is at least suggested by the fact that envoys from the emperor of China to Rome actually reached the eastern shores of the Mediterranean, but turned back frightened by the Parthian accounts of the terrors of the sea voyage.

Early in the 3rd century A.D. Heliogabalus is reputed to have been amongst the first of the Roman emperors to wear garments entirely of silk (holosericum), which, if figured (as is not unlikely), were probably of Syrian or Persian manufacture. Sidonius Apollinaris (5th century) writes of Persian patterned stuffs,—" Bring forth brilliant cushions and stuffs on which, produced by a miracle of art, we behold the fierce Parthian with his head turned back on a prancing steed; now escaping, now returning to hurl his spear, by turns fleeing from and putting to flight wild animals whom he pursues "—a description quite appropriate to such silk weaving as that in fig. 33. A number of kindred pieces have been recovered of late years from Egyptian burial-places of the Roman period. The Persians of the Sassanian dynasty (3rd to 7th century) traded in silks with Romans and Byzantines; King Chosroes (about 570) encouraged the trade, and ornamental weaving seems to have been an industry of some standing at Bagdad and other towns north, east and south, *e.g.* Hamadan, Kazvin Kashan, Yezd Persepolis, &c. To the north-west of Persia and north of Syria lay the Byzantine region of Anatolia (now Asia Minor), some towns in which became noted for their fine weavings: the mass of the population there was well off in the 6th century, the country highly cultivated and prosperous, and justice fairly administered,[3] thus affording favourable conditions for an industry like ornamental weaving, which had been and was prospering in neighbouring Syrian districts.

Between the 1st and 6th centuries A.D., then, knowledge of silk and its value in fine weaving was spreading itself, not only in the further western regions of Southern Asia, but also in Egypt, where Greek and Roman taste influenced the works of Copts or those natives who maintained old Egyptian traditions in technical handicrafts. Of peculiar interest in this connexion are fragments of flax (yellow and brown) woven with a comparatively elaborate texture, as well as in patterns (see fig. 34) which suggest an ordinary type of Roman pavement designs (3rd century and earlier), the basis of which is roundels linked together. Stuffs in which the style of patterns, though comparatively simple, is rather more Oriental, are of flax and wool, and the official robes of Roman consuls seem to have been of this character, and amongst other goods may have been made with small technical difference at Rome[4] or at Fostat (Cairo)

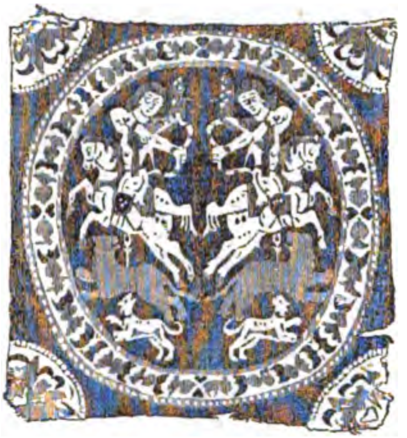


Fig. 33.—Syrian or Persian Silk Weaving of the 5th Century.

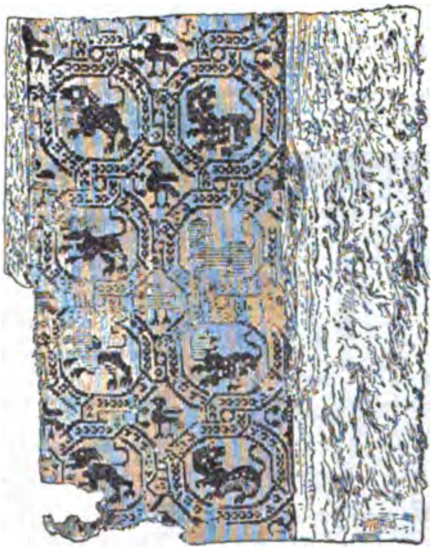


Fig. 34.—Syrian and Coptic Flax Weaving of the 5th or 6th Century.

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[1] See *Chinese Art*, by Stephen W. Bushell, C.M.G., B.Sc., M.D. (London, 1906), vol. ii. p. 95.

[2] Aristotle describes the silk-worm and its cocoon. Virgil-Martial and late Roman writers (including Pliny) throw scarcely more light [illegible] of silken stuffs than that they were of rarity and [illegible] by opulent Romans. Propertius (19 B.C.) writes of [illegible]ments of varied tissue," and of Cynthia that " perchance [illegible] Arabian Silk."

[3] [illegible]msay, *Studies in the History and Art of the Roman* [illegible]versity of Aberdeen, 1906).

[4] In 369 by order of the emperors Valens and Valentinian the making of textiles in which gold and silken threads were introduced was limited to women's workrooms or gynecia (see Codex of Theodosius, lib. x. tit. 21, lex 1). In the 5th century the weaving of silken tunics and mantles was prohibited (Codex Theodosius, lib. x. tit. 21, lex 3).

or Alexandria or other towns in Lower Egypt as well as in Syria. Contemporaneously the development of similar weaving appears to have been proceeding in Byzantine provinces, though perhaps not in so marked a way as when Justinian systematized sericulture[1] and still further stimulated shuttle-weaving in the town of Byzantium (Constantinople) itself in A.D. 552.

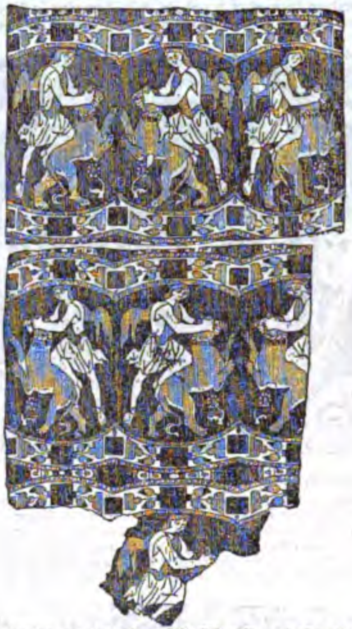

FIG. 35.—Syrian or Anatolian Silk Weaving of the 5th Century. with Samson and the Lion (repeated).

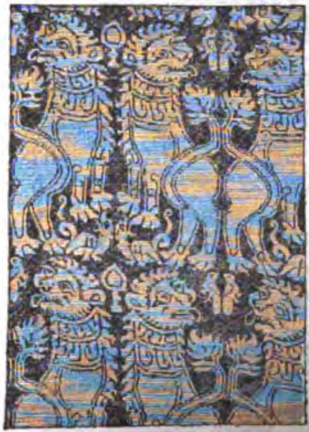

FIG. 36.—Byzantine Red Silk and Gold Thread Weaving of the 11th Century. Pairs of lions and pairs of small birds.

For examples of the elaborate figure weavings at that time we have to rely upon such as have been rescued in the service of archaeology from the oblivion of tombs and burial-places. The dates of some specimens can be fixed with almost certainty by means of nearly contemporary records, *e.g.* those of Sidonius Apollinaris and later Anastasius the Librarian; comparison and classification lead to almost conclusive inferences as to the dates of other examples. Broadly speaking, the earlier of these remains (*i.e.* from about the 4th to the 7th century) seem to be either of Persian (Sassanian) manufacture and design, or of Syrian and possibly Alexandrian make. Christian subjects were occasionally introduced into the designs. Between the 7th and the 13th centuries Byzantine manufactures [illegible] the fore, and it is difficult if not impossible now [illegible] between those of Roman-Byzantine, Pers[illegible] Byzantine styles, though one may do so in respect of certain Moslem (Moorish and Saracenic) weavings, which have distinctive features of design, and were produced in the south of Spain and in Sicily about a period from the 10th century to the 13th.

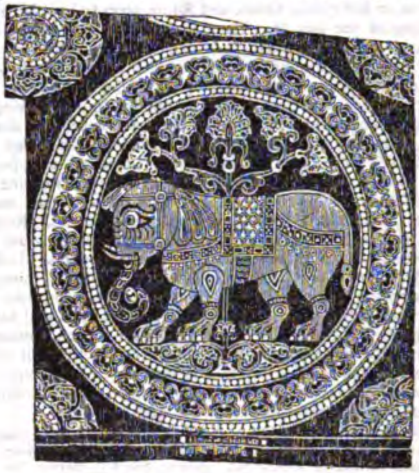

FIG. 37.—Part of Silk Wrapping of the Emperor Charlemagne, possibly of Bagdad manufacture, 9th Century, with Fanciful Elephant and Sacred Tree device in a Roundel.

Fig. 35, from a piece of sarcenet with repeated parallel series of Samsons and lions (or gladiators?), is probably 5th-century Syrian or

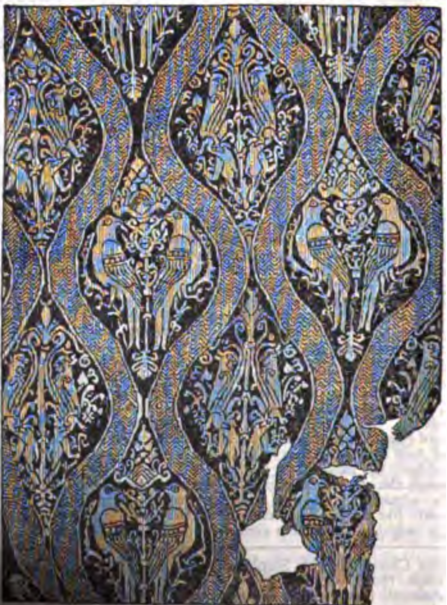

FIG. 38.—Fragment of Byzantine Silk, 12th Century, with Ogival Framing about pairs of Birds, &c.

[illegible] same date are pieces with scenes of the Annuncia[illegible] roundels, and with artistic birds and lions, in the [illegible] Sancta Sanctorum of the Chapel of St Lawrence in the old Lateran Palace, Rome. Scriptural subjects[1] seem to be typical of those which were condemned by Anatolian and Syrian fathers of the Christian church as early as in the late 4th century, and Asterius, bishop of Amasus, in denouncing the luxury of the rich in flaunting themselves in such inappropriately decorated silks, has left a most useful description of the subjects decorating them. A scheme long maintained in Syrian and Byzantine patterns was that of repeated roundels, within which other than scriptural subjects were wrought, *e.g.* hunters on horseback (as in fig. 33), fantastic animals and birds, singly or in pairs, confronting one another or back to back, frequently with a sacred tree device[2] between them. A piece of Sassanian silk, probably of the 6th century, shows a gryphon practically identical with that sculptured on the patterned saddle-cloth of a king (Chosroes II.?) in the archway to the garden of the king's palace at Kermchah.

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[1] This virtually was the starting [illegible]

Less common perhaps are patterns, without roundel or other framing, composed of animals, birds and the like, formally treated and repeated vertically and horizontally, as in fig. 36, which is from a silk and gold thread shuttle-weaving classified as Byzantine of the 11th century manufacture. But this style of composition also occurs in a Sassanian or Syrian silk of the 5th century at Le Mans,[3] and again in the Cope of St Maxim at Chinon, which is powdered with panthers. Conventional eagles (reminiscent perhaps of the Roman Eagle), with scale patterns on their breasts and wings, are woven in the wrappings reputed to have been given by the Empress Placidia for the corpse of St Germain (448) preserved at the church of St Eusebius at Auxerre. Some likeness in style may be detected between these latter and a fragment of one of the wrappings of St Cuthbert (d. 688) at Durham, though in this case the elaborate ornamentation is set within a roundel. Prior to the discovery of woven silks in the Akhmin cemeteries, the periods to which tradition and association had ascribed the Auxerre and Durham specimens were considered too early; but there now seems to be far less reason to question that ascription. Fig. 37 is from part of a silken wrapping of Charlemagne (early 9th century) now at Aix-la-Chapelle. It bears a Greek inscription of the names of Peter, governor of Negropont, and Michael, chamberlain of the Imperial Chambers, and this is taken by some authorities as evidence that the weaving was made at Byzantium. On the other hand, Eginhard, Charlemagne's secretary, has written of gifts, including rich textiles presented in his day by Haroun al Raschid to the emperor,[4] and a fabric like that in question might have been made quite possibly even at Baghdad in the 9th century or earlier. In the 11th century amongst the handicraftsmen in the city of Byzantium were many skilled native and foreign weavers; and their designs generally appear to reflect the style of earlier Persianesque and Syrian taste.

About the 12th century the well-used pattern scheme of roundels became more or less superseded by one of continuous ovals, of ogival framings (see fig. 38), contemporary with which are Saracenic patterns based on hexagonal and star-shape frames. Within these new varieties of pattern framings recur the Byzantine and Persianesque pairs of birds, animals, &c. But distinct from these is the more restricted style which has been mentioned. It had arisen under the influence for the most part of the Fatimy Khalifs, not only in Syria and Alexandria but also in Sicily and southern Spain. Patterns of this Moslem or Saracenic type are usually composed of a succession of parallel bands—narrow and wide—containing Kufic inscriptions, groups of small intricate geometrical devices, and occasionally conventional animals and birds. A 12th-century example of this class of pattern has been given elsewhere (see BROCADE, fig. 1).

Almeria, Malaga, Grenada and Seville were notable Moorish weaving places in Spain for such patterned silks and stuffs as these; and even after the Christian conquest of Grenada at the end of the 15th century this city retained its celebrity for silks woven "à la Moresque."

In Sicily no similar survival of Saracenic influence seems to have been as strongly maintained, notwithstanding the numerous Saracen weavers at work in the island for years before the Royal factory for silk weaving came to be organized at Palermo under Norman supremacy. According to the usual story, Roger of Sicily, or Roger Guiscard, who in 1147 made a successful raid on the shores of Attica, and took Athens, Thebes and Corinth, carried off as prisoners a number of Greek (Byzantine) weavers and settled them at Palermo in the factory known as the Hôtel des Tiraz A mixture of Byzantine

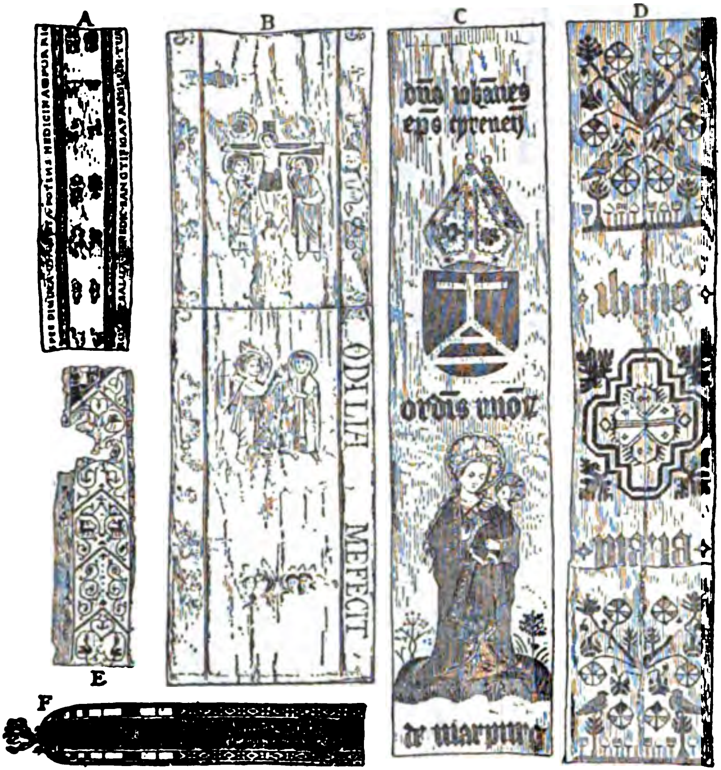

FIG. 39.—Specimens of various Small Loom Weavings between the 7th and 15th centuries.

A. Part of a narrow band or orphrey woven in gold and silk threads with a Latin inscription along the edges. German work of the 13th century.

B. Part of a broad band or orphrey woven in gold and silk threads with figures of the Crucifixion and the Annunciation (?). It bears an inscription, Odilia me fecit. It is probably German work of the 13th century.

C and D. Specimens of Cologne orphreys woven in silk and gold threads; C bears a Latin inscription, and the faces of the Virgin and Child are embroidered.

E. Part of a narrow band woven in gold and silk threads with chevron spaces filled with delicate scroll ornament, among which are occasional animal and bird devices. Possibly English or French work of the 13th century.

F. Part of a narrow band or clavus from a Coptic tunic of the 9th or 10th century.

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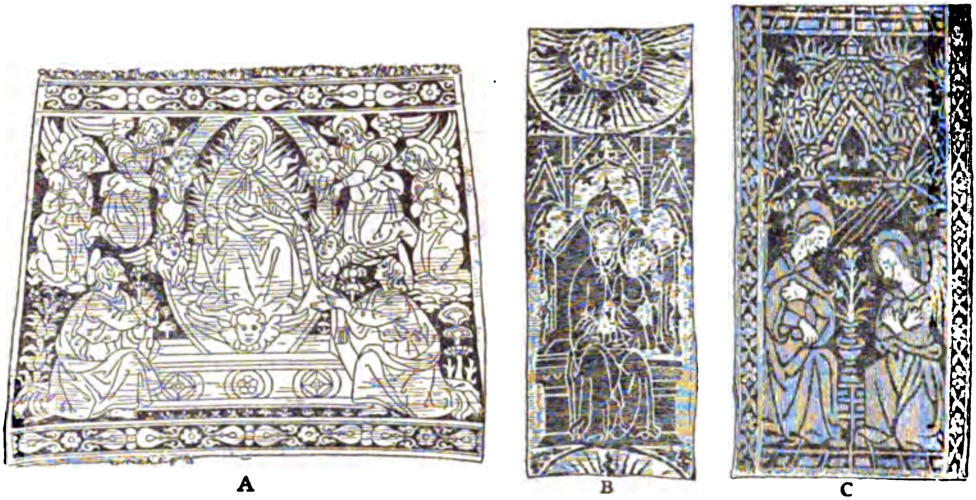
[1] The silken wrappings of St Wilibald (700–786), a founder of the church at Eichstätt, where they are still preserved, are woven with repeated roundels, each enclosing a Daniel between two lions, and are perhaps Byzantine of the 8th century.

[2] See Sir George Birdwood's chapter on Knop and Flower pattern in his *Industrial Arts of India*, in which this device of ancient Assyrian art is discussed as well as its relation and that of the horn, a fanlike symbol, to cognate ornament in Greek, Roman and even Renaissance art.

[3] See *Abécédaire d'archéologie* (June 1854).

[4] *Recherches*, &c., by Francisque Michel, i. 40.



Apparel of a Dalmatic woven in Venice late in the 15th century, with the Virgin in glory.

Part of Orphrey with the Virgin and Child (Siena weaving, 1425–1450).

Part of Orphrey, with the Annunciation (Florentine weaving, late 15th century)

FIG. 40.

and Saracenic styles of textile patterns ensued; and this peculiarity is demonstrated in many of the rich fabrics attributed to south and north Italian weavers from the 12th century onwards. From Palermo the art of ornamental weaving in this style soon extended into the mainland, and from Apulia a bishop of St Evroul in Normandy is mentioned as having obtained a number of silken goods in the 12th century. From the 13th century onwards Lucca, Florence, Milan, Genoa and Venice became important centres, using not only imported silk, but also such as was being then cultivated in Italy, for sericulture had become an Italian industry early in the 13th century. Wandering Saracenic and Byzantine weavers even before that time had strayed or been taken to work at places in Germany, France and Britain, but the output of their productions in northern countries was almost infinitesimal as compared with that of the far greater Italian output, nevertheless they were sowing the seeds of a harvest to be reaped centuries later by these more northerly European countries.

To the influence of these early sporadic weavings we seem to trace a distinctive class of work, which was done by inmates of monasteries and convents as well as by devout ladies, in little looms, for use as stoles, maniples, orphreys and similar narrow bands. A rhyming chronicler of the 13th century paraphrases the older record by Eginhard of the skill of Charlemagne's daughters in silk weaving, "ouvrer en soie en taulieles" or small looms.[1] The illustrations in fig. 39 give varieties of this class of work between the 7th and 15th centuries, for which Cologne especially seems to have become famous in the 15th century. Venice also made work of corresponding character: and the designs were evidently furnished by or directly adapted from the compositions of such artists as those who produced the notable German and Venetian woodcuts of the 15th century (fig. 40).

Whilst the bulk of the Italian patterned stuffs issuing in great lengths from large looms were of silk, a good many also were woven in wools, or wools intermixed with silks. The earlier of the silk textiles—Persian, Syrian and Byzantine—were of the nature of sarcenet and taffetas; later in development are satins, damask satins, brocades, and still later (*i.e.* about the end of the 14th century) come Italian velvets and cloths of gold, which quite transcended the ancient and less substantial attalic cloths of the early Roman period. Medieval inventories and records contain many names of textiles, but the exact technical meaning of several of them is uncertain. *Cendal, Sandal, Syndonus* seem to relate to such materials as sarcenet or taffeta: *setani*, from low Latin, is held by some writers to be of the same class as *samit* or *examite*, so called because the weft threads were only caught at every sixth thread of the warp; *damask*, now regarded as a special class of textile, the ornamentation of which depends upon contrasting sheens in the surface of the stuff, whether of silk or linen, got its name from Damascus, much in the same way as *Baudekin* comes from Baldak, or Baghdad. *Baudekin*, and an apparently somewhat earlier word *ciclatoun*, seem to have been general terms for rich-looking textiles, in which gold thread played an important part, and possibly was applicable to early brocades. *Carmaca* or *Carmuk* (Arab *Kamkla*, from the Chinese *Kimko*—also brocade) was another handsome stuff corresponding in a way with Indian *Kincobs*. Velvet (Italian *velluto*—shaggy) is *veluiau* in French documents of the 14th century, and is a finely piled material of silk, and on that account may have been called *Samit*, as the German word *Sammet* implies velvet, as does the Russian *Axamitt*. Diaper (Italian *diaspro*, meaning patterned) was used not only to denote a regular and geometric patterning but in some cases a special sort of linen or silk. Muslin from Mosul, and gauze from Gaza, are two

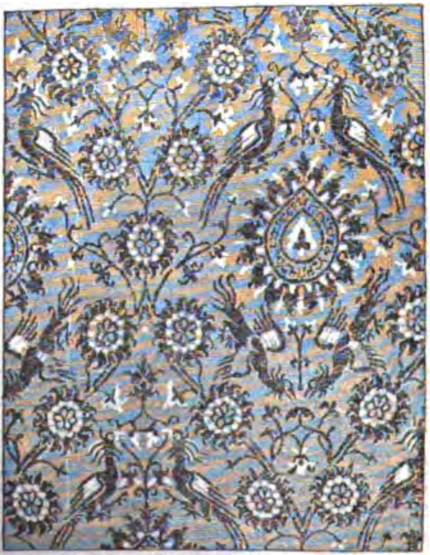


FIG. 41.—Piece of North Italian Silk Weaving of the 14th century, with pattern planned on an ogival basis with fantastic birds, some of which are of a Chinese type, and Persianesque cone forms containing sham Arabic inscriptions.

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[1] See [illegible] 93-94.

well-known and kindred textiles. Frequently one meets with odd phrases such as "silk of Brydges" (Bruges), "silk dornex" (from Dorneck), "sheets of raynes" (Rheims), and "fuschan in Appules" (Naples fustian).

Many of the foregoing stuffs are identifiable by textures peculiar to them; this is, however, not so as regards their ornamental patterns, for these are frequently interchanged, the same class of patterns appearing in satin damasks, velvets and brocades. This is particularly the case with 13th- and 14th-century Italian stuffs. In the patterns of these, as previously suggested, are strong traces of Saracenic and Byzantine motives, intermingled with badges, heraldic devices, human figures, eagles, falcons, hounds, lions, harts, boards, leopards, rays of light, Persianesque pine cone and cloud forms, and even Chinese mystical birds, symmetrically distributed, without framings, as a rule, though elaborations of the ogival frame or scheme are also met with, but less frequently (see fig. 41). Such fabrics, made in the main by Lucchese weavers, appear to have been traded in with other European countries. But besides trade records, there are others relating to Lucchese weavers who left their own town under stress of circumstances, civil wars and the like, to settle and work elsewhere, as in France and Flanders, during the 15th century. Nevertheless the northern parts of Italy were the fertile places for producing fine types of patterned textiles used by Italian and other European courts and nobles: and if the art seriously dwindled in the town of Lucca, it flourished conspicuously, from the end of the 14th century and up to the beginning of the 16th century, in Venice, Bologna, Genoa, Florence and Milan. There was nothing similar to compete with it in France, Germany or England. The identification of its splendid varieties is made possible upon referring to contemporary paintings by Orcagna, Crivelli, Spinello Aretino and later Italian masters, as well as to those of the Flemish School, Gheraet David, Mabuse, &c.

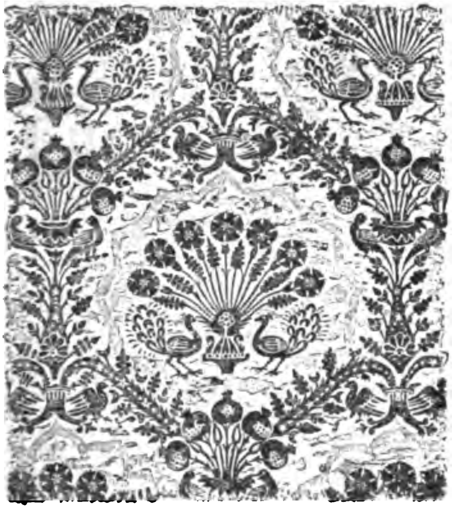
FIG. 42.—Damask and Brocade Silk Fabric. Italian manufacture of the 15th century.

Of a specially distinct class, very dignified in effect, are patterns of the 15th century based upon the repetition of conventional pentagonally constructed leaf panels, clearly defined in outline, each encircling a pomegranate or cone form around which radiate small leaves or blossoms; though they were more richly developed in superb velvets and cloths of gold, for which Florence, Venice and Genoa were famed, this type of design is also woven in less costly materials. A composite unusual and beautiful design of another kind is given in fig. 42. Repeated large leaf shapes can just be detected in it, but more remarkable are the bunches of radiating stalks of wheat-ears and cornflowers within them; whilst about them, arranged in hexagonal trellising, are leafy bars, small birds, crowns, pomegranates and other daintily depicted plant forms. This piece of damask combined with brocade weaving is of late 15th century manufacture: and after the opening of the next century the freedom towards realistic treatment, which we find here, enters into many of the Italian patterns. In some of them, however, an Ottoman or Anatolian feeling is apparent, as in fig. 43 from a figured silk which is considered to have been made in Venice. The chained dogs and birds in this design recall the rather more formal ones in Lucchese patterns of a hundred and fifty years earlier, whereas the lengthy serrated leaves and elongated flower devices charged with carnations and hyacinths depicted on a smaller scale are unmistakably Ottoman. Persian fabrics of rather thin silk material or taffetas like that of the original of this were also being woven with varieties of floral designs, as well as others portraying Persian stories. At this period there was considerable activity in weaving sumptuous stuffs at Broussa and Constantinople (fig. 44). Arabic and Turkish weavers often came over to be employed in Venice, blending Italian and Oriental characteristics into their designs.

In Spain during the early 16th century we have traces of Hispano-Moresque influence in the overlapping and interlocking nondescript forms; but Spanish weavings are hardly comparable in quality with the Italian of the same time. In the middle of this century cloths of gold or of silver, with the pattern details raised in velvet and brocatelles of similar formal design were made in greater quantities in Italy for costumes of men and women. The frequent basis of most of the designs is the ogival framework already referred to, but it is much elaborated with detail and combined with the cone device of a previous century. The ornamentation of this style is purely conventional throughout, the various devices having little of the appearance of actual objects like fruit, leaves, &c.

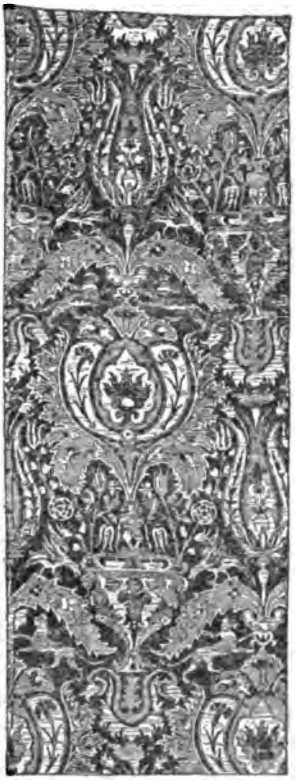
FIG. 43.—Piece of Venetian Silk Weaving showing Ottoman influence in the design (16th century).

The time, however, was close at hand when a more general reaction was to set in, in the direction of designs representing forms very nearly as they actually look, an example of which occurs in fig. 45, with its leaf forms and crowns. This from a class of silk damask or lampas, which is kindred to brocatelle; a feature in lampas is that its ground is different in colour from that of the ornament on it, and as in the case of portions of brocatelles its texture is of taffeta or sarcenet quality.[1] At the end of the 16th century a peculiar type of pattern consists of repetitions in different positions of the same detail treated realistically or purely ornamentally, little if anything of quite the same character having been previously designed. Of such fig. 46, with its repeated realistic leafy logs variously placed, is an example. The principle in the composition of these patterns, but with a greater variety of conventional detail, is followed in French 17th century examples. However, as soon as figured weaving became well organized in France at this time, a school of designers arose in that country who adopted a realism that predominated in French patterns during the succeeding 150 years, that is, from Louis XIV. to the end of the 18th century. Throughout this period French figured stuffs seem to surpass those of other countries. "If," writes Monsieur Pariset, "any account is to be taken of the weavers during the 14th and 15th centuries who made cloths and velvets of silk at Paris, Rouen, Lyons, Nimes and Avignon, it must be remembered that they were almost solely Italian emigrants from Lucca and Florence, who had fled their towns during troublous times." By a charter granted by Francis I. to Lyons, foreign and native workmen were encouraged to promote the city's interests in trade and manufacture; still, it is not until the 17th century that Lyons really asserts herself in producing fabrics possessing French taste and ornamentation. The more important designs were supplied by trained artists of whom Reval, a pupil of Le Brun, the first principal of the Academie des Beaux Arts founded by Colbert in Paris (1648), Pillement and Philippe de la Salle in the 18th century, may be named. Their influence in the domain of fanciful, and at times extravagant realistic, floral patterns was widespread. Soon after the revocation of the Edict of Nantes, in consequence of which thousands of Protestant weavers left France, factories for weaving silks and mixed materials with patterns imitating the successive French phases became organized at Spitalfields, in Cheshire, Yorkshire, Norfolk and elsewhere in England, as well as in Germany at Crefeld, Elberfeld, Barmen and Weissen.

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[1] See *Ornament in European Silks* (London, 1899), p. 15.

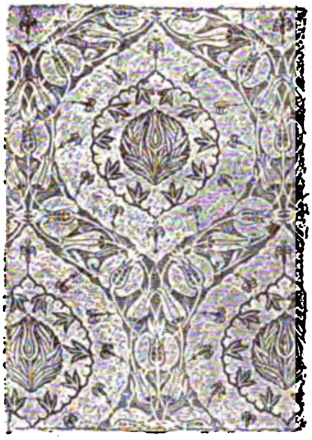

Fig. 44.—Ottoman (Anatolian) Silk and Gold Thread Weaving of the 16th century, with ogival framed ornament. The original is stated to have come from a sultana's tomb at Broussa or Constantinople.

Entirely distinct from what has already been discussed is a branch of artistic weaving concerned with the decoration of linens, that flourished notably in Italy towards the end of the 15th century and in the 16th century. From early times long and narrow Italian tablecloths were enriched with ornament of linen or cotton threads of a single colour, and Signora Isabella Errera has written at some length about them,[1] illustrating the result of her investigations with several examples culled from paintings by Pietro Lorenzetto of Siena (1340), by Ghirlandaja (1447-1490), &c. In Leonardo da Vinci's painting of the Last Supper, now in the Louvre, the border of the tablecloth is very like many examples of this sort of textile in the Victoria and Albert Museum, South Kensington. Their characteristic ornament, in rather heavy blue thread, consists of quaint animals and birds in pairs, which are evident derivations of those so often seen in Italo-Byzantine and Lucchese silks and brocades. Besides animals and birds, reversed names and words were sometimes introduced, *e.g.* "Amor" for "Roma," "[illegible]" and "Eroma" for "Amore," &c. The[illegible] patterns probably date from be[illegible] fuller ones were certainly ma[illegible] century. An inventory[illegible] cloths woven in cotto[illegible] which is suggestive[illegible]

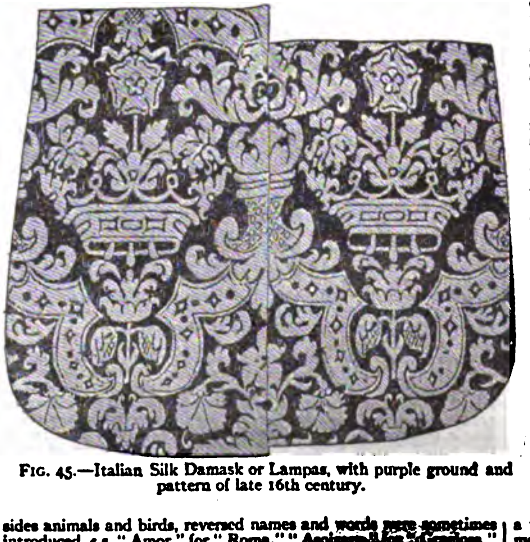

Fig. 45.—Italian Silk Damask or Lampas, with purple ground and pattern of late 16th century.

larly with Perugia. In the 16th century, work of similar style was produced, but it was lighter and flatter in texture and often done with red or yellow silk, and embroidery was sometimes added to the weaving.

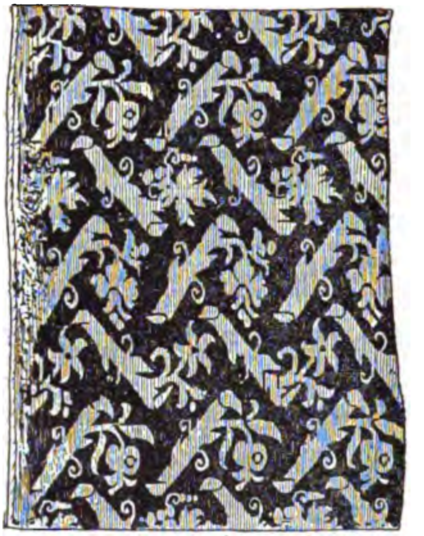

Fig. 46.—Italian Silk Damask or Lampas of late 16th century, with pattern of repeated leafy logs.

The most important and probably the best known class of later ornamental linen weaving is that of damask household napery, which, as a reflection of satin damask, was developed in the flax-growing regions of Saxony, Flanders and North France, during the late 15th or early 16th century; it was then rare and acquired for use by wealthy persons only.[2] The style of design in the better of the old linen damasks has some kinship with that of bold 15th- and 16th-century woodcuts of the Flemish or German schools. To some extent these damask figure subjects recall those of the coloured Cologne and Venetian orphreys for copes and apparels for dalmatics. The early history of linen damask is obscure, but a great many of its results are preserved in England. A napkin with the royal shield of Henry VII., the supporters within the garter surmounted by the crown, is in the Victoria and Albert Museum where it is called Flemish. On the other hand it is possibly the work of Flemings in England, since from the time of Edward I. and for a hundred years "a constant stream of emigrants passed from Flanders to England."[3] The Victoria and Albert Museum contains an early 16th-century tablecloth in damask linen of German or Flemish manufacture with various subjects, chiefly religious and moral: Gideon being shown as a kneeling knight, the fleece of wool on the ground being near him, while from above the dew falls on it; below Gideon is the Virgin Mary and the unicorn, and lower down an angel with seven dogs' heads typifying different virtues as shown in the lettering—*fides, spes, charitas*, &c. In another which was probably made in England (at Norwich?) by Flemings during the second half of the 16th century, we find St George and the Dragon, the royal arms of Queen Anne Boleyn, the badges of Queen Anne Boleyn and Queen Elizabeth, the crowned Tudor Rose, and repeated portraits of Queen Elizabeth, with the legend below, "God save the Queene." This specimen is also in the Victoria and Albert Museum. A hundred years later in date is a tablecloth on which is a view of old St Paul's (burnt in 1666), while above and below occurs the wreathed shield of the City of London. A different class of linen, with the design done in blue, was evidently, from the inscriptions on it, the work of a German or Fleming, and probably woven in Germany about 1730. Here we find the wreathed arms of the City of London, a view of "London," and "George der II. König in Engelland" mounted on horseback. In this specimen the design is repeated, and not severed, as is the case with the earlier pieces. A large collection of this German damask weaving with coloured thread was formed under the auspices of the Royal Kunstgewerbe Museum at Dresden.[1] The north-eastern Irish industry of damask weaving owes much to French Protestant refugees, who settled there towards the close of the 17th century, though linen manufacture had been established in the district by a colony of Scots in 1634. Dunfermline in Scotland is said to produce as much damask as the rest of Europe, but there are important manufactories of it at Courtrai and Liége in Belgium, in Silesia, Austria and elsewhere.

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[1] See the Itali[illegible]

[2] The earl of Northumberland (1512) is said to have had but eight linen cloths for his personal use, while his large retinue of servants had but one, which was washed once a month. (See notes by Rev. [illegible] Evelyn White on damask linen. *Proceedings of Society of* [illegible]*aries*, second series, vol. xx. p. 132.)

[3] [illegible] Rev. C. H. Evelyn White's paper on damask linen, *Pro*[illegible] *of Society of Antiquaries*, second series, vol. xx. pp. 130-140.

Literature.—The following are titles of a few works on weaving, from which much important information on the subject may be derived:—J. Bezon, *Dictionnaire des tissus* (8 vols., Paris, 1859–1863), more or less technical only, *Dictionnaire des sciences* (Paris, 1751–1780), technical; Michel Francisque, *Recherches sur le commerce, la fabrication et l'usage des étoffes de soie, d'or et d'argent* (2 vols., Paris, 1852–1854), a well-known work full of erudition in respect of the archaeology of woven fabrics, their technical characteristics, &c.; James Yates, *Textrinum antiquorum: an Account of the Art of Weaving among the Ancients* (London, 1843), a very valuable and learned work of reference; Very Rev. Daniel Rock, D.D., *Textile Fabrics* (London, 1870), with some few good illustrations; Pariset, *Histoire de la soie* (Paris, 1862); Raymond Cax, *L'Art de décorer les tissus*, &c. (Paris, 1900); Alan Cole, *Ornament in European Silks* (London, 1899), well illustrated; J. Lessing, *Berlin königliche Museen, Die Gewebe-Sammlung des k. Kunstgewerbe-Museums* (Berlin, 1900), a very fine series of phototype facsimiles of all kinds of textiles; A. Riegl, *Die ägyptischen Textil-Funde* (Wien, 1889); R. Forrer, *Römische und byzantinische Seiden-Textilien* (Strassburg, 1891); A. Dupont Auberville, *L'Ornament des tissus* (Paris, 1877), admirable illustrations; F. Fischbach, *Die wichtigsten Webe-Ornamente* (3 vols., Wiesbaden, 1901), admirable illustrations; Raymond Cax, *Le Musée historique des tissus . . . de Lyon* (Lyon, 1902); Nuremberg: Germanisches Museum, *Katalog der Gewebesammlung des germanischen National-Museums* (Nuremberg, 1896).

(A. S. C.)

WEB (a word common to Teutonic languages, cf. Du. *webbe*, Dan. *vaev*, Ger. *Gewebe*, all from the Teutonic *wabh*—to weave), that which is woven (see Weaving). The word is thus applied to anything resembling a web of cloth, to the *vexillum* of the feather of a bird, to the membrane which connects the toes of many aquatic birds and some aquatic mammals; it is particularly used of the "cobweb," the net spun by the spider, the Old English name for which was *ātor-coppe*, *i.e.* poison-head (*ātor*, poison, and *coppe*, tuft or head). In architecture the term "web" is sometimes given, in preference to "panel," to the stone shell of a vault resting on the ribs and taking its winding surface from the same; see Vault.

WEBB, MATTHEW (1848–1883), English swimmer, generally known as "Captain Webb," was born at Dawley in Shropshire on the 18th of January 1848, the son of a doctor. While still a boy he saved one of his brothers from drowning in the Severn, and, while serving on board the training ship in the Mersey, he again distinguished himself by saving a drowning comrade. He served his apprenticeship in the East India and China trade, shipped as second mate for several owners, and in 1874, was awarded the first Stanhope gold medal by the Royal Humane Society for an attempt to save a seaman who had fallen overboard from the Cunard steamship "Russia." In 1875 Captain Webb abandoned a sea-faring life and became a professional swimmer. On the 3rd of July he swam from Blackwall Pier to Gravesend, a distance of 20 m., in 4¾ hours, a record which remained unbeaten until 1899. In the same year, after one unsuccessful attempt, he swam the English Channel, on the 24th of August, from Dover to Calais in 21¾ hours. For the next few years Webb gave performances of diving and swimming at the Royal Aquarium in London and elsewhere. Crossing to America, he attempted, on the 24th of July 1883, to swim the rapids and whirlpool below Niagara Falls. In this attempt he lost his life.

WEBB, SIDNEY (1859–), English socialist and author, was born in London on the 13th of July 1859. He was educated at private schools in London and Switzerland, at the Birkbeck Institute and the City of London College. From 1875 to 1878 he was employed in a city office, but he entered the civil service by open competition as a clerk in the War Office in 1878, became surveyor of taxes in 1879, and in 1881 entered the colonial office, where he remained until 1891. In 1885 he was called to the bar at Gray's Inn. Mr Webb was one of the early members of the Fabian Society, contributing to *Fabian Essays* (1889); and he became well-known as a socialist, both by his speeches and his writings. He entered the London County Council in 1892 as member for Deptford, and was returned at the head of the poll in the successive elections of 1895; 1898, 1901 and 1904. He resigned from the civil service in 1891 to give his whole time to the work of the Council (where he was chairman of the Technical Education Board) and to the study of economics. He served from 1903 to 1906 on the Royal Commission on Trade Union Law and on other important commissions. He married in 1892 Miss Beatrice Potter, herself a writer on economics and sociology, the author of *The Co-operative Movement in Great Britain* (1891) and a contributor to Charles Booth's *Life and Labour of the People* (1891–1903). His most important works are: a number of Fabian tracts; *London Education* (1904); *The Eight Hours Day* (1891), in conjunction with Harold Cox; and, with Mrs Sidney Webb, *The History of Trade Unionism* (1894, new ed. 1902), *Industrial Democracy* (1897, new ed. 1902), *Problems of Modern Industry* (1898), *History of Liquor Licensing* (1903), *English Local Government* (1906), &c. Mrs Webb was a member of the Royal Commission on the Poor Law, and she and her husband were responsible for the Minority Report (see Poor Law) and for starting the widespread movement in its favour.

WEBB CITY, a city of Jasper county, Missouri, U.S.A., in the S.W. part of the state, about 160 m. S. of Kansas City. Pop. (1890) 5043; (1900) 9201, of whom 248 were foreign-born; (1910 U.S. census) 11,817. It is served by the Missouri Pacific and the St Louis & San Francisco railway systems, and is the headquarters of the electric interurban railway connecting with Carthage and Joplin, Missouri, Galena, Kansas and other cities. With Carterville (pop. 1910, 4539), which adjoins it on the E., it forms practically one city; they are among the most famous and productive "camps" in the rich lead and zinc region of south-western Missouri, and Webb City owes its industrial importance primarily to the mining and shipping of those metals. The value of the factory product increased from $353,566 in 1900 to $637,965 in 1905. Webb City was laid out and incorporated as a town in 1875, and first chartered as a city in 1876. White lead was discovered here in 1873, on the farm of John C. Webb, in whose honour the city is named; and systematic mining began in 1877.

WEBBE, WILLIAM (fl. 1586), English literary critic, was educated at St John's College, Cambridge, where he took his degree in 1572–1573. He was tutor to the two sons of Edward Sulyard of Flemyngs, Essex, and later to the children of Henry Grey of Pirgo in the same county. A letter from him is prefixed to the 1592 edition of *Tancred and Gismunda*,[2] written by his friend, Robert Wilmot. In 1586 he published *A Discourse of English Poetrie*, dedicated to his patron, Edward Sulyard. Webbe argued that the dearth of good English poetry since Chaucer's day was not due to lack of poetic ability, or to the poverty of the language, but to the want of a proper system of prosody. He abuses "this tinkerly verse which we call ryme," as of barbarous origin, and comments on the works of his contemporaries, displaying enthusiasm for Spenser's *Shepheardes Calendar*, and admiration for Phaer's translation of Virgil. He urged the adoption of hexameters and sapphics for English verse, and gives some lamentable examples of his own composition.

The *Discourse* was reprinted in J. Haslewood's *Ancient Critical Essays* (1811–1815), by E. Arber in 1869, and in Gregory Smith's *Elizabethan Critical Essays* (1904).

WEBER, CARL MARIA FRIEDRICH ERNEST VON (1786–1826), German composer, was born at Eutin, near Lübeck, on the 18th of December 1786, of a family that had long been devoted to art. His father, Baron Franz Anton von Weber, a military officer in the service of the palgrave Karl Theodor, was an excellent violinist, and his mother once sang on the stage. His cousins, Josepha, Aloysia, Constanze and Sophie, daughters of Franz Anton's brother Fridolin, attained a high reputation as vocalists. The great composer, Mozart, after having been rejected by Aloysia, married Constanze, and thus became Franz Anton's nephew by marriage. Fridolin played the violin nearly as well as his brother; and the whole family displayed exceptional talent for music. Franz Anton von Weber was a man of thriftless habits and culpable eccentricity. Having been wounded at Rosbach, he quitted the army, and in 1758 he was appointed financial councillor to Clement August, elector of Cologne, who for nine years overlooked his incorrigible neglect of duty. But the elector's successor dismissed him in 1768; and for many years after this he lived in idleness at Hildesheim, squandering the property of his wife, Anna de' Fumetti, and doing nothing for the support of his children until 1778, when he was appointed director of the opera at Lübeck. In 1779 the prince bishop of Eutin made him his kapellmeister, and not long afterwards his wife died of a broken heart. Five years later he went to Vienna, placed two of his sons under Michael Haydn, and in 1785 married the young Viennese singer Genovefa von Brenner. In the following year Carl Maria von Weber was born—a delicate child, afflicted with congenital disease of the hip-joint.

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[1] See *Leinendamastmuster des XVII. und XVIII. Jahrhunderts*, Emil Kumsch (Dresden, 1891).

[2] The original play, *Gismonde of Salerne*, was by five authors, and was produced in the Queen's presence at the Inner Temple in 1568.

On his return from Vienna, Franz Anton, finding that a new kapellmeister had been chosen in his place, accepted the humbler position of "Stadt Musikant." This, however, he soon relinquished; and for some years he wandered from town to town, giving dramatic performances, in conjunction with the children of his first wife, wherever he could collect an audience. The effect of this restless life upon the little Carl Maria's health and education was deplorable; but, as he accompanied his father everywhere, he became familiarized with the stage from his earliest infancy, and thus gained an amount of dramatic experience that laid the foundation of his future greatness. Franz Anton hoped to see him develop into an infant prodigy, like his cousin Mozart, whose marvellous career was then rapidly approaching its close. In furtherance of this scheme, the child was taught to sing and place his fingers upon the pianoforte almost as soon as he could speak, though he was unable to walk until he was four years old. Happily his power of observation and aptitude for general learning were so precocious that he seems, in spite of all these disadvantages, to have instinctively educated himself as became a gentleman. In 1798 Michael Haydn taught him gratuitously at Salzburg. In the March of that year his mother died. In April the family visited Vienna, removing in the autumn to Munich. Here the child's first composition—a set of "Six Fughettas"—was published, with a pompous dedication to his half-brother Edmund; and here also he took lessons in singing and in composition. Soon afterwards he began to play successfully in public, and his father compelled him to write incessantly. Among the compositions of this period were a mass and an opera—*Die Macht der Liebe und des Weins*—now destroyed. A set of "Variations for the Pianoforte," composed a little later, was lithographed by Carl Maria himself, under the guidance of Alois Senefelder, the inventor of the process, in which both the father and the child took great interest.

In 1800 the family removed to Freiberg, where the Ritter von Steinsberg gave Carl Maria the libretto of an opera called *Das Waldmädchen*, which the boy, though not yet fourteen years old, at once set to music, and produced in November at the Freiburg theatre. The performance was by no means successful, and the composer himself was accustomed to speak of the work as "a very immature production"; yet it was afterwards reproduced at Chemnitz, and even at Vienna.

Carl Maria returned with his father to Salzburg in 1801, resuming his studies under Michael Haydn. Here he composed his second opera, *Peter Schmoll und seine Nachbarn*, which was unsuccessfully produced at Nuremberg in 1803. In that year he again visited Vienna, where, though Joseph Haydn and Albrechtsberger were both receiving pupils, his father preferred placing him under Abt Vogler. Through Vogler's instrumentality Carl Maria was appointed conductor of the opera at Breslau, before he had completed his eighteenth year. In this capacity he greatly enlarged his experience of the stage, so that he ranks among the greatest masters of stage-craft in musical history; but he lived a sadly irregular life, contracted debts, and lost his beautiful voice through accidentally drinking an acid used in lithography—a mishap which nearly cost him his life. These hindrances, however, did not prevent him from beginning a new opera called *Rübezahl*, the libretto of which was "romantic" to the last degree, and Weber worked at it enthusiastically, but it was never completed, and little of it has been preserved beyond a quintet and the masterly overture, which, re-written in 1811 under the title of *Der Beherrscher der Geister*, now ranks among its author's finest instrumental compositions.

Quitting Breslau in 1806, Weber removed in the following year to Stuttgart, where he had been offered the post of private secretary to Duke Ludwig, brother of Frederick, king of Würtemberg. The appointment was a disastrous one. The stipend attached to it was insufficient to meet the twofold demands of the young man's new social position and the thriftlessness of his father, who was entirely dependent upon him for support. Court life at Stuttgart was uncongenial to him, though he yielded to its temptations. The king hated him and his practical jokes. He fell hopelessly into debt, and, worse than all, became involved in a fatal intimacy with Margarethe Lang, a singer at the opera. Notwithstanding these distractions he worked hard, and in 1809 re-modelled *Das Waldmädchen*, under the title of *Sylvana*,[1] and prepared to produce it at the court theatre. But a dreadful calamity prevented its performance. Franz Anton had misappropriated a large sum of money placed in the young secretary's hands for the purpose of clearing a mortgage upon one of the duke's estates.[2] Both father and son were charged with embezzlement, and, on the 9th of February 1810, they were arrested at the theatre, during a rehearsal of *Sylvana*, and thrown by the king's order into prison. No one doubted Weber's innocence, but after a summary trial he and his father were ordered to quit the country, and on the 27th of February they began a new life at Mannheim.

Having provided a comfortable home for his father, and begun a new comic opera, in one act, called *Abu Hassan*, Weber removed to Darmstadt in order to be near his old master Abt Vogler, and his fellow-pupils Meyerbeer and Gänsbacher. On the 16th of September 1810, he reproduced *Sylvana* at Frankfort, but with very doubtful success. *Abu Hassan* was completed at Darmstadt in January 1811, after many interruptions, one of which (his attraction to the story of *Der Freischütz*—see below) exercised a memorable influence upon his later career.

Weber started in February 1811 on an extended artistic tour, during which he made many influential friends, and on the 4th of June brought out *Abu Hassan* with marked success at Munich. His father died at Mannheim in 1812, and after this he had no settled home, until in 1813 his wanderings were brought to an end by the unexpected offer of an appointment as kapellmeister at Prague, coupled with the duty of entirely remodelling the performances at the opera-house. The terms were so liberal that he accepted at once, engaged a new company of performers, and directed them with uninterrupted success until the autumn of 1816. During this period he composed no new operas, but he had already written much of his best pianoforte music, and played it with never-failing success, while the disturbed state of Europe inspired him with some of the finest patriotic melodies in existence. First among these stand ten songs from Körner's *Leyer und Schwerdt*, including "Vater, ich rufe dich," and "Lützow's wilde Jagd"; and in no respect inferior to these are the splendid choruses in his cantata *Kampf und Sieg*, which was first performed at Prague, on the 22nd of December 1815.

Weber resigned his office at Prague on the 30th of September

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[1] As the MS. of *Das Waldmädchen* has been lost, it is impossible now to determine its exact relation to the later work.

[2] Spitta gives a different account of the occurrence, and attributes the robbery to a servant.

1816, and on the 21st of December, Frederick Augustus, king of Saxony, appointed him kapellmeister at the German opera at Dresden. The Italian operas performed at the court theatre were superintended by Morlacchi, whose jealous and intriguing disposition gave endless trouble. The king, however, placed the two kapellmeisters on an exact equality both of title and salary, and Weber found ample opportunity for the exercise of his remarkable power of organization and control. He now gave his close attention to the story of *Der Freischütz*, which he had previously meditated turning into an opera, and, with the assistance of Friedrich Kind, he produced an admirable libretto, under the title of *Des Jägers Braut*. No subject could have been better fitted than this to serve as a vehicle for the new art-form which, under Weber's skilful management, developed into the type of "romantic opera." He had dealt with the supernatural in *Rübezahl*, and in *Sylvana* with the pomp and circumstance of chivalry; but the shadowy impersonations in *Rübezahl* are scarcely less human than the heroine who invokes them; and the music of *Sylvana* might easily have been adapted to a story of the 19th century. But Weber now knew better than to let the fiend in *Der Freischütz* sing; with three soft strokes of a drum below an unchanging dismal chord he brings him straight to us from the nether world. Every note in *Euryanthe* breathes the spirit of medieval romance; and the fairies in *Oberon* have an actuality quite distinct from the tinsel of the stage. This uncompromising reality, even in face of the unreal, forms the strongest characteristic of the pure "romantic school," as Weber understood and created it. It treats its wildest subjects in earnest, and without a doubt as to the reality of the scenes it ventures to depict, or the truthfulness of their dramatic interpretation.

Weber wrote the first note of the music of *Der Freischütz* on the 2nd of July—beginning with the duet which opens the second act. But so numerous were the interruptions caused by Morlacchi's intrigues, the insolence of unfriendly courtiers, and the attacks of jealous critics that nearly three years elapsed before the piece was completed. In the meantime the performances at the opera-house were no less successfully remodelled at Dresden than they had already been at Prague, though the work of reformation was far more difficult; for the new kapellmeister was surrounded by enemies who openly subjected him to every possible annoyance, and even the king himself was at one time strongly prejudiced against him. Happily, he no longer stood alone in the world. Having, after much difficulty, broken off his *liaison* with Margarethe Land, he married the singer Carolina Brandt, a noble-minded woman and consummate artist, who was well able to repay him for the part he had long played in her mental development. The new opera was completed on the 13th of May 1820, on which day Weber wrote the last note of the overture—which it was his custom to postpone until the rest of the music was finished. There is abundant evidence to prove that he was well satisfied with the result of his labours; but he gave himself no rest. He had engaged to compose the music to Wolff's Gipsy drama, *Preciosa*. Two months later this also was finished, and both pieces ready for the stage.

In consequence of the unsatisfactory state of affairs at Dresden, it had been arranged that both *Preciosa* and *Der Freischütz*—no longer known by its original title, *Des Jägers Braut*—should be produced at Berlin. In February 1821 Sir Julius Benedict was accepted by Weber as a pupil; and to his pen we owe a delightful account of the rehearsals and first performance of his master's *chef-d'œuvre*. *Preciosa* was produced with great success at the old Berlin opera-house on the 14th of June 1821. On the 18th of June, the anniversary of the battle of Waterloo, the opening of the new "Schauspielhaus" was celebrated by the production of *Der Freischütz*. Much anxiety was caused by unforeseen difficulties at the rehearsals; yet, so calm was Weber's mind that he devoted his leisure time to the composition of his *Concertstück* in F minor—one of his finest pianoforte pieces. Until the last moment his friends were anxious; the author was not; and the result justified his confidence in his own powers. The success of the piece was triumphant. The work was received with equal enthusiasm at Vienna on the 3rd of October, and at Dresden on the 26th of January 1822. Yet Weber's position as kapellmeister was not much improved by his success, though, in order to remain faithful to his engagements, he had refused tempting offers at Berlin and Cassel, and, at the last-named place, had installed Ludwig Spohr in a position much more advantageous than his own.

For his next opera Weber accepted a libretto based, by Frau Wilhelmine von Chezy, on the story of *Euryanthe*, as originally told in the 13th century, in Gilbert de Montreuil's *Roman de la Violette*, and repeated with alterations in the *Decamerone*, in Shakespeare's *Cymbeline*, and in several later forms. In place of the ghostly horrors of *Der Freischütz*, the romantic element was here supplied by the chivalric pomp of the middle ages. The libretto is in one respect superior to that of *Der Freischütz*, inasmuch as it substitutes elaborate recitative for the spoken dialogue peculiar to the German "Schauspiel" and French "opéra comique." It is, in fact, a "grand opera" in every sense of the words,—the prototype of the "music drama" perfected fifty years later by Wagner. The overture—as usual, written last—presents a feature that has never been imitated. During its performance the curtain temporarily rises, to exhibit, in a *tableau vivant*, the scene in the sepulchral vault upon which the whole story turns. This direction is now rarely carried out; but Weber himself well knew how much the interest of the piece depended on it. The work was produced at the Kärntnerthor theatre in Vienna, on the 25th of October 1823, and received with enthusiasm.

Weber's third and last dramatic masterpiece was an English opera, written for Covent Garden theatre, upon a libretto adapted by Planché from Wieland's *Oberon*. It was disfigured by the spoken dialogue abandoned in *Euryanthe*; but in musical beauty it is quite equal to it, while its fairies and mermaids are as vividly real as the spectres in *Der Freischütz*. Though already far gone in consumption, Weber began to compose the music on the 23rd of January 1825. Charles Kemble had offered him £1000 for the work, and he could not afford to rest. He finished the overture in London, at the house of Sir George Smart, soon after his arrival, in March 1826; and on the 12th of April the work was produced with triumphant success. But it cost the composer his life. Wearied out with rehearsals and performances of the opera, and concerts at which he was received with rapturous applause, he grew daily perceptibly weaker; and, notwithstanding the care of his kind host, Sir George Smart, and his family, he was found dead in his bed on the morning of the 5th of June 1826. For eighteen years his remains rested in a temporary grave in Moorfields chapel; but in 1844 they were removed and placed in the family vault at Dresden, Wagner making an eloquent speech.

Besides his three great dramatic masterpieces and the other works already mentioned, Weber wrote two masses, two symphonies, eight cantatas, and a large number of songs, orchestral and pianoforte pieces, and music of other kinds, amounting altogether to more than 250 compositions. (W. S. R.)

Weber's style rises, in his three greatest works, to heights which show his kinship with the great classics and the great moderns. His intellect was quick and clear; but yet finer was the force of character with which he overcame the disadvantages of his feeble health, desultory education and the mistakes of his youth. With such gifts of intellect and character, every moment of his short life was precious to the world; and it is impossible not to regret the placing of his training in the hands of Abt Vogler. Weber's master was an amiable charlatan, whose weakness as a teacher was thoroughly exposed, in perfect innocence, by his two illustrious pupils. Meyerbeer wished to be famous as the maker of a new epoch in opera. Weber could not help being so in reality. But he was sadly hampered by his master's inability to teach realities instead of appearances; and to this impediment alone must we assign the fact that his masterpieces do not begin earlier in his career. With extraordinary rapidity and thoroughness he learnt English a year before his death in order to compose *Oberon*, with the res that there is only one obvious mistake in the whole work, and the general correctness of declamation is higher than in most of his German works. This is typical of Weber's general culture, mental energy and determination; points in which, as in many traits in his music, he strikingly resembles Wagner. But all his determination could not quite repair the defects of his purely musical training, and though his weaknesses are not of glaring effect in opera, still there are moments when even the stage cannot explain them away. Thus the finale of *Der Freischütz* breaks down so obviously that no one thinks of it as anything but a perfunctory winding-up of the story, though it really might have made quite a fine subject for musical treatment. In *Euryanthe* Weber attained his full power, and his inspiration did not leave him in the lurch where this work needed large musical designs. But the libretto was full of absurdities; especially in the last act, which not even nine remodellings under Weber's direction could redeem. Yet it is easy to see why it fascinated him, for, whatever may be said against it from the standpoints of probability and literary merit, its emotional contrasts are highly musical. Indeed it is through them that the defects invite criticism.

Oberon is spoilt by the old local tradition of English opera according to which its libretto admitted of no music during the action of the drama. Thus Weber had in it no opportunity for his musical stage-craft; apart from the fact that the action itself is entirely without dramatic motive and passion, since the characters are simply shifted from Bordeaux to Bagdad whenever Oberon waves his wand.

Many attempts have been made to improve the libretti of *Euryanthe* and *Oberon*, but none are quite successful, for Weber has taken a great artist's pains in making the best of bad material. All that can be said against Weber's achievements only reveals the more emphatically how noble and how complete in essentials was his success and his claim to immortality. His pianoforte works, while showing his helplessness in purely musical form, more than bear out his contemporary reputation as a very great pianoforte player. They have a pronounced theatrical tendency which, in the case of such pieces of gay romanticism as the *Invitation à la danse* and the *Concertstück*, is amusing and by no means inartistic. In orchestration Weber is one of the greatest masters. His treatment of the voice is bold and interesting, but very rash; and his declamation of words is often incorrect. His influence on the music of his own day is comparable to his influence on posterity; for he was not only a most efficient director but a very persuasive journalist; and (in spite of the inexperience that made him disapprove of Beethoven) for all good music other than his own he showed a growing enthusiasm that was infectious. (D. F. T.)

WEBER, WILHELM EDUARD (1804–1891), German physicist, was born at Wittenberg on the 24th of October 1804, and was a younger brother of Ernst Heinrich Weber, the author of Weber's Law (see below). He studied at the university of Halle, where he took his doctor's degree in 1826 and became extraordinary professor of physics in 1828. Three years later he removed to Göttingen as professor of physics, and remained there till 1837, when he was one of the seven professors who were expelled from their chairs for protesting against the action of the king of Hanover (duke of Cumberland) in suspending the constitution. A period of retirement followed this episode, but in 1843 he accepted the chair of physics at Leipzig, and six years later returned to Göttingen, where he died on the 23rd of June 1891. Weber's name is especially known for his work on electrical measurement. Until his time there was no established system either of stating or measuring electrical quantities; but he showed, as his colleague K. F. Gauss did for magnetic quantities, that it is both theoretically and practically possible to define them, not merely by reference to other arbitrary quantities of the same kind, but absolutely in terms in which the units of length, time, and mass are alone involved. He also carried on extensive researches in the theory of magnetism; and it is interesting that in connexion with his observations in terrestrial magnetism he not only employed an early form of mirror galvanometer, but also, about 1833, devised a system of electromagnetic telegraphy, by which a distance of some 9000 ft. was worked over. In conjunction with his elder brother he published in 1825 a well-known treatise on waves, *Die Wellenlehre auf Experimente gegründet*; and in 1833 he collaborated with his younger brother, the physiologist Eduard Friedrich Weber (1806–1871), in an investigation into the mechanism of walking.

WEBER'S LAW, in psychology, the name given to a principle first enunciated by the German scientist, Ernst Heinrich Weber (1795–1878), who became professor at Leipzig (of anatomy, 1818, of physiology, 1840). He was specially famous for his researches into aural and cutaneous sensations. His law, the purport of which is that the increase of stimulus necessary to produce an increase of sensation in any sense is not a fixed quantity but depends on the proportion which the increase bears to the immediately preceding stimulus, is the principal generalization of that branch of scientific investigation which has come to be known as psycho-physics (*q.v.*).

According to Gustav Fechner (*q.v.*), who has done most to prosecute these inquiries and to consolidate them under a separate name, "psycho-physics is an exact doctrine of the relation of function or dependence between body and soul." In other words, it is throughout an attempt to submit to definite measurement the relation of physical stimuli to the resulting psychical or mental facts, and forms an important department of experimental psychology. It deals with the quantitative aspects of mental facts—their intensity or quantity proper and their duration. Physical science enables us, at least in the case of some of the senses, to measure with accuracy the objective amount of the stimulus, and introspection enables us to state the nature of the subjective result. Thus we are able to say whether a stimulus produces *any* psychical result, and can fix in that way the *minimum sensibile* or "threshold of consciousness" for each of the senses. In like manner (though with less accuracy, owing to the disturbing nature of the conditions) we can fix the sensational maximum, or upper limit of sensibility, in the different senses, that is to say, the point beyond which no increase of stimulus produces any appreciable increase of sensation. We thus determine, as Wundt puts it, the limit-values between which changes of intensity in the stimulus are accompanied by changes in sensation. But the central inquiry of psycho-physics remains behind. Between the quantitative minimum and the quantitative maximum thus fixed can we discover any definite relation between changes in the objective intensity of the stimuli and changes in the intensity of the sensations as estimated by consciousness. The answer of psycho-physics to this inquiry is given in the generalization variously known as "Weber's law," "Fechner's law," or the "psycho-physical law," which professes to formulate with exactitude the relations which exist between change of stimulus and change of sensation.

As we have no means of subjectively measuring the absolute intensity of our sensations, it is necessary to depend upon the mental estimate or comparison of two or more sensations. Comparison enables us to say whether they are equal in intensity, or if unequal which is the greater and which is the less. But as they approach equality in this respect it becomes more and more difficult to detect the difference. By a series of experiments, therefore, it will be possible, in the case of any particular individual, to determine the least observable difference in intensity between two sensations of any particular sense. This least observable difference is called by Fechner the *Unterschiedsschwelle* or "difference-threshold," that is to say, the limit of the discriminative sensibility of the sense in question. That such a "threshold," or least observable difference, exists is plain from very simple examples. Very small increases may be made in the objective amount of light, sound or pressure—that is, in the physical stimuli applied to these senses—without the subject on whom the experiment is made detecting any change. It is further evident that, by means of this *Unterschiedsschwelle*, it is possible to compare the discriminative sensibility of different individuals, or of different senses, or (as in the case of the skin) of different parts of the same sense organ: the smaller the difference observable the finer the discriminative sensibility. Thus the discrimination of the muscular sense is much more delicate than that of the sense of touch or pressure, and the discriminative sensibility of the skin and the retina varies very much according to the parts of the surface affected. Various methods have been adopted with a view to determine these *minima* of discriminative sensibility with an approach to scientific precision. The first is that employed by Weber himself, and has been named the method of just observable differences. It consists either in gradually adding to a given stimulus small amounts which at first cause no perceptible difference in sensation but at a certain point do cause a difference to emerge in consciousness, or, vice versa, in gradually decreasing the amount of additional stimulus, till the difference originally perceived becomes imperceptible. By taking the average of a number of such results, the minimum may be determined with tolerable accuracy. The second method is called by Fechner the method of correct and incorrect instances. When two stimuli are very nearly equal the subject will often fail to recognize which is the greater, saying sometimes that A is greater, sometimes that B is greater. When in a large number of trials the right and wrong guesses exactly balance one another we may conclude that the difference between the two stimuli is not appreciable by the sense. On the other hand, as soon as the number of correct guesses definitely exceeds half of the total number of cases, it may be inferred that there is a certain subjective appreciation of difference. This method was first employed by Vierordt. The third method, that of average errors, is very similar to the one just explained. Here a certain weight (to take a concrete example) is laid upon the hand of the person experimented upon, and he is asked, by the aid of subjective impression alone, to fix upon a second weight exactly equal to the first. It is found that the second weight sometimes slightly exceeds the first, sometimes slightly falls below it. Whether above or below is of no consequence to the method, which depends solely on the amount of the error. After a number of experiments, the different errors are added together, and the result being divided by the number of experiments gives us the average error which the subject may be calculated upon to make. This marks the amount of stimulus which is just below the difference-threshold for him. This method was first employed by Fechner and Volkmann. The different methods were first named, and the theory of their application developed by Fechner in his *Elemente der Psychophysik* (1860).

A number of experimental variations have since been devised by Wundt and others, but they are all reducible to the two types of the "gradation" and "error" methods. These methods have been chiefly applied to determine the relation of the difference-threshold to the absolute magnitude of the stimuli employed. For a very little reflection tells us that the smallest perceivable difference is not an amount whose absolute intensity is constant even within the same sense. It varies with the intensity of the stimuli employed. We are unable, for example, to recognize slight differences in weight when the weights compared are heavy, though we should be perfectly able to make the distinction if the weights compared were both light. Ordinary observation would lead us, therefore, to the conclusion that the greater the intensity of the original stimulus at work the greater must be the increase of stimulus in order that there may be a perceptible difference in the resulting sensation. Weber was the first (after a prolonged series of experiments) to clothe this generality with scientific precision by formulating the law which has since gone by his name. He showed that the smallest perceptible difference is not absolutely the same, but remains relatively the same, that is, it remains the same fraction of the preceding stimulus. For example, if we can distinguish 16 oz. and 17 oz., we shall be able to distinguish 32 oz. and 34 oz., but not 32 oz. and 33 oz., the addition being in each case $\frac{1}{16}$ of the preceding stimulus. This fraction (supposing it to be the difference-threshold of the muscular sense) remains a constant, however light or however heavy the weights compared. The law may be formulated thus:—The difference between any two stimuli is experienced as of equal magnitude, in case the mathematical relation of these stimuli remains unaltered. Or, otherwise expressed, in order that the intensity of a sensation may increase in arithmetical progression the stimulus must increase in geometrical progression. It is also expressed by Fechner in the form—The sensation increases as the logarithm of the stimulus.

The law has been variously interpreted. Fechner himself designated it the psycho-physical law, and treated it as the fundamental formula of the relation between body and mind, thus assigning to it an ontological dignity and significance. But in this "psycho-physical" interpretation of his results he has not had a numerous following. Wundt interprets the law in a purely "psychological" sense, making it a special instance of the general law of relativity which governs our mental states. Introspection can give us no information as to the absolute intensity of the stimulus; for a stimulus is known in consciousness only through its sensational resultant. Hence, he argues, we can only compare one psychical state with another, and our standard of measurement is therefore necessarily a relative one; it depends directly upon the preceding state with which we compare the present. Others (*e.g.* G. E. Müller) have attempted to give the law a purely physical or "physiological" explanation. Instead of holding with Fechner that the law expresses a recondite relation between the material and the spiritual world, they prefer to regard the quantitative relation between the last physical antecedent in the brain and the resultant mental change as prima facie one of simple proportion, and to treat Weber's law as holding between the initial physical stimulus and the final action of the nerve-centres. According to this interpretation, the law would be altogether due to the nature of nervous action. As a nerve, says Sully, after a temporary degree of stimulation temporarily loses its sensibility, so the greater the previous stimulation of a nerve the greater is the additional stimulus required to produce an appreciable amount of sensation.

Weber's law, it must be added, holds only within certain limits. In the "chemical" senses of taste and smell experiments are almost impossible. It is not practicable to limit the amount of the stimulus with the necessary exactitude, and the results are further vitiated by the long continuance of the physiological effects. The same considerations apply with still more force to the organic sensations, and the results in the case of temperature sensations are completely uncertain. The law is approximately true in the case of sight, hearing pressure, and the muscular sense—most exactly in the case of sound. As this is the sense which affords the greatest facilities for measuring the precise amount of the stimulus, it may perhaps be inferred that, if we could attain the same exactitude in the other senses, with the elimination of the numerous disturbing extraneous influences at work, the law would vindicate itself with the same exactitude and certainty. It is further to be noted, however, that even in those senses in which it has been approximately verified, the law holds with stringency only within certain limits. The results are most exact in the middle regions of the sensory scale; when we approach the upper or lower limit of sensibility they become quite uncertain.

Literature.—Weber's investigations were published as "Der Tastsinn und das Gemeingefühl," in Wagner's *Handwörterbuch der Physiologie*, iii. (1846). Fechner's *Elemente der Psychophysik* (1860) contains an elaborate exposition of the whole subject. He replied to his critics in two later works, *In Sachen der Psychophysik* (1877) and *Revision der Hauptpunkte der Psychophysik* (1882). Delbœuf's *Étude psychophysique* (1873), *Examen critique de la loi psychophysique* (1883), and *Éléments de psychophysique générale et spéciale* (1883), and G. E. Müller's *Zur Grundlegung der Psychophysik* (1878) are also important documents; and the subject is fully treated in Wundt's *Grundzüge der physiologischen Psychologie* (ed. 1902–1903), and "Über die Methode d. Minimaländerungen," in *Philos. Stud.* (Leipzig, 1883), or, more popularly, in his *Human and Animal Psychology* (2nd ed., 1892), Lectures 2, 3, 4. See also Ladd's *Physiological Psychology* (1887), which is based upon Wundt; Meinong, in *Zeitschr. für Psychologie*, xi. (1896); Ziehen, *Leitfaden der physiologischen Psychologie* (7th ed., Jena, 1906); E. B. Titchener, *Experimental Psychology* (ii., 1905); Professor James Ward's "Attempt to Interpret Fechner's Law," in *Mind*, i. 452 sqq.; and generally textbooks of psychology, *e.g.* G. F. Stout's *Manual of Psychology*, bk. ii. ch. 7 (following Meinong); James's *Principles of Psychology*, ch. 13; Külpe's *Outlines of Psychology*, part i. chap. 1 and 3. (A. S. P.-P.)

WEBSTER, ALEXANDER (1707–1784), Scottish writer and minister, son of James Webster, a covenanting minister, was born in Edinburgh in 1707. Having become a minister in the church of Scotland, he propounded a scheme in 1742 for providing pensions for the widows of ministers. The tables which he drew up from information obtained from all the presbyteries of Scotland were based on a system of actuarial calculation that supplied a precedent followed by insurance companies in modern times for reckoning averages of longevity. In 1755 the government commissioned Webster to obtain data for the first census of Scotland, which he carried out in the same year. In 1753 he was elected moderator of the General Assembly; in 1771 he was appointed a dean of the Chapel Royal and chaplain to George III. in Scotland; and he died on the 25th of January 1784.

Webster published in 1748 his *Calculations*, setting forth the principles on which his scheme for widows' pensions was based; he also wrote a defence of the Methodist movement in 1742, and *Zeal for the Civil and Religious Interests of Mankind Commended* (1754).

WEBSTER, BENJAMIN NOTTINGHAM (1797–1882), English actor, manager and dramatic writer, was born in Bath on the 3rd of September 1797, the son of a dancing master. First appearing as Harlequin, and then in small parts at Drury Lane, he went to the Haymarket in 1829, and was given leading comedy character business. He was the lessee of the Haymarket from 1837; he built the new Adelphi theatre (1859); later the Olympic, Princess's and St James's came under his control; and he was the patron of all the contemporary playwrights and many of the best actors, who owed their opportunity of success to him. As a character actor he was unequalled in his day, especially in such parts as Triplet in *Masks and Faces*, Joey Ladle in *No Thoroughfare*, and John Peerybingle in his own dramatization of *The Cricket on the Hearth*. He wrote, translated or adapted nearly a hundred plays. Webster took his formal farewell of the stage in 1874, and he died on the 3rd of July 1882. His daughter, Harriette Georgiana (d. 1897), was the first wife of Edward Levy-Lawson, 1st baron Burnham; and his son, W. S. Webster, had three children—Benjamin Webster (b. 1864; married to Miss May Whitby), Annie (Mrs A. E. George) and Lizzie (Mrs Sydney Brough)—all well known on the London stage, and further connected with it in each case by marriage.

WEBSTER, DANIEL (1782–1852), American statesman, was born in Salisbury (now Franklin), New Hampsh

18th of January 1782. He was a descendant of Thomas Webster, of Scottish ancestry, who settled in New Hampshire about 1636. His father, Ebenezer Webster (1739–1806), was a sturdy frontiersman; when, in 1763, he built his log cabin in the town of Salisbury there was no habitation between him and Canada. He was a member of Rogers' Rangers in the Seven Years' War, served in the War of Independence, was for several years a member of the New Hampshire legislature, was a delegate to the New Hampshire convention which ratified the Federal constitution, and was a justice of the court of common pleas for his county. Daniel was a frail but clever child, and his family made great sacrifices to give him and his elder brother Ezekiel a good education. He attended Phillips Exeter Academy about nine months in 1794, was further prepared for college by Dr Samuel Wood, the minister at Boscawen, and graduated at Dartmouth College in 1801. He was chosen Fourth of July orator in Hanover, the college town, in 1800, and in his speech appears the substance of the political principles for the development of which he is chiefly famous. After graduation he began the study of law in his native town. When in the following winter money had to be earned to enable Ezekiel to remain in college, Daniel accepted the principalship of the academy at Fryeburg, Maine; but he resumed his law studies in the following year, and in 1804, with Ezekiel's assistance, he was enabled to go to Boston and conclude his studies under Christopher Gore (1758–1827), later governor of Massachusetts (1809–1810) and a U.S. senator (1813–1816). Admitted to the bar in Boston in 1805, Webster began the practice of law at Boscawen, but his father died a year later, and Webster removed in the autumn of 1807 to Portsmouth, then one of the leading commercial cities of New England. Here he rose rapidly to eminence both at the bar and in politics.

His political career began in earnest at the opening of the War of 1812. He led the opposition in his state to the policy of Madison's administration, was elected by the Federalists a member of the National House of Representatives, and took his seat in May 1813. Henry Clay, the speaker, appointed him a member of the Committee on Foreign Relations, of which John C. Calhoun was chairman, and for some forty years these three constituted a great triumvirate in American politics. Webster had been in the House less than three weeks when he greatly embarrassed the administration by introducing a set of resolutions asking for information relating to the immediate cause of the war. In January 1814, when a bill to encourage enlistments was before the House, he attacked the conduct of the war in his first great speech. An even more forcible speech, delivered later in the same session, in support of a bill for repealing the embargo and non-importation acts, marked him as one of the foremost men in Congress. He successfully opposed a bill providing for what would have been practically an irredeemable currency, and he voted against the bill for chartering the second United States bank, although it provided for the redemption of bank notes in specie, because he objected to permitting the government to have so large a share in its management. Webster removed to Boston in June 1816. This cost him his seat in Congress after the 4th of March 1817, and for the next six years he was engaged chiefly in the practice of law in the courts of Massachusetts and before the U.S. Supreme Court.

His first leading case before the Supreme Court was the Dartmouth College Case. In 1815, when the Dartmouth board of trustees was rent by factions, the majority, who were Federalists and Congregationalists, removed the president, John Wheelock, who was a Presbyterian, and appointed Francis Brown in his place. Wheelock appealed to the legislature in the following year, when it was strongly Republican, and that body responded by passing acts which virtually repealed the charter received from George III., created a state university, placed Wheelock at its head, and transferred to it the property of the college. The case came before the Supreme Court of New Hampshire in May 1817. Jeremiah Mason (1768–1848), a lawyer of the first rank, Jeremiah Smith and Webster appeared for the college, and argued that these acts were invalid because they were not within the general scope of the legislature's power, because they violated provisions of the state constitution and because they violated the clause of the Federal Constitution which prohibits a state from impairing the obligation of contracts but the court decided against them. On the last point, however, the case was carried to the Supreme Court of the United States, and there Webster, presenting principally arguments of his colleagues at the state trial and making a powerful appeal to the emotions of the court, won the case for the college and for himself the front rank at the American bar. The result, too, vindicating as it did the supremacy of the Constitution of the United States, was a substantial gain for that nationalism which Webster advocated in his first Fourth of July oration at Hanover, and the promotion of which was for the remainder of his career his principal service to his country. His next great case was that of *M'Culloch* v. *Maryland* Maryland had imposed a tax upon the Baltimore branch of the Bank of the United States. The Maryland Court of Appeals sustained the validity of this act. Webster, supported by William Pinkney and William Wirt, argued in February 1819, (1) that the power to establish a bank was to be implied from the general power given to Congress to administer the financial affairs of the nation, and was a means of administering the finances which was appropriate and within the discretion of Congress; (2) that "the power to tax is the power to destroy," and that a state had not the constitutional power to impose a tax upon any instrumentality of the government of the United States. The Supreme Court sustained these arguments and the act of Maryland was held to be void. Four years later (1823) Webster argued the case of *Gibbons* v. *Ogden*. The state of New York, in order to reward the enterprise of Robert R. Livingston and the inventive genius of Robert Fulton in the application of the steam engine to traffic on the water, had given to them a monopoly of all transportation by steam within the waters of New York. The highest court of that state sustained the validity of the monopoly. Gibbons, who had begun to run a steamboat from New Jersey, appealed to the Supreme Court. Webster argued that the Federal Constitution gave to Congress control over interstate commerce, and that any interference by the legislature of a state with this commerce was unconstitutional and void. The Supreme Court so held; its opinion, written by Chief Justice Marshall, being little else than a recital of Webster's argument. In the case of *Ogden* v. *Saunders*, heard in 1824 and reheard in 1827, in which the question was the validity or invalidity of the insolvent laws of the several states, Webster argued that the clause prohibiting a state from impairing the obligation of contracts applied to future as well as to past contracts, but the court decided against him.

Meanwhile Webster had come to be recognized as the first American orator. His oration at Plymouth, on the 22nd of December 1820, on the second centennial anniversary of the landing of the Pilgrims, placed him in this rank. No man mastered more thoroughly the fundamental principles of government and the currents of feeling which influence the destiny of nations. His oration in 1825 at the laying of the corner stone of the Bunker Hill monument contained perhaps the clearest statement to be found anywhere of the principles underlying the American War of Independence. In the following year Webster delivered his oration in commemoration of the second and third presidents of the United States—John Adams and Thomas Jefferson—who died on the 4th of July 1826; it is particularly remarkable for Adams's imaginary reply in the Continental Congress to the arguments against a Declaration of Independence, beginning with the familiar quotation: "Sink or swim, live or die, survive or perish, I gave my hand and my heart to this vote." Webster's physical endowments as an orator were extraordinary. Thomas Carlyle thus describes him as he appeared in London in 1839.

"Not many days ago I saw at breakfast the notablest of your notabilities, Daniel Webster. He is a magnificent specimen. You might say to all the world, 'This is our Yankee Englishman; such limbs we make in Yankee land!' As a logic fencer, or parliamentary Hercules, one would be inclined to back him at first sight against all the extant world. The tanned complexion, that amorphous crag-like face; the dull black eyes under the precipice of brows, like dull anthracite furnaces, needing only to be *blown*; the mastiff mouth accurately closed; I have not traced so much of *silent Berserkir rage* that I remember in any man."

In 1820 Webster took an important part in the convention called to revise the constitution of Massachusetts, his arguments in favour of removing the religious test, in favour of retaining property representation in the Senate, and in favour of increasing the independence of the judiciary, being especially notable. He was a member of the National House of Representatives from 1823 to 1827 and of the Senate from 1827 to 1841. Soon after returning to the House he supported in a notable speech a resolution to send a commissioner to Greece, then in insurrection.

The tariff was to him a distasteful subject, and he was governed in his attitude toward it largely by the wishes of the majority of his constituents. He opposed the tariff bill of 1816 and in 1824, and he repudiated the name of "American system," claimed by Clay for his system of protection. When, however, the tariff bill of 1828, which was still more protective, came up for discussion, Webster had ceased to oppose protection; but he did not attempt to argue in favour of it. He stated that his people, after giving warning in 1824 that they would consider protection the policy of the Government, had gone into protected manufactures, and he now asked that that policy be not reversed to the injury of his constituents. In later speeches, too, he defended protection rather as a policy under which industries had been called into being than as advisable if the stage had been clear for the adoption of a new policy.

The tariff of 1828 aroused bitter opposition in South Carolina, and called from Vice-President Calhoun the statement of the doctrine of nullification which was adopted by the South Carolina legislature at the close of the year and is known as the South Carolina Exposition. Senator Robert Y. Hayne, from the same state, voiced this doctrine in the Senate, and Webster's reply was his most powerful exposition of the national conception of the Union. The occasion of this famous Webster-Hayne debate was the introduction by Senator Samuel A. Foote (1780–1846) of Connecticut of a resolution of inquiry into the expediency of restricting the sales of the Western lands. This was on the 29th of December 1829, and after Senator Benton of Missouri had denounced the resolution as one inspired by hatred of the East for the West, Hayne, on the 19th of January 1830, made a vigorous attack on New England, and declared his opposition to a permanent revenue from the public lands or any other source on the ground that it would promote corruption and the consolidation of the government and "be fatal to the sovereignty and independence of the states." Webster's brief reply drew from Hayne a second speech, in which he entered into a full exposition of the doctrine of nullification, and the important part of Webster's second reply to Hayne on the 26th and 27th of January is a masterly exposition of the Constitution as in his opinion it had come to be after a development of more than forty years. He showed the revolutionary and unpractical character of any doctrine such as nullification (*q.v.*) based on the assumption that the general government was the agent of the state legislatures. It placed the general government, he said, in the absurd position of a "servant of four-and-twenty masters, of different wills and different purposes, and yet bound to obey all." He then argued at length that the correct assumption was that both the general government and the state government were "all agents of the same supreme power, the people," that the people had established the Constitution of the United States and that in the Supreme Court, established under that Constitution, was vested the final decision on all constitutional questions. Whatever may be said of the original creation of the Constitution, whether by the states or by the people, its development under the influences of a growing nationalism was a strong support to Webster's argument, and no other speech so strengthened Union sentiment throughout the North; its keynote was "Liberty and Union, now and forever, one and inseparable." South Carolina, however, insisted that its doctrine was sound, and in November 1832 passed an ordinance declaring the revenue laws of the United States null and void. President Jackson responded with a proclamation denying the right of nullification, and asked Congress for authority to collect the revenue in South Carolina by force if necessary. A bill, known as the Force Bill, was introduced in the Senate, and in the debate upon it Webster had an encounter with Calhoun. His reply to Calhoun, printed as "The Constitution not a compact between sovereign States," is one of his closest legal arguments, but somewhat overmatched by the keen logic of his adversary.

Webster's support of President Jackson in the South Carolina trouble helped to drive Calhoun into an alliance with Clay; and Clay, whose plan of preserving the Union was by compromise, came forward with a bill for greatly reducing the tariff. Webster, strongly opposed to yielding in this way, made a vigorous speech against the bill, but it passed and South Carolina claimed a victory. In the same year (1833) the Whig party began to take definite form under the leadership of Clay, in opposition, chiefly, to President Jackson's bank policy, and Webster joined the ranks behind Clay with an aspiration for the presidency. He was formally nominated for that office by the Massachusetts legislature in 1835, and received the electoral vote of that state, but of that state only. Four years later his party passed him by for William Henry Harrison, the hero of Tippecanoe, and Webster refused the proffered nomination for vice-president.

President Harrison appointed Webster secretary of state but died one month after taking office. John Tyler, who succeeded to the presidency, was soon "read out of his party," and all his cabinet except Webster resigned. Webster hesitated, but after consultation with a delegation of Massachusetts Whigs decided to remain. Although he was severely criticized there were good reasons for his decision. When he entered office the relations between the United States and Great Britain were critical. The M'Leod case[1] in which the state of New York insisted on trying a British subject, with whose trial the Federal government had no power to interfere, while the British government had declared that it would consider conviction and execution a *casus belli*; the exercise of the hateful right of search by British vessels on the coast of Africa; the Maine boundary, as to which the action of a state might at any time bring the Federal government into armed collision with Great Britain—all these at once met the new secretary, and he felt that he had no right to abandon his work for party reasons. With the special commissioner from Great Britain, Lord Ashburton, he concluded the treaty of 1842 known as the Webster-Ashburton Treaty. Differences arising out of the M'Leod case were adjusted by extending the principle of extradition. The question of the suppression of the African slave trade, with which was connected the right of search, was settled by an agreement that each nation should keep in service off the coast of Africa a squadron carrying not fewer than eighty guns, and that the two squadrons should act in concert when necessary. The North-east boundary dispute was settled by a compromise which allowed Maine about 5500 sq. m. less than she had claimed, and allowed Great Britain about as much less on her claim, and by an agreement on the part of the government of the United States to pay to Maine and Massachusetts "in equal moieties" the sum of $300,000 for their assent (see Maine).

Immediately after the treaty had been concluded the Whigs insisted that Webster should leave the cabinet. He refused, for a time, to be driven, but because of their continued attacks, together with his ambition to become president, and because Tyler favoured the annexation of Texas while he was opposed to it, he resigned in May 1843. He was forgiven by his party in the following year, but not until the opposition, provoked by the retention of his position under Tyler, had ruined whatever chance he might have had in that year of receiving the presidential nomination. In June 1843, on the occasion of the completion of the Bunker Hill monument, Webster delivered another classic oration. In February 1844 he argued the Girard Will Case before the United States Supreme Court. Stephen Girard (*q.v.*) had devised and bequeathed the residue of his estate for the establishment and maintenance of Girard College, in which no minister of the Gospel of any sect or denomination whatever should be admitted. The suit was brought to break the will, and Webster, for the plaintiffs, after stating that the devise could stand only on condition that it was a charity, argued that it was not a charity because no teaching was such except Christian teaching. He made an eloquent plea for Christianity, but his case was weak in law, and the court sustained the will.

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[1] This case grew out of the Canadian rebellion of 1837. Alexander M'Leod boasted in November 1840 that he was one of a Canadian party who, on the 29th of December 1837, had captured and burned a small American steamboat, the "Caroline," and in the course of the attack had shot Amos Durfee. The Canadian commander had regarded the "Caroline" as being in the service of the insurgents and had asked for volunteers to destroy her (see Seward, W. H.).

Webster was returned to the Senate in 1845. He opposed the annexation of Texas and the Mexican War, and was, as before, the recognized spokesman of his party. At the beginning of the quarrel of the North and the South over the organization of the territory acquired from Mexico, Calhoun contended that the Constitution of the United States extended over this territory and carried slavery with it, but Webster denied this on the ground that the territory was the property of, not part of, the United States, and Webster's view prevailed. The whole matter had, therefore, to be adjusted by Congress, and as the growing intensity of the quarrel revealed the depth of the chasm between the sections, Clay came forward with the famous compromise of 1850, and Webster's last great speech—" The Constitution and the Union," or as it is more commonly known " The Seventh of March Speech "—was in support of this Compromise. It was a noble effort to secure a lasting settlement of the slavery question, but he was bitterly denounced throughout the north as a renegade. In July 1850 Webster again became secretary of state, in the cabinet of President Fillmore. Perhaps the most important act of his second term was obtaining the release of Kossuth and other Hungarian refugees who had fled to Turkey, and whose surrender had been demanded by the Austrian government. He died at his home in Marshfield, Massachusetts, on the 24th of October 1852. Webster was twice married—first in 1808 to Grace, daughter of Rev. Elijah Fletcher, a New Hampshire clergyman. She died in 1828, leaving two sons, Daniel Fletcher, killed in the second battle of Bull Run, and Edward, a major in the United States army, who died while serving in the Mexican War, and a daughter Julia, who married Samuel Appleton. Webster's second wife was Caroline Le Roy, daughter of Jacob Le Roy, a New York merchant. He was married to her in 1829 and she survived him.

The universal expression of respect and admiration at the time of Webster's death showed that he had retained the confidence of his people. Never, since the death of Washington, had there been in the United States such a universal expression of public sorrow and bereavement. It is not too much to say that the conviction of the justice of their cause that carried the northern states successfully through the Civil War was largely due to the arguments of Webster. He had convinced the majority of the people that the government created by the Constitution was not a league or confederacy, but a Union, and had all the powers necessary to its maintenance and preservation. He had convinced the Supreme Court, and established the principle in American jurisprudence, that whenever a power is granted by a Constitution, everything that is fairly and reasonably involved in the exercise of that power is granted also. He established the freedom of the instrumentalities of the national government from adverse legislation by the states; freedom of commerce between the different states; the right of Congress to regulate the entire passenger traffic through and from the United States, and the sacredness of public franchises from legislative assault. The establishment of these principles was essential to the integrity and permanence of the American Union.

Bibliography.—*The Works of Daniel Webster* (6 vols., Boston, 185:) contain a biographical memoir by Edward Everett; G. T. Curtis, *Life of Daniel Webster* (2 vols., New York, 1870) is the most complete biography, but it is written wholly from an admirer's point of view. See also J. W. McIntyre (ed.), *Writings and Speeches of Daniel Webster* (18 vols., Boston, 1903); Fletcher Webster (ed.), *Daniel Webster's Private Correspondence* (2 vols., Boston, 1857); H. C. Lodge, *Daniel Webster* (Boston, 1899); J. B. McMaster, *Daniel Webster* (New York, 1902); E. P. Wheeler, *Daniel Webster, the Expounder of the Constitution* (New York, 1905); S. W. McCall, *Daniel Webster* (Boston, 1902); and Norman Hapgood, *Daniel Webster* (Boston, 1899).

(E. P. W.: X.)

WEBSTER, JOHN (fl. 1602–1624), English dramatist, was a writer for the stage in the year 1602, when he had a share in three plays noted by Philip Henslow, and he published in 1624 the city pageant for that year, " invented and written by John Webster, merchant-tailor." In the same year a tragedy by Ford and Webster, *A late Murther of the Sonn upon the Mother*, was licensed for the stage; it is one of the numberless treasures now lost to us through the carelessness of genius or the malignity of chance. Beyond the period included between these two dates there are no traces to be found of his existence; nor is anything known of it with any certainty during that period, except that seven plays appeared with his name on the title page, three of them only the work of his unassisted hand. He was the author of certain additions to Marston's tragi-comedy of *The Malcontent* (1604); these probably do not extend beyond the induction, a curious and vivacious prelude to a powerful and irregular work of somewhat morbid and sardonic genius. Three years later, in 1607, two comedies and a tragedy, " written by Thomas Dekker and John Webster," were given to the press. The comedies are lively and humorous, full of movement and incident; but the beautiful interlude of poetry which distinguishes the second scene of the fourth act of *Westward Ho!* is unmistakably and unquestionably the work of Dekker; while the companion comedy of *Northward Ho!* is composed throughout of homespun and coarse-grained prose. *The Famous History of Sir Thomas Wyatt* is apparently a most awkward and injurious abridgment of an historical play in two parts on a pathetic but undramatic subject, the fate of Lady Jane Grey. In this lost play of *Lady Jane* (noted by Henslow in 1602) Heywood, Dekker, Chettle and Smith had also taken part; so that even in its original form it can hardly have been other than a rough piece of patchwork. There are some touches of simple eloquence and rude dramatic ability in the mangled and corrupt residue which is all that survives of it; but on the whole this " history " is crude, meagre, and unimpressive. In 1612 John Webster stood revealed to the then somewhat narrow world of readers as a tragic poet and dramatist of the very foremost rank in the very highest class. *The White Devil*, also known as *Vittoria Corombona*,[1] is a tragedy based on events then comparatively recent—on a chronicle of crime and retribution in which the leading circumstances were altered and adapted with the most delicate art and the most consummate judgment from the incompleteness of incomposite reality to the requisites of the stage of Shakespeare. By him alone among English poets have the finest scenes and passages of this tragedy been ever surpassed or equalled in the crowning qualities of tragic or dramatic poetry—in pathos and passion, in subtlety and strength, in harmonious variety of art and infallible fidelity to nature. Eleven years had elapsed when the twin masterpiece of its author—if not indeed a still greater or more absolute masterpiece—was published by the poet who had given it to the stage seven years before. *The Duchess of Malfy*[2] (an Anglicized version of Amalfi, corresponding to such designations as Florence, Venice and Naples) was probably brought on the stage about the time of the death of Shakespeare; it was first printed in the memorable year which witnessed the first publication of his collected plays. This tragedy stands out among its compeers as one of the imperishable and ineradicable landmarks of literature. All the great qualities apparent in *The White Devil* reappear in *The Duchess of Malfy*, combined with a yet more perfect execution, and utilized with a yet more consummate skill. No poet has ever so long and so successfully sustained at their utmost height and intensity the expressed emotions and the united effects of terror and pity. The transcendent imagination and the impassioned sympathy which inspire this most tragic of all tragedies save *King Lear* are fused together in the fourth act into a creation which has hardly been excelled for unflagging energy of impression and of pathos in all the dramatic or poetic literature of the world. Its wild and fearful sublimity of invention is not more exceptional than the exquisite justice and tenderness and subtlety of its expression. Some of these executive merits may be found in an ill-constructed and ill-conditioned tragi-comedy which was printed in the same year; but few readers will care to remember much more of *The Devil's Law Case* than the admirable scenes and passages which found favour in the unerring and untiring sight of Webster's first and final interpreter or commentator, Charles Lamb. Thirty-one years later (1654) the noble tragedy of *Appius and Virginia* was given to the world—a work which would alone have sufficed to perpetuate the memory of its author among all competent lovers of English poetry at its best. Seven years afterwards an unprincipled and ignorant bookseller published, under the title of *Two New Playes: viz. A Cure for a Cuckold: a Comedy. The Thracian Wonder, A Comical History. As it hath been several times acted with great Applause*, two plays of which he assigned the authorship to John Webster and William Rowley. This attribution may or may not be accurate; the former play is a mixture of coarsely realistic farce and gracefully romantic comedy. An elegy on Henry, prince of Wales, and a few slight occasional verses, compose the rest of Webster's remaining extant works.

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[1] *The White Divel; or, The Tragedy of Paulo Giordano Ursini, Duke of Brachiano, with the Life and Death of Vittoria Corombona, the famous Venetian Curtizan* (1612). Other editions, with varying title-pages, 1631, 1665, 1672.

[2] *The Dutchess of Malfey, A Tragedy. As it was approvedly well acted at Blackfriers* . . . (1623). The plot is taken from a novel by Bandello, and is also the subject of a tragedy by Lope de Vega, *El Mayor Domo de la duquessa d'Amalfi.*

[Edward Phillips, in his *Theatrum poëtarum*, wrongly attributed to him a share in *The Weakest goes to the Wall.* The play of *Guise*, mentioned by Webster himself in the introduction to *The Devil's Law Case*, is lost.]

Webster's claims to a place among the chief writers of his country were ignored for upwards of two centuries. In 1830 the Rev. Alexander Dyce first collected and edited the works of a poet who had found his first adequate recognition twenty-two years earlier at the pious and fortunate hands of Lamb. But we cannot imagine that a presentiment or even a foreknowledge of this long delay in the payment of a debt so long due from his countrymen to the memory of so great a poet would seriously have disturbed or distressed the mind of the man who has given us the clue to his nature in a single and an imperishable sentence—"I rest silent in my own work." (A. C. S.)

See *The Works of John Webster; with some Account of the Author and Notes*, by Alexander Dyce (new ed., 1857); *The Dramatic Works of John Webster*, edited by William Hazlitt the younger (1857); *The Best Plays of Webster and Tourneur*, edited by J. A. Symonds for the "Mermaid" series (1888–1903), *Love's Graduate* . . (Oxford, 1885), in which Webster's supposed share in *A Cure for a Cuckold* is presented separately by S. Spring-Rice, with an introduction by Edmund Gosse. See also E. Gosse, *Seventeenth-Century Studies* (1883); and especially an exhaustive treatise by E. E. Stoll, *John Webster, The Periods of his Work as determined by his Relations to the Drama of his Day* (Boston, Massachusetts, 1905). Mr Stoll's account (see p. 42) shows that the additional biographical suggestions made by Mr Sidney Lee in his article in the *Dict. Nat. Biog.* are not supported.

WEBSTER, NOAH (1758–1843), American lexicographer and journalist, was born at West Hartford, Connecticut, on the 16th of October 1758. He was descended from John Webster of Hartford, governor of Connecticut in 1656–1657, and on his mother's side from Governor William Bradford of Plymouth. He entered Yale in 1774, graduating in 1778. He studied law, and was admitted to the bar at Hartford in 1781. In 1782–1783 he taught in a classical school at Goshen, New York, and became convinced of the need of better textbooks of English. In 1783–1785 he published at Hartford *A Grammatical Institute of the English Language*, in three parts, a spelling-book, a grammar and a reader. This was the pioneer American work in its field, and it soon found a place in most of the schools of the United States. During the twenty years in which Webster was preparing his dictionary, his income from the spelling-book, though the royalty was less than a cent a copy, was enough to support his family; and before 1861 the sale reached more than a million copies a year. The wide use of this book contributed greatly to uniformity of pronunciation in the United States, and, with his dictionary, secured the general adoption in the United States of a simpler system of spelling than that current in England. In 1785 he published *Sketches of American Policy*, in which he argued for a constitutional government whose authority should be vested in Congress. This he regarded as the first distinct proposal for a United States Constitution, and when in 1787 the work of the commissioners was completed at Philadelphia, where Webster was then living as superintendent of an academy, he wrote in behalf of the constitution an *Examination of the Leading Principles of the Federal Constitution*. In 1788 he started in New York the *American Magazine*, but it failed at the end of a year, and he resumed the practice of law at Hartford. In 1793, in order to support Washington's administration, he removed to New York and established a daily paper, the *Minerva* (afterwards the *Commercial Advertiser*), and later a semi-weekly paper, the *Herald* (afterwards the *New York Spectator*). In 1798 he removed to New Haven. He served in the Connecticut House of Representatives in 1800 and 1802-07, and as a county judge in 1807-11. In 1807 he published *A Philosophical and Practical Grammar of the English Language*. In 1806 he had brought out *A Compendious Dictionary of the English Language*, and in 1807 he began work on his dictionary. While engaged on it he removed in 1812 to Amherst, Massachusetts, where he was president of the Board of Trustees of the Academy and assisted in founding Amherst College. He was also a member of the General Court of Massachusetts. In 1822 he returned to New Haven, and the next year he received the degree of LL.D. from Yale. He spent a year (1824-1825) abroad, working on his dictionary, in Paris and at the university of Cambridge, where he finished his manuscript. The work came out in 1828 in two volumes. It contained 12,000 words and from 30,000 to 40,000 definitions that had not appeared in any earlier dictionary. An English edition soon followed. In 1840 the second edition, corrected and enlarged, came out, in two volumes. He completed the revision of an appendix a few days before his death, which occurred in New Haven on the 28th of May 1843.

The dictionary was revised in 1847 under the editorship of Professor Chauncey A. Goodrich and published in one volume. In 1859 a pictorial edition was issued. In 1864 it was revised mainly under the direction of Professor Noah Porter, and again in 1890 under the same direction, the latter revision appearing with the title of the *International Dictionary of the English Language*. The latter was again issued in 1900, with a supplement of 25,000 words and phrases, under the supervision of William Torrey Harris, who edited another revision, in 1909, under the title of the *New International Dictionary of the English Language*. It has frequently been abridged.

Among Webster's other works are *Dissertations on the English Language* (1789), a course of lectures that he had given three years before in some of the chief American cities; *Essays* (1790); *The Revolution in France* (1794); *A Brief History of Epidemics and Pestilential Diseases* (1799), in two vols.; *The Rights of Neutral Nations in Time of War* (1802); *Historical Notices of the Origin and State of Banking Institutions and Insurance Offices* (1802); and *A Collection of Papers on Political, Literary, and Moral Subjects* (1843), which included "On the Supposed Change in the Temperature of Winter," a treatise showing long and careful research. He also published Governor John Winthrop's *Journal* in 1790, and wrote a *History of the United States*, of which a revised edition appeared in 1839.

See *Memoir of Noah Webster* by his son-in-law, Professor Chauncey A. Goodrich, in the quarto editions of the *Dictionary*, also *Noah Webster* (1882), by Horace E. Scudder, in "American Men of Letters."

WEBSTER, THOMAS (1773–1844), British geologist, was born in the Orkney Isles in 1773, and was educated at Aberdeen. He subsequently went to London and studied architecture, the Royal Institution in Albemarle Street being built from his design. In 1826 he was appointed house-secretary and curator to the Geological Society of London, and for many years he rendered important services in editing and illustrating the Transactions of the Society. In 1841–1842 he was professor of geology in University College, London. He was distinguished for his researches on the Tertiary formations of the Isle of Wight, where he recognized the occurrence of both fresh-water and marine strata; he continued his observations on the mainland of Hampshire, and subsequently in Dorsetshire, where he described the Purbeck and Portland rocks. To him Sir Henry C. Englefield (1752–1822) was indebted for the geological descriptions and the effective geological views and sections of the Isle of Wight and Dorset that enriched his *Description of the Principal Picturesque Beauties, Antiquities and Geological Phenomena of the Isle of Wight* (1816). The mineral Websterite was named after him. He died in London on the 26th of December 1844.

WEBSTER, THOMAS (1800–1886), English figure painter, was born at Ranelagh Street, Pimlico, London, on the 20th of March 1800. His father was a member of the household of George III.; and the son, having shown an aptitude for music, became a chorister in the Chapel Royal, St James's. He, however, developed a still stronger love for painting, and in 1821 he was admitted student of the Royal Academy, to whose exhibition he contributed, in 1824, portraits of "Mrs Robinson and Family." In the following year he gained the first medal in the school of painting. Till 1879 he continued to exhibit in the Royal Academy work of a genial and gently humorous character, dealing commonly with subjects of familiar incident, and especially of child life. Many of these were exceedingly popular, particularly his "Punch" (1840), which procured in 1841 his election as A.R.A., followed five years later by full membership. He became an honorary retired academician in 1877, and died at Cranbrook, Kent, on the 23rd of September 1886. His "Going into School, or the Truant" (1836), and his "Dame's School" (1845) are in the National Gallery, and five of his works are in the South Kensington Museum.

WEBSTER, a township of Worcester county, Massachusetts, U.S.A., on the French river, about 16 m. S.S.W. of Worcester. Pop. (1890) 7031; (1900) 8804, of whom 3562 were foreign-born; (1910 census), 11,509. Land area (1906), 12·19 sq. m. Webster is served by the New York, New Haven & Hartford, and the Boston & Albany railways, and by interurban electric lines. In the township is Lake Chaubunagungamaug, a beautiful sheet of water about 2 sq. m. in area. The manufacture of textiles and of boots and shoes is the principal industry; the total value of the factory product in 1905 was $5,867,769. Webster was founded by Samuel Slater (1768–1835), who in 1812 built cotton-mills and in 1815–1816 began the manufacture of woollen cloth. The township, named in honour of Daniel Webster, was erected in 1832 from common lands and from parts of Dudley and Oxford townships, which before the cotton-mills were built here were almost uninhabited.

See Holmes Ammidown, *Historical Collections* (New York, 1874), vol. i. pp. 461-524.

WECKHERLIN, GEORG RUDOLF (1584–1653), German poet, was born at Stuttgart on the 15th of September 1584. After studying law he settled at Stuttgart, and, as secretary to the Duke Johann Friedrich of Württemberg, was employed on diplomatic missions to France and England. Between 1620 and 1624 he lived in England in the service of the Palatinate, and seems also to have been employed by the English government. In 1644 he was appointed "Secretary for Foreign Tongues" in England, a position in which, on the establishment of the Commonwealth, he was followed by Milton. He died in London on the 13th of February 1653. Weckherlin was the most distinguished of the circle of South German poets who prepared the way for the Renaissance movement associated in Germany with Martin Opitz. Two volumes of his *Oden und Gesänge* appeared in 1618 and 1619; his collected *Geistliche und weltliche Gedichte* in 1641. His models were the poets of the French *Pléiade*, and with his psalms, odes and sonnets he broke new ground for the German lyric. An epic poem on the death of Gustavus Adolphus, in alexandrines, seems to have won most favour with his contemporaries.

Weckherlin's *Gedichte* have been edited by H. Fischer for the *Stuttgarter Literarischer Verein* (vols. cxcix.-cc., 1894–1895). Selections were published by W Müller (1823) and K. Goedeke (1873). See also C. P. Conz, *Nachrichten von dem Leben und den Schriften Weckherlins* (1803); E. Höpfner, *G. R. Weckherlins Oden und Gesänge* (1865); H. Fischer, *Beiträge zur Literaturgeschichte Schwabens* (1891), and the same author's article in the *Allgemeine deutsche Biographie* (1896).

WEDDERBURN, JAMES (1495?–1533), **JOHN** (1500–1556) and **ROBERT** (1510?–?1556), Scottish poets and religious reformers, were natives of Dundee, where their father James Wedderburn was a prosperous merchant. All three brothers studied at St Andrews University. James Wedderburn, who had gone to St Andrews in 1514, was for a time in France preparing for a mercantile career. On his return to Dundee in 1514 he received instruction in the Reformed faith from Friar Hewat, a Dominican monk. He composed a play on the beheading of St John the Baptist, and another, a morality satirizing church abuses, in the setting of episodes from the story of Dionysius the Tyrant, both of which were performed in 1540 in the play-field of Dundee. Neither of these nor a third ascribed to him by Calderwood, the historian, are extant. A charge of heresy was brought against him, but he escaped to France, and established himself as a merchant at Rouen or Dieppe, where he lived unmolested until his death in 1553, although attempts were made by the Scottish community there to bring further charges against him.

John Wedderburn graduated M.A. at St Andrews in 1528. He took priests' orders and appears to have held the chaplaincy of St Matthews, Dundee, but in March 1539 he was accused of heresy, apparently for having, in conjunction with his brothers, written some anti-Catholic ballads. He escaped to Wittenberg, where with other of his compatriots he received the teaching of the German reformers. There he gained an acquaintance with the Lutheran hymns, which he turned to account on his return to Scotland. The death of James V. and the known leanings of the regent, the earl of Arran, to reform, encouraged many exiles, Wedderburn among them, to revisit Scotland. It is probable that he was the author of the greater portion of the *Compendious Book of Psalms and Spiritual Songs* which contains a large number of hymns from the German. The enormous influence of the collection, with its added *Gude and Godlie Ballatis*, on Scottish reform, is attested by the penalties enacted against the authors and printers of these books. John Wedderburn was in Dundee as late as 1546, when he was obliged to flee to England. John Johnston in his *Coronis martyrum* says he died in exile in 1556.

Robert Wedderburn, who graduated M.A. in 1530, was ordained priest, and succeeded his uncle John Barry as vicar of Dundee; but before he came into actual possession he also was suspected of heresy, and was compelled to flee to France and Germany. He returned to Scotland in 1546. He appears to have been actual vicar of Dundee in 1552. His sons were legitimized in January 1553.

The earliest known edition of the *Compendious Book of Psalms and Spiritual Songs* (of which an unique copy is extant) dates back to 1567, though the contents were probably published in broad sheets during John Wedderburn's lifetime. It consists of a calendar and almanac, a catechism, hymns, many of them translations from the German, metrical versions of the Psalms, and a collection of ballads and satirical poems against the Catholic church and clergy. The separate shares of the brothers in this compilation cannot be settled, but Robert is said to have edited the whole and added the section of "gude and godlie ballatis." Many of these ballads are adapted from secular songs. Editions of the book appeared in 1578 (printed by John Ros), in 1600 (by Robert Smith), in 1621 (by Andro Hart); selections were published by Lord Hailes (1765) and by Sibbald (1802); a reprint of the 1621 volume was edited by Sir J. G. Dalyell in *Scotish Poems of the Sixteenth Century* (1801); and of the 1578 volume by David Laing in 1868. In 1897 Professor A. F. Mitchell reprinted the 1567 volume (expurgated) for the Scottish Text Society.

"Vedderburn's" *Complainte of Scotlande* (1549) has been variously assigned to Robert Wedderburn, to Sir David Lyndsay and to Sir James Inglis, who was chaplain of the Abbey of Cambuskenneth from about 1508 to 1550. It is a prose treatise pleading for the maintenance of the Scottish alliance with France, written by a determined enemy of England and of the English party in Scotland. It is dedicated to Mary of Guise, and consists of the "Dreme" of Dame Scotia and her complaint against her three sons. These two sections are connected by a "Monologue Recreatif," in which the author displays his general knowledge of popular songs, dances and tales, of astronomy, natural history and naval matters. Four copies of this work are extant, but in none is the title-page preserved. In the Harleian catalogue the book is entered as *Vedderburn's Complainte of Scotlande, wyth ane Exortatione to the thre Estaits to be vigilante in the Deffens of their Public Veil* (1549) (*Catalogus Bibliothecae*

Harleianae, vol. i. no. 8371). This title, which is repeated with variations in spelling in vol. iv. no. 12070, bears every mark of authenticity. The book appears to have been printed in France, and the idea of Dame Scotia's exhortations to her sons, the Three Estates, is borrowed from Alain Chartier's *Quadrilogue invectif*, some passages of which are appropriated outright. Other passages are borrowings from Octavien de Saint Gelais and Sir David Lyndsay. There are strong arguments against Robert Wedderburn's authorship, as maintained by Laing and others. It is not likely that he would write in support of Cardinal Beaton's policy, and the dialect is an exaggerated form of Latinized Middle Scots, differing materially from the language of the *Compendious Book*. Some of the orthographical and typographical peculiarities are due to the fact that the book was set up by Parisian printers. Sir J. A. H. Murray inclines to assign it to Sir James Inglis, or an unknown priest of the name of Wedderburn.

The text of the *Complaynt* was first edited by Leyden in 1801. Murray's edition for the E.E.T.S. appeared in 1872. The introduction to the latter requires revision in the light of later discoveries as to the plagiarisms in the text. See the paper by W. A. Neilson in *The Journal of Germanic Philology* (iv.), the note by W. A. Craigie in *The Modern Quarterly of Language and Literature* (i. 267), Gregory Smith's *Specimens of Middle Scots* (1902), p. 135 et seq., and the article by J. T. T. Brown in the *Scottish Historical Review* (January 1904).

WEDDING, the common term for the marriage ceremony. The verb "to wed" is properly to engage by a pledge (O. Eng. *wed*, a pledge, wager; cf. Lat. *vas*, *vadis*; M. Dutch *wedde*, pledge, pawn; Swed. *vad*, bet, &c.). The term "wedlock" (O. Eng. *wedlāc*; from *lāc*, a gift), used of the state of marriage, or the vows and sacrament of marriage, properly means a gift given as a pledge; cf. Ger. *Morgengabe*, the gift to the bride on the morning after the marriage.

See Marriage and Family.

WEDGE (O. Eng. *wecg*, a mass of metal, cognate with Dutch *wig*, *wigge*, Dan. *vægge*, &c.; in Lith. the cognate form outside Teut. is found in *wagis*, a peg, spigot; there is no connexion with "weigh," "weight," which must be referred to the root *wegh*, to lift, carry, draw, cf. Lat. *vehere*, whence "vehicle," &c.), a piece of wood or metal, broad and thick at one end, and inclined to a thin edge or point at the other, used as a means for splitting wood, rocks, &c., of keeping two closely pressing surfaces apart, or generally for exerting pressure in a confined space. The "wedge" has sometimes been classed as one of the simple mechanical powers, but it is properly only an application of the inclined plane.

In meteorology, the term "wedge" is used of a narrow area of high pressure between two adjacent cyclonic systems, which takes the form of a wedge or tongue, as do the isobars representing it on a weather-chart. A wedge moves along between the rear of a retreating cyclone and the front of one advancing, and may be regarded as a projection from an anticyclonic system lying to one side of the course of the cyclones. As the crest of the wedge (*i.e.* the line of highest pressure) passes over any point the wind there changes suddenly from one direction almost to the opposite, while the clearing weather of the retreating cyclone and the temporary fine weather after its passing are quickly succeeded by a break indicating the approach of the following cyclone. Conditions exactly opposite to those accompanying a wedge are provided by a "V-shaped depression."

WEDGWOOD, JOSIAH (1730–1795), the most distinguished of English manufacturers of pottery, came of a family many members of which had been established as potters in Staffordshire throughout the 17th century and had played a notable part in the development of the infant industry. Dr Thomas Wedgwood of Burslem was one of the best of the early salt-glaze potters. Josiah, born in 1730, was the youngest child of another Thomas Wedgwood, who owned a small but thriving pottery in Burslem. At a very early age he distinguished himself by keen powers of observation and interest in all that was curious and beautiful. Soon after the death of his father in 1739, Josiah, then scarcely ten years of age, was taken away from school and set to learn the art of "throwing" clay, *i.e.* shaping pottery vessels on the thrower's wheel, at which he soon became extraordinarily skilful.

In 1744 he was apprenticed to his eldest brother, who had succeeded to the management of his father's pottery; and in 1752, shortly after the term of his apprenticeship had expired, he became manager of a small pottery at Stoke-upon-Trent, known as Alder's pottery, at a very moderate salary. Within a year or two he became junior partner with Thomas Whieldon of Fenton, then the cleverest master-potter in Staffordshire. Many of Whieldon's apprentices afterwards became noted potters, and there can be little doubt that Wedgwood gained greatly at this period of his life by his association with Whieldon. But he was too original to remain long content with a subordinate position, and the pottery business was developing so rapidly that he had every inducement to commence work on his own account.

In 1759 he leased the Ivy House pottery in Burslem from some relatives, and like a sensible man he continued to make only such pottery as was being made at the period by his fellow-manufacturers. Salt-glaze and green and yellow glaze seem to have been his first staples. In 1762 he also leased the Brick-House, alias "Bell" works, at Burslem. The fine white English earthenware was just reaching perfection, and Wedgwood was soon one of its best-known makers. He was most active and energetic in his efforts, not only for the improvement of Staffordshire pottery, but almost equally so for the improvement of turnpike roads, the construction of a canal (the Trent & Mersey) and the founding of schools and chapels. Almost the first step in his public career outside his native district was the presentation of a service of his improved cream-coloured earthenware to Queen Charlotte in 1762. The new ware was greatly appreciated, and Wedgwood was appointed potter to the queen and afterwards to the king. He gave the name of Queen's Ware to his productions of this class, and this judicious royal patronage awarded to a most deserving manufacturer undoubtedly helped Wedgwood greatly. Having laid the foundations of a successful business in his admirable domestic pottery—the best the world had ever seen up to that time—he turned his attention to artistic pottery, and the European renaissance of classic art—fostered by the discovery of Pompeii and the recovery of Greek painted vases from the ancient graves in Campania and other parts of Italy—being at its height it was natural that Wedgwood should turn to such a source of inspiration. Although every European country was affected by this neo-classical revival it may be claimed that England absorbed it more completely than any other country, for the brothers Adam (the architects) and Josiah Wedgwood brought it into absolute correspondence with modern tastes and ideas. Wedgwood was particularly successful in this direction, for his "dry" bodies—some of which, like the black and cane bodies, had long been known in the district, others, such as the famous Jasper bodies, which he invented after years of laborious effort—lent themselves particularly well to the reproduction of designs based on the later phases of Greek art. If our increased appreciation and knowledge of Greek and Roman art makes us at times impatient with the mechanical perfection of the works of Wedgwood and his contemporaries, the fault is even more the fault of a nation and a period than that of any individual, however commanding. It will always remain to Wedgwood's credit that he was the most successful and original potter the world has ever seen—the only one, through all the centuries, of whom it can be truthfully said that the whole subsequent course of pottery manufacture has been influenced by his skill.

Of the externals of his life a few facts will suffice. He married his cousin, Sarah Wedgwood, in 1764, and they had a numerous family of sons and daughters. One of these daughters was the mother of the famous naturalist Charles Darwin. Some time after his marriage (viz. 1768) he entered into a partnership with Thomas Bentley of Liverpool, a man of considerable taste and culture. Bentley, who was a handsome, courtly man, attended largely to the London sales. In 1769 they opened splendid new works, near Hanley, that with their classic leanings they christened "Etruria." They continued a practice of Wedgwood's in employing able artists to produce designs, and the most famous of these was John Flaxman, whose name will for ever be associated with the firm's productions. Bentley died in 1780 and Wedgwood remained sole owner of the Etruria works until 1790, when he took some of his sons and a nephew, named Byerley, into partnership. He died on the 3rd of January 1795, rich in honours and in friends, for besides being a great potter he was a man of high moral worth, and was associated with many noted men of his time, amongst whom should be mentioned Sir Joseph Banks, Joseph Priestley and Erasmus Darwin. His descendants have carried on the business at Etruria to this day, and have lately established at the works a Wedgwood museum of great interest.

See CERAMICS. For detailed accounts of his life see Eliza Metyeard, *Life of Wedgwood* (1865–1866); Jewitt, *Life of Wedgwood* (1865); Rathbone, *Old Wedgwood* (1893); Church, *Josiah Wedgwood: Master-Potter* (1894; new ed., 1903); Burton, *History and Description of English Earthenware and Stoneware* (1904); J. C. Wedgwood, *A History of the Wedgwood Family* (1909). (W. B.*)

WEDMORE, FREDERICK (1844–), English art critic and man of letters, was born at Richmond Hill, Clifton, on the 9th of July 1844, the eldest son of Thomas Wedmore of Druids Stoke, Stoke Bishop. His family were Quakers, and he was educated at a Quaker private school and then in Lausanne and Paris. After a short experience of journalism in Bristol he came to London in 1868, and began to write for the *Spectator*. His early works included two novels, but the best examples of his careful and artistic prose are perhaps to be found in his volumes of short stories, *Pastorals of France* (1877), *Renunciations* (1893), *Orgeas and Miradou* (1896), reprinted in 1905 as *A Dream of Provence*. In 1900 he published another novel, *The Collapse of the Penitent*. As early as 1878 he had begun a long connexion with the London *Standard* as art critic. He began his studies on etching with a noteworthy paper in the *Nineteenth Century* (1877–1878) on the etchings of Charles Méryon. This was followed by *The Four Masters of Etching* (1883), with original etchings by Sir F. S. Haden, Jules Ferdinand Jacquemart, J. M. Whistler, and Alphonse Legros; *Etching in England* (1895); an English edition (1894) of E. Michel's *Rembrandt*; and a study and a catalogue of *Whistler's Etchings* (1899). His other works include *Studies in English Art* (2 vols., 1876–1880), *The Masters of Genre Painting* (1880), *English Water Colour* (1902), *Turner and Ruskin* (2 vols., 1900).

WEDNESBURY, a market town and municipal and parliamentary borough of Staffordshire, England, in the Black Country, 121 m. N.W. from London by the London & North-Western railway, and on the northern line of the Great Western. Pop. (1901) 26,554. An overhead electric tramway connects with Walsall, 3½ m. N. The town is ancient, but of modern growth and appearance as an industrial centre. The church of St Bartholomew, however, is a fine Perpendicular building, standing high. It is traditionally supposed to occupy the site of a place of the worship of Woden or Odin, and the name of the town to be derived from this god through the form Wodensborough. A church was built, probably in the 11th century, and from 1301 to 1535 the advowson, tithes, &c., belonged to the abbot of Halesowen. The present church was several times restored in the 18th and 19th centuries. The chief public buildings are the town hall (1872), art gallery (1891), and free library (1878). Coal, limestone and ironstone are mined. A special kind of coal, giving an intense heat, is largely used in forges. There are great iron and steel works, producing every kind of heavy goods used by railway and engineering works, such as boiler plates, rails, axles, tubes, bolts and nuts. Stoneware potteries are also important. Similar industries, with brick-making, are practised at DARLASTON, an urban district (pop. 15,395), within the parliamentary borough. Wednesbury returns one member to parliament. The town is governed by a mayor, 4 aldermen, and 12 councillors. Area, 2287 acres.

Here Ethelfleda, widow of Æthelred of Mercia, in 916 constructed a castle. The place is not mentioned in Domesday, but appears to have b[illegible] to the barony of Dudley. After the Conquest it [illegible] crown, and it was bestowed by Henry II. [illegible] parliamentary representation [illegible] borough in 1886.

[illegible] American journalist and [illegible] county, New York, on the 15th of November 1797. He began to earn his own living at the age of eight. From 1811 to 1818 he worked as an apprentice and journeyman printer in Onondaga Hollow, Utica, Auburn, Cooperstown, Albany and New York City. His first independent enterprises, the *Republican Agriculturist*, established at Norwich, N.Y., in 1818, and the *Onondaga County Republican*, established at Manlius, N.Y., in 1821, proving unsuccessful, he became editor of the *Rochester Telegraph* in 1822. Entering politics as an opponent of the Democratic machine, which he termed the Albany Regency, Weed was in 1824 elected to the Assembly on the John Quincy Adams ticket, serving for a single session (1825). Two years later, during the excitement over the disappearance of William Morgan (see ANTI-MASONIC PARTY), he retired from the *Telegraph* and threw himself with enthusiasm into the attack on the Masonic order, editing for a time the *Anti-Masonic Enquirer*. In 1830 he established and became editor of the *Albany Evening Journal*, which he controlled for thirty-five years. Supporting the Whigs and later the Republicans, it was one of the most influential anti-slavery papers in the north-east; and Thurlow Weed himself became a considerable force in politics. In 1863 he retired from the *Journal* and settled in New York City. In 1867 he assumed editorial control of the *Commercial Advertiser*, but was soon compelled to resign on account of ill-health. He died in New York City on the 22nd of November 1882.

See *The Life of Thurlow Weed* (vol. i., Autobiography, edited by his daughter, Harriet A. Weed; vol. ii., Memoir, by his grandson, Thurlow Weed Barnes, Boston and New York, 1884). The Memoir is especially full for the period 1850–1867.

WEEHAWKEN, a township of Hudson county, New Jersey, U.S.A., in the N.E. part of the state, on the Hudson river, adjoining Hoboken and opposite the city of New York. Pop. (1890) 1943; (1900) 5325; (1910 census), 11,228. It is served by the New York, Ontario & Western, and the West Shore railways (being a terminus of the latter), and by suburban electric lines, and is connected with New York City by steam ferries. The township consists of a narrow strip of land along the western bank of the Hudson, and at the southern extremity of the Palisades. The extensive water-front is lined with wharves, some of which can accommodate the largest ocean steamers. On a ledge below the crest of the Palisades is the famous duelling ground, where New York citizens and others once settled their quarrels. Originally a part of Hoboken and North Bergen, the township of Weehawken was separately incorporated in 1859. Its name is an Indian word said to mean "maize land."

WEEK (from A.S. *wicu*, Germanic **wikôn*, probably = change, turn), the name given to periods of time, varying in length in different parts of the world, but shorter than a "month." The month may be divided in two ways: a fractional part may be taken (decad or pentad), as in East Africa or Ancient Egypt (moon-week), or the week may be settled without regard to the length of the month (market-week, &c.). The seven-day week (see CALENDAR) originated in West Asia, spread to Europe and later to North Africa (Mahommedan). In other parts of Africa three, four (especially in the Congo), five, six and eight (double four) day weeks are found, and always in association with the market; the same applies to the three-day week of the Muyscas (S. America), the four-day week of the Chibchas, the five-day week of Persia, Malaysia, Java, Celebes, New Guinea and Mexico; in ancient Scandinavia a five-day period was in use, but markets were probably unknown. That the recurrence of the market determined the length of the week seems clear from the Wajagga custom of naming the days after the markets they visit, as well as from the fact that on the Congo the word for week is the same as the word for market. Among agricultural tribes in Africa one day of the week, which varies from place to place, is often a rest-day, visiting the market being the only work allowed.

Lasch in *Zts. für Socialwissenschaft*, ix. 619 seq., and N.W. Thomas in *Journ. Comparative Legislation*, xix. 90 seq., refer to the week in connexion with the market. (N. W. T.)

WEEKS, EDWIN LORD (1849–1903), American artist, was born at Boston, Massachusetts, in 1849. He was a pupil of Léon Bonnat and of J. L. Gérôme, at Paris. He made many voyages to the East, and was distinguished as a painter of oriental scenes. In 1895 he wrote and illustrated a book of travels, *From the Black Sea through Persia and India*, and two years later he published *Episodes of Mountaineering*. He died on the 17th of November 1903. He was a member of the Legion of Honour, France, an officer of the Order of St Michael, Germany, and a member of the Secession, Munich.

WEENIX, JAN BAPTIST (1621–1660), Dutch painter, the son of an architect, was born in Amsterdam, and studied first under Jan Micker, then at Utrecht under A. Bloemaert, and at Amsterdam under Moijaert, and finally, between 1643 and 1647, in Rome. In that city he acquired a great name and worked for Pope Innocent and Cardinal Pamphili. He returned to his native country in 1649, in which year he became master of the gild of St Luke at Utrecht, where he died in 1660. He was a very productive and versatile painter, his favourite subjects being landscapes with ruins and large figures, seaports, and, later in life, large still-life pictures of dead game. Now and then he attempted religious genre, one of the rare pieces of this kind being the "Jacob and Esau" at the Dresden Gallery. At the National Gallery, London, is a "Hunting Scene" by the master, and the Glasgow Gallery has a characteristic painting of ruins. Weenix is represented at most of the important continental galleries, notably at Munich, Vienna, Berlin, Amsterdam, and St Petersburg. His chief pupils were his son Jan, Berchem, and Hondecoeter.

His son, JAN WEENIX (1640–1719), was born at Amsterdam and was a member of the Utrecht gild of painters in 1664 and 1668. Like his father he devoted himself to a variety of subjects, but his fame is chiefly due to his paintings of dead game and of hunting scenes. Indeed, many of the pictures of this genre, which were formerly ascribed to the elder Weenix, are now generally considered to be the works of his son, who even at the early age of twenty rivalled, and subsequently surpassed, his father in breadth of handling and richness of colour. At Amsterdam he was frequently employed to decorate private houses with wall-paintings on canvas; and between 1702 and 1712 he was occupied with an important series of large hunting pictures for the Prince Palatine Johann Wilhelm's castle of Bensberg, near Cologne. Some of these pictures are now at Munich Gallery. He died at Amsterdam in 1719. Many of his best works are to be found in English private collections, though the National Gallery has but a single example, a painting of dead game and a dog. Jan Weenix is well represented at the galleries of Amsterdam, The Hague, Haarlem, Rotterdam, Berlin, and Paris.

WEEVER, JOHN (1576–1632), English poet and antiquary, a native of Lancashire, was born in 1576. He was educated at Queens' College, Cambridge, where he resided for about four years from 1594, but he took no degree. In 1599 he published *Epigrammes in the Oldest Cut and Newest Fashion*, containing a sonnet on Shakespeare, and epigrams on Samuel Daniel, Michael Drayton, Ben Jonson, William Warner and Christopher Middleton, all of which are valuable to the literary historian. In 1601 he published *The Mirror of Martyrs or The Life and Death of . . . Sir John Oldcastle*, which he calls in his preface the "first trew Oldcastle," perhaps on account of the fact that Shakespeare's Falstaff first appeared as Sir John Oldcastle. In the fourth stanza of this long poem, in which Sir John is his own panegyrist, occurs a reminiscence of Shakespeare's *Julius Caesar* which serves to fix the date of the play. After travelling in France, the Low Countries and Italy, Weever settled in Clerkenwell, and made friends among the chief antiquaries of his time. The result of extensive travels in his own country appeared in *Ancient Funerall Monuments* (1631), now valuable on account of the later obliteration of the inscriptions.

The Huth Library contains a unique copy of a thumb-book *Agnus Dei* (1606), containing a history of Christ. The *Mirror of Martyrs* has been reprinted for the Roxburghe Club (1872).

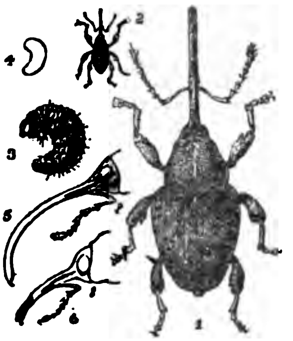
WEEVER. The weevers (*Trachinus*) are small marine fishes which are common on the coasts of Europe, and which have attained notoriety from the painful and sometimes dangerous wounds they are able to inflict upon those who incautiously handle them. They belong to a family of spiny-rayed fishes (*Trachinidae*), and are distinguished by a long low body with two dorsal fins, the anterior of which is composed of six or seven spines only, the posterior being long and many-rayed; their anal resembles in form and composition the second dorsal fin. The ventral fins are placed in advance of the pectorals, and consist of a spine and five rays. The caudal fin has the hind margin not excised. The body is covered with very small scales, sunk in and firmly adherent to the skin, but the upper surface of the head is bony, without integument. The head, like the body, is compressed, with the eyes of moderate size and placed on the side of the head; the mouth is wide, oblique. and armed with bands of very small teeth.

Several species of weevers are known, but two only occur on the British coasts, viz., the Greater Weever (*Trachinus draco*) and the Lesser Weever (*T. vipera*); the former is frequently found of a length of 12 in., and possesses some thirty rays in the second dorsal fin, whilst the latter grows only to about half that length, and has about ten rays less in the dorsal. The coloration of both is plain, but the short first dorsal fin is always of a deep black colour. The weevers are bottom fish, burying and hiding themselves in the sand or between shingle—the lesser species living close inshore and the greater preferring deeper water, and being found sometimes floating on the surface at a distance of several miles from the shore. Although weevers, especially the lesser, are in the habit of burying themselves in the sand, and are abundant in some localities much resorted to by bathers, accidents from stepping upon them are much more rare than from incautiously handling them after capture. They probably make their escape on perceiving the approach of a person. The wounds are inflicted by the dorsal and opercular spines, are very painful, and sometimes cause violent local inflammation. The spines are deeply grooved, and the poisonous fluid which is lodged in the grooves is secreted by small glands at their base. The flesh is not bad eating, and great numbers of the larger species (*T. draco*) are brought to the Paris market. On the poisonous properties, cf. G. J. Allman, *Ann. and Mag. N.H.*, vi. (1841), p. 161; L. Gressin, *Contribution à l'étude de l'appareil à venin chez les poissons du genre Vive* (Paris, 1884); W. N. Parker, *Proc. Zool. Soc.* (1888), p. 359; C. Phisalix, *Bull. Mus. Paris* (1899), p. 256; A. Briot, *C. R. Soc. Biol.*, liv. (1902), pp. 1169 and 1197, and lv. (1903), p. 623.

WEEVIL, Anglo-Saxon *wifel*, a term now commonly applied to the members of a group of Coleoptera termed the Rhyncophora. This group is characterized by the prolongation of the head into a rostrum or proboscis, at the end of which the mouth, with its appendages, is placed. The antennae are usually elbowed, and often end in a club-shaped swelling. The basal portion of the antennae frequently lies in a depression at the side of the rostrum, and this gives the antennae the appearance of emerging half-way along the rostrum. The mouth appendages are small; the mandibles, however, are stout. The palps are very short and conical as a rule. The body is usually small; in shape it varies very much. The elytra are very hard, and in some cases fused with one another, rendering flight impossible. The larvae are white, fleshy, apodal grubs, with a series of tubercles along each side of the body; the head is round, and bears strong jaws, and sometimes rudimentary ocelli. They are exclusively phytophagous. The Rhyncophora embrace four families,—(1) the Curculionidae, or true weevils, (2) the Scolytidae, or bark-beetles, (3) the Brenthidae, (4) the Anthribidae.

The Curculionidae form one of the largest families amongst the Coleoptera, the number of species described exceeding 20,000, arranged in 1150 genera. The antennae are elbowed, and clavate, with the basal portion inserted in a groove. The third tarsal joint is generally bilobed. Over 400 species exist in Great Britain, few of which exceed half an inch in length. The genera *Phyllobius* and *Polydrosus* include some of the most beautiful insects found in Britain—their brilliancy, like that of the Lepidoptera, being due to the presence of microscopic scales. The diamond beetle of South America, *Entimus imperialis*, is another singularly beautiful weevil; its colour is black, studded with spangles of golden green. The immense family of the Curculionidae includes members which differ greatly from one another in size, colour, and appearance; even the rostrum, the most striking common characteristic, varies greatly. The form of the body is very various: some are rounded or oval, others elongated, almost linear; some are covered with warty protuberances, whilst others are smooth and shining, often with a metallic lustre.

One of the commonest members of this family in Great Britain is the nut weevil, *Balaninus nucum*. It is of a brownish colour, varied with yellow, the legs reddish. Its rostrum is unusually long, being five-sixths of the body length in the female, and slightly shorter in the male. The antennae are 7-jointed. The first three joints are much longer than thick; the four following are shorter, and the seventh not longer than thick. The larva is very common in hazel nuts and filberts. When the nuts are about half-grown, the female bores, with its rostrum, a minute hole in the still comparatively soft nut-shell, and deposits an egg within the nut. The egg is said to be pushed in by means of the long rostrum. As the nut grows the slight puncture becomes almost obliterated, so that it is unnoticed by all but the most observant eye. The larva is a thick white grub with a brownish head, bearing fleshy tubercles along its side. It feeds upon the substance of the nut. The nuts which are infested by this insect are usually the first to fall to the ground; the larva then bores a round hole through the nut shell, by means of its jaws, and creeps out. It hides itself in the ground during the winter, and in the spring it passes into the pupa stage, from which it emerges about August as the full-grown insect. A nearly allied form, *Balaninus glandium*, attacks both hazel nuts and acorns.



1. *Balaninus glandium*, magnified.
2. The same, natural size.
3. The larva, magnified.
4. The same, natural size.
5. Head and snout of the female, magnified.
6. The same parts of the male, magnified, to show arrangement of antennae.

In an unobtrusive way weevils do immense harm to vegetation. This is effected not so much by their numbers and their powers of consumption, as amongst caterpillars, but by their habits of attacking the essential parts of a plant, and causing by their injuries the death of the plant affected. They destroy the young buds, shoots and fruits, and attack the young plants in their most delicate organs. Many of them devour seed, as the corn weevils, *Calandra granaria* and *C. oryzae*, and in this way vegetation is severely injured, and its spread seriously checked. Others cause much damage in forests, by boring under the bark and through the wood of trees, whilst some even burrow in the tissue of the leaves.

The Brenthidae, Anthribidae and Scolytidae are described in the article COLEOPTERA.

The Bruchidae are often called "weevils," but they have no close affinity with the Rhynchophora, being nearly allied to the Chrysomelidae or leaf beetles. The antennae are straight, and inserted upon the head just in front of the eyes; they are 11-jointed, and serrated or toothed in the inside. *Bruchus pisi* causes considerable damage to pease; during the spring the beetle lays its eggs in the young pea, which is devoured by the larva which hatches out in it.

(A. E. S.; G. H. C.)

WEGSCHEIDER, JULIUS AUGUST LUDWIG (1771–1849), German theologian, was born at Kübelingen, Brunswick, on the 17th of September 1771, studied theology at Helmstädt, was tutor in a Hamburg family 1795–1805, *Repetent* at Göttingen, professor of theology at Rinteln in Hesse (1806–1815), and at Halle from 1815. In 1830 he (with his colleague Wilhelm Gesenius) was threatened with deposition for teaching rationalism, and though he retained his office he lost his influence, which passed to F. A. Tholuck and Julius Müller. He died on the 27th of January 1849.

His chief works were *Über die von der neuesten Philosophie geforderte Trennung der Moral von der Religion* (1804); *Einleitung in das Evangelium Johannis* (1806); and *Institutiones theologicae dogmaticae* (1815), to which W. Steiger's *Kritik des Rationalismus in Wegscheider's Dogmatik* (1830) was a reply.

WEIGHING MACHINES. Mechanical devices for determining weights or comparing the masses of bodies may be classified as (*a*) equal-armed balances, (*b*) unequal-armed balances, (*c*) spring balances and (*d*) automatic [illegible]. Equal-armed balances may be divided into [illegible] which the scale-pans are below [illegible] and balances on the same [illegible] above the beam. [illegible] (1) [illegible] by combinations of unequal-armed levers and steelyards, such as platform machines, weighbridges, &c.

Equal-armed Balances.

Scale-beams are the most accurate balances, and the most generally used. When constructed for purposes of extreme accuracy they will turn with the one-millionth part of the load weighed, though to ensure such a result the knife-edges and their bearings must be extremely hard (either hardened steel or agate) and worked up with great care. The beam must be provided with a small ball of metal which can be screwed up and down a stem on the top of the beam for the purpose of accurately adjusting the position of the centre of gravity, and there should be a small adjustable weight on a fine screw projecting horizontally from one end of the beam for the purpose of accurately balancing the arms.

The theory of the scale-beam is stated by Weisbach in his *Mechanics of Machinery and Engineering*, as follows:—In fig. 1 D is the fulcrum of the balance, S the centre of gravity of the beam alone without the scales, chains or weights; A and B the points of suspension of the chains. If the length of the arms AC = BC = *l*, CD = *a*, SD = *s*, the angle of deviation of the balance from the horizontal = ϕ, the weight of the beam alone = G, the weight on one side = P, that on the other = P+Z, and lastly the weight of each scale with its appurtenances = Q then

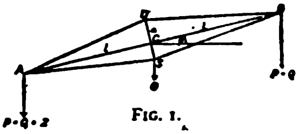


FIG. 1.

$$\tan\phi = \frac{Zl}{[2(P+Q)+Z]a+Gs},$$

From this it is inferred that the deviation, and therefore the sensitiveness, of the balance increases with the length of the beam, and decreases as the distances, *a* and *s*, increase; also, that a heavy balance is, *ceteris paribus*, less sensitive than a light one, and that the sensitiveness decreases continually the greater the weight put upon the scales. In order to increase the sensitiveness of a balance, the line AB joining the points of suspension and the centre of gravity of the balance must be brought nearer to each other. Finally, if *a* is made extremely small, so that practically $\tan\phi = Zl/Gs$, the sensitiveness is independent of the amount weighed by the balance. Weisbach also shows that if $G\gamma^2$ is the moment of inertia of the beam, the time, *t*, of a vibration of the balance is

$$t = \pi\sqrt{\frac{2(P+Q)(l^2+a^2)+G\gamma^2}{g[2(P+Q)a+Gs]}}.$$

This shows that the time of a vibration increases as P, Q and *l* increase, and as *a* and *s* diminish. Therefore with equal weights a balance vibrates more slowly the more sensitive it is, and therefore weighing by a sensitive balance is a slower process than with a less sensitive one.

The conditions which must be fulfilled by a scale-beam in proper adjustment are:—(1) The beam must take up a horizontal position when the weights in the two scale-pans are equal, from nothing to the full weighing capacity of the machine. (2) The beam must take up a definite position of equilibrium for a given small difference of weight in the scale-pans. The sensitiveness, *i.e.* the angle of deviation of the beam from the horizontal after it has come to rest, due to a given small difference of weight in the scale-pans, should be such as is suited to the purposes for which the balance is intended. Bearing in mind that with ordinary trade balances there is always a possibility of the scale-pans and chains getting interchanged, these conditions require; (*a*) That the beam without the scale-pans and chains must be equally balanced and horizontal; (*b*) that the two scale-pans with their chains must be of equal weight; (*c*) that the arms of the beam must be exactly equal in length; *i.e.* the line joining the end knife edges must be exactly bisected by a line drawn perpendicular to it from the fulcrum knife-edge. By testing the beam with the scale-pans attached and equal weights in the pans, and noting carefully the position which it takes up; and then interchanging the scale-pans, &c., and again noting the position which the beam takes up, a correct inference can be drawn as to the causes of error; and if after slightly altering or adjusting the knife-edges and scale-pans in the direction indicated by the experiment, the operation is repeated, any required degree of accuracy may be obtained by successive approximations. The chief reason for testing [illegible] with weights in the scale-pans rather than with the scale-[illegible], is that the balance might be unstable with the weights [illegible] without them. This is not an infrequent occurrence, [illegible] from the tendency on the part of manufacturers to make [illegible] so extremely sensitive that they are on the verge of in-[illegible] In fig. 2 let ABCD be the beam of a scale-beam, Z the fulcrum knife-edge, and X, Y the knife-edges on which the scales are hung. In order to ensure a high degree of sensitiveness, balances are sometimes constructed so that Z is slightly below the line joining X and Y, and is only slightly above H, the centre of gravity of the beam with the scale-pans and chains attached. The addition of weights in the scales will have the effect of raising the point H till it gets above Z, and the balance, becoming unstable, will turn till it is brought up by a stop of some kind.

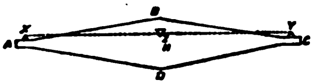
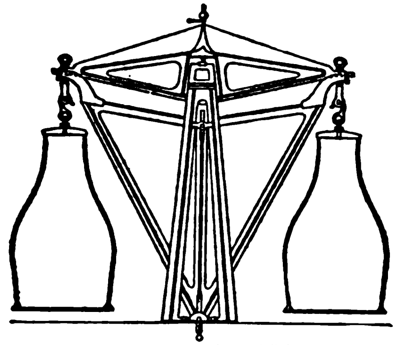


FIG. 2.

Fig. 3 represents a precision balance constructed to weigh with great accuracy. The beam is of bronze in a single deep casting, cored out in the middle so as to allow the saddle at the top of the stand to pass through the beam and afford a continuous bearing for the fulcrum knife-edge. The knife-edge and its bearing are both of steel or agate, and the bearing surface is flat. The end knife-edges also are of steel or agate, and have continuous bearing on flat steel or agate surfaces at the upper part of the suspension links. To relieve the knife-edges from wear when the balance is not being used a triangular frame is provided, which is lifted and lowered by a cam action at the bottom, and moves vertically in guides fixed on the stand. By its upward movement the tops of the screw studs near its ends are first received by the projecting studs on each side of the suspension links, and the suspension links are lifted off the end knife-edges; and next, as the sliding frame continues its upward motion, the horizontal studs at the two ends of the beam are received in the forks at the ends of the sliding frame, and by them the fulcrum of the beam is lifted off its bearing. To keep the beam truly in its place, which is very necessary, as all the bearings are flat, the recesses for the ends of the studs are formed so as to draw the beam without strain into its true position every time that it is thrown out of gear by the sliding frame. The end knife-edges are adjusted and tightly jammed into exact position by means of wedge pieces and set screws, and the beam is furnished with delicate adjusting weights at its top. The position of the beam with respect to the horizontal is shown by a horizontal pointer (not shown) projecting from one end of it, which plays past a scale, each division of which corresponds to the $\frac{1}{10}$th or $\frac{1}{100}$th of a grain according to the size and delicacy of the machine. A first-class chemical balance would be made in this manner, but in all places where there are acids and gases the knife-edges and bearings must be made of agate, as the fumes attack and corrode steel.



From Airy, "On Weighing Machines," Institution of Civil Engineers, 1892.

FIG. 3.—Precision Balance.

For the weighing of very small quantities with balances of great delicacy, the following method is adopted:—If the balance be in perfect adjustment, and l be the length of each arm, and w a very minute difference of the weights in the two scale-pans, by which the beam is deflected from the horizontal by a very small angle ϕ, it can easily be shown that tan ϕ, or ϕ, varies as $w \times l$. Therefore the angle of deflection which would be produced by grain weight hung at the distance $l/10$ (for example) from the centre is the same as would be produced by $\frac{1}{10}$th of a grain in the scale-pan at the distance l. Therefore by graduating the top of the beam and shifting a rider grain weight till the beam is horizontal, it is easy to ascertain the small difference of weight in the scale-pans which caused the deflection to the $\frac{1}{100}$th or $\frac{1}{1000}$th part of a grain without using a weight smaller than a grain.

The fitting of the knife-edges is of great importance. In ordinary trade balances a triangular piece of hard steel, with a finely-ground edge, is driven through a triangular hole in the beam and jammed tight. This forms the knife-edge, and the scale-pans are hung from the two projecting ends of the piece of steel. Similarly the two projecting ends of the central piece of steel which forms the fulcrum take bearing on two cheeks of the stand, between which the beam sways. It is clear that errors will arise if the pieces of steel are not truly perpendicular to the plane of the beam, and the adjustment of great accuracy would be very tedious. Therefore for balances of precision the end knife-edges are fixed on the top of the beam so as to present a continuous unbroken knife-edge, and the fulcrum knife-edge is also made continuous, the beam being cored out or cut away to admit of the introduction of the stand bearing. With this arrangement the knife-edges can be easily adjusted and examined, and the system is now rapidly extending to the better class of trade balances.

The knife-edges of weighing machines are the parts that wear out soonest, but very little is known about them experimentally, and the knife-edges made by different makers vary extremely in their angles. Those made by some of the best makers for the most delicate machines are formed to an angle of about 80° between the sides, with the finished edge ground to an angle varying from 110° to 120°. The following may be taken as the maximum loads per in. of acting or efficient knife-edge allowed by the best makers:—

1. For scale-beams of the highest accuracy—From ½ lb per in. for a machine of ½ lb capacity, to 25 lb per in. for a machine of 80 lb capacity.

2. For ordinary trade scale-beams, counter machines, and dead-weight machines—From 20 lb per in. for a machine of 7 lb capacity, to 600 lb per in. for a machine of ½ ton capacity.

3. For platform machines and weighbridges—From 120 lb per in. for a machine of 4 cwt. capacity, to 1 ton per in. for a machine of 25 tons capacity.

The sensitiveness of scale-beams depends entirely upon the skill and care used in their construction. With balances of the highest precision it may be as high as $\frac{1}{1000000}$th of the load weighed, while with trade balances when new it would be about $\frac{1}{2000}$th of the load.

In Emery's testing machine there are no knife-edges, but their function is performed by thin steel plates, which are forced under a very heavy pressure into slots formed in the parts that are to be connected, so that the parts are united by the plate. In this case there is no friction and no sensible wear, so that very great permanency of condition and constancy of action might be expected. But the resistance to bending of the steel plates would render this arrangement unsuitable for scale-beams, in which the movement is large. In some respects it would appear to be very suitable for weighbridges, in which the movement of the lever is very small, but for general convenience of adjustment the knife-edges appear preferable.

In the comparison of standard weights, or in any weighing operations where great accuracy is required, it is necessary to use many precautions. The comparison of standard weights has to be conducted at the standard temperature, and the room must be brought to that temperature and maintained at it. The balance must be enclosed in a glass case to protect it from draughts of air or from the heat of the body of the operator. And the operations of placing and shifting the weights must be effected by mechanism which will enable this to be done without opening the case or exposing the machine.

When the weights which are to be compared are of different metals further complications arise, for the volumes of equal weights of different metals will be different, and therefore the quantity of air displaced by them will be different, and the difference of the weights of air displaced by the two weights must be allowed for. And the weight of air displaced depends upon the density of the air at the time of weighing, and therefore the barometer reading must be taken. For this correction an exact knowledge of the specific gravities of the metals under comparison is required. In this way an exact comparison of the weights *in vacuo* can be computed, but of course the simplest way of arriving at the result would be by the construction of a strong air-tight case which can be completely exhausted of air by an air-pump, and in which the weighing can then be effected *in vacuo*. The difficulty about weighing *in vacuo* is that it is found almost impossible to exhaust the case entirely, or even to maintain a constant degree of exhaustion, by reason of the leakage connected with the weighing operations, and in consequence weighing *in vacuo* is not much in favour. Whatever method is adopted, very exact weighing is a difficult and troublesome work.

Counter machines have an advantage over scale-beams in not being encumbered with suspension chains and the beam above. They are usually made with two beams, each with its three knife-edges, rigidly tied together or cast in one piece and some distance apart, so that the scale-pans being carried on two knife-edges, each is prevented from tipping over sideways. To prevent them from tipping over in the direction of the beams a vertical leg is rigidly fastened to the under side of each pan, the lower end of which is loosely secured by a horizontal stay to a pin in the middle of the frame. In using these machines there is seldom any question of determining the weight to any great nicety, and rapid action is generally of high importance. Hence they are very commonly made unstable, or "accelerating," *i.e.* they are constructed with the fulcrum knife-edges lower than the line joining the end knife-edges, and they are arranged so that the beam is horizontal when the stop of the weights-pan is hard down on its bearings. This arrangement is well adapted for weighing out parcels of goods of a definite weight, though not for ascertaining the correct weight of a given article. For the latter purpose machines are used of which the beams are made stable, or " vibrating," by constructing them with the fulcrum knife-edges above the line joining the end knife-edges.

" Accelerating " machines can be used to the advantage of the vendor in two ways. Firstly, in using them to determine the weight of a given article. For with unstable balances, although the smallest excess of weight in the goods-pan will cause it to descend till it is brought up by its stop, yet being in this position, a very much greater weight than the difference which brought it there will be required in the weights-pan to enable it to mount again. If W be the weight in each pan when the goods-pan commenced to sink, l the length of each arm, m the distance of the fulcrum below the line joining the end knife-edges, and β the angle at the fulcrum which defines the range of sway of the beam, it can easily be shown that w, the additional weight required in the weights-pan to enable the goods-pan to rise from its stop, is given by the equation $w = W\,2m\tan\beta/L - m\tan\beta$. So that if, for example, a fishmonger uses such a machine to ascertain the weight of a piece of fish which he places in the goods-pan, and thereby depresses it down upon its stop, and then places weights in the weights-pan till the goods-pan rises, the customer is charged for more than the real weight of the fish. Secondly, in using them out of level, with the goods end of the machine lower than the weights end. If θ be the angle of tilt of the machine, and the other symbols be as before, it may be shown that the additional weight w which is needed in the weights-pan to enable the goods-pan to rise off its stop, is given by the equation $w = W\,2m\tan(\beta-\theta)/L - m\tan(\beta-\theta)$. When θ is negative, as it is when the goods end of the machine is lower than the weights end, the value of w may be very appreciable. With " vibrating " machines the value of m is in general so extremely small that w is of no practical importance in either of the above cases.

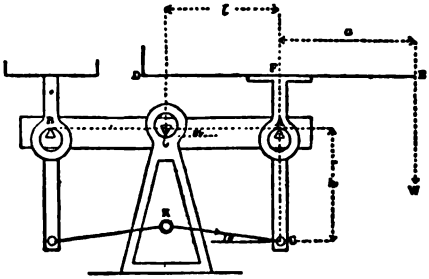


FIG. 4.

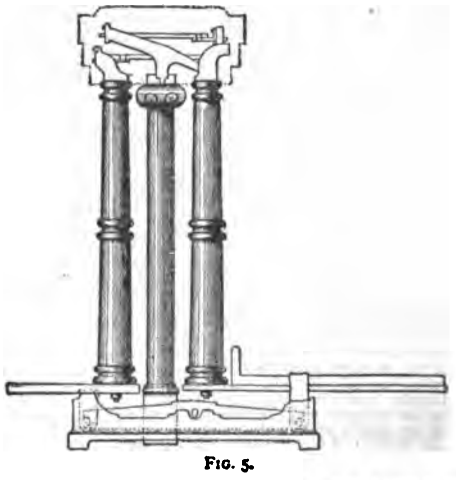


FIG. 5.

If a counter machine be made with a large flat goods-pan, as in fig. 4, an error may be caused by placing the goods eccentrically on the pan, as at D or E. Using the symbols of the diagram, it can be shown that the effect of placing the weight W at E instead of F is to cause the end of the beam to descend, as if under the action of an additional weight, w, at F such that

$$w = Wa(ml^{-1} + \tan\theta)/h.$$

The condition that must exist in order that the balance may weigh correctly for all positions of the weight W is $w = o$, or $\tan\theta = -ml^{-1}$; that is, the stay KG must be adjusted parallel to the line joining the points A and C. From the equation for w, it is seen that the larger h is the smaller w will be. Therefore for the larger counter machines, where it is not convenient to have the scale-pans raised high above the counter, and for " dead-weight " machines on the same principle, where it is not convenient to have the scale-pans raised high above the floor, there is an advantage in adopting the " inverted counter machine " arrangement (fig. 5), because the vertical leg can be produced upwards as high as is required. This arrangement is very common. As will be readily understood from the construction of the machines, there is more friction in counter machines than in scale-beams. The "sensitiveness " error allowed by the Board of Trade for counter machines is five times as great as that allowed for scale-beams.

The torsion balance made by the United States Torsion Balance and Scale Company of New York is a counter machine made without knife-edges, and is very sensitive. It is constructed with two similar beams, one above the other, which are coupled together at the ends to form a parallel motion for carrying the pans upright. The coupling is effected by firmly clamping the ends of the beams upon the top and bottom respectively of a loop of watch-spring, which is tightly stretched round the casting carrying the pan, as is shown in the end view in fig. 6. At their middles the beams are similarly clamped upon the top and bottom of a loop of watch-spring which is tightly stretched round a casting which is bolted upon the bed-plate. When the case which holds the machine is adjusted horizontally by means of its foot-screws, and the weights in the pans are equal, the beams remain perfectly horizontal; but with the slightest difference of weight in the pans the beams are tilted, and the elastic resistance of the springs to torsion allows the beams to take up a definite position of equilibrium. The lower beam carries on a saddle a scale which is raised nearly to the top of the glass case in which the machine is enclosed, and as the beams sway this scale plays past a scratch on the glass, which is so placed that when the zero point on the scale coincides with the scratch the beams are horizontal. With proper care this machine should be very permanent in its action.

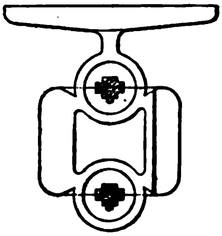


FIG. 6.

Unequal-armed Balances.

Steelyards are simple, trustworthy and durable, but unless special contrivances are introduced for ascertaining the position of the travelling poise with very great accuracy, there will be a little uncertainty as to the reading, and therefore steelyards are not in general so accurate as scale-beams. When carefully nicked they are well-adapted for weighing out definite quantities of goods, such as 1 lb, 2 lb, &c., as in such cases there is no question of estimation. The ordinary way of using a steelyard is to bring it into a horizontal position by means of movable weights, and to infer the amount of the load from the positions of these. But it is sometimes convenient to use a fixed weight on the long arm, and to infer the amount of the load from the position of the steelyard. The rule for graduation is very simple. The simplest form is that which has a single travelling poise. The more elaborate ones are made either with a heavy travelling poise to measure the bulk of the load with a light travelling poise for the remainder, or else with a knife-edge at the end of the steelyard, on which loose weights are hung to measure the bulk of the load, the remainder being measured with a light travelling poise. The advantage of the first arrangement is that the weights on the steelyard are always the same and inconsistencies of indication are avoided, while in the [illegible] the loose weights are lighter and ha[illegible] accurate and consistent [illegible] considerabl[illegible]

Ste[illegible]

In fig. 7 let Z be the fulcrum knife-edge, X the knife-edge on which the load R is hung, and H the centre of gravity of the weights to the right of Z, viz. the weight, W, of the steelyard acting at its centre of gravity; G, the travelling poise; P, acting at M; and the weights, Q, hung on the knife-edge at Y. Then if Z be below the line joining X and H, the steelyard will be "accelerating"; *i.e.* with the smallest excess of moment on the left-hand side of the fulcrum, the end C of the steelyard will rise with accelerating velocity till it is brought up by a stop of some sort; and with the smallest excess of moment on the right-hand side of the fulcrum, the end C of the steelyard will drop, and will descend with accelerating velocity till it is brought up by a similar stop. If Z be above the line XH, the steelyard is "vibrating"; *i.e.* it will sway or vibrate up and down, ultimately coming to rest in its position of equilibrium. Steelyards, again, are frequently arranged as counter machines, having a scoop or pan resting on a pair of knife-edges at the short end, which is prevented from tipping over by a stay arrangement similar to that of other counter machines.

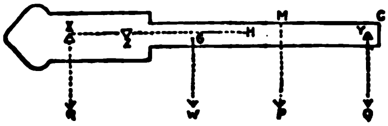


Fig. 7.

Steelyards are largely used in machines for the automatic weighing out of granular substances. The principle is as follows: The weighing is effected by a steelyard with a sliding poise which is set to weigh a definite weight of the material, say 1 lb. A pan is carried on the knife-edges at the short end, and is kept from tipping over by stays. A packet is placed on the pan to receive the material from the shoot of a hopper. A rod, connected at its lower end with the steelyard, carries at its upper end a horizontal dividing knife, which cuts off the flow from the shoot when the steelyard kicks. When the filled packet is removed, the steelyard resumes its original position, and the filling goes on automatically.

The automatic personal weighing machine found at most railway stations operates by means of a steelyard carrying a fixed weight on its long arm, the load on the platform being inferred from the position of the steelyard. In fig. 8 the weight on the platform is transferred by levers to the vertical steel band, A, which is wrapped round an arbor on the axle of the disk-wheel, B, to which is rigidly attached the toothed segment, C. The weight, D, is rigidly attached to the axle of the wheel, B, and the counter-balance, E, is hung from the wheel, B, by means of a cord wrapped round it. When the pull of the band, A, comes upon the wheel, B, it revolves through a certain angle in the direction of the arrow until the three forces, viz. the pull of A, the weight, D, and the counterbalance, E, are in equilibrium. The toothed segment, C, actuates the pinion, F, which carries the finger, G, and this finger remains fixed in position so long as the person is standing on the platform. If now a small weight, as a penny, be passed through the slot, H, it falls into the small box, I, and causes the lever, J, to turn; the lever, J, which turns in friction wheels at K, and is counterbalanced at O, carries a toothed segment, L, which actuates a small pinion on the same axle as F, and is free to turn on that axle by a sleeve. This small pinion carries a finger, M, which is arranged to catch against the finger, G, when moved up [illegible] to the lever, J, turns the finger, M, revolves, [illegible] of the pinion which [illegible] if the dial is properly [illegible]. The box, I, has a [illegible] which, as the box de- [illegible] arc. When the weight [illegible] balance, E, causes the finger, G, to run back to its zero position, carrying with it the finger M, and causing the click finger of the box, I, to trip open the bottom of the box and let the penny fall out. The lever, J, regains its zero position, and all is ready for another weighing. Since so small a weight as a penny has to move the lever, J, together with the dial finger, &c., it is evident that the workmanship must be good and the friction kept very low by means of friction wheels.

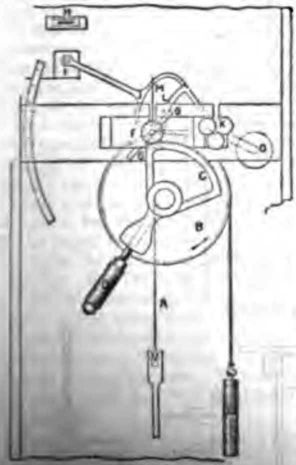


Fig. 8.

Some of the largest and most accurate steelyards are those made for testing machines for tearing and crushing samples of metals and other materials. They are sometimes made with a sliding poise weighing 1 ton, which has a run of 200 in., and the steelyard can exert a pull of 100 tons.

Balances are frequently used as counting machines, when the articles to be counted are all of the same weight or nearly so, and this method is both quick and accurate. They are also used as trade computing machines, as in the case of the machine made by the Computing Scale Company, Dayton, Ohio, U.S.A. In this machine the goods to be priced are placed on the platform of a small platform machine whose steelyard is adjusted to balance exactly the weight of the platform, levers and connexions. The rod which transmits the pull of the long body lever of the platform machine to the knife-edge at the end of the short arm of the steelyard is continued upwards, and by a simple mechanical arrangement transmits to an upper steelyard any additional pull of the long body lever due to the weight of goods placed on the platform. This upper steelyard is arranged as in fig 9, where A is the point where the pull of the long body lever due to the weight of the goods on the platform comes upon the steelyard; C is the fulcrum of the steelyard, which with the steelyard can be slid to and fro on the frame of the machine; and Q is a poise which can be slid along the upper bar of the steelyard. The steelyard is exactly in balance when there is no weight on the platform and Q is at the zero end of its run, at O. Suppose that the weight of the goods on the platform is (p) lb, and that $\frac{1}{n}$th of this weight is transmitted by the long body lever to the point A, so that $\frac{p}{n}$ lb is the pull at A. Let the lower bar of the steelyard be graduated in equal divisions of length, d, each of which represents one penny, so that the distance $CA = q \times d$ represents q pence. Then the number $\overline{p \times q}$ represents the total value of the goods on the platform. If Q lb be the weight of the poise Q, the position of Q when the steelyard is exactly in balance is given by the equation $\frac{p}{n} \times q.d = Q \times OQ$, or $OQ = \overline{p \times q} \times \frac{d}{nQ}$. If therefore the upper bar be graduated in divisions, each of which is $\frac{d}{nQ}$, the indication of the poise Q, viz. $\overline{p \times q}$ graduations, gives correctly the value of the goods. Thus to ascertain the value of goods on the platform of unknown weight at a given price per lb, it is only necessary to slide the steelyard till the weight acts at the division which represents the price per lb, and then to move the poise Q till the steelyard is in balance; the number of the division which defines the position of the poise Q will indicate the sum to be paid for the goods. When the load on the platform is large, so that the value of the goods may be considerable, it is convenient to measure the larger part of the value by loose weights which, when hung at the end of the steelyard, represent each a certain money value, and the balance of the value is determined by the sliding poise Q.

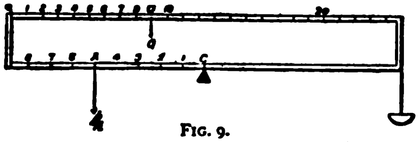


Fig. 9.

In the machines commonly used to weigh loads exceeding 2 cwt. the power is applied at the end of the long arm of the steelyard and multiplied by levers from 100 to 500 times, so that the weights used are small and handy. The load is received upon four knife-edges, so that on the average each knife-edge receives only one-fourth of the load, and, as will be seen, it is immaterial whether the load is received equally by the four knife-edges or not, which is essential to the useful application of these machines.

In fig. 10 AB is the steelyard. The platform and the load upon it are carried on four knife-edges, two of which, x_1 and x_2, are shown, and the load is transferred to the steelyard by the two levers shown, the upper one CD being known as the "long body," and the lower one EF as the "short body." If $z_1x_1 = z_2x_2$, and $z_1t = z_2y_2$, then the leverage of any portion of the load applied at x_2 will be the same as the leverage of any part of the load applied at x_1, and the pressure produced at y_1 will be the same for equal portions of the load, whether they were originally applied at x_1 or x_2. Platform machines, like steelyards, may be arranged either on the "accelerating" principle or on the "vibrating" principle. If in fig. 10 g_1 be the centre of gravity of the long body CD, and h_1 be the centre of gravity of the three vertical forces acting downwards at the points x_1, t and g_1, considered as weights collected at those points; then if h_1 be above the line x_1y_1 it can be shown that this arrangement of the knife-edges of CD favours the "acceleration" principle, and is suited to act with and assist an "accelerating" steelyard, and similarly if the point h_2 be above the line x_2y_2 in the case of the short body EF. If the knife-edges be placed so that h_1 and h_2 are below the lines x_1y_1 and x_2y_2 respectively, the arrangement will favour the "vibration" principle, and is suited to act with and assist a "vibrating" steelyard.

It is very important that platform machines should be truly level. With accelerating machines a small amount of tilt in any direction considerably affects the accuracy of the weighing, and when the amount of tilt is considerable the action may be changed, so that a machine which was intended to act as an accelerating machine acts like a vibrating one. Vibrating machines are only slightly affected by being out of level in comparison with accelerating machines, and in this matter they have a distinct advantage. When a platform machine is in true adjustment, and the loose weights which are intended to be hung at the end of the steelyard are correct and consistent among themselves, a good and new machine, whose capacity is 4 cwt., should not show a greater error than 4 oz. when fully loaded. Platform machines are slightly affected by changes of temperature. In some cases they are made "self-recording" by the following arrangement: The steelyard is provided with a large and a small travelling poise. Each of these poises carries a horizontal strip of metal, which is graduated and marked with raised figures corresponding to those on the steelyard itself. These strips pass under a strong punching lever arranged on the frame of the machine. A card prepared for the purpose is introduced through a slit in the frame between the punch and the strips. When the poises have been adjusted to weigh a load on the platform the punch is operated by a strong pull, and the impression of the raised figures is left on the card. Thus the weight is recorded without reading the positions of the poises. In another arrangement the self-recording parts are entirely enclosed in the travelling poise itself.

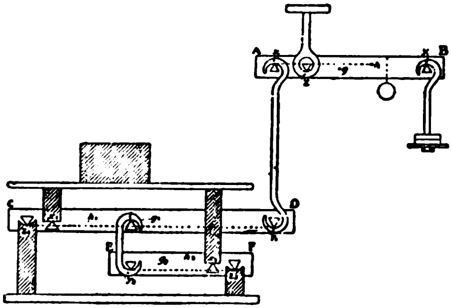


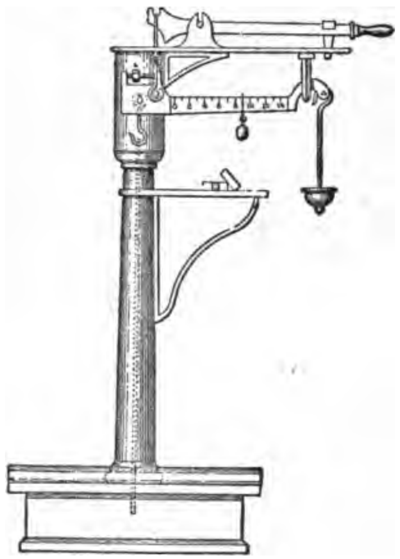
FIG. 10.

Fig. 11 shows the ordinary arrangement of the parts of a platform machine, but there are many types which differ greatly in detail though not in principle.

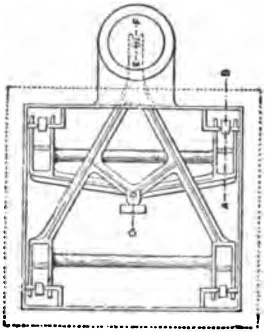
When the goods to be weighed are very heavy, portable weighbridges or platform machines are inapplicable and it is necessary to erect the weighbridge on a solid foundation. Some weighbridges are arranged in a manner similar to that of the platform machines already described, but having the long body lever turned askew, so that the end of it projects considerably beyond the side of the weighbridge casing, and the pillar and steelyard which receive its pull are clear of the wagon on the platform. In another arrangement two similar triangular levers take bearing on opposite sides of an intermediate lever which communicates their pressures to the steelyard; this is a very sound and simple arrangement for ordinary long weighbridges. Lastly, when the weighbridge is very long—and they are sometimes made 40 ft. long, and are arranged to weigh up to 100 tons or more—it is practically composed of two platform machines end to end, each having its four knife-edges to receive the load, and the two long bodies take bearing on the opposite sides of an intermediate horizontal lever, the end of which is connected with the steelyard. When skilfully made they are very accurate and durable.

A useful application of weighbridges is to ascertain the exact weights on the separate wheels of locomotive engines, so that they may be properly adjusted. For this purpose a number of separate weighbridges of simple construction are erected, one for each wheel of the engine, with their running surfaces in exactly the same horizontal plane. The engine is moved on to them, and the pressures of all the wheels are taken simultaneously, each by its own weighbridge.

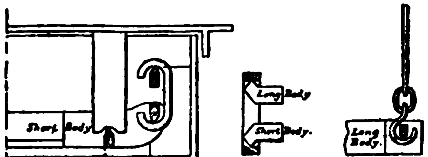
There are many kinds of weighing machines depending for their action on combinations of levers, and arranged to meet special requirements. Such are coal platform machines for weighing out coal in sacks, the levers of which are arranged as in the ordinary platform machines, but for the sake of compactness the steelyard is returned back over the long body, and when loaded with the proper weight indicates the correct weight of the coal in the sack by its end



Elevation.



Plan with cover removed.



Section on AB. Section on CD. Section on EF.

FIG. 11.

kicking up. Crane machines are used to weigh goods as [illegible] hoisted by a crane; the lever arrangement is shown in [illegible]

A crane machine of peculiar construction, well [illegible] ing heavy loads, and extremely simple and [illegible] properly come under any of the heads [illegible] have been classified, is the hydro[illegible] machine is constructed with an [illegible] being provided by which [illegible] cylinder, which is filled with oil or other liquid, is fitted with a piston having a piston-rod passing downwards and terminating in an attachment for the goods to be weighed. As the goods are lifted by the crane the whole of their weight is taken by the liquid in the cylinder, and the pressure on the liquid, as indicated by a pressure gauge, gives the weight. The gauge has a plain dial, marked off to indications given by the application of standard tons and cwts.; it could probably be read to about ½% of the load weighed.

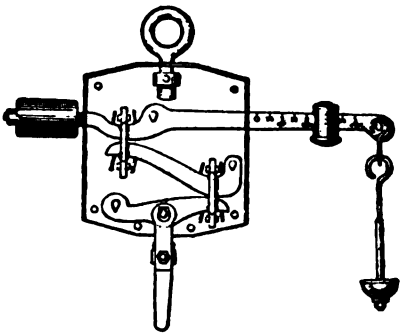


FIG. 12.

Spring Balances.

For many purposes spring balances are the most convenient of all weighing machines. They are rapid in action, the indication is in general clear, and there is no need of loose weights except for testing the machine occasionally. Their action depends upon the extension of one or more spiral springs, and as the extension is proportionate to the weight which causes it the graduation is very simple. The accuracy of spring machines depends upon the accuracy of the springs and the workmanship of the machines. The springs in general are very accurate and uniform in their extension, and are very permanent when fairly well used; but their indications are apt to vary from fatigue of the springs if they are kept extended by a weight for a long time. Their indications also vary with the temperature, so that for good work it is advisable that spring balances should be frequently checked with standard weights. For the sake of compactness and convenience of reading the extension of the springs, and consequently the load, is frequently indicated on a dial, by means of a small rack and pinion, which give motion to a finger on the dial-plate, but the regularity and correctness of the indications of the finger will depend upon the condition of the rackwork and upon the friction, and these will vary with the wear of the machine. For the above reasons spring balances are not in general so accurate as knife-edge machines. It is found that when a spiral spring is extended by a weight it has a tendency to turn a little round its axis. Therefore an index pointer attached to the bottom of the spring, and moving past a scale would rub slightly against the case. To correct this tendency the spring is usually made half with right-hand spiral and half with left-hand spiral.

The extension of a spiral spring is given by the formula:—

Extension $= W 4 n R^3 / E r^4$, in which W = weight causing extension, in lbs; n = number of coils; R = radius of spring, from centre of coil to centre of wire, in inches; r = radius of wire of which the spring is made, in inches; E = coefficient of elasticity of wire, in lbs per square inch. The value of E depends upon the tempering of the wire and will vary accordingly: for the springs of trade balances E will usually be about 10,500,000. For the application of the above formula it is necessary to measure (R) and (r) [illegible] accurately, by [illegible] of the high powers involved, but wh[illegible] carefully [illegible] formula may be relied upon. T[illegible] the values of the quantities [illegible] $E = 10{,}500{,}000$ the [illegible] direct experiment [illegible] spring for [illegible] is [illegible]

Automatic Weighing Machines.

During the last few years great efforts have been made to expedite the operation of weighing machines by the introduction of machinery, more or less complicated, which renders the machines to a great extent self-acting. The object aimed at varies very much with different machines. Sometimes the object is to weigh out parcels of goods in great numbers of the same definite weight. Sometimes the object is to weigh out parcels of goods, of unknown weight, as in ordinary retail dealing, and to give the exact value of each parcel at different rates per lb. Sometimes the object is to weigh many loads in succession, the loads being of varying weight, and to present the total weight at the end of a day's work; this is the case with machines for weighing coal and other minerals. Of course the introduction of automatic mechanism introduces friction and other complications, and it is difficult to construct automatic machines that shall be as accurate in their weighing as the simpler weighing machines, but in many weighing operations a moderate degree of accuracy will suffice, and speed is of great importance. It is to meet such cases that the greater number of automatic weighing machines have been invented. Some examples of these machines will now be given.

Automatic Computing Spring Weighing Machine for Retail Purposes (fig. 13).—A light and carefully balanced drum with its axis horizontal is enclosed within a cylindrical casing, and rotates freely in bearings formed in the ends of the casing. The casing is fixed in supports on the top of a strong frame, which also carries a small platform machine of ordinary construction on which the goods to be weighed are placed. The pull of the load is transmitted to a hook which hangs freely from the middle of a horizontal bar below the drum casing. At each end of the drum casing is attached a vertical spiral spring, and by the extension of these springs the weighing of the goods is effected. There are also two vertical racks, one at each end of the casing, in connexion with the two springs, and these actuate pinions on the axle of the drum and cause it to revolve as the springs extend. The horizontal bar which receives the pull of the load is connected at its ends with the two spiral springs and pulls vertically upon them. Above the horizontal bar, and parallel with it, is a rod which is connected at its ends with the lower ends of the vertical racks, and at its middle with the horizontal bar. The connexion with the horizontal bar is through the medium of an adjustable cam. This cam can be turned by hand in a vertical plane by means of a worm and wheel movement, and by turning the worm the vertical distance between the bar which is attached to the springs and the rod which is attached to the racks can be increased or diminished, and thus the racks can be moved relatively to the springs. By this means the zero of the scale on the drum can be adjusted to the fixed index on the casing when there are no goods on the platform. There is also a compensation arrangement for effecting automatically the same adjustment for changes of temperature. To deaden the vibration of the springs after a load has been placed on the platform, and thus to enable the weights and values of the goods to be read rapidly, the piston of a glycerin cylinder is attached to the end of the lever which pulls upon the hook of the horizontal bar and is worked by it in the glycerin.

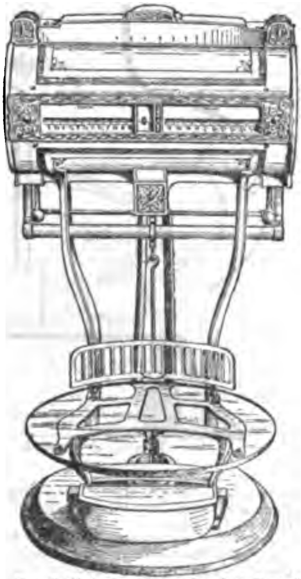


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FIG. 13.—Price-computing Spring Weighing Machine.

On the outer surface of the drum are printed the weight of the goods in lb and oz., and the money value of the goods corresponding to the different rates per lb. The side of the casing which is next to the seller is pierced centrally by two slots, one a vertical slot through which the weight is read on the drum, and the other a horizontal slot, half of it on each side of the vertical slot, through which the money values of the goods, corresponding to the different rates per lb, are read. The weight of the goods is recorded by means of an index pointer fixed to the casing on one side of the vertical slot, and the money values are opposite the figures defining the rates per lb, which are marked on the edge of the casing below the horizontal slot. On the side of the casing which is next to the buyer there is a vertical slot through which the weight of the goods can be read on the drum.

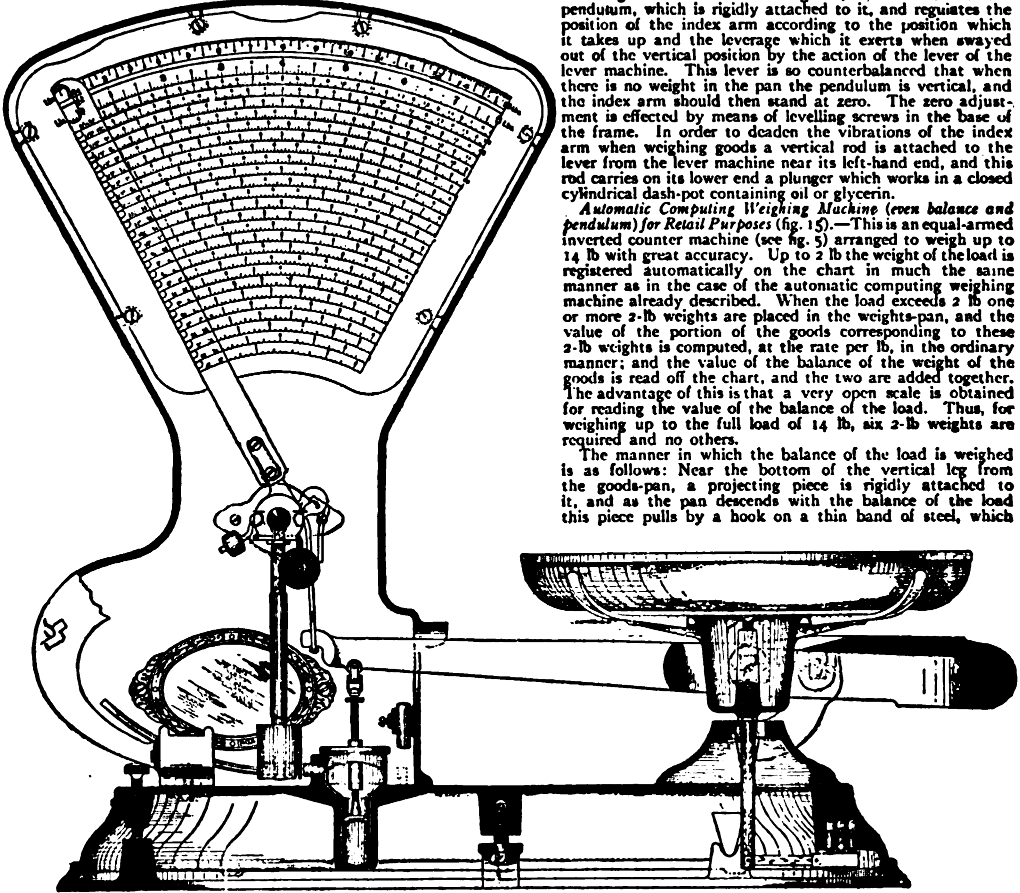

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Fig. 14.—Price-computing Weighing Machine.

Automatic Computing Weighing Machine for Retail Purposes (fig. 14).—The action of the machine shown in fig. 14 depends upon the displacement of a loaded pendulum. And the machine is arranged to weigh goods up to 8 lb with the fixed weight only on the pendulum, and up to 16 lb with an additional weight which can be readily slipped on to the pendulum rod. The weights and [illegible] values are arranged on a vertical chart, the sides of which [illegible] towards the pivoting centre of an index arm which [illegible] the weighing mechanism. The two outer arcs [illegible] occupied by the scales for the weight [illegible] and the rest of the chart [illegible] arcs which show the money [illegible] The rates per lb are [illegible] sponding to the values [illegible] values are indicated on the chart by the toothed edge of the index arm. On the customer's side of the machine the weight of the goods is indicated on a pair of arcs by a separate index arm precisely in the same manner as on the seller's side.

In weighing, the goods are placed in the pan of an ordinary lever machine (see fig. 14), and the end of the lever rests on the stirrup end of a short vertical rod. The upper end of this rod is formed into a loop, and this loop pulls upon a knife-edge which is fixed to a short lateral arm rigidly attached to a vertical disk, and this disk turns in bearings formed in the frame of the machine. The same disk carries the index arm, which is rigidly fixed to it and indicates the weight and value of the goods, and also carries the pendulum, which is rigidly attached to it, and regulates the position of the index arm according to the position which it takes up and the leverage which it exerts when swayed out of the vertical position by the action of the lever of the lever machine. This lever is so counterbalanced that when there is no weight in the pan the pendulum is vertical, and the index arm should then stand at zero. The zero adjustment is effected by means of levelling screws in the base of the frame. In order to deaden the vibrations of the index arm when weighing goods a vertical rod is attached to the lever from the lever machine near its left-hand end, and this rod carries on its lower end a plunger which works in a closed cylindrical dash-pot containing oil or glycerin.

Automatic Computing Weighing Machine (even balance and pendulum) for Retail Purposes (fig. 15).—This is an equal-armed inverted counter machine (see fig. 5) arranged to weigh up to 14 lb with great accuracy. Up to 2 lb the weight of the load is registered automatically on the chart in much the same manner as in the case of the automatic computing weighing machine already described. When the load exceeds 2 lb one or more 2-lb weights are placed in the weights-pan, and the value of the portion of the goods corresponding to these 2-lb weights is computed, at the rate per lb, in the ordinary manner; and the value of the balance of the weight of the goods is read off the chart, and the two are added together. The advantage of this is that a very open scale is obtained for reading the value of the balance of the load. Thus, for weighing up to the full load of 14 lb, six 2-lb weights are required and no others.

The manner in which the balance of the load is weighed is as follows: Near the bottom of the vertical leg from the goods-pan, a projecting piece is rigidly attached to it, and as the pan descends with the balance of the load this piece pulls by a hook on a thin band of steel, which is led upwards and wraps round the surface of a disk to which it is firmly secured. This disk rotates by rocking on a pair of knife-edges whose bearings are rigidly attached to the frame. The disk carries a weighted brass cylinder rigidly attached to it, which is pulled into an oblique position by the steel band until equilibrium is established. And the disk also carries the index arm which plays past the vertical face of the chart, and indicates [illegible] weight and price up to 2 lb weight. The disk also carries a [illegible] arm which indicates the weight on [illegible] At the bottom of the vertical [illegible] also a projecting piece which is [illegible] piston rod, the piston of which [illegible] the beam sways, and deadens the [illegible]

[illegible] *Machine* (fig. 16).—This machine is [illegible] quantities of ¼ lb each, which are done [illegible] hand. A large number of movements have to be provided for, and the machinery is complicated, so that a general description of the action of the machine is all that will be here given.

The tea is fed into a hopper, which has a large opening at the bottom, and this opening is entirely closed by two cylindrical brushes, which are mounted end to end on a horizontal shaft. As they revolve these brushes engage the tea in the hopper, draw it out by degrees, and drop it into a compartment of a circular drum which hangs on one end of a scale-beam. The brushes have the same diameter, but one is much longer than the other, and they move independently of one another. For the bulk of the filling both brushes are in operation, but when the load is nearly complete the longer brush is stopped and the filling is completed by the shorter brush only. When the load is complete the shorter brush also is stopped while the compartment of the drum is emptied. And the action is then renewed. All these operations are effected automatically.

The circular drum is divided into four equal compartments by radial diaphragms. And in a pan at the other end of the beam (which is counterbalanced for the weight of the drum) is a ½-lb weight to weigh the tea. As the uppermost compartment fills, the weights end of the beam rises, and by means of a vertical rod successively operates on detents connected with the rotation of the two brushes, and stops them in turn. And when the short brush is stopped a rod from the shaft frees a spring detent which keeps the drum in position and tips it over. The tea is shot out and falls into a receptacle below, and the drum makes a quarter of a revolution, and is again held in position by the detent with an empty compartment at top ready for the next filling.

The power is applied by a belt round a pulley, which is mounted on the end of the horizontal shaft which carries the brushes. The brushes are carried by sleeves which run loosely on the shaft, and to each sleeve is rigidly fixed a ratchet wheel. Next the ratchet wheel is a disk which is keyed on to the shaft. The ratchet wheel and the disk are automatically connected by clutch mechanism in order to effect the rotation of the brushes. The clutch mechanism is freed at the proper time by the action of the vertical rod at the end of the beam, and the brushes then [illegible] while the load is discharged. The beam then recovers its [illegible] position and the action of the machine is renewed.

[illegible]tic Sugar Weighing Machine (fig. 17).—This machine is [illegible] for weighing out granulated white sugar in parcels of 1-lb, [illegible] 4-lb weight. The sugar is run into a conical hopper and is [illegible] into the open mouth of a bag which is placed on the goods-[illegible] balance. The balance consists of a pair of equal-armed beams connected together and acting as a single beam. A 4-lb weight is placed in the weights-pan of the balance, and is the only loose weight used with the machine. The pair of beams are hung centrally by rods and hooks from knife-edges in the forked end of a strong beam, which is carried at its fulcrum by the top plate of the frame of the machine. This beam is heavily counterbalanced at its further extremity. Underneath the top plate of the machine, and strongly framed to it, is a box, which contains the horizontal rods to the ends of which are attached the slides which regulate the flow of sugar from the bottom of the hopper. These rods pass through holes in the front and back plates of the box, and are furnished with spiral springs, which (when the rods are forced back by hand) are in compression between the back plate of the box and shoulders on the rods. The rods are held in this position by detents which take hold of the shoulders of the rods, and are acted upon from the front end of the upper beam and the weights-pan end of the lower beam respectively, in order to release the rods at the proper times and reduce or cut off the flow of sugar from the hopper. The upper slide has the shape of a truncated cone, and it reduces the orifice of flow so as to render the flow of the sugar more manageable. The lower slide is simply a cut-off slide. When it is desired to use the machine, a 4-lb bag is placed under the orifice of the hopper upon the goods-pan of the balance, and the slide rods are thrust back by hand till they are held by their detents, and the sugar flows rapidly into the bag. When the bag is nearly charged to the weight of 4 lb, the weight of the bag of sugar overcomes the resistance of the counterbalance of the upper beam, and its front end drops a certain distance. In dropping it dislodges the detent of the reducing slide, and the slide springs forward and reduces the flow of the sugar. The diminished stream of sugar continues to flow till the 4-lb weight in the weights-pan is lifted (the end of the upper beam being for the time brought up against the frame and unable to descend further), and in lifting it dislodges the detent of the cut-off slide. The slide springs forward and cuts off the flow. The filled bag is then removed and replaced by an empty bag and the action is renewed.

In order to ensure the correct weight of the bag it is necessary to consider that when the cut-off slide acts, a certain quantity of sugar is *in transitu* and has not at that moment taken its place in the bag. This is allowed for by means of a rider weight, which is arranged so as automatically to add its weight to that of the sugar in the bag while

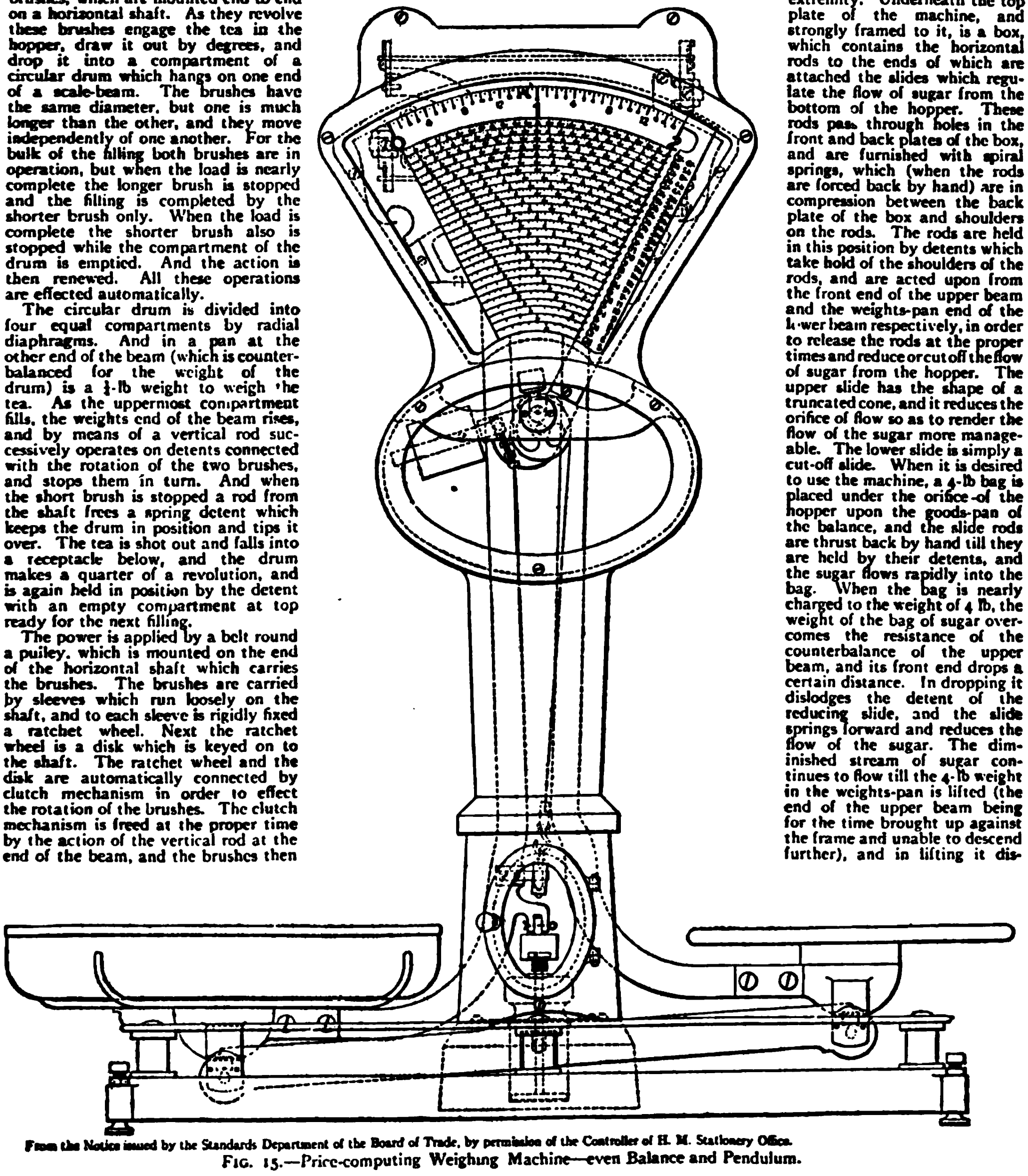

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FIG. 15.—Price-computing Weighing Machine—even Balance and Pendulum.

the 4-lb weight is being lifted. But at the same instant that the cut-off takes place the rider weight is lifted off the end of the balance by a self-acting arrangement, and the sugar *in transitu* takes its place in the bag. And, if the rider weight has been correctly adjusted, the bag of sugar will be shown to weigh exactly 4 lb by the beam vibrating in equipoise.

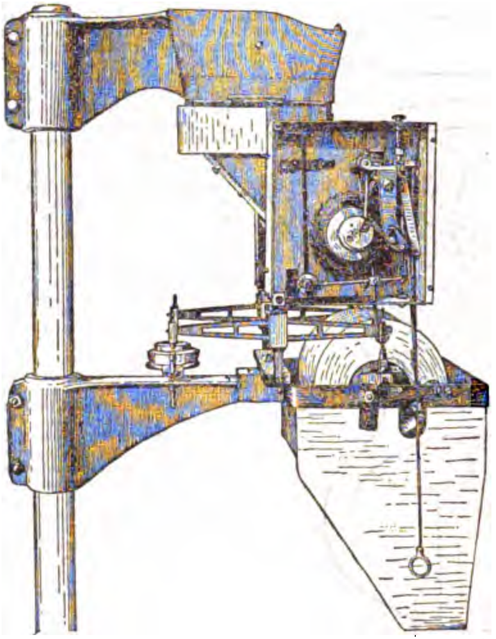

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FIG. 16.—Automatic Tea Weighing Machine.

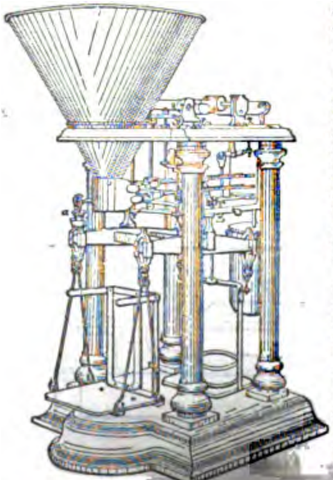

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FIG. 17.—Automatic Sugar Weighing Machine.

Automatic Coal Weighing Machine (fig. 18).—This machine weighs the coal delivered into factories, &c., by charges up to 20 cwt. at a time, and records and sums up the weights of the charges so as to exhibit the total weight delivered. The whole of this work is effected automatically.

The coal is dropped into a hopper by a grab. The hopper is carried on two knife-edges, one on each side, and is prevented from tipping over fore and aft by a pair of parallel motion bars on each side. The knife-edges on which the hopper rests are on two horizontal levers, one on each side of the hopper. These levers are carried by knife-edge fulcra in bearings on the frame of the machine, and transmit the weight of the hopper by means of an intermediate lever and a vertical rod to the indicator lever. And the long arm of [illegible] lever pulls vertically upon the spring of an ordinary spring balance, which registers the load, and with the addition of suitable counting mechanism sums up the weights of any number of successive loads.

The charges of coal fall into the hopper with a heavy shock, and in order to save the knife-edges there is a strong pin in each side of the hopper below the knife-edge, which, before the charge of coal is dropped into the hopper, is acted on by a strong horizontal flitch-plate, which heaves the hopper off the knife-edges and relieves them from the shock. The heaving-up of the flitch-plate and hopper is effected by a cam on the end of a horizontal shaft which runs along the back of the machine behind the hopper. The flitch-plate rests at one end on the top of this cam, and at the other end is shackled to the horizontal arm of a bell-crank lever which is pivoted on the frame. When a charge of coal is dropped into the hopper, the bell-crank lever receives a violent jerk from the shackle of the flitch-plate, and this jerk by means of suitable mechanical arrangements throws a pinion on the cam shaft into gear with a wheel on a counter shaft which is kept constantly running by means of a belt and pulley driven by an engine. The cam shaft and the cam then begin to revolve, and the flitch-plate is gradually lowered till the knife-edge bearings of the hopper are received on the knife-edges of the main measuring levers, and the load is then weighed by the levers and the spring-balance. Shortly after this is done the mechanism at the back of the hopper automatically opens the doors at the bottom of the hopper, and the coal drops out. The rotation of the cam shaft continues till the cam has again heaved up the flitch-plate, when the pinion on the cam shaft is thrown out of gear with the wheel on the counter shaft, and the cam remains steady till another charge of coal is dropped into the hopper and the action is renewed. The coal when dropped out of the hopper runs down a shoot into a receptacle, from whence it is lifted by a Jacob's Ladder and distributed to the boilers, &c., of the factory.

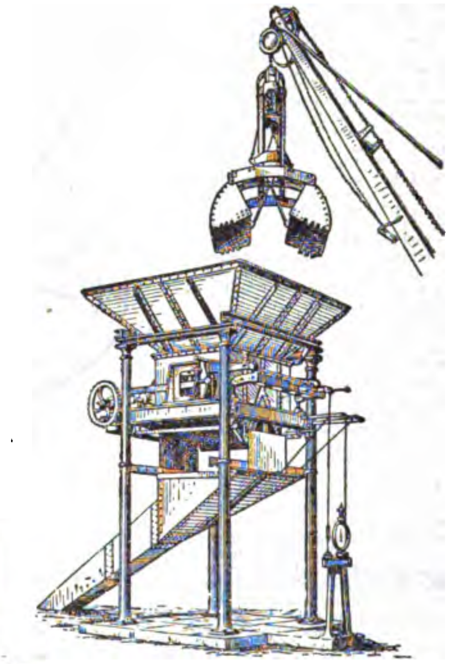

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FIG. 18.—Automatic Coal Weighing Machine.

Automatic Coal Weighing Machine (fig. 19).—This machine is designed to weigh and total up the weight of materials passed over it during a considerable course of operations. The trucks or other receptacles containing the coal, &c., are drawn upon the platform of the machine, and the pull of the load is transferred by a vertical rod at the left-hand end of the machine to the knife-edge on the short arm of the steelyard, whose fulcrum is carried on bearings in the frame. Behind the pulley at the top of the machine and on the same shaft is a spur wheel, which drives both of the spur wheels shown in the diagram. The small spur wheel is mounted on the steelyard, and this wheel and the one that drives it are so arranged that their line of pressure shall exactly coincide with the line of the fulcrum knife-edge; the object of this is that the pressure may not influence the sway of the steelyard, which must depend entirely upon the poise. By means of a pair of mitre wheels the small spur wheel causes a screwed shaft, which runs along the middle of the steelyard, to revolve, and as it revolves it carries the large poise along the steelyard. . Thus, if the poise be at the zero end of the steelyard at the left-hand side of the machine, when the load comes upon the platform the screwed shaft carries the poise along the steelyard till equilibrium is established, and the end of the steelyard drops. By the first part of this drop the movement of the poise is suddenly stopped, as will be explained below, and the travel of the poise along the steelyard, which measures the load on the platform, is recorded by the amount of rotation of the large spur wheel, and this is suitably shown on a dial in connexion with the wheel. By the second part of the drop the motion of the poise is reversed and the poise is run back to the zero end in readiness for the next load. All of this is effected automatically as follows:—

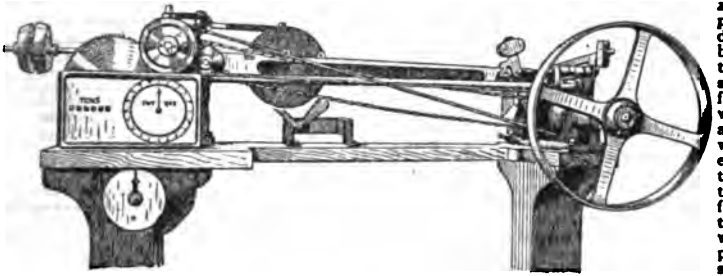

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FIG. 19.—Automatic Coal Weighing Machine.

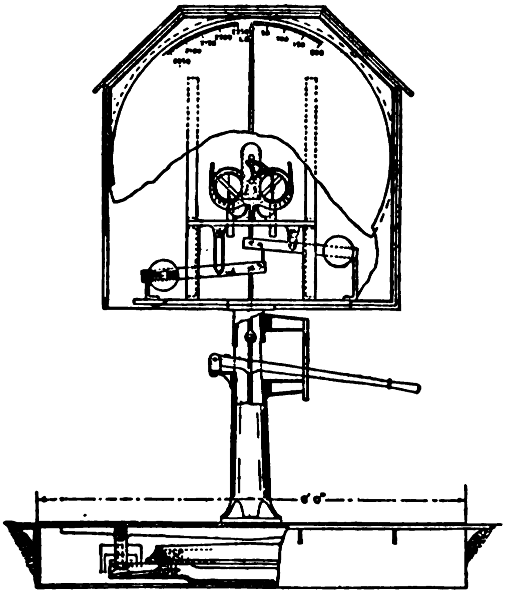

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FIG. 20.—Automatic Luggage Weighing Machine.

The machine is driven continuously by a belt from a motor which wraps round the large drum at the right-hand side of the machine. On the same axle as the drum and behind it is a small pulley which is keyed upon the axle and is connected with the small pulley (which runs idle on its shaft) at the left-hand side of the machine by a crossed belt. Thus these two small pulleys are always running, but in opposite directions. The drum-shaft is connected by a friction clutch with a shaft in the same line, on which are keyed a sprocket wheel and a ratchet wheel. The sprocket wheel is connected by a chain with a similar sprocket wheel which is keyed on the same shaft as that of the left-hand pulley. The ratchet wheel is acted upon by a pawl which is shown on the diagram. When the poise is at the zero end, and there is no load on the platform, the end of the steelyard is down, and has locked the ratchet wheel by means of the pawl; the shaft being thus locked, the sprocket wheels are stopped, the drum-shaft runs free by the friction clutch, and the two pulleys which are connected by the crossed band are running idle. When the load to be weighed comes upon the platform, the end of the steelyard rises and unlocks the ratchet wheel through the pawl; the sprocket gearing is driven by the friction clutch, and drives the axle of the left-hand small pulley. The mitre wheels come into operation and the poise is carried along till the end of the steelyard drops, and locks the ratchet wheel. By means of a horizontal rod the same drop of the steelyard also locks together by clutch gearing the left-hand pulley and the adjacent sprocket wheel, and the pulley drives the sprocket wheel in the opposite direction to that which it had before. Consequently the motion of the mitre wheels is reversed and the poise is run back to zero. When the poise arrives at zero it frees the clutch which connects the pulley and the sprocket wheel, and the machine is then ready for the next load. The poise having arrived at the end of its run and unable to go further, the mitre wheels and the sprocket gearing are stopped, and the two pulleys and the cross belt run idle till the next load comes upon the platform.

Automatic Luggage Weighing Machine (fig. 20).—This machine is intended for the weighing of personal luggage at railway stations. It consists of a platform which is carried by levers arranged in the manner of an ordinary platform machine, which are connected with the registration mechanism by a vertical rod. This rod is continued upwards by a pair of thin nickel bands which are led right and left over two horizontal cylinders, round which they partly wrap, and to which they are firmly attached. The diameter of the middle part of the cylinders is greater than that of the ends, and the bands from the vertical rod are led over the middle part. To each cylinder a pair of similar nickel bands are led downwards from the top of a casting which is bolted to the frame. The lower ends of these bands pass round the under side of the end portions of the cylinders, wrapping close round them, and are firmly attached to them. To the bottom of each cylinder is rigidly attached a heavy solid cylinder of lead, and these are the regulators of the position of equilibrium of the cylinders when they rotate under the action of the load. When the load comes upon the platform the pull of the vertical rod is transmitted by the nickel bands to the cylinders around which they are wrapped, and causes them to revolve. As they rotate they roll themselves up the pairs of bands which are attached to the top of the casting, and at the same time cause the leaden weights attached to the bottoms of the cylinders to take up a lateral position, where they exercise a leverage opposing the motion of the cylinders, and bringing them up in a definite position corresponding to the pull of the vertical rod. By the rolling of the cylinders up the vertical bands from the casting the cylinders are raised vertically through a space defined by the position of the leaden regulators. By means of suitable and simple mechanism this vertical movement of the cylinders works plunger pistons in a pair of cylinders which contain glycerin, and these deaden the vibrations of the machinery while weighing is going on. The same vertical movement also actuates the index finger of a large-dial, on which the weight of their luggage can be easily read by passengers standing near while their luggage is being weighed.

AUTHORITIES.—Julius Weisbach, *Mechanics of Machinery and Engineering* (London, 1848); Ernest Brauer, *Die Konstruktion der Waage* (Weimar, 1887); H. J. Chaney, *Our Weights and Measures* (London, 1897); Airy on "Weighing Machines," *Proc. Inst. C.E.* vol. cviii.; W. H. Brothers on "Weighing Machinery," *Trans. Soc. Engineers*, vol. for 1890. (W. Ay.)

WEIGHTS AND MEASURES. This subject may be most conveniently considered under three aspects—I. Scientific; II. Historical; and III. Commercial.

I. SCIENTIFIC

1. *Units.*—In the United Kingdom two systems of weights and measures are now recognized—the imperial and the metric. The fundamental units of these systems are—of length, the yard and metre; and of mass, the pound and kilogram.

The legal theory of the British system of weights and measures is—(*a*) the standard yard, with all lineal measures and their squares and cubes based upon that; (*b*) the standard pound of 7000 grains, with all weights based upon that, with the troy pound of 5760 grains for trade purposes; (*c*) the standard gallon (and multiples and fractions of it), declared to contain 10 lb of water at 62° F., being in volume 277·274 cub. in., which contain each 252·724 grains of water in a vacuum at 62°, or 252·458 grains of water weighed with brass weights in air of 62° with the barometer at 30 in. Of the metric units international definitions have been stated as follows:—

(*a*) The unit of volume for determinations of a high degree of accuracy is the volume occupied by the mass of 1 kilogram of pure water at its maximum density and under the normal atmospheric pressure; this volume is called litre.

(*b*) In determinations of volume which do not admit of a high degree of accuracy the cubic decimetre can be taken as equivalent to the litre; and in these determinations expressions of volumes based on the cube of the unit of linear measure can be substituted for expressions based on the litre as defined above.

(*c*) The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram.[1]

(*d*) The term "weight" denotes a magnitude of the same nature as a force; the weight of a body is the product of the mass of the body by the acceleration of gravity; in particular, the normal weight of a body is the product of the mass of the body by the normal acceleration of gravity. The number adopted for the value of the normal acceleration of gravity is 980·965 cm/sec^2.

2. *Standards.*—The metre (*mètre-à-traits*) is represented by the distance marked by two fine lines on an iridio-platinum bar ($t=0°$ C.) deposited with the Standards Department. This metre (m.) is the only unit of metric extension by which all other metric measures of extension—whether linear, superficial or solid—are ascertained.

The kilogram (kg.) is represented by an iridio-platinum standard weight, of cylindrical form, by which all other metric weights, and all measures having reference to metric weight, are ascertained in the United Kingdom.

From the above four units are derived all other weights and measures (W. and M.) of the two systems.

The gallon is the standard measure of capacity in the imperial system as well for liquids as for dry goods.

In the United Kingdom the metric standard of capacity is the litre, represented (Order in Council, 19th May 1890) by the capacity of a hollow cylindrical brass measure whose internal diameter is equal to one-half its height, and which at 0° C., when filled to the brim, contains one kg. of distilled water of the temperature of 4° C., under an atmospheric pressure equal to 760 millimetres at 0° C. at sea-level and latitude 45°; the weighing being made in air, but reduced by calculation to a vacuum. In such definition an attempt has been made to avoid former confusion of expression as to capacity, cubic measure, and volume; the litre being recognized as a measure of capacity holding a given weight of water.

For the equivalent of the litre in terms of the gallon, see below III. *Commercial.*

In the measurement of the cubic inch it has been found that[2] the specific mass of the cubic inch of distilled water freed from air, and weighed in air against brass weights ($\Delta=8\cdot13$), at the temperature of 62° F., and under an atmospheric pressure equal to 30 in. (at 32° F.), is equal to 252·297 grains weight of water at its maximum density (4° C.). Hence a cubic foot of water would weigh 62·281 lb avoir., and not 62·321 lb as at present legally taken.

For the specific mass of the cubic decimetre of water at 4° C., under an atmospheric pressure equal to 760 mm., Guillaume and Chappuis of the Comité International des Poids et Mesures at Paris (C.I.P.M.) have obtained 0·9999707 kg.,[3] which has been accepted by the committee.

The two standards, the cubic inch and the cubic decimetre, may not be strictly comparable owing to a difference in the normal temperature (Centigrade and Fahrenheit scales) of the two units of extension, the metre and the yard.

For the weight of the cubic decimetre of water, as deduced from the experiments made in London in 1896 as to the weight of the cubic inch of water, D. Mendeléeff (*Proc. Roy. Soc.*, 1895) has obtained the following results, which have been adopted in legislative enactments in the United Kingdom:—

Temperature on the Hydrogen Thermometer Scale.		Weight of Water *in vacuo.*		
C.	F.	Of a Cubic Decimetre in Grammes.	Of a Cubic Inch in Grains.	Of a Cubic Inch in Russian Dolis.
0°	32°·0	999·716	252·821	368·686
4	39·2	999·847	252·854	368·734
15	59·0	998·979	252·635	368·414
16⅔	62·0	998·715	252·568	368·316
20	68·0	998·082	252·407	368·083

In this no account is taken of the compressibility of water—that is to say, it is supposed that the water is under a pressure of one atmosphere. The weight of a cubic decimetre of water reaches 1000 grammes under a pressure of four atmospheres; but *in vacuo*, at all temperatures, the weight of water is less than a kilogram.

3. *National Standards.*—National standards of length are not legally now referred to natural standards or to physical constants,[4] but it has been shown by A. A. Michelson that a standard of length might be restored, if necessary, by reference to the measurement of wave-lengths of light. Preliminary experiments have given results correct to ±0·5 micron, and it appears probable that by further experiments, results correct to ±1·0μ may be obtained. That is to say, the metre might be redetermined or restored as to its length within one ten-millionth part, by reference to, *e.g.*, 1553163·5 wave-lengths of the red ray of the spectrum of cadmium, in air at 15° C. and 760 mm.

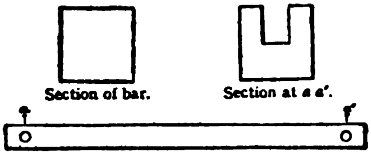

FIG. 1.—Present Imperial Standard Yard, 1844.

Total length of bronze bar, 38 in.; distance *a a'*, 36 in., or the imperial yard; *a a'*, wells sunk to the mid-depth of the bar, at the bottom of each of which is inserted a gold stud, having the defining line of the yard engraved on it.

In all countries the national standards of weights and measures are in the custody of the state, or of some authority administering the government of the country. The standards of the British Empire, so far as they relate to the imperial and metric systems, are in the custody of the Board of Trade. Scientific research is not, of course, bound by official standards.

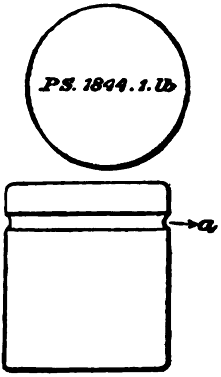

FIG. 2.—Imperial Standard Pound, 1844.

Platinum pound avoirdupois, of cylindrical form, with groove at *a* for lifting the weight.

For the care of these national standards the Standards Department was developed, under the direction of a Royal Commission[5] (of which the late Henry Williams Chisholm was a leading member), to conduct all comparisons and other operations with reference to weights and measures in aid of scientific research or otherwise, which it may be the duty of the state to undertake. Similar standardizing offices are established in other countries (see STANDARDS). Verified "Parliamentary Copies" of the imperial standard are placed at the Royal Mint, with the Royal Society, at the Royal Observatory, and in the Westminster Palace.

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[1] *Troisième Conférence Générale des Poids et Mesures* (Paris, 1901). *Metric Units Com. Roy. Soc.* ([illegible]).

[2] *Phil. Trans.* [illegible] (1895), p. 143.

[3] *Proc. Verbs* [illegible] *Mesures* (1900), p. 84. Congrès I[illegible] 1900.

[illegible]

[4] *Valeur du Mètre*, A. A. Michelson (Paris, 1894); *Units*, Everett, Illustrations of C.G.S. System; *Unités et Étalons*, Guillaume (Paris, 1890); Lupton's Numerical Tables, 1892; Metric Equivalent Cards, 1901; *Dictionary of Metric Measures*, L. Clark (1891); Glazebrook and Shaw's *Physics* (1901).

[5] Report Standards Commission, 1870.

The forms of the four primary standards representing the four units of extension and mass are shown in figs. 1 to 4.

A secondary standard measure for dry goods is the bushel of 1824, containing 8 imperial gallons, represented by a hollow bronze cylinder having a plane base, its internal diameter being double its depth.

The imperial standard measure of capacity is a hollow cylinder (fig. 5) made of brass, with a plane base, of equal height and diameter; which when filled to the brim, as determined by a plane glass disk, contains 10 lb weight of water at $t=62°$ F. B. $=30$ in., weighed in air against brass weights.

4. *Atmospheric Pressure, and Materials.*—In the verification of a precise standard of length there may be taken into account the influence of the variation of atmospheric pressure. Taking the range of the barometer in Great Britain from 28 to 31 in., giving a difference of 3 in. (76 millimetres), which denotes a variation of 103 grammes per square centimetre in the pressure of the atmosphere, the change caused thereby in the length of a standard of linear measurement would appear to be as follows:—

For the yard measure of the form shown in fig. 1 a difference of length equal to 0·000002 in. is caused by the variation of atmospheric pressure from 28 to 31 in. For the metre of the form shown in fig. 3 the difference in length for a variation of 76 mm. in the barometer would be 0·000048 mm. on the metre.

With reference to the materials of which standards of length are made, it appears that the Matthey alloy iridio-platinum (90% platinum, 10% iridium) is probably of all substances the least affected by time or circumstance, and of this costly alloy, therefore, a new copy of the imperial yard has been made. There appears, however, to be some objection to the use of iridio-platinum for weights, as, owing to its great density (Δ=21·57), the slightest abrasion will make an appreciable difference in a weight; sometimes, therefore, quartz or rock-crystal is used; but to this also there is some objection, as owing to its low density (Δ=2·65) there is a large exposed surface of the mass. For small standard weights platinum (Δ=21·45) and aluminium (Δ=2·67) are used, and also an alloy of palladium (60%) and silver (40%) (Δ=11·00).

For ordinary standards of length Guillaume's alloy (*invar*) of nickel (35·7%) and steel (64·3%) is used, as it is a metal that can be highly polished, and is capable of receiving fine graduations. Its coefficient of linear expansion is only 0·0000008 for 1° C.[1]

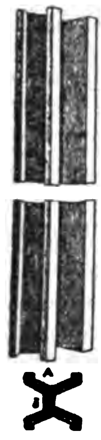

FIG. 3.—National Standard Metre, 1897.

Iridio-platinum bar of Tresca section as shown at A. The two microscopic lines are engraved on the measuring axis of the bar at *b*, one near to each end of the bar. The standard metre (*mètre-à-traits*) was supplemented by the delivery to Great Britain, in 1898, of an end standard metre (*mètre-à-bouts*) also made of iridio-platinum, and also verified by the C.I.P.M. A comparison of the yard with the metre was made by the C.I.P.M. in 1896, and of the pound and kilogram in 1883–1885 (see III. *Commercial*).

5. *Electrical Standards*.—Authoritative standards and instruments for the measurement of electricity, based on the fundamental units of the metric system, have been placed in the Electrical Laboratory of the Board of Trade[2] These include

Current measuring instruments.	The standard ampere, and sub-standards from 1 to 2500 amperes.
Potential measuring instruments.	The standard volt, and sub-standards for the measurement of pressure from 25 to 3000 volts.
Resistance measuring instruments.	The standard ohm, sub-standards up to 100,000 ohms, and below 1 ohm to $\frac{1}{1000}$ ohm.

6. *Temperature.*—In the measurement of temperature the Fahrenheit scale is still followed for imperial standards, and the Centigrade scale for metric standards. At the time of the construction of the imperial standards in 1844, Sheepshanks's Fahrenheit thermometers were used; but it is difficult to say now what the true temperature then, of 62° F., may have been as compared with 62° F., or 16·667° C., of the present normal hydrogen scale. For metrological purposes the C.I.P.M. have adopted as a normal thermometric scale the Centigrade scale of the hydrogen thermometer, having for fixed points the temperature of pure melting ice (0°) and that of the vapour of boiling distilled water (100°), under a normal atmospheric pressure; hydrogen being taken under an initial manometric pressure of 1 metre, that is to say, at $\frac{1000}{760}=1{\cdot}3158$ times the normal atmospheric pressure. This latter is represented by the weight of a column of mercury 760 mm. in height; the specific gravity of mercury being now taken as 13·5950, after Volkmann and Marek, and at the normal intensity followed under this pressure. The value of this intensity is equal to that of the force of gravity at the Bureau International, Paris (at the level of the Bureau), divided by 1·000332; a co-efficient which allows for theoretical reduction to the latitude 45° and to the level of the sea. The length of the metre is independent of the thermometer so far that it has its length at a definite physical point, the temperature of melting ice (0° C.), but there is the practical difficulty that for ordinary purposes measurements cannot be always carried out at 0° C.

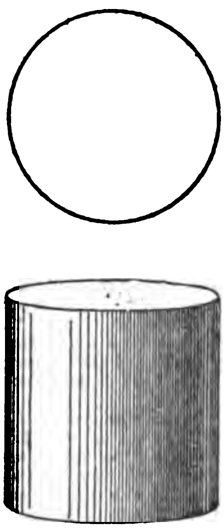

FIG. 4.—National Standard Kilogram, 1897.

The International Geodetic Committee have adopted the metre as their unit of measurement. In geodetic measurements the dimensions of the triangles vary with the temperature of the earth, but these variations in the same region of the earth are smaller than the variations of the temperature of the air, less than 10° C. Adopting as a co-efficient of dilatation of the earth's crust 0·000002, the variations of the distances are smaller than the errors of measurement (see GEODESY).

7. *Standardizing Institutions.*—Besides the State departments dealing with weights and measures, there are other standardizing institutions of recent date. In Germany, *e.g.* there is at Charlottenburg (Berlin) a technical institute (Physikalisch - technische-Reichsanstalt) established under Dr W. Förster in 1887, which undertakes researches with reference to physics and mechanics, particularly as applied to technical industries.[3] In England a National Physical Laboratory (N.P.L.) has been established, based on the German institute, and has its principal laboratory at Bushey House, near Hampton, Middlesex. Here is carried out the work of standardizing measuring instruments of various sorts in use

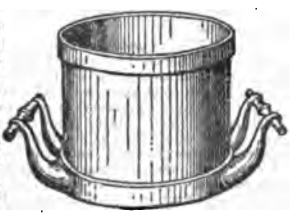

FIG. 5.—Present Imperial Standard Gallon, 1824

by manufacturers, the determination of physical constants and the testing of materials. The work of the Kew Observatory, at the Old Deer Park, Richmond, has also been placed under the direction of the N.P.L. (see III. *Commercial*).[1] The C.I.P.M. at Paris, the first metrological institution, also undertakes verifications for purely scientific purposes. A descriptive list of the verifying instruments of the Standards Department, London, has been published.[2] In the measurement of woollen and other textile fabrics, as to quality, strength, number of threads, &c., there exists at Bradford a voluntary standardizing institution known as the Conditioning House (Bradford Corporation Act 1887), the work of which has been extended to a chemical analysis of fabrics.

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[1] *Rapport du Yard*, Dr Benoit (1896).

[2] Orders in Council (1894).

[3] *Wissenschaftliche Abhandlungen der physikalischen Reichsanstalt*, Band ii. (Berlin, 1900): *Denkschrift betreffend die Tätigkeit der K. Norm.-Aichungs Kommn.* (1869–1900).

8. *Ancient Standards of England and Scotland.*—A "troy pound" and a new standard yard, as well as secondary standards, were constructed by direction of parliament in 1758–1760, and were deposited with the Clerk of the House of Commons. When the Houses of Parliament were burned down in 1834, the pound was lost and the yard was injured. It may here be mentioned that the expression "imperial" first occurs in the Weights and Measures Act of 1824. The injured standard was then lost sight of, but it was in 1891 brought to light by the Clerk of the Journals, and has now been placed in the lobby of the residence of the Clerk of the House, together with a standard "stone" of 14 lb.[3]

In the measurement of liquids the old "wine gallon" (231 cub. in.) was in use in England until 1824, when the present imperial gallon (fig. 5) was legalized; and the wine gallon of 1707 is still referred to as a standard in the United States. Together with the more ancient standard of Henry VII. and of Queen Elizabeth, this standard is deposited in the Jewel Tower at Westminster. They are probably of the Norman period, and were kept in the Pyx Chapel at Westminster, now in the custody of the Commissioners of Works. A sketch of these measures is given in fig. 6.[4]

Besides these ancient standards of England (1495, 1588, 1601) there are at the council chambers of Edinburgh and Linlithgow some of the interesting standards of Scotland, as the Stirling jug or Scots pint, 1618; the choppin or half-pint, 1555 (fig. 7); the Lanark troy and tron weights of the same periods (fig. 8).[5]

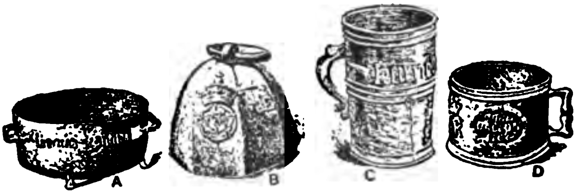

FIG. 6.—A, Winchester Bushel of Henry VII.; B, Standard Hundred-weight (112 lb) of Elizabeth; C, Ale Gallon of Henry VII.; D, the old Wine Gallon.

English Weights and Measures Abolished.—The yard and handful, or 40 in. ell, abolished in 1439. The yard and inch, or 37 in. ell (cloth measure), abolished after 1553; known later as the Scotch ell = 37·06. Cloth ell of 45 in., used till 1600. The yard of Henry VII. = 35·963 in. Saxon moneyers pound, or Tower pound, 5400 grains, abolished in 1527. Mark, ⅔ pound = 3600 grains. Troy pound in use in 1415, established as monetary pound 1527. Troy weight was abolished, from the 1st of January 1879, by the Weights and Measures Act 1878, with the exception only of the Troy ounce, its decimal parts and multiples, legalized in 1853, 16 Vict. c. 29, to be used for the sale of gold and silver articles, platinum and precious stones. Merchant's pound, in 1270 established for all except gold, silver and medicines = 6750 grains, generally superseded by avoirdupois in 1303. Merchant's pound of 7200 grains, from France and Germany, also superseded. ("Avoirdepois" occurs in 1336, and has been thence continued: the Elizabethan standard was probably 7002 grains.) Ale gallon of 1601 = 282 cub. in., and wine gallon of 1707 = 231 cub. in., both abolished in 1824. Winchester corn bushel of 8×268.8 cub. in. and gallon of 274¼ are the oldest examples known (Henry VII.), gradually modified until fixed in 1826 at 277.274, or 10 pounds of water.

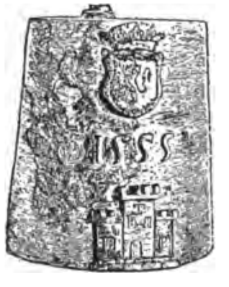

FIG. 7.—The Scots Choppin or Half-Pint, 1555.

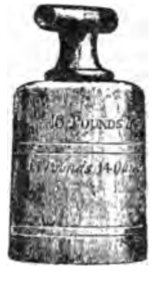

FIG. 8.—Lanark Stone Troy Weight, 1618.

French Weights and Measures Abolished.—Often needed in reading older works.

ligne,	12 = pouce,	12 = pied,	6 = toise,	2000 = lieue de poste.
·08883 in.	1·0658	12·7892	76·735	2·42219 miles.
grain,	72 = gros,	8 = once,	8 = marc,	2 = poids de marc.
·8197 gr.	59·021	472·17	3777·33	1·0792 lb.

Rhineland foot, much used in Germany, = 12·357 in. = the foot of the Scotch or English cloth ell of 37·06 in., or 3×12·353. (H. J. C.)

II. ANCIENT HISTORICAL

Though no line can be drawn between ancient and modern metrology, yet, owing to neglect, and partly to the scarcity of materials, there is a gap of more than a thousand years over which the connexion of units[6] of measure is mostly guess-work. Hence, except in a few cases, we shall not here consider any units of the middle ages. A constant difficulty in studying works on metrology is the need of distinguishing the absolute facts of the case from the web of theory into which each writer has woven them—often the names used, and sometimes the very existence of the units in question, being entirely an assumption of the writer. Again, each writer has his own leaning: A. Böckh, to the study of water-volumes and weights, even deriving linear measures therefrom; V. Queipo, to the connexion with Arabic and Spanish measures; J. Brandis, to the basis of Assyrian standards; Mommsen, to coin weights; and P. Bortolotti to Egyptian units; but F. Hultsch is more general, and appears to give a more equal representation of all sides than do other authors. In this article the tendency will be to trust far more to actual measures and weights than to the statements of ancient writers; and this position seems to be justified by the great increase in materials, and their more accurate means of study. The usual arrangement by countries has been mainly abandoned in favour of following out each unit as a whole, without recurring to it separately for every locality.

The materials for study are of three kinds. (1) *Literary*, both in direct statements in works on measures (*e.g.* Elias of Nisibis), medicine (Galen) and cosmetics (Cleopatra), in ready-reckoners (Didymus), clerk's (kātib's) guides, and like handbooks, and in indirect explanations of the equivalents of measures mentioned by authors (*e.g.* Josephus). But all such sources are liable to the most confounding errors, and some passages relied on have in any case to submit to conjectural emendation. These authors are of great value for connecting the monumental information, but must yield more and more to the increasing evidence of actual weights and measures. Besides this, all their evidence is but approximate, often only stating quantities to a half or quarter of the amount, and seldom nearer than 5 or 10%; hence they are entirely worthless for all the closer questions of the approximation or original identity of standards in different countries; and it is just in this line that the imagination of writers has led them into the greatest speculations, unchecked by accurate evidence of the original standards. (2) *Weights and measures actually remaining.* These are the prime sources, and as they increase and are more fully studied, so the subject will be cleared and obtain a fixed basis. A difficulty has been in the paucity of examples, more due to the neglect of collectors than the rarity of specimens. The number of published weights did not exceed 600 of all standards in 1880; but the collections from Naucratis (28),[1] Defenneh (29) and Memphis (44) have supplied over six times this quantity, and of an earlier age than most other examples, while existing collections have been more thoroughly examined. It is above all desirable to make allowances for the changes which weights have undergone; and, as this has only been done for the above Egyptian collections and that of the British Museum, conclusions as to the accurate values of different standards will here be drawn from these rather than continental sources. (3) *Objects which have been made by measure or weight*, and from which the unit of construction can be deduced. Buildings will generally yield up their builder's foot or cubit when examined (*Inductive Metrology*, p. 9). Vases may also be found bearing such relations to one another as to show their unit of volume. And coins have long been recognized as one of the great sources of metrology—valuable for their wide and detailed range of information, though most unsatisfactory on account of the constant temptation to diminish their weight, a weakness which seldom allows us to reckon them as of the full standard. Another defect in the evidence of coins is that, when one variety of the unit of weight was once fixed on for the coinage, there was (barring the depreciation) no departure from it, because of the need of a fixed value, and hence coins do not show the range and character of the real variations of units as do buildings, or vases, or the actual commercial weights.

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[1] Treasury Committee on National Physical Laboratory, Parliamentary Paper, 1898.

[2] Descriptive List of Standards and Instruments, Parliamentary Paper, 1892.

[3] Report on Standards deposited in House of Commons, 1st November 1891.

[4] S. Fisher, *The Art Journal*, August 1900.

[5] Buchanan, *Ancient Scotch Standards*.

[6] In the absence of the actual standards of ancient times the units of measure and of weight have to be inferred from the other remains; hence unit in this division is used for any more or less closely defined amount of length or weight in terms of which matter was measured.

PRINCIPLE OF STUDY.—1. *Limits of Variation in Different Copies, Places and Times.*—Unfortunately, so very little is known of the ages of weights and measures that this datum—most essential in considering their history—has been scarcely considered. In measure, Egyptians of Dynasty IV. at Gizeh on an average varied 1 in 350 between different buildings (27). Buildings at Persepolis, all of nearly the same age, vary in unit 1 in 450 (25). Including a greater range of time and place, the Roman foot in Italy varied during two or three centuries on an average $\frac{1}{400}$ from the mean. Covering a longer time, we find an average variation of $\frac{1}{300}$ in the Attic foot (25), $\frac{1}{150}$ in the English foot (25), $\frac{1}{170}$ in the English itinerary foot (25). Se we may say that an average variation of $\frac{1}{400}$ by toleration, extending to double that by change of place and time, is usual in ancient measures. In weights of the same place and age there is a far wider range; at Defenneh (29), within a century probably, the average variation of different units is $\frac{1}{36}$, $\frac{1}{60}$, and $\frac{1}{67}$, the range being just the same as in all times and places taken together. Even in a set of weights all found together, the average variation is only reduced to $\frac{1}{50}$, in place of $\frac{1}{36}$ (29). Taking a wider range of place and time, the Roman libra has an average variation of $\frac{1}{50}$ in the examples of better period (43), and in those of Byzantine age $\frac{1}{35}$ (44). Altogether, we see that weights have descended from original varieties with so little intercomparison that no rectification of their values has been made, and hence there is as much variety in any one place and time as in all together. Average variation may be said to range from $\frac{1}{40}$ to $\frac{1}{70}$ in different units, doubtless greatly due to defective balances.

2. *Rate of Variation.*—Though large differences may exist, the rate of general variation is but slow—excluding, of course, all monetary standards. In Egypt the cubit lengthened $\frac{1}{170}$ in some thousands of years (25, 44) The Italian mile has lengthened $\frac{1}{100}$ since Roman times (2); the English mile lengthened about $\frac{1}{200}$ in four centuries (31). The English foot has not appreciably varied in several centuries (25). Of weights there are scarce any dated, excepting coins, which nearly all decrease; the Attic tetradrachm, however, increased $\frac{1}{50}$ in three centuries (28), owing probably to its being below the average trade weight to begin with. Roughly dividing the Roman weights, there appears a decrease of $\frac{1}{40}$ from imperial to Byzantine times (43).

3. *Tendency of Variation.*—This is, in the above cases of lengths, to an increase in course of time. The Roman foot is also probably $\frac{1}{300}$ larger than the earlier form of it, and the later form in Britain and Africa perhaps another $\frac{1}{300}$ larger (25). Probably measures tend to increase and weights to decrease in transmission from time to time or place to place.

4. *Details of Variation.*—Having noticed variation in the gross, we must next observe its details. The only way of examining these is by drawing curves (28, 29), representing the frequency of occurrence of all the variations of a unit; for instance, in the Egyptian unit—the kat—counting in a large number how many occur between 140 and 141 grains, 141 and 142, and so on; such numbers represented by curves show at once where any particular varieties of the unit lie (see *Naukratis*, i. 83). This method is only applicable where there is a large number of examples; but there is no other way of studying the details. The results from such a study—of the Egyptian kat, for example—show that there are several distinct families or types of a unit, which originated in early times, have been perpetuated by copying, and reappear alike in each locality (see *Tanis*, ii. pl. l.). Hence we see that if one unit is derived from another it may be possible, by the similarity or difference of the forms of the curves, to discern whether it was derived by general consent and recognition from a standard in the same condition of distribution as that in which we know it, or whether it was derived from it in earlier times before it became so varied, or by some one action forming it from an individual example of the other standard without any variation being transmitted. As our knowledge of the age and locality of weights increases these criteria in curves will prove of greater value; but even now no consideration of the connexion of different units should be made without a graphic representation to compare their relative extent and nature of variation.

5. *Transfer of Units.*—The transfer of units from one people to another takes place almost always by trade. Hence the value of such evidence in pointing out the ancient course of trade and commercial connexions (17). The great spread of the Phoenician weight on the Mediterranean, of the Persian in Asia Minor and of the Assyrian in Egypt are evident cases; and that the decimal weights of the laws of Manu (43) are decidedly not Assyrian or Persian, but on exactly the Phoenician standard, is a curious evidence of trade by water and not overland. If, as seems probable, units of length may be traced in prehistoric remains, they are of great value; at Stonehenge, for instance, the earlier parts are laid out by the Phoenician foot, and the later by the Pelasgo-Roman foot (26). The earlier foot is continually to be traced in other megalithic remains, whereas the later very seldom occurs (25). This bears strongly on the Phoenician origin of our prehistoric civilization. Again, the Belgic foot of the Tungri is the basis of the present English land measures, which we thus see are neither Roman nor British in origin, but Belgic. Generally a unit is transferred from a higher to a less civilized people; but the near resemblance of measures in different countries should always be corroborated by historical considerations of a probable connexion by commerce or origin (Head, *Historia Numorum*, xxxvii.). It should be borne in mind that in early times the larger values, such as minae, would be transmitted by commerce, while after the introduction of coinage the lesser values of shekels and drachmae would be the units; and this needs notice, because usually a borrowed unit was multiplied or divided according to the ideas of the borrowers, and strange modifications thus arose

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[1] These figures refer to the authorities at the end of this section.

6. *Connexions of Lengths, Volumes and Weights.*—This is the most difficult branch of metrology, owing to the variety of connexions which can be suggested, to the vague information we have, especially on volumes, and to the liability of writers to rationalize connexions which were never intended. To illustrate how easy it is to go astray in this line, observe the continual reference in modern handbooks to the cubic foot as 1000 oz. of water; also the cubic inch is very nearly 250 grains, while the gallon has actually been fixed at 10 lb of water; the first two are certainly mere coincidences, as may very probably be the last also, and yet they offer quite as tempting a base for theorizing as any connexions in ancient metrology. No such theories can be counted as more than coincidences which have been adopted, unless we find a very exact connexion, or some positive statement of origination. The idea of connecting volume and weight has received an immense impetus through the metric system, but it is not very prominent in ancient times. The Egyptians report the weight of a measure of various articles, amongst others water (6), but lay no special stress on it; and the fact that there is no measure of water equal to a direct decimal multiple of the weight-unit, except very high in the scale, does not seem as if the volume was directly based upon weight. Again, there are many theories of the equivalence of different cubic cubits of water with various multiples of talents (2, 3, 18, 24, 33); but connexion by lesser units would be far more probable, as the primary use of weights is not to weigh large cubical vessels of liquid, but rather small portions of precious metals. The Roman amphora being equal to the cubic foot, and containing 80 librae of water, is one of the strongest cases of such relations, being often mentioned by ancient writers. Yet it appears to be only an approximate relation, and therefore probably accidental, as the volume by the examples is too large to agree to the cube of the length or to the weight, differing $\frac{1}{20}$, or sometimes even $\frac{1}{12}$.[1]

Another idea which has haunted the older metrologists, but is still less likely, is the connexion of various measures with degrees on the earth's surface. The lameness of the Greeks in angular measurement would alone show that they could not derive itinerary measures from long and accurately determined distances on the earth.

7. *Connexions with Coinage.*—From the 7th century B.C. onward, the relations of units of weight have been complicated by the need of the interrelations of gold, silver and copper coinage; and various standards have been derived theoretically from others through the weight of one metal equal in value to a unit of another. That this mode of originating standards was greatly promoted, if not started, by the use of coinage we may see by the rarity of the Persian silver weight (derived from the Assyrian standard), soon after the introduction of coinage, as shown in the weights of Defenneh (29). The relative value of gold and silver (17, 21) in Asia is agreed generally to have been 13⅓ to 1 in the early ages of coinage; at Athens in 434 B.C. it was 14:1; in Macedon, 350 B.C., 12½:1; in Sicily, 400 B.C., 15:1, and 300 B.C., 12:1; in Italy in 1st century, it was 12:1, in the later empire 13·9:1, and under Justinian 14·4:1. Silver stood to copper in Egypt as 80:1 (Brugsch), or 120:1 (Revillout); in early Italy and Sicily as 250:1 (Mommsen), or 120:1 (Soutzo), under the empire 120:1, and under Justinian 100:1. The distinction of the use of standards for trade in general, or for silver or gold in particular, should be noted. The early observance of the relative values may be inferred from Num. vii. 13, 14, where silver offerings are 13 and 7 times the weight of the gold, or of equal value and one-half value.

8. *Legal Regulations of Measures.*—Most states have preserved official standards, usually in temples under priestly custody. The Hebrew "shekel of the sanctuary" is familiar; the standard volume of the apet was secured in the dromus of Anubis at Memphis (35); in Athens, besides the standard weight, twelve copies for public comparison were kept in the city; also standard volume measures in several places (2); at Pompeii the block with standard volumes cut in it was found in the portico of the forum (33); other such standards are known in Greek cities (Gythium, Panidum and Trajanopolis) (11, 33); at Rome the standards were kept in the Capitol, and weights also in the temple of Hercules (2); the standard cubit of the Nilometer was before Constantine in the Serapaeum, but was removed by him to the church (2). In England the Saxon standards were kept at Winchester before A.D. 950 and copies were legally compared and stamped; the Normans removed them to Westminster to the custody of the king's chamberlains at the exchequer; and they were preserved in the crypt of Edward the Confessor, while remaining royal property (9). The oldest English standards remaining are those of Henry VII. Many weights have been found in the temenos of Demeter at Cnidus, the temple of Artemis at Ephesus, and in a temple of Aphrodite at Byblus (44); and the making or sale of weights may have been a business of the custodians of the temple standards.

9. *Names of Units.*—It is needful to observe that most names of measures are generic and not specific, and cover a great variety of units. Thus foot, digit, palm, cubit, stadium, mile, talent, mina, stater, drachm, obol, pound, ounce, grain, metretes, medimnus, modius, hin and many others mean nothing exact unless qualified by the name of their country or city. Also, it should be noted that some ethnic qualifications have been applied to different systems, and such names as Babylonian and Euboic are ambiguous; the normal value of a standard will therefore be used here rather than its name, in order to avoid confusion, unless specific names exist, such as *kat* and *uten*.

All quantities stated in this article without distinguishing names are in British units of inch, cubic inch or grain.

Standards of Length.—Most ancient measures have been derived from one of two great systems, that of the cubit of 20·63 in., or the digit of ·729 in.; and both these systems are found in the earliest remains.

20·63 in.—First known in Dynasty IV. in Egypt, most accurately 20·620 in the Great Pyramid, varying 20·51 to 20·71 in Dyn. IV. to VI. (27). Divided decimally in 100ths; but usually marked in Egypt into 7 palms of 28 digits, approximately; a mere juxtaposition (for convenience) of two incommensurate systems (25, 27). The average of several cubit rods remaining is 20·65, age in general about 1000 B.C. (33). At Philae, &c., in Roman times 20·76 on the Nilometers (44). This unit is also recorded by cubit lengths scratched on a tomb at Beni Hasan (44), and by dimensions of the tomb of Rameseu IV. and of Edfu temple (5) in papyri. From this cubit, *mahi*, was formed the *xylon* of 3 cubits, the usual length of a walking-staff; fathom, *nent*, of 4 cubits, and the *khet* of 40 cubits (18); also the *schoenus* of 12,000 cubits, actually found marked on the Memphis-[illegible] road (44).

[illegible] had this unit nearly as early as Egypt. The divided [illegible] lying on the drawing boards of the statues of Gudea ([illegible] 341) are of ½ 20·89, or a span of 10·44, which is [illegible] 16 digits of ·653, a fraction of the cubit also found in Egypt.

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[1] Relative to the uncertain connexion of length, capacity and weight in the ancient metrological systems of the East, Sir Charles Warren, R.E., has obtained by deductive analysis a new equivalent of the original cubit (*Palestine Exploration Fund Quarterly*, April, July, October 1899). He shows that the length of the cubit arose through the weights; that is to say, the original cubit of Egypt was based on the cubic double—cubit of water—and from this the several nations branched off with their measures and weights. For the length of the building cubit Sir C. Warren has deduced a length equivalent to 20·6109 English inches, which compares with a mean Pyramid cubit of 20·6015 in. as hitherto found. By taking all the ancient cubits, there appears to be a remarkable coincidence throughout with 20·6109 in.

Sir C. Warren has derived a primitive unit from a proportion of the human body, by ascertaining the probable mean height of the ancient people in Egypt, and so thereby has derived a standard from the stature of man. The human body has furnished the earliest measure for many races (H. O. Arnold-Forster, *The Coming of the Kilogram*, 1898), as the foot, palm, hand, digit, nail, pace, ell (*ulno*), &c. It seems probable, therefore, that a royal cubit may have been derived from some kingly stature, and its length perpetuated in the ancient buildings of Egypt, as the Great Pyramid, &c.

So far this later research appears to confirm the opinion of Boeckh (2) that fundamental units of measure were at one time derived from weights and capacities. It is curious, how[illegible] that an ancient nation of the East, so wise in g[illegible] should have followed what by modern exper[illegible] method, that of obtaining a [illegible] weights and cubic measu[illegible] through the unit of length

Buildings in Assyria and Babylonia show 20·5 to 20·6. The Babylonian system was sexagesimal, thus (18)—

uban,	5=qat,	6=ammat,	6=qanu,	60=sos,	30=parasang,	2=kaspu.
·69 inch	3·44	20·6	124	7430	223,000	446,000

Asia Minor had this unit in early times—in the temples of Ephesus 20·55, Samos 20·62; Hultsch also claims Priene 20·90, and the stadia of Aphrodisias 20·67 and Laodicea 20·94. Ten buildings in all give 20·63 mean (18, 25); but in Armenia it arose to 20·76 in late Roman times, like the late rise in Egypt (25). It was specially divided into ⅗th, the foot of ⅗ths being as important as the cubit.

12·45 in. ⅗×20·75. This was especially the Greek derivative of the 20·63 cubit. It originated in Babylonia as the foot of that system (24), in accordance with the sexary system applied to the early decimal division of the cubit. In Greece it is the most usual unit, occurring in the Propylaea at Athens 12·44, temple at Aegina 12·40, Miletus 12·51, the Olympic course 12·62, &c. (18); thirteen buildings giving an average of 12·45, mean variation ·06 (25), =⅗ of 20·75, m. var. ·10. The digit=¼ palaeste, =1/16 foot of 12·4; then the system is—

foot,	1½=cubit,	4=orguia			100=	stadion.
	10		=acaena,	10=plethron,	6=	
12·4 in.	18·7	74·7	124·5	1245		7470

In Etruria it probably appears in tombs as 12·45 (25); perhaps in Roman Britain; and in medieval England as 12·47 (25).

13·8 in. ⅔×20·7. This foot is scarcely known monumentally. On three Egyptian cubits there is a prominent mark at the 19th digit or 14 in., which shows the existence of such a measure (33). It became prominent when adopted by Philetaerus about 280 B.C. as the standard of Pergamum (42), and probably it had been shortly before adopted by the Ptolemies for Egypt. From that time it is one of the principal units in the literature (Didymus, &c.), and is said to occur in the temple of Augustus at Pergamum as 13·8 (18). Fixed by the Romans at 16 digits (1⅕=Roman foot), or its cubit at 1⅘ Roman feet, it was legally =13·94 at 123 B.C. (42); and 7½ Philetaerean stadia were=Roman mile (18). The multiples of the 20·63 cubit are in late times generally reckoned in these feet of ⅔ cubit. The name "Babylonian foot" used by Böckh (2) is only a theory of his, from which to derive volumes and weights; and no evidence for this name, or connexion with Babylon, is to be found. Much has been written (2, 3, 33) on supposed cubits of about 17-18 in. derived from 20·63—mainly in endeavouring to get a basis for the Greek and Roman feet; but these are really connected with the digit system, and the monumental or literary evidence for such a division of 20·63 will not bear examination.

17·30 ⅚×20·76. There is, however, fair evidence for units of 17·30 and 1·730 or 1/12 of 20·76 in Persian buildings (25); and the same is found in Asia Minor as 17·25 or ⅚ of 20·70. On the Egyptian cubits a small cubit is marked as about 17 in., which may well be this unit, as ⅚ of 20·6 is 17·2; and, as these marks are placed *before* the 23rd digit or 17·0, they cannot refer to 6 palms, or 17·7, which is the 24th digit, though they are usually attributed to that (33).

We now turn to the second great family based on the digit. This has been so usually confounded with the 20·63 family, owing to the juxtaposition of 28 digits with that cubit in Egypt, that it should be observed how the difficulty of their incommensurability has been felt. For instance, Lepsius (3) supposed two primitive cubits of 13·2 and 20·63, to account for 28 digits being only 20·4 when free from the cubit of 20·63—the first 24 digits being in some cases made shorter on the cubits to agree with the true digit standard, while the remaining 4 are lengthened to fill up to 20·6. In the

·727 in. Dynasties IV. and V. in Egypt the digit is found in tomb sculptures as ·727 (27); while from a dozen examples in the later remains we find the mean ·728 (25). A length of 10 digits is marked on all the inscribed Egyptian cubits as the "lesser span" (33). In Assyria the same digit appears as ·730, particularly at Nimrud (25); and in Persia buildings show the 10-digit length of 7·34 (25). In Syria it was about ·728, but variable; in eastern Asia Minor more like the Persian, being ·732 (25). In these cases the digit itself, or decimal multiples, seem to have been used.

18·23 25×·729. The pre-Greek examples of this cubit in Egypt, mentioned by Böckh (2), give 18·23 as a mean, which is 25 digits of ·729, and has no relation to the 20·63 cubit. This cubit, or one nearly equal, was used in Judaea in the times of the kings, as the Siloam inscription names a distance of 1758 ft. as roundly 1200 cubits, showing a cubit of about 17·6 in. This is also evidently the Olympic cubit; and, in pursuance of the decimal multiple of the digit found in Egypt and Persia, the cubit of 25 digits was ¼ of the orguia of 100 digits, the series being—

old digit,	25=cubit.	4=	orguia,	10=amma,	10=stadion.
	100	=			
·729 inch	18·2		72·9	729	7296.

Then, taking ⅔ of the cubit, or ⅙ of the orguia, as a foot, the Greeks arrived at their foot of 12·14; this, though very well known in literature, is but rarely found, and then generally in the form of the cubit, in monumental measures. The Parthenon step, celebrated as 100 ft. wide, and apparently 225 ft. long, gives by Stuart 12·137, by Penrose 12·165, by Paccard 12·148, differences due to scale and not to slips in measuring. Probably 12·16 is the nearest value. There are but few buildings wrought on this foot in Asia Minor, Greece or Roman remains. The Greek system, however, adopted this foot as a basis for decimal multiplication, forming

foot,	10=acaena,	10=plethron,
12·16 inches	121·6	1216

which stand as ⅙th of the other decimal series based on the digit. This is the agrarian system, in contrast to the orguia system, which was the itinerary series (33).

Then a further modification took place, to avoid the inconvenience of dividing the foot in 16⅔ digits, and a new digit was formed —longer than any value of the old digit—of 1/16 of the foot, or ·760, so that the series ran

digit,	10=lichas			
	96	=orguia,	10=amma,	10=stadion.
·76 inch	7·6	72·9	729	7296.

This formation of the Greek system (25) is only an inference from the facts yet known, for we have not sufficient information to prove it, though it seems much the simplest and most likely history.

11·62 16×·726. Seeing the good reasons for this digit having been exported to the West from Egypt—from the presence of the 18·23 cubit in Egypt, and from the ·729 digit being the decimal base of the Greek long measures—it is not surprising to find it in use in Italy as a digit, and multiplied by 16 as a foot. The more so as the half of this foot, or 8 digits, is marked off as a measure on the Egyptian cubit rods (33). Though Queipo has opposed this connexion (not noticing the Greek link of the digit), he agrees that it is supported by the Egyptian square measure of the plethron, being equal to the Roman actus (33). The foot of 11·6 appears probably first in the prehistoric and early Greek remains, and is certainly found in Etrurian tomb dimensions as 11·59 (25). Dörpfeld considers this as the Attic foot, and states the foot of the Greek metrological relief at Oxford as 11·65 (or 11·61, Hultsch). Hence we see that it probably passed from the East through Greece to Etruria, and thence became the standard foot of Rome; there, though divided by the Italian duodecimal system into 12 unciae, it always maintained its original 16 digits, which are found marked on some of the foot-measures. The well-known ratio of 25:24 between the 12·16 foot and this we see to have arisen through one being ⅙ of 100 and the other 16 digits—16⅔ : 16 being as 25 : 24, the legal ratio. The mean of a dozen foot-measures (1) gives 11·616±·008, and of long lengths and buildings 11·607±·01. In Britain and Africa, however, the Romans used a rather longer form (25) of about 11·68, or a digit of ·730. Their series of measures was—

digitus,	4=palmus,	4=pes,	5=passus,	125=stadium,	8=milliare;
·726 inch	2·90	11·62	58·1	7262	58,100

also

uncia ·968=1/12 pes, palmipes 14·52=5 palmi, cubitus 17·43=6 palmi.

Either from its Pelasgic or Etrurian use or from Romans, this foot appears to have come into prehistoric remains, as the circle of Stonehenge (26) is 100 ft. of 11·68 across, and the same is found in one or two other cases. 11·60 also appears as the foot of some medieval English buildings (25).

We now pass to units between which we cannot state any connexion.

25·1.—The earliest sign of this cubit is in a chamber at Abydos (44) about 1400 B.C.; there, below the sculptures, the plain wall is marked out by red designing lines in spaces of 25·13±·03 in., which have no relation to the size of the chamber or to the sculpture. They must therefore have been marked by a workman using a cubit of 25·13. Apart from medieval and other very uncertain data, such as the Sabbath day's journey being 2000 middling paces for 2000 cubits, it appears that Josephus, using the Greek or Roman cubit, gives half as many more to each dimension of the temple than does the Talmud; this shows the cubit used in the Talmud for temple measures to be certainly not under 25 in. Evidence of the early period is given, moreover, by the statement in 1 Kings (vii. 26) that the brazen sea held 2000 baths; the bath being about 2300 cub. in., this would show a cubic of 25 in. The corrupt text in Chronicles of 3000 baths would need a still longer cubit; and, if a lesser cubit of 21·6 or 18 in. be taken, the result for the size of the bath would be impossibly small. For other Jewish cubits see 18·2 and 21·6. Oppert (24) concludes from inscriptions that there was in Assyria a royal cubit of 7/3 the U cubit, or 25·20; and four monuments show (25) a cubit averaging 25·28. For Persia Queipo (33) relies on, and develops, an Arab statement that the Arab *hashama* cubit was the royal Persian, thus fixing it at about 25 in.; and the Persian guerze at present is 25, the royal guerze being 1½ times this, or 37½ in. As a unit of 1·013, decimally multiplied, is most commonly to be deduced from the ancient Persian buildings, we may take 25·34 as the nearest approach to the ancient Persian unit.

21·6.—The circuit of the city wall of Khorsabad (24) is minutely stated on a tablet as 24,740 ft. (U), and from the actual size the U is therefore 10·806 in. Hence the recorded series of measures on the Senkereh tablet are valued (Oppert) as—

susi,	30=(palm),	3=U,	6=qanu,	2=sa,	5=(s),	12=ss,	30=kasbu.
	60	=U,	60		=(s),		
·18 inch	3·6	10·80	64·8	129·6	648	7776	223,280

Other units are the suklum or ½U=5·4, and cubit of 2U=21·6, which are not named in this tablet. In Persia (24) the series on the same base was—

vitasti,	2 = arasni,	360 = asparasa,	30 = parathañha,	2 = gāv;
10·7 inches	21·4	7704	231,120	462,240

probably

yava,	6 = angusta	10 = vitasti;	and gama = ⅗ arasni;		also bāzu = 2 arasni.	
·18 inch	1·07	10·7	12·8	21·4	42·8	21·4

The values here given are from some Persian buildings (25), which indicate 21·4, or slightly less; Oppert's value, on less certain data, is 21·52. The Egyptian cubits have an arm at 15 digits or about 10·9 marked on them, which seems like this same unit (33).

This cubit was also much used by the Jews (33), and is so often referred to that it has eclipsed the 25·1 cubit in most writers. The Gemara names 3 Jewish cubits (2) of 5, 6 and 7 palms; and, as Oppert (24) shows that 25·2 was reckoned 7 palms, 21·6 being 6 palms, we may reasonably apply this scale to the Gemara list, and read it as 18, 21·6 and 25·2 in. There is also a great amount of medieval and other data showing this cubit of 21·6 to have been familiar to the Jews after their captivity; but there is no evidence for its earlier date, as there is for the 25-in. cubit (from the brazen sea) and for the 18-in. cubit from the Siloam inscription.

From Assyria also it passed into Asia Minor, being found on the city standard of Ushak in Phrygia (33), engraved as 21·8, divided into the Assyrian foot of 10·8, and half and quarter, 5·4 and 2·7. Apparently the same unit is found (18) at Heraclea in Lucania, 21·86; and, as the general foot of the South Italians, or Oscan foot (18), best defined by the 100 feet square being 1/16 of the jugerum, and therefore = 10·80 or half of 21·60. A cubit of 21·5 seems certainly to be indicated in prehistoric remains in Britain, and also in early Christian buildings in Ireland (25).

22·2.—Another unit not far different, but yet distinct, is found apparently in Punic remains at Carthage (25), about 11·16 (22·32), and probably also in Sardinia as 11·07 (22·14), where it would naturally be of Punic origin. In the Hauran 22·16 is shown by a basalt door (British Museum), and perhaps elsewhere in Syria (25). It is of some value to trace this measure, since it is indicated by some prehistoric English remains as 22·4.

20·0.—This unit may be that of the pre-Semitic Mesopotamians, as it is found at the early temple of Muḳayyir (Ur); and, with a few other cases (25), it averages 19·97. It is described by Oppert (24), from literary sources, as the great U of 222 susi or 39·96, double of 19·98; from which was formed a reed of 4 great U or 159·8. The same measure decimally divided is also indicated by buildings in Asia Minor and Syria (25).

19·2.—In Persia some buildings at Persepolis and other places (25) are constructed on a foot of 9·6, or cubit of 19·2; while the modern Persian arish is 38·27 or 2×19·13. The same is found very clearly in Asia Minor (25), averaging 19·3; and it is known in literature as the Pythic foot (18, 33) of 9·75, or ½ of 19·5, if Censorinus is rightly understood. It may be shown by a mark (33) on the 26th digit of Sharpe's Egyptian cubit = 19·2 in.

13·3.—This measure does not seem to belong to very early times, and it may probably have originated in Asia Minor. It is found there as 13·35 in buildings. Hultsch gives it rather less, at 13·1, as the "small Asiatic foot." Thence it passed to Greece, where it is found (25) as 13·36. In Romano-African remains it is often found, rather higher, or 13·45 average (25). It lasted in Asia apparently till the building of the palace at Mashita (A.D. 620), where it is 13·22, according to the rough measures we have (25). And it may well be the origin of the dirá' Stambuli of 26·6, twice 13·3. Found in Asia Minor and northern Greece, it does not appear unreasonable to connect it, as Hultsch does, with the Belgic foot of the Tungri, which was legalized (or perhaps introduced) by Drusus when governor, as ⅛ longer than the Roman foot, or 13·07; this statement was evidently an approximation by an increase of 2 digits, so that the small difference from 13·3 is not worth notice. Further, the pertica was 12 ft. of 18 digits, *i.e.* Drusian feet.

Turning now to England, we find (25) the commonest building foot up to the 15th century averaged 13·22. Here we see the Belgic foot passed over to England, and we can fill the gap to a considerable extent from the itinerary measures. It has been shown (31) that the old English mile, at least as far back as the 13th century, was of 10 and not 8 furlongs. It was therefore equal to 79,200 in., and divided decimally into 10 furlongs 100 chains, or 1000 fathoms. For the existence of this fathom (half the Belgic pertica) we have the proof of its half, or yard, needing to be suppressed by statute (9) in 1439, as "the yard and full hand," or about 40 in.,—evidently the yard of the most usual old English foot of 13·22, which would be 39·66. We can restore then the old English system of long measure from the buildings, the statute-prohibition, the surviving chain and furlong, and the old English mile shown by maps and itineraries, thus:—

foot,	3 = yard,	2 = fathom,	10 = chain,	10 = furlong,	10 = mile.
13·22	39·66	79·32	793	7932	79,320

Such a regular and extensive system could not have been put into use throughout the whole country suddenly in 1250, especially as it must have had to resist the legal foot now in use, which was enforced (9) as early as 950. We cannot suppose that such a system would be invented and become general in face of the laws enforcing the 12-in. foot. Therefore it must be dated some time before the 10th century, and this brings it as near as we can now hope to the Belgic foot, which lasted certainly to the 3rd or 4th century, and is exactly in the line of migration of the Belgic tribes into Britain. It is remarkable how near this early decimal system of Germany and Britain is the double of the modern decimal metric system. Had it not been unhappily driven out by the 12-in. foot, and repressed by statutes both against its yard and mile, we should need but a small change to place our measures in accord with the metre.

The Gallic leuga, or league, is a different unit, being 1·59 British miles by the very concordant itinerary of the Bordeaux pilgrim. This appears to be the great Celtic measure, as opposed to the old English, or Germanic, mile. In the north-west of England and in Wales this mile lasted as 1·56 British miles till 1500; and the perch of those parts was correspondingly longer till this century (31). The "old London mile" was 5000 ft., and probably this was the mile which was modified to 5280 ft., or 8 furlongs, and so became the British statute mile.

STANDARDS OF AREA.—We cannot here describe these in detail. Usually they were formed in each country on the squares of the long measures. The Greek system was—

foot,	36 = hexapodes			
	100 = ...	acaena,	25 = aroura,	4 = plethron.
1·027 sq. ft.	36·96	102.68	2567	10,268

The Roman system was—

pes,	100 = decempeda,	36 = clima,	4 = actus,	2 = jugerum.
·94 sq. ft.	94	3384	13,536	27,072

jugerum,	2 = heredium,	100 = centuria,	4 = saltus.
·6205 acre	1·241	124·1	496·4

STANDARDS OF VOLUME.—There is great uncertainty as to the exact values of all ancient standards of volume—the only precise data being those resulting from the theories of volumes derived from the cubes of feet and cubits. Such theories, as we have noticed, are extremely likely to be only approximations in ancient times, even if recognized then; and our data are quite inadequate for clearing the subject. If certain equivalences between volumes in different countries are stated here, it must be plainly understood that they are only known to be approximate results, and not to give a certain basis for any theories of derivation. All the actual monumental data that we have are alluded to here, with their amounts. The impossibility of safe correlation of units necessitates a division by countries.

Egypt.—The hon was the usual small standard; by 8 vases which have contents stated in hons (8, 12, 20, 22, 33, 40) the mean is 29·2 cub. in. ± ·6; by 9 unmarked pottery measures (30) 29·1 ± ·16, and divided by 20; by 18 vases, supposed multiples of hon (1), 32·1 ± ·2. These last are probably only rough, and we may take 29·2 cub. in. ± ·5. This was reckoned (6) to hold 5 utens of water (uten ∴ 1470 grains), which agrees well to the weight; but this was probably an approximation, and not derivative, as there is (14) a weight called shet of 4·70 or 4·95 uten, and this was perhaps the actual weight of a hon. The variations of hon and uten, however, cover one another completely. From ratios stated before Greek times (35) the series of multiples was—

ro,	8 = hon,	4 = honnu,	10 = apet or besha	4 = tama	........10 = (Theban),	10 = sa.
3·65 cub. in.	29·2	116·8	1168	4672	11,680	116,800

(Theban) is the "great Theban measure."

In Ptolemaic times the artaba (2336·), modified from the Persian, was general in Egypt, a working equivalent to the Attic metretes—value 2 apet or ½ tama; medimnus = tama or 2 artabas, and fractions down to 1/160 artaba (35). In Roman times the artaba remained (Didymus), but ⅓ was the usual unit (name unknown), and this was divided down to 1/24 or 1/144 artaba (35)—thus producing by 1/72 artaba a working equivalent to the xestes and sextarius (35). Also a new Roman artaba (Didymus) of 1540· was brought in. Beside the equivalence of the hon to 5 utens weight of water, the mathematical papyrus (35) gives 5 besha = ⅔ cubic cubit (Revillout's interpretation of this as 1 cubit^3 is impossible geometrically; see *Rev. Eg.*, 1881, for data); this is very concordant, but it is very unlikely for 3 to be introduced in an Egyptian derivation, and probably therefore only a working equivalent. The other ratio of Revillout and Hultsch, 320 hons = cubit^3, is certainly approximate.

Syria, Palestine and Babylonia.—Here there are no monumental data known; and the literary information does not distinguish the closely connected, perhaps identical, units of these lands. Moreover, none of the writers are before the Roman period, and many relied on are medieval rabbis. A large number of [illegible] are rough (2, 18, 33), being based on the working equivalence of the bath or epha with the Attic metretes, from which are sometimes drawn fractional statements which seem more accurate than they are. This, however, shows the bath to be about 2500 cub. in. There are two better data (2) of Epiphanius and Theodoret—Attic medimnus = 1½ baths, and saton (⅓ bath) = 1⅔ modii; these give about [illegible] and 2260 cub. in. The best datum is in Josephus [illegible] where 10 baths = 41 Attic or 31 Sicilian medimni, [illegible] must read modii (33); hence the bath [illegible] three different [illegible] Greek and [illegible]

Punic variant of the ⅓ bath or saton of Phoenicia. One close datum, if trustworthy, would be log of water = Assyrian mina ∴ bath about 2200 cub. in. The rabbinical statement of cub. cubit of 21·5 holding 320 logs puts the bath at about 2250 cub. in.; their log-measure, holding six hen's eggs, shows it to be over rather than under this amount; but their reckoning of bath = ⅛ cubit cubed is but approximate; by 21·5 it is 1240, by 25·1 it is 1990 cubic in. The earliest Hebrew system was—

log, 4=kab) …………3=hin, 6} = {bath, or epha}, 10={homer—wet. or kor—dry.}
'issarón……………19}
32 cub. in. 128 230 383 ? 2300 23,000

'Issarón ("tenth-deal") is also called gomer. The log and kab are not found till the later writings; but the ratio of hin to 'issarón is practically fixed in early times by the proportions in Num. xv. 4-9. Epiphanius stating great hin = 18 xestes, and holy hin = 9, must refer to Syrian xestes, equal to 24 and 12 Roman; this makes holy hin as above, and great hin a double hin, *i.e.* seah or saton. His other statements of saton = 56 or 50 sextaria remain unexplained, unless this be an error for bath = 56 or 50 Syr. sext. and ∴ = 2290 or 2560 cub. in. The wholesale theory of Revillout (35) that all Hebrew and Syrian measures were doubled by the Ptolemaic revision, while retaining the same names, rests entirely on the resemblance of the names apet and epha, and of log to the Coptic and late measure lok. But there are other reasons against accepting this, besides the improbability of such a change.

The Phoenician and old Carthaginian system was (18)—

log,	4=kab,	6=saton,	30=corus,
31 cub. in.	123	740	22,200

valuing them by 31 Sicilian = 41 Attic modii (Josephus, above).

The old Syrian system was (18)—

cotyle,	2=Syr. xestes,	18=sabitha or saton,	1½=collathon,	2=bath-artaba;
21 cub. in.	41	740	1110	2220

also

Syr. xestes,	45=maris,	2=metretes or artaba.
41	1850	3700

The later or Seleucidan system was (18)—

cotyle,	2=Syr. xestes,	90=Syr. metretes,
22	44	4000

the Syrian being 1¼ Roman sextarii.

The Babylonian system was very similar (18)—

(½), 4=capitha, {15=maris / 18= ……epha}, 10=homer, 6=achane.
33 cub. in. 132 1980 2380 23,800 142,800

The approximate value from capitha = 2 Attic choenices (Xenophon) warrants us in taking the achane as fixed in the following system, which places it closely in accord with the preceding.

In Persia Hultsch states—

capetis…………48=artaba, 40} =achane,
maris………… 72}
74·4 cub. in. 1983 3570 142,800

the absolute values being fixed by artaba = 51 Attic choenices (Herod. i. 192). The maris of the Pontic system is ⅙ of the above, and the Macedonian and Naxian maris ¹⁄₆ of the Pontic (18). By the theory of maris = ⅕ of 20·6³ it is 1755·; by maris = Assyrian talent, 1850, in place of 1850 or 1980 stated above; hence the more likely theory of weight, rather than cubit, connexion is nearer to the facts.

Aeginetan System.—This is so called from according with the Aeginetan weight. The absolute data are all dependent on the Attic and Roman systems, as there are no monumental data. The series of names is the same as in the Attic system (18). The values are 1½ × the Attic (Athenaeus, Theophrastus, &c.) (2, 18), or more closely 11 to 12 times ⅛ of Attic. Hence, the Attic cotyle being 17·5 cub. in., the Aeginetan is about 25·7. The Boeotian system (18) included the achane; if this = Persian, then cotyle = 24·7. Or, separately through the Roman system, the mnasis of Cyprus (18) = 170 sextarii; then the cotyle = 24·8. By the theory of the metretes being 1½ talents Aeginetan, the cotyle would be 23·3 to 24·7 cub. in. by the actual weights, which have tended to decrease. Probably then 25·0 is the best approximation. By the theory (18) of 2 metretes = cube of the 18·67 cubit from the 12·45 foot, the cotyle would be about 25·4, within ·4; but then such a cubit is unknown among measures, and not likely to be formed, as 12·4 is ⅗ of 20·6. The Aeginetan system then was—

cotyle, 4=choenix, {3=chous…………………16 / 8=……hecteus, 4=metretes, 1½} =medimnus.
25 cub. in. 100 300 800 3200 4800

This was the system of Sparta, of Boeotia (where the aporryma = 4 choenices, the cophinus = 6 choenices, and saites or saton or [illegible] = 2 aporrymae, while 30 medimni = achane, evidently Asiatic connexions throughout), and of Cyprus (where 2 choes = Cyprian medimnus, of which 5 = medimnus of Salamis, of which 2 = [illegible] (18).

Attic or Usual Greek System.—The absolute value of this system [illegible] The best [illegible] stone slabs, each with [illegible] cut [illegible] and two named vases. [illegible] is 15·4 (best, others [illegible] Panidum slab 17·1 [illegible] om the Ganus slab [illegible] 5 as a fair approximation. It is supposed that the Panathenaic vases were intended as metretes; this would show a cotyle of 14·4–17·1. The theories of connexion give, for the value of the cotyle, metretes = Aeginetan talent, ∴ 15·4–16·6; metres ⁴⁄₃ of 12·16 cubed, ∴ 16·6; metretes = [illegible] of 12·16 cubed, ∴ 16·8; medimnus = 2 Attic talents, hecteus = 20 minae, choenix = 2½ minae, ∴ 16·75; metretes = 3 cub. spithami (½ cubit = 9·12), ∴ 17·5; 6 metretes = 2 ft. of 12·45 cubed, ∴ 17·8 cub. in. for cotyle. But probably as good theories could be found for any other amount; and certainly the facts should not be set aside, as almost every author has done, in favour of some one of half a dozen theories. The system of multiples was for liquids—

cyathus,	1½=oxybaphon,	4=cotyle,	12=chous,	12=metretes,
2·9 cub. in.	4·4	17·5	210	2520

with the tetarton (8·8), 2 = cotyle, 2 = xestes (35·), introduced from the Roman system. For dry measure—

cyathus,	6=cotyle,	4=choenix,	8=hecteus,	6=medimnus,
2·9 cub. in.	17·5	70	560	3360

with the xestes, and amphoreus (1680) = ½ medimnus, from the Roman system. The various late provincial systems of division are beyond our present scope (18).

System of Gythium.—A system differing widely both in units and names from the preceding is found on the standard slab of Gythium in the southern Peloponnesus (*Rev. Arch.*, 1872). Writers have unified it with the Attic, but it is decidedly larger in its unit, giving 19·4 (var. 19·1–19·8) for the supposed cotyle. Its system is—

cotyle,	4=hemihecton,	4=chous,	3=(n).
58 cub. in.	233	932	2796

And with this agrees a pottery cylindrical vessel, with official stamp on it (ΔΗΜΟΣΙΟΝ, &c.), and having a fine black line traced round the inside, near the top, to show its limit; this seems to be probably very accurate, and contains 58·5 cub. in., closely agreeing with the cotyle of Gythium. It has been described (*Rev. Arch.*, 1872) as an Attic choenix. Gythium being the southern port of Greece, it seems not too far to connect this 58 cub. in. with the double of the Egyptian hon = 58·4, as it is different from every other Greek system.

Roman System.—The celebrated Farnesian standard congius of bronze of Vespasian, "mensurae exactae in Capitolio P. X.," contains 206·7 cub. in. (2), and hence the amphora 1654. By the sextarius of Dresden (2) the amphora is 1695; by the congius of Ste Geneviève (2) 1700 cub. in.; and by the ponderarium measures at Pompeii (33) 1540 to 1840, or about 1620 for a mean. So the Farnesian congius, or about 1650, may best be adopted. The system for liquid was—

quartarius,	4=sextarius,	6=congius,	4=urna,	2=amphora,
8·6 cub. in.	34·4	206	825	1650

for dry measure 16 sextarii = modius, 550 cub. in.; and to both systems were added from the Attic the cyathus (2·87), acetabulum (4·3) and hemina (17·2 cub. in.). The Roman theory of the amphora being the cubic foot makes it 1569 cub. in., or decidedly less than the actual measures; the other theory of its containing 80 librae of water would make it 1575 by the commercial or 1605 by the monetary libra—again too low for the measures. Both of these theories therefore are rather working equivalents than original derivations; or at least the interrelation was allowed to become far from exact.

Indian and Chinese Systems.—On the ancient Indian system see *Numismata Orientalia*, new ed., i. 24; on the ancient Chinese, *Nature*, xxx. 565, and xxxv. 318.

STANDARDS OF WEIGHT.—For these we have far more complete data than for volumes or even lengths, and can ascertain in many cases the nature of the variations, and their type in each place. The main series on which we shall rely here are those—(1) from Assyria (38) about 800 B.C.; (2) from the eastern Delta of Egypt (29) (Defenneh); (3) from western Delta (28) (Naucratis); (4) from Memphis (44)—all these about the 6th century B.C., and therefore before much interference from the decreasing coin standards; (5) from Cnidus; (6) from Athens; (7) from Corfu; and (8) from Italy (British Museum) (44). As other collections are but a fraction of the whole of these, and are much less completely examined, little if any good would be done by including them in the combined results, though for special types or inscriptions they will be mentioned.

140 grains.—The Egyptian unit was the kat, which varied between 138 and 155 grains (28, 29). There were several families or varieties within this range, at least in the Delta, probably five or six in all (29). The original places and dates of these cannot yet be fixed, except for the lowest type of 138–140 grains; this belonged to Heliopolis (7), as two weights (35) inscribed of "the treasury of An" show 139·9 and 140·4, while a plain one from there gives 138·8; the variety 147–149 may belong to Hermopolis (35), according to an inscribed weight. The names of the kat and tema are fixed by being found on weights, the uten by inscriptions; the series was—

(n),	10=kat,	10=uten,	10=tema.
14·6 grs.	146	1460	14,600.

The tema is the same name as the large wheat measure (35), which was worth 30,000 to 19,000 grains of copper, according to Ptolemaic receipts and accounts (*Rev. Eg.*, 1881, 150), and therefore very likely worth 10 utens of copper in earlier times when metals were scarcer. The kat was regularly divided into 10; but another division, for the sake of interrelation with another system, was in ⅓ and ⅙.

scarcely found except in the eastern Delta, where it is common (29); and it is known from a papyrus (38) to be a Syrian weight. The uten is found ÷6 = 245, in Upper Egypt (rare) (44). Another division (in a papyrus) (38) is a silver weight of $\frac{3}{5}$ kat = about 88—perhaps the Babylonian siglus of 86. The uten was also binarily divided into 128 peks of gold in Ethiopia; this may refer to another standard (see 129) (33). The Ptolemaic copper coinage is on two bases—the uten, binarily divided, and the Ptolemaic five shekels (1050), also binarily divided. (This result is from a larger number than other students have used, and study by diagrams.) The theory (3) of the derivation of the uten from $\frac{1}{1500}$ cubic cubit of water would fix it at 1472, which is accordant; but there seems no authority either in volumes or weights for taking 1500 utens. Another theory (3) derives the uten from $\frac{1}{1000}$ of the cubic cubit of 24 digits, or better $\frac{6}{7}$ of 20·63; that, however, will only fit the very lowest variety of the uten, while there is no evidence of the existence of such a cubit. The kat is not unusual in Syria (44), and among the haematite weights of Troy (44) are nine examples, average 144, but not of extreme varieties.

129 grs.; 258 grs.
7750; 15,500;
465,000.

The great standard of Babylonia became the parent of several other systems; and itself and its derivatives became more widely spread than any other standard. It was known in two forms—one system (24) of—

um,	60=sikhir,	6=shekel,	10=stone,	6=maneh,	60=talent;
·36 grs.	21·5	129	1290	7750	465,000

and the other system double of this in each stage except the talent. These two systems are distinctly named on the weights, and are known now as the light and heavy Assyrian systems (19, 24). (It is better to avoid the name Babylonian, as it has other meanings also.) There are no weights dated before the Assyrian bronze lion weights (9, 17, 19, 38) of the 11th to 8th centuries B.C. Thirteen of this class average 127·2 for the shekel; 9 haematite barrel-shaped weights (38) give 128·2; 16 stone duck-weights (38), 126·5. A heavier value is shown by the precious metals—the gold plates from Khorsabad (18) giving 129, and the gold daric coinage (21, 35) of Persia 129·2. Nine weights from Syria (44) average 128·8. This is the system of the "Babylonian" talent, by Herodotus = 70 minae Euboic, by Pollux = 70 minae Attic, by Aelian = 72 minae Attic, and, therefore, about 470,000 grains. In Egypt this is found largely at Naucratis (28, 29), and less commonly at Defenneh (29). In both places the distribution, a high type of 129 and a lower of 127, is like the monetary and trade varieties above noticed; while a smaller number of examples are found, fewer and fewer, down to 118 grains. At Memphis (44) the shekel is scarcely known, and a $\frac{1}{3}$ mina weight was there converted into another standard (of 200). A few barrel weights are found at Karnak, and several egg-shaped shekel weights at Gebelen (44); also two cuboid weights from there (44) of 1 and 10 utens are marked as 6 and 60, which can hardly refer to any unit but the heavy shekel, giving 245. Hultsch refers to Egyptian gold rings of Dynasty XVIII. of 125 grains. That this unit penetrated far to the south in early times is shown by the tribute of Kush (34) in Dynasty XVIII.; this is of 801, 1443 and 23,741 kats, or 15 and 27 manehs and 7½ talents when reduced to this system. And the later Ethiopic gold unit of the pek (7), or $\frac{1}{128}$ of the uten, was 10·8 or more, and may therefore be the $\frac{1}{2}$ sikhir or obolos of 21·5. But the fraction $\frac{1}{128}$, or a continued binary division repeated seven times, is such a likely mode of rude subdivision that little stress can be laid on this. In later times in Egypt a class of large glass scarabs for funerary purposes seem to be adjusted to the shekel (30). Whether this system or the Phoenician of 224 grains was that of the Hebrews is uncertain. There is no doubt but that in the Maccabean times and onward 218 was the shekel; but the use of the word darkemôn by Ezra and Nehemiah, and the probabilities of their case, point to the darag-maneh, $\frac{1}{60}$ maneh or shekel of Assyria; and the mention of $\frac{1}{3}$ shekel by Nehemiah as poll tax nearly proves that the 129 and not 218 grains is intended, as 218 is not divisible by 3. But the Maccabean use of 218 may have been a reversion to the older shekel; and this is strongly shown by the fraction $\frac{1}{4}$ shekel (1 Sam. ix. 8), the continual mention of large decimal numbers of shekels in the earlier books, and the certain fact of 100 shekels being = mina. This would all be against the 129 or 258 shekel, and for the 218 or 224. There is, however, one good datum if it can be trusted: 300 talents of silver (2 Kings xviii. 14) are 800 talents on Sennacherib's cylinder (34), while the 30 talents of gold is the same in both accounts. Eight hundred talents on the Assyrian silver standard would be 267—or roundly 300—talents on the heavy trade or gold system, which is therefore probably the Hebrew. Probably the 129 and 224 systems coexisted in the country; but on the whole it seems more likely that 129 or rather 258 grains was the Hebrew shekel before the Ptolemaic times—especially as the 100 shekels to the mina is paralleled by the following Persian system (Hultsch)—

shekel.	{ 50=mina . . .		60=talent of gold	
	{ 60= . . .	.mina.		60=talent of trade,
129 grs.	6450	7750	387,000	465,000

the Hebrew system being

gerah,	20=shekel,	100=maneh,	30=talent,
12·9 grs.	258?	25,800	774,000

and, considering that the two Hebrew cubits are the Babylonian and Persian units, and the volumes are also Babylonian, it is the more likely that the weights should have come with these. From the east this unit passed to Asia Minor; and six multiples of 2 to 20 shekels (av. 127) are found among the haematite weights of Troy (44), including the oldest of them. On the Aegean coast it often occurs in early coinage (17)—at Lampsacus 131–129, Phocaea 256–254, Cyzicus 252–247, Methymna 124·6, &c. In later times it was a main unit of North Syria, and also on the Euxine, leaden weights of Antioch (3), Callatia and Tomis being known (38). The mean of these eastern weights is 7700 for the mina, or 128. But the leaden weights of the west (44) from Corfu, &c., average 7580, or 126·3; this standard was kept up at Cyzicus in trade long after it was lost in coinage. At Corinth the unit was evidently the Assyrian and not the Attic, being 129·6 at the earliest (17) (though modified to double Attic, or 133, later) and being ÷3, and not into 2 drachms. And this agrees with the mina being repeatedly found at Corcyra, and with the same standard passing to the Italian coinage (17) similar in weight, and in division into $\frac{1}{3}$—the heaviest coinages (17) down to 400 B.C. (Terina, Velia, Sybaris, Posidonia, Metapontum, Tarentum, &c.) being none over 126, while later on many were adjusted to the Attic, and rose to 134. Six disk weights from Carthage (44) show 126. It is usually the case that a unit lasts later in trade than in coinage; and the prominence of this standard in Italy may show how it is that this mina (18 unciae = 7400) was known as the "Italic" in the days of Galen and Dioscorides (2).

126 grs.
6300.

A variation on the main system was made by forming a mina of 50 shekels. This is one of the Persian series (gold), and the $\frac{1}{4}$ of the Hebrew series noted above. But it is most striking when it is found in the mina form which distinguishes it. Eleven weights from Syria and Cnidus (44) (of the curious type with two breasts on a rectangular block) show a mina of 6250 (125·0); and it is singular that this class is exactly like weights of the 224 system found with it, but yet quite distinct in standard. The same passed into Italy and Corfu (44), averaging 6000—divided in Italy into unciae ($\frac{1}{12}$), and scripulae ($\frac{1}{288}$), and called litra (in Corfu?). It is known in the coinage of Hatria (18) as 6320. And a strange division of the shekel in 10 (probably therefore connected with this decimal mina) is shown by a series of bronze weights (44) with four curved sides and marked with circles (British Museum, place unknown), which may be Romano-Gallic, averaging 125 ÷ 10. This whole class seems to cling to sites of Phoenician trade, and to keep clear of Greece and the north—perhaps a Phoenician form of the 129 system, avoiding the sexagesimal multiples.

If this unit have any connexion with the kat, it is that a kat of gold is worth 15 shekels or $\frac{1}{4}$ mina of silver; this agrees well with the range of both units, only it must be remembered that 129 was used as gold unit, and another silver unit deduced from it. More likely then the 147 and 129 units originated independently in Egypt and Babylonia.

86 grs.
8600;
516,000.

From 129 grains of gold was adopted an equal value of silver = 1720, on the proportion of 1 : 13⅓, and this was divided in 10 = 172—which was used either in this form, or its half, 86, best known as the siglus (17). Such a proportion is indicated in Num. vii., where the gold spoon of 10 shekels is equal in value to the bowl of 130 shekels, or double that of 70, *i.e.* the silver vessels were 200 and 100 sigli. The silver plates at Khorsabad (18) we find to be 80 sigli of 84·6. The Persian silver coinage shows about 86·0; the danak was $\frac{1}{3}$ of this or 28·7, Xenophon and others state it at about 84. As a monetary weight it seems to have spread, perhaps entirely, in consequence of the Persian dominion; it varies from 174· downwards, usually 167, in Aradus, Cilicia and on to the Aegean coast, in Lydia and in Macedonia (17). The silver bars found at Troy averaging 2744, or $\frac{1}{3}$ mina of 8232, have been attributed to this unit (17); but no division of the mina in $\frac{1}{3}$ is to be expected, and the average is rather low. Two haematite weights from Troy (44) show 86 and 87·2. The mean from leaden weights of Chios, Tenedos (44), &c., is 8430. A duck-weight of Camirus, probably early, gives 8480; the same passed on to Greece and Italy (17), averaging 8610; but in Italy it was divided, like all other units, into unciae and scripulae (44). It is perhaps found in Etrurian coinage as 175–172 (17). By the Romans it was used on the Danube (18), two weights of the first legion there showing 8610; and this is the mina of 20 unciae (8400) named by Roman writers. The system was—

obol,	6=siglus,	100=mina,	60=talent.
14·3 grs.	86	8600	516,000

A derivation from this was the $\frac{1}{3}$ of 172, or 57·3, the so-called Phocaean drachma, equal in silver value to the $\frac{1}{60}$ of the gold 258 grains. It was used at Phocaea as 58·5, and passed to the colonies of Posidonia and Velia as 59 or 118. The colony of Massilia brought it into Gaul as 58·2–54·9.

224 grs.
11,200;
672,000.

That this unit (commonly called Phoenician) is [illegible] from the 129 system can hardly be doubted, [illegible] so intimately associated in Syria and [illegible] relation is 258 : 229 :: 9:8; but the [illegible] the descent took place is not settled; [illegible] 57 of silver or a drachm, $\frac{1}{4}$ of 230 (or [illegible] otherwise, deriving it from the [illegible] the drachm is $\frac{1}{3}$ of the stater, [illegible] 28·7, and the sacred unit [illegible] 27; or thirdly, what [illegible] gold was equal to 1150 of silver, 5 shekels or $\frac{1}{10}$ mina. Other proposed derivations from the kat or pek are not satisfactory. In actual use this unit varied greatly: at Naucratis (29) there are groups of it at 231, 223 and others down to 208; this is the earliest form in which we can study it, and the corresponding values to these are 130 and 126, or the gold and trade varieties of the Babylonian, while the lower tail down to 208 corresponds to the shekel down to 118, which is just what is found. Hence the 224 unit seems to have been formed from the 129, after the main families or types of that had arisen. It is scarcer at Defenneh (29) and rare at Memphis (44). Under the Ptolemies, however, it became the great unit of Egypt, and is very prominent in the later literature in consequence (18, 35). The average of coins (21) of Ptolemy I. gives 219·6, and thence they gradually diminish to 210, the average (33) of the whole series of Ptolemies being 218. The "argenteus" (as Revillout transcribes a sign in the papyri) (35) was of 5 shekels, or 1090; it arose about 440 B.C., and became after 160 B.C. a weight unit for copper. In Syria, as early as the 15th century B.C., the tribute of the Rutennu, of Naharaina, Megiddo, Anaukasa, &c. (34), is on a basis of 454–484 kats, or 300 shekels ($\frac{1}{10}$ talent) of 226 grains. The commonest weight at Troy (44) is the shekel, averaging 224. In coinage it is one of the commonest units in early times; from Phoenicia, round the coast to Macedonia, it is predominant (17); at a maximum of 230 (Ialysus), it is in Macedonia 224, but seldom exceeds 220 elsewhere, the earliest Lydian of the 7th century being 219, and the general average of coins 218. The system was—

(1).	8=drachm,	4=shekel,	25=mina,	120=talent.
7 grs.	56	224	5600	672,000

From the Phoenician coinage it was adopted for the Maccabean. It is needless to give the continual evidences of this being the later Jewish shekel, both from coins (max. 223) and writers (2, 18, 33); the question of the early shekel we have noticed already under 129. In Phoenicia and Asia Minor the mina was specially made in the form with two breasts (44), 19 such weights averaging 5600 (=224); and thence it passed into Greece, more in a double value of 11,200 (=224). From Phoenicia this naturally became the main Punic unit; a bronze weight from Iol (18), marked 100, gives a drachma of 56 or 57 (224–228); and a Punic inscription (18) names 28 drachmae =25 Attic, and ∴ 57 to 59 grains (228–236); while a probably later series of 8 marble disks from Carthage (44) show 208, but vary from 197 to 234. In Spain it was 236 to 216 in different series (17), and it is a question whether the Massiliote drachmae of 58-55 are not Phoenician rather than Phocaic. In Italy this mina became naturalized, and formed the "Italic mina" of Hero, Priscian, &c.; also its double, the mina of 26 unciae or 10,800, =50 shekels of 216; the average of 42 weights gives 5390 (=215·6), and it was divided both into 100 drachmae, and also in the Italic mode of 12 unciae and 288 scripulae (44). The talent was of 120 minae of 5400, or 3000 shekels, shown by the talent from Herculaneum, TA, 660,000 and by the weight inscribed PONDO CXXV. (*i.e.* 125 librae) TALENTUM SICLORUM. iii., *i.e.* talent of 3000 shekels (2) (the M being omitted; just as Epiphanius describes this talent as 125 librae, or *θ* (=9) nomismata, for 9000). This gives the same approximate ratio 96:100 to the libra as the usual drachma reckoning. The Alexandrian talent of Festus, 12,000 denarii, is the same talent again. It is believed that this mina ÷ 12 unciae by the Romans is the origin of the Arabic raṭl of 12 ūkīyas, or 5500 grains (33), which is said to have been sent by Harun al-Rashid to Charlemagne, and so to have originated the French monetary pound of 5666 grains. But, as this is probably the same as the English monetary pound, or tower pound of 5400, which was in use earlier (see Saxon coins), it seems more likely that this pound (which is common in Roman weights) was directly inherited from the Roman civilization.

80 grs.
4000;
400,000.

Another unit, which has scarcely been recognized in metrology hitherto, is prominent in the weights from Egypt—some 50 weights from Naucratis and 15 from Defenneh plainly agreeing on this and on no other basis. Its value varies between 76·5 and 81·5—mean 79 at Naucratis (29) or 81 at Defenneh (29). It has been connected theoretically with a binary division of the 10 shekels or "stone" of the Assyrian systems (28), 1290 ÷ 16 being 80·6; this is suggested by the most usual multiples being 40 and 80=25 and 50 shekels of 129; it is thus akin to the mina of 50 shekels previously noticed. The tribute of the Asi, Rutennu, Khita, Assaru, &c., to Thothmes III. (34), though in uneven numbers of kats, comes out in round thousands of units when reduced to this standard. That this unit is quite distinct from the Persian 86 grains is clear in the Egyptian weights, which maintain a wide gap between the two systems. Next, in Syria three inscribed weights of Antioch and Berytus (18) show a mina of about 16,400, or 200×82. Then at Abydus, or more probably from Babylonia, there is the large bronze lion-weight, stated to have been originally [illegible] grains; [illegible] originally [illegible] nt writers, [illegible] of the [illegible] he numeral [illegible] 4005; and [illegible] nts to a [illegible] al Greek [illegible] ÷ 100 = [illegible] verlooked [illegible] earliest coinage in Cilicia, before the general Persian coinage (17) about 380 B.C., is Tarsus, 164 grains; Soli, 169, 163, 158; Nagidus, 158, 161-153 later; Issus, 166; Mallus, 163-154—all of which can only by straining be classed as Persian; but they agree to this standard, which, as we have seen, was used in Syria in earlier times by the Khita, &c. The Milesian or "native" system of Asia Minor (18) is fixed by Hultsch at 163 and 81·6 grains—the coins of Miletus (17) showing 160, 80 and 39. Coming down to literary evidence, this is abundant. Böckh decides that the "Alexandrian drachma" was $\frac{6}{5}$ of the Solonic 67, or = 80·5, and shows that it was not Ptolemaic, or Rhodian, or Aeginetan, being distinguished from these in inscriptions (2). Then the "Alexandrian mina" of Dioscorides and Galen (2) is 20 unciae = 8250; in the "Analecta" (2) it is 150 or 158 drachmae = 8100. Then Attic: Euboic or Aeginetan :: 18:25 in the metrologists (2), and the Euboic talent = 7000 "Alexandrian" drachmae; the drachma therefore is 80·0. The "Alexandrian" wood talent: Attic talent : : 6:5 (Hero, Didymus), and ∴ 480,000, which is 60 minae of 8000. Pliny states the Egyptian talent at 80 librae = 396,000; evidently = the Abydus lion talent, which is ÷ 100, and the mina is ∴ 3960, or 50×79·2. The largest weight is the "wood" talent of Syria (18) = 6 Roman talents, or 1,860,000, evidently 120 Antioch minae of 15,500 or 2×7750. This evidence is too distinct to be set aside; and, exactly confirming as it does the Egyptian weights and coin weights, and agreeing with the early Asiatic tribute, it cannot be overlooked in future. The system was

drachm,	2=stater,	50=mina,	{50=talent.	60=Greek talent.
80 grs.	160	8000	400,000	480,000

207 grs. to 190
9650;
579,000.

This system, the Aeginetan, one of the most important to the Greek world, has been thought to be a degradation of the Phoenician (17, 21), supposing 220 grains to have been reduced in primitive Greek usage to 194. But we are now able to prove that it was an independent system—(1) by its not ranging usually over 200 grains in Egypt before it passed to Greece; (2) by its earliest example, perhaps before the 224 unit existed, not being over 208; and (3) by there being no intermediate linking on of this to the Phoenician unit in the large number of Egyptian weights, nor in the Ptolemaic coinage, in which both standards are used. The first example (30) is one with the name of Amenhotep I. (17th century B.C.) marked as "gold 5," which is 5×207·6. Two other marked weights are from Memphis (44), showing 201·8 and 196·4, and another Egyptian 191·4. The range of the (34) Naucratis weights is 186 to 199, divided in two groups averaging 190 and 196, equal to the Greek monetary and trade varieties. Ptolemy I. and II. also struck a series of coins (32) averaging 199. In Syria haematite weights are found (30) averaging 198·5, divided into 99·2, 49·6 and 24·8; and the same division is shown by gold rings from Egypt (38) of 24·9. In the medical papyrus (38) a weight of $\frac{2}{3}$ kat is used, which is thought to be Syrian; now $\frac{2}{3}$ kat = 92 to 101 grains, or just this weight which we have found in Syria; and the weights of $\frac{2}{3}$ and $\frac{1}{3}$ kat are very rare in Egypt except at Defenneh (29), on the Syrian road, where they abound. So we have thus a weight of 207-191 in Egypt on marked weights, joining therefore completely with the Aeginetan unit in Egypt of 199 to 186, and coinage of 199, and strongly connected with Syria, where a double mina of Sidon (18) is 10,460 or 50×209·2. Probably before any Greek coinage we find this among the haematite weights of Troy (44), ranging from 208 to 193·2 (or 104-96·6), *i.e.* just covering the range from the earliest Egyptian down to the early Aeginetan coinage. Turning now to the early coinage, we see the fuller weight kept up (17) at Samos (202), Miletus (201), Calymna (100, 50), Methymna and Scepsis (99, 49).[1] Ionia (197); while the coinage of Aegina, (17, 12), which by its wide diffusion made this unit best known, though a few of its earliest staters go up even to 207, yet is characteristically on the lower of the two groups which we recognize in Egypt, and thus started what has been considered the standard value of 194, or usually 190, decreasing afterwards to 184. In later times, in Asia, however, the fuller weight, or higher Egyptian group, which we have just noticed in the coinage, was kept up (17) into the series of cistophori (196-191), as in the Ptolemaic series of 199. At Athens the old mina was fixed by Solon at 150 of his drachmae (18) or 9800 grains, according to the earliest drachmae, showing a stater of 196; and this continued to be the trade mina in Athens, at least until 160 B.C., but in a reduced form, in which it equalled only 138 Attic drachmae, or 9200. The Greek mina weights show (44), on an average of 37, 9650 (= stater of 193), varying from 186 to 199. In the Hellenic coinage it varies (18) from a maximum of 200 at Pharae to 192, usual full weight; this unit occupied (17) all central Greece, Peloponnesus and most of the islands. The system was—

obol,	6=drachm,	2=stater,	50=mina,	60=talent.
16 grs.	96	192	9600	576,000

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[1] That this unit was used for gold in Egypt, one thousand years before becoming a silver coin weight in Asia Minor, need not be dwelt on, when we see in the coinage of Lydia (17) gold pieces and silver on the same standard, which was expressly formed for silver alone, *i.e.* 84 grains. The Attic and Assyrian standards were used indifferently for either gold or silver.

It also passed into Italy, but in a smaller multiple of 35 drachmae, or ¼ of the Greek mina; 12 Italian weights (44) bearing value marks (which cannot therefore be differently attributed) show a libra of 2400 or ¼ of 9600, which was divided in unciae and sextulae, and the full-sized mina is known as the 24 uncia mina, or talent of 120 librae of Vitruvius and Isidore (18) = 9900. Hultsch states this to be the old Etruscan pound.

412 4950 grs. With the trade mina of 9650 in Greece, and recognized in Italy, we can hardly doubt that the Roman libra is the half of this mina. At Athens it was 2×4900, and on the average of all the Greek weights it is 2×4825, so that 4950—the libra—is as close as we need expect. The division by 12 does not affect the question, as every standard that came into Italy was similarly divided. In the libra, as in most other standards, the value which happened to be first at hand for the coinage was not the mean of the whole of the weights in the country; the Phoenician coin weight is below the trade average, the Assyrian is above, the Aeginetan is below, but the Roman coinage is above the average of trade weights, or the mean standard. Rejecting all weights of the lower empire, the average (44) of about 100 is 4956; while 42 later Greek weights (nomisma, &c.) average 4857, and 16 later Latin ones (solidus, &c.) show 4819. The coinage standard, however, was always higher (18); the oldest gold shows 5056, the Campanian Roman 5054, the consular gold 5037, the aurei 5037, the Constantine solidi 5053 and the Justinian gold 4996. Thus, though it fell in the later empire, like the trade weight, yet it was always above that. Though it has no exact relation to the congius or amphora, yet it is closely = 4977 grains, the $\frac{1}{88}$ of the cubic foot of water. If, however, the weight in a degraded form, and the foot in an undegraded form, come from the East, it is needless to look for an exact relation between them, but rather for a mere working equivalent, like the 1000 ounces to the cubit foot in England. Böckh has remarked the great diversity between weights of the same age—those marked "Ad Augusti Temp" ranging 4971 to 5535, those tested by the fussy praefect Q. Junius Rusticus vary 4362 to 5625, and a set in the British Museum (44) belonging together vary 4700 to 5168. The series was—

siliqua,	6 = scripulum,	4 = sextula,	6 = uncia,	12 = libra,
2·87 grs.	17·2	68·7	412	4950

the greater weight being the centumpondium of 495,000. Other weights were added to these from the Greek system—

obolus,	6 = drachma,	2 = sicilicus,	4 = uncia;
8·6 grs.	51·5	103	412

and the sextula after Constantine had the name of solidus as a coin weight, or nomisma in Greek, marked N on the weights. A beautiful set of multiples of the scripulum was found near Lyons (38), from 1 to 10×17·28 grains, showing a libra of 4976. In Bryzantine times in Egypt glass was used for coin-weights (30), averaging 68·0 for the solidus = 4896 for the libra. The Saxon and Norman ounce is said to average 416·5 (*Num. Chron.*, 1871, 42), apparently the Roman uncia inherited.

67 grs. 6700; 402,000. The system which is perhaps the best known, through its adoption by Solon in Athens, and is thence called Attic or Solonic, is nevertheless far older than its introduction into Greece, being found in full vigour in Egypt in the 6th century B.C. It has been usually reckoned as a rather heavier form of the 129 shekel, increased to 134 on its adoption by Solon. But the Egyptian weights render this view impossible. Among them (29) the two contiguous groups can be discriminated by the 129 being multiplied by 30 and 60, while the 67 or 134 is differently ×25, 40, 50 and 100. Hence, although the two groups overlap owing to their nearness, it is impossible to regard them as all one unit. The 129 range is up to 131·8, while the Attic range is 130 to 138 (65-69). Hultsch reckons on a ratio of 24:25 between them, and this is very near the true values; the full Attic being 67·3, the Assyrian should be 129·2, and this is just the full gold coinage weight. We may perhaps see the sense of this ratio through another system. The 80-grain system, as we have seen, was probably formed by binarily dividing the 10 shekels, or "stone"; and it had a talent (Abydus lion) of 5000 drachmae; this is practically identical with the talent of 6000 Attic drachmae. So the talent of the 80-grain system was sexagesimally divided for the mina which was afterwards adopted by Solon. Such seems the most likely history of it, and this is in exact accord with the full original weight of each system. In Egypt the mean value at Naucratis (29) was 66·7, while at Defenneh (29) and Memphis (44)—probably rather earlier—it was 67·0. The type of the grouping is not alike in different places, showing that no distinct families had arisen before the diffusion of this unit in Egypt; but the usual range is 65·5 to 69·0. Next it is found at Troy (44) in three cases, all high examples of 68·2 to 68·7; and these are very important, since they cannot be dissociated from the Greek Attic unit, and yet they are of a variety as far removed as may be from the half of the Assyrian, which ranges there from 123·5 to 131; thus the difference of unit between Assyrian and Attic in these earliest of all Greek weights is very strongly marked. At Athens a low variety of the unit was adopted for the coinage, true to the object of Solon in depreciating debts; and the first coinage is of only 65·2, or scarcely within the range of the trade weights (28); this seems to have been felt, as, contrary to all other states, Athens slowly increased its coin weight up to 66·6, or but little under the trade average. It gradually supplanted the Aeginetan standard in Greece and Italy as the power of Athens rose; and it was adopted by Philip and Alexander (17) for their great gold coinage of 133 and 66·5. This system is often known as the "Euboic," owing to its early use in Euboea, and its diffusion by trade from thence. The series was—

chalcous,	8 = obolus,	6 = drachma,	100 = mina,	60 = talanton.
1·4 grs.	11·17	67	6700	402,000

Turning now to its usual trade values in Greece (44), the mean of 113 gives 67·15; but they vary more than the Egyptian examples, having a sub-variety both above and below the main body, which itself exactly coincides with the Egyptian weights. The greater part of those weights which bear names indicate a mina of double the usual reckoning, so that there was a light and a heavy system, a mina of the drachma and a mina of the stater, as in the Phoenician and Assyrian weights. In trade both the minae were divided in ½, ⅓, ¼, ⅙, and ⅛, regardless of the drachmae. This unit passed also into Italy, the libra of Picenum and the double of the Etrurian and Sicilian libra (17); it was there divided in unciae and scripulae (44), the mean of 6 from Italy and Sicily being 6600; one weight (bought in Smyrna) has the name "Leitra" on it. In literature it is constantly referred to; but we may notice the "general mina" (Cleopatra), in Egypt, 16 unciae = 6600; the Ptolemaic talent, equal to the Attic in weight and divisions (Hero, Didymus); the Antiochian talent, equal to the Attic (Hero); the treaty of the Romans with Antiochus, naming talents of 80 librae, *i.e.* mina of 16 unciae; the Roman mina in Egypt, of 15 unciae, probably the same diminished; and the Italic mina of 16 unciae. It seems even to have lasted in Egypt till the middle ages, as Jabarti and the "kātib's guide" both name the raṭl misri (of Cairo) as 144 dirhems = 6760.

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(W. M. F. P.)

III. COMMERCIAL

1. *Denominations.*—The denominations of trade weights and measures at present used in the United Kingdom are represented by "Board of Trade standards," by which are regulated the accuracy of the common weights and measures handled in shops, &c.:[1]

Imperial Measures of Length.—100 feet, 66 feet or a chain of 100 links, rod, pole, or perch, measures from 10 feet to 1 foot;

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[1] Board of Trade Model Regulations, 1892; Weights and Measures Acts, 1878, 1889, 1892, 1893.

18 inches; yard of 36 inches, ½, ¼, ⅛, 1/16 yard, nail, inch, and duodecimal, decimal and binary parts of the inch.

Imperial Measures of Capacity.—Liquid measures from 32 gallons to 1 gallon, quart, pint, ½ pint, gill, ½ gill, ¼ gill. Dry measures of bushel, ½ bushel, peck, gallon, quart, pint, ½ pint.

Apothecaries' Measures.—40 fluid ounces to ½ fl. oz., 16 fluid drachms to ½ fl. dr., 60 minims to 1 minim.

Avoirdupois Weights.—Cental (100 lb), 56 lb (½ cwt.), 28 lb, 14 lb (stone), 7, 4, 2, 1 lb; 8, 4, 2, 1, ½ ounce (8 drams); 4, 2, 1, ½ drams.

Troy Weights.—The ounce (480 gr.) and multiples and decimal parts of the ounce troy from 500 ounces to 0·001 oz.

Apothecaries' Weights.—10 oz. to 1 oz. (480 gr.); 4 drachms to ½ oz.; 2, 1 drachms; 2 scruples to ½ scruple; and 6 grains to ½ grain.

Pennyweights.—20 dwt. (480 grains), 10, 5, 3, 2, 1 dwts.

Grain Weights.—4000, 2000, 1000 gr. (making 7000 gr. or 1 lb), 500 to 0·01 gr.

2. The international trade metric weights and measures (1897) handled in shops, &c., of which there are also Board of Trade standards, are set out as follows:—

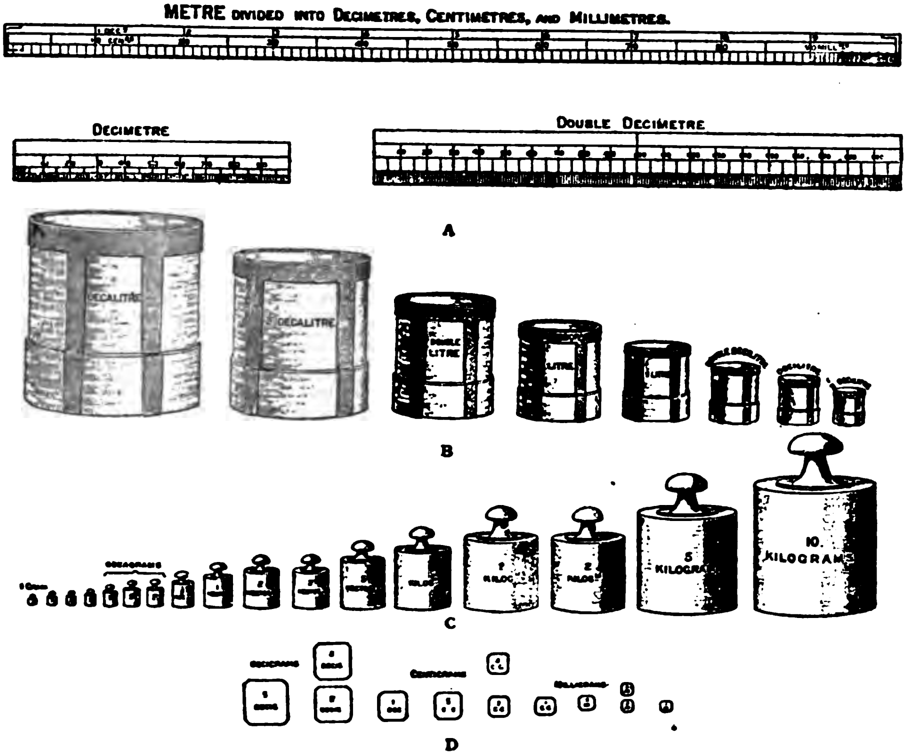

FIG. 9.—International Metric Trade Weights and Measures, 1897. A, linear; B, capacity; C, and D, weights.

Length.—Decametre or 10 metres; double metre; metre or 1000 millimetres; decimetre or 0·1 metre; centimetre or 0·01 metre; millimetre.

Capacity.—20 litres; 10 litres or decalitre; 5, 2, 1, 0·5, 0·2, 0·1 (decilitre); 0·05, 0·02, 0·01 (centilitre); 0·005, 0·002, 0·001 (millilitre) litres.

Cubic Measures.—1000 (litre), 500, 200, 100, 50, 20, 10, 5, 2 cubic centimetres, 1 c.c. or 1000 cubic millimetres.

Weights.—20, 10, 5, 2, 1 kilograms; 500 to 1 gramme; 5 to 1 decigram; 5 to 1 centigram; 5 to 1 milligram. (Series 5, 2, 2,¹ 1, *i.e.* with a duplicate weight of "2.")

3. *Equivalents.*—The metric equivalents of the units of the metric system in terms of the imperial system, as recalculated in 1897, are as follows:—[1]

IMPERIAL TO METRIC

1 yard	=	0·914399 m.
1 square yard	=	0·836126 m^2.
1 cubic inch	=	16·387 c.c.
1 gallon[2]	=	4·5459631 l.
1 pound (7000 grains)	=	0·45359243 kg.
1 ounce troy (480 gr.)	=	31·1035 grammes.
1 fluid drachm	=	3·552 millilitres (ml.).
1 fluid ounce	=	2·84123 centilitres (cl.).

METRIC TO IMPERIAL

1 metre (m.) at 0° C.	=	39·370113 inches at 62° F
1 square metre (m^2.)	=	10·7639 square feet.
1 cubic decimetre (c.d.) or 1000 cubic centimetres (c.c.)	=	61·024 cubic inches.
1 litre (l.)	=	1·7598 pints.
1 kilogram (kg.)	=	2·2046223 lb avoir.
1 gramme (g.)	=	15·4323564 grains or 0·7716 scruple.

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[1] *Metric Equivalents*, King's Printers (1898).

[2] The equivalent of the litre in gallons may also be derived as follows:—

Let $P(1-p/d)=P^1(1-p/d^1)$, where P is the weight of the water contained in the gallon when weighed in London—g. London = g. Paris (45°) × 1·000577.

The correction for temperature, 62° F., is −0·0906 in.; hence 29·9094 inches. One inch = 25·4 mm.; also 29·9094 × 25·4 = 759·69876; and 759·698761 × 1·000577 = 760·137 mm. P^1 is the weight of the brass weights (10 lb) Δ = 8·143.

p, the density (0·001218738) of dry air, containing 4 vols. of carbonic acid in 10,000 vols.; t = 16·667° C.; B = 760·137 mm. of mercury at 0°, lat. 45°, and at sea-level. Coefficient of expansion of air = 0·00367; Δ mercury at 0° C. = 13·595. d is the density of water at 62° F. (16·667° C.) = 0·9988611. d^1, the density of the brass as above. 10 lb = 4·5359243 kg.

From the above it follows that P = 4·5407857 kg. Therefore—1 gallon = P/0·9988611 = 4·5459631 litres.

The equivalents of the Russian weights and measures, in terms also of the imperial and metric weights and measures, were re-calculated in 1897.[1] The following are the leading equivalents:

1 Russian pound = {0·025 pood. / 96 zolotniks. / 9216 dolis.}
=0·40951240 kg.
=0·90282018 ℔ avoir.
1 archinne = {0·00066 verst. / 0·33 sagène. / 16 verchoks. / 280 liniias.}
=0·711200 metre.
=0·777778 yard.
1 vedro = {10 schtoffs / =100 tcharkas}
=12·299 litres
=2·7056 gallons.
1 tchetverts =8 tchetveriks
=2·0991 hectolitres
=5·7719 bushels.

4. *Local Control.*—The necessary local inspection and verification of weights and measures in use for trade (as distinct from the verbal and written use of weights and measures) is in the United Kingdom undertaken by inspectors of weights and measures, who are appointed by the local authorities, as the county and borough councils. An inspector is required to hold a certificate of qualification, and for his guidance general regulations are made by his local authority as to modes of testing weights, measures and weighing instruments.[2] In Europe the local inspection is generally carried out through the State, and a uniform system of local verification is thereby maintained.

5. *Errors.*—In the verification of weights and measures a margin of error is permitted to manufacturers and scale-makers, as it is found to be impossible to make two weights, or two measures, so identical that between them some difference may not be found either by the balance or the microscope. For common weights and measures this margin (tolerance, remedy or allowance, as it is also called) has been set out by the Board of Trade for all the various kinds of weights and measures in use for commercial purposes in the United Kingdom, and similar margins of error are recognized in other countries. For instance, on 1 ℔ avoir. weight made of brass, 2 grains in excess are allowed; on 1 oz. troy or apothecaries' weight, +0·2 grain is allowed; on 1 pint pot, 4 fluid drachms is permitted; on 1 brass yard, 0·05 inch in excess or 0·02 inch in deficiency in length is allowed for ordinary trade purposes.

6. *Foreign Weights and Measures.*—Throughout the British Empire the imperial system of weights and measures is legal.

In Russia, as in the United Kingdom and the United States, the national weights and measures are followed (§ 3 above), although the use of metric weights and measures is permissive.

In India the native weights, &c., ancient and arbitrary, are still followed. In 1889 the British yard was adopted for the whole of India (Measures of Length Act) at a normal temperature of 85° F. as standardized to the imperial yard at 62° F. The metric system was also introduced, mainly for railway purposes, in 1870 and 1871 (Indian Acts). Certified measures of the yard, foot and inch are kept by the Commissioners of Police at Calcutta, Madras and Bombay.

In standardizing a weight for use in India, correction has to be made for the weight of air displaced by the material standard, and for such purpose the normal temperature of 85°, atmospheric pressure 29·8 inches, latitude 22° 35′ 6·5″ (Calcutta), $g = \left\{ g_{45} \cdot 0{\cdot}9982515 \right\}$ are taken. The "tola" (180 grains) is properly the Government unit of weight for currency; and 80 tolas make the "Government seer."

7. *Customary Weights and Measures.*—In some districts of the United Kingdom, as well as in provincial districts of other countries, old local and customary denominations of weights and measures are still found to be in use, although their use may have been prohibited by law. So powerful is custom with the people.[3]

8. *Legislation.*—In everyday transactions with reference to weights and measures, the British legislature also exercises control in industrial pursuits. For instance, in weighing live cattle, owners of markets are now required to provide adequate accommodation.[4] Useful statutes have also been passed to protect the working class, as in checking the weighing instruments used in mines in Great Britain, over which instruments wages are paid, and in the inspection of similar instruments used in factories and workshops. The Merchandise Marks Act 1887 makes it an offence also to apply in trade a false description, as to the number, quantity, measure, gauge or weight of goods sold; and this Act appears to reach offences that the Weights and Measures Acts may perhaps not reach.

9. *Pharmaceutical Weights and Measures.*—By the Medical Act of 1858, and the Act of 1862, the General Council of Medical Education and Registration of the United Kingdom are authorized to issue a "Pharmacopoeia" with reference to the weights and measures used in the preparation and dispensing of drugs, &c. The British Pharmacopoeia issued by the Council in 1898 makes no alteration in the imperial weights and measures required to be used by the Pharmacopoeia of 1864. For all pharmaceutical purposes, however, the use of the metric system alone is employed in all paragraphs relating to analysis, whether gravimetric or volumetric. For measures of capacity the Pharmacopoeia continues to use imperial measuring vessels graduated at the legal temperature of 62° F. The official names of the metric capacity units are defined at 4° C., as generally on the Continent. The new Pharmacopoeia also follows foreign practice, and employs metric measures of capacity and volumetric vessels graduated at 15·5 C., or 60° F. Specific gravity bottles are also adjusted at 60° F., the figures indicating specific gravities being quotients obtained by dividing in each instance the weight of the solid or liquid by the weight of an equal bulk of water, both taken at 60° F.[5]

10. *Gauges.*—"Gauges," as understood at one time, included only those used in the measurement of barrels, casks, &c., and hence the term "gauger." For engineering and manufacturing purposes the more important linear gauges are, however, now used, adjusted to some fundamental unit of measure as the inch; although in certain trades, as for wires and flat metals, gauges continue to be used of arbitrary scales and of merely numerical sizes, having no reference to a legal unit of measure; and such are rarely accurate. A standard gauge, however, exists (Order in Council, August 1883), based on the inch, but having numbered sizes from 7/0 (0·5 inch) to No. 50 (0·001 inch) to meet the convenience of certain trades.[6]

11. *Screws.*—The screw is an important productive measuring instrument, whether used as a micrometer-screw of less than an inch in length, or as a master-screw of 20 feet in length. The probable errors and eccentricities of small micrometer-screws have been carefully investigated to ±0·00001 inch; but the accuracy of leading screws used in workshops has not been sufficiently verified. For some engineering purposes it would appear to be desirable to produce master-screws to an accuracy of $\frac{1}{2000}$ of an inch to the foot of screw, so as to serve indirectly for the verification of "guiding screws" for general use in workshops.[7] Attempts in this direction were originally made by Whitworth, Clement, Donkin, Rogers, Bond and others, but we still need a higher accuracy in screw-threads.

12. *Educational.*—Ordinary arithmetic books often contain references to local and customary weights and measures and to obsolete terms of no practical use to children. It appears to be desirable, as the Committee of Council on Education have done, to recognize only the legal systems of weights and measures—the imperial and metric. The Education Code of Regulations for 1900 prescribes that the tables of weights and measures to be learned include those only which are in ordinary use, viz. in all classes or forms above the third the tables of

{Weight—ton, cwt, stone, ℔, oz. and dr.,
Length—mile, furlong, rod or pole, chain, yd., ft. and inch,
Capacity—quarter, bushel, pk., gall., qt. and pt.

In Code standards above the fifth, in addition to the foregoing, the tables of

{Area—sq. mile, acre, rood, pole, yd., ft. and inch,
Volume—cubic yard, foot and inch.

Instruction in the principles of the metric system, and in the advantages to be gained from uniformity in the method of forming multiples and sub-multiples of the unit, are, under this Code, to be given to the scholars in Standards IV., V., VI. and VII. As a preparation for this it is stated in the Code that it will be useful to give in Standard III. (arithmetic) elementary lessons on the notation of decimal fractions. (See ARITHMETIC.)

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[1] *C.I.P.M. Procès-verbaux* (1897), p. 155.

[2] Regulations, Birmingham, Glasgow, London, Manchester, &c.

[3] Report Select Committee (1892); *Merchant's Handbook*, W. A. Browne (1892); Reports H.M. Representatives Abroad, Foreign Office, 1900–1901.

[4] Markets and Fairs (Cattle) Acts 1887, 1891; Coal Mines Regulation Act 1887; Factory and Workshop Act 1878.

[5] *Pharmacopoeia* (1901); Calendar Pharmaceutical Society, 1902.

[6] Order in Council, 26th August 1881.

[7] *Systématique des vis horlogères*, Thury (Geneva, 1878). Bulletin Soc. d'Encouragement pour l'Industrie Nationale, Paris, 1894. Report of British Association on Screw-threads, 1900.

Table of the Principal Foreign Weights and Measures now in use, and of their Equivalents in Imperial or in Metric Weights and Measures.

Almude	Portugal	16·8 litres.
Anoman (Ammomam, Amomam)	Ceylon	0·699 quarter (dry measure), 5·60 bushels.
Ara	Italy	1 metric are, 119.6 sq. yds.
Archin, or Arshin	Turkey	1 new archin (Law 1881) = 1 metre (39·37 inches) = 10 parmaks (decimetres) = 100 khats (centimetres), 1 mill = 1000 archins (kilometre). Pharoagh = 10 mills. Another pharoagh = 2 hours' journey.
Archin	Bulgaria	0·758 metre (masons). 0·680 metre (tailors).
Archine, or Archinne	Russia	28 inches, or 0·7112 metre.
Ardeb	Egypt	5·447 bushels (Customs). 5 bushels (old measure).
Are		= 100 sq. metres = 119·6 sq. yds.
Area	Spain	1 metric are.
Arpent	France	Legal arpent was equal to 100 sq. perches = 51·07 metric ares. in Quebec = 180 French feet.
	Canada	
Arroba	Portugal	14·68 to 15 kilogrammes.
	Spain	Mayor = 3·55 gallons, or 1 cantara.
Artaba	Persia	1·809 bushel.
		Menor = 2·76 gallons (liquids).
Aune	Belgium	1 metre. Formerly 1·312 yard.
	France	1·885 metre (1812).
	Jersey	4 feet.
Barilo	Rome	12·834 gallons.
Bat, or Tical	Siam	234 grains.
Batman	Persia	6½ lb av.; varies locally.
	Turkey	= 10 ocks.
Behâr	Arabia	439·45 lb av., nearly.
Berri	Turkey	1·084 mile (old measure).
Boisseau	Belgium	15 litres.
Boutylka	Russia	1·353 pint (wine bottle).
Braça	Portugal	2·22 metres.
Braccio	Spain	0·670 metre (commercial).
	Rome	Braccio-d'ara = 29·528 inches.
Brasse	France	5·328 feet.
Braza	Argentina	5·682 feet.
Bu, or tsubo	Japan	3·0306 square metres.
Bushel	U. States	2150·42 cubic inches, about 0·969914 imperial bushel. 1 bushel = 8 gallons = 32 quarts = 64 pints.
	Canada	
Bunder	Netherlands	2·471 acres (old hectare).
Cabot	Jersey	10 pots, or 4 gallons, 1 quart 3 gills imperial measure.
Candy	Bombay	560 lb av.
	Madras	493·7 lb av.
Cantar	Turkey	124·7 lb av. (old weight).
Cantara piccolo	Italy	74·771 lb av.
Capicha	Persia	0·58 gallon.
Catty	China	1⅓ lb av. See *Tael*.
	N. Borneo	1⅓ lb av.
	Siam	2·675 lb av., or $\frac{1}{50}$ hap.
Cawnie	Madras	1·322 acre.
Cental	U. States	100 lb av. (As in Great Britain.)
	Canada	
Centigramme		= $\frac{1}{100}$ grm. = 0·154 grain.
Centilitre		= $\frac{1}{100}$ litre = 0·07 gill.
Centimetre		= 0·394 inch = $\frac{1}{100}$ m.
Centimetre, cubic (c.c.)		= 0·061 cubic inch, or 1 c.c.
Centimetre, square		= 0·155 square inch.
Centner	Austria	50 kilogrammes = 110·231 lb. av.
	Denmark	50 kilogrammes = 110·231 lb. av.
	Switzerland	50 kilogrammes = 110·231 lb.
Chain	Canada	66 feet.
	Cyprus	0·33 pic.
Chang	China	10 ch'ih = 11 ft. 9 inches (Treaty).
	Siam	2·675 lb.
Chapah	N. Borneo	1⅓ lb av.
Chee. See *Tahil*.		
Chek	Hong Kong	14⅝ inches.
Chenica	Persia	0·289 gallon.
Ch'ien	China	58⅓ grains (silver weight).
Ch'ih	China	Varies throughout China from 11 to 15·8 inches. For Customs purposes the Treaty ch'ih = 14·1 inches, and 5 ch'ih = 1 pu.
Ch'ih	Peking	= 12·3 public works.
		= 12·5 public works.
		= 12·4 statistics.
		= 12·6 architects.
		= 12·7 common.
		= 13·1 tribunal of mathematics.
	Shanghai	= 13·2 Board of Revenue.
		= 14·1 Customs.
Chilogramme	Italy	1 kilogramme.
Chin or Catty	China	1⅓ lb av. (Treaty).
Ching	China	121 sq. feet (Treaty).
Ch'ing	China	72,600 sq. feet (Treaty).
Chittack	Bengal	5 tolas, or 900 grains.
Ch'ok	Corea	7⅞ in. (linear); 12⅞ in. (building).
Chüo	China	1815 sq. feet (Treaty).
Chupah	Singapore	1·66 lb av. of water at 62° F., as a measure of capacity.
	Malacca	144 oz. av. of water.
Chupak	Straits Settlements	1 quart.
Collothun	Persia	1·809 gallon.
Coss	Bengal	1·136 metre.
Covado	Portugal	0·66 metre.
Covid, or Cubit	Madras	18 to 21 inches.
	Bombay	18 inches.
	Siam	18 inches.
Covido	Arabia	18 inches approximately.
Covido (Great)		27 inches.
Cuartillo	Spain	1·16 litre (dry); 0·504 litre liquid.
Daktylon (Royal)	Greece	1 centimetre.
Daribah	Egypt	43·58 bushels (Customs).
Decagramme		= 10 grms. = 5·64 drams av.
Decalitre		= 10 litres = 2·2 gallons.
Decametre		= 10·936 yards.
Déçiatina	Russia	= 2400 square sagènes = 2·7 acres.
Decigramme		= $\frac{1}{10}$ grm. = 1·54 grain.
Decilitre		= $\frac{1}{10}$ litre = 0·176 pint.
Decimetre		= 3·937 inches = 0·1 metre.
Decimetre, cubic		= 1000 c.c. = 61·024 cub. in.
Decimetre, square		= 100 sq. centm. = 15·5 sq. in.
Denaro	Rome	18·17 grains (old weight).
Deunam	Turkey	1 metric are.
Diraa, or Drâa, or Pic	Egypt	27 inches usually. 21·3 inches Nile measure.
	Turkey	27 inches (old measure of pike).
Dirhem	Egypt	1·761 dram av. (Customs). 3·0884 grammes (Cairo).
Djerib	Turkey	1 hectare.
Dolla, or Dola	Russia	0·686 grain. 96 doli = 1 zolotnick.
Drachma	Netherlands	3·906 grammes.
	Turkey	154·324 grains.
Drachmé (Royal)	Greece	1 gramme (gold weight).
	Constantinople	= 57·871 grains. See *Ock*.
Dram. See *Oke*.		
Ducat	Vienna	53·873 grains.
Duim	Netherlands	1 centimetre.
Eimer	Austria	12·448 gallons.
El	Netherlands	1 metre. (Old ell = 27·08 inches).
Ell	Jersey	4 feet.
Ella	N. Borneo	1 yard.
Elle	Switzerland	0·6561 yard.
Endaseh, or Hindâzi	Egypt	Usually 25 inches.
Faltche	Moldavia	1 hectare, 43 ares, 22 centiares.
Fanega	Argentina	3·773 bushels.
	Portugal	55·364 litres.
	Spain	1·526 bushel.
	Peru	1½ bushel.
		1·615 acre, but varies locally.
Fass	Germany	1 hectolitre.
Feddan	Egypt	1·038 acre (Masri). Also 1·127 acre locally. 1.266 acre (old).
Fen	China	5·83 grains (silver weight).
Fjerdingkar	Denmark	0·9564 bushel.
Fod	Denmark	1·0297 foot.
	Norway	0·3137 metre.
Foglietto	Rome	0·8 pint.
Foot	U. States	12 inches.
	Canada	French foot = 12·8 inches.
	Amsterdam	11·147 in. old measure.
	South Africa	
	Old Rhenish	12·356 in.

Fot . .	Sweden . .	11·689 in. 10 fot = 1 stŏng. 1 ref = 10 stănger. 1 mil = 360 ref.
Founte, or Funt or Livre	Russia . .	0·90282 lb av.
Foute, or Pied .	Russia . .	1 English foot.
Frasco . . .	Argentina .	2⅜ litres.
Fuss	Vienna . .	12 zolls = 1·037 foot.
	Switzerland	3⅓ fuss = 1 metre.
		See *Stab.*
Gallon . . .	U. States . Canada . .	231 cubic inches = 8·3389 lb av. of water at t. 39·8° Fahr. At 62° Fahr. = 0·8325 imp. gallon.
Gantang . .	Straits Settlements	32 gallons.
	N. Borneo .	144 oz. av. weight of water as measure of capacity.
Garnetz . . .	Russia . .	0·3607 peck.
Gin. See *Kati.*		
Gisla . . .	Zanzibar . .	Measure of 360 lb av. of rice.
Go	Japan . .	180·39 cubic centimetres.
Grain . . .	Russia . .	0·960 grain (apothecaries).
Gramme (gr.) .	. . .	= 15·4323564 grains av. troy. = 0·2572 drachm, 0·7716 scruple. = 0·03215 oz. troy.
Grammé (Royal)	Greece . .	1 millimetre.
Gramo . . .	Spain . .	1 gramme.
Grano . . .	Rome . .	0·757 grain.
Grao . . .	Portugal . .	0·768 grain; also measure 0·18 in.
Grein . . .	Netherlands .	= 0·065 gramme.
Guz, or Gudge .	India: Bengal	36 inches.
	„ Bombay	27 inches.
	„ Madras .	33 inches, Government Survey.
	Persia . .	The guz, gueza or zer varies from 24 to 44 inches. A guz of 40·95 inches (Guz, Azerbáiján) is common. Government standard guz = 36½ inches. There is a guz for retail trade of 25 inches.
	Arabia . .	25 inches to 37 inches (Bassorah).
Hat'h, or Moolum, or Cubit	Bengal . .	18 inches.
	Bombay . .	18 inches, or cubit.
Hectare . .	. . . .	= 100 ares, or 2·471 acres.
Hectogramme .	. . . .	100 grm. = 3·53 oz. av.
Hectolitre . .	. . . .	100 litres = 2·75 bushels.
Hectometre . .	. . . .	= 109·36 yards.
Hiyaka-me . .	Japan . .	5797·198 grains.
Hiyak-kin . .	Japan . .	132⅓ lb av.
Hoon. See *Tahil.*		
Hu	China . .	12½ gallons, nearly.
Immi . . .	Switzerland	1·5 litre.
Joch	Austria-Hungary	1·422 acre.
Kaima . . .	Sweden . .	0·576 gallon.
Kan . . .	Netherlands	1 litre.
	Hong Kong	1⅓ lb av.
Kanne or Kanna	Germany .	1 litre, or formerly 1·762 pint.
	Sweden . .	0·576 pint.
Kantar, or Cantaro	Egypt . .	99·0492 lb av. = 100 rotls (Customs). 45 kilogrammes of cotton. 44·5 kilogrammes other produce.
Karwar . .	Persia . .	100 batman.
Kassabah . .	Egypt . .	3·8824 yards (Customs).
Kati, Catty or Gin	China, Straits Settlements	1⅓ lb av.
Keila, or Pishi	Zanzibar . .	Measure of 6 lb av. of rice.
Ken . .	Japan . .	5·965 ft., 1·81 metre.
Kerât . . .	Turkey . .	1⅛ inch measure (old). 3·09 grains weight (old)
Kette, or Chain	Germany .	14·994 ellen, or 10·936 yards.
Keu . . .	Siam . . .	40 inches.
Khat (New) .	Turkey . .	1 centimetre.
Kile	Cyprus . .	8 gallons.
Killow . . .	Turkey . .	0·97 bushel.
Kilogramme .	. . . .	= 1000 grm. = 2·2046223 lb av.
Kilometre . .	. . . .	= 0·6214 mile.
Kin	Japan, China	0·601 kilogramme = 1·325 lb.
Klafter . . .	Austria . .	= 2·0740 yards.
	Switzerland	1·9685 yard.
Köddi . . .	Arabia . .	1·67 gallon.
Koilon (Royal) .	Greece . .	1 hectolitre. Old koilon = 33·16 litra.
Koku . . .	Japan . .	= 39·7033 galls. = 4·9629 bushels.
Kon . . .	Corea . .	1⅓ lb av.
Korn-tonde . .	Norway . .	138·97 litres.

Korn-tonde . .	Sweden . .	3·821 bushels.
Korn-top Maal	Norway . .	160 litres.
Korrel . . .	Netherlands .	1 decigramme.
Kotyle (Royal) .	Greece . .	1 decilitre.
Kouza . .	Cyprus . .	9 quarts.
Koyan . . .	Straits Setts .	5333⅓ lb av.
Krina . . .	Bulgaria . .	12·8 litres.
Kung . . .	China . .	78·96 inches (Treaty).
Kup	Siam . . .	10 inches.
Kwan or Kuwan	Japan . .	8·281 lb = 3·75652 kilogrammes.
Kyat . . .	Burma . .	100 kyats = 3·652 lb av.
Lak't . . .	Bulgaria . .	0·650 metre.
Last	Netherlands .	30 hectolitres.
Léang . . .	China . .	583⅓ grains (silver weight).
Lèkhà . . .	Bulgaria . .	229·83 sq. metres.
Li	China . .	about ⅓ mile = 360 pu. Varies with length of ch'ih. A small weight 0·583 grain.
Liang . . .	China . .	1⅓ oz. 16 liang = 1 chin = 1⅓ lb av.
Libbra . . .	Italy . . .	0·7477 lb av.
Libra . . .	Argentina .	1·0127 lb av.
Libra (Castilian)	Spain, Mexico	1·014 lb.
Libra, or Arratel	Portugal . .	1·012 lb av.
Line or Ligne .	Paris . . .	$\frac{1}{12}$ point, or 0·089 inch.
Liniia . . .	Russia . .	0·1 inch, 1 archine = 280 liniias.
Litra (Royal) .	Greece . .	1 litre = 100 mystra.
Litre . . .	Cyprus . .	2¼ quarts.
Litre (metric) .	. . . .	= 1·7598 pint
Litro	Spain . . Italy . . .	1 litre.
Livre (lb) . .	Russia . .	0·90282 lb av. Apoth. livre = 11·5204 oz. troy.
	Belgium .	Kilogramme.
Livre-poids . .	France . .	0·4895 kilogramme.
Loth	Germany .	New loth = 1 decagramme. Old loth, nearly ½ oz. av.
	Switzerland	15·625 grammes.
	Vienna . .	270·1 grains. Postal loth, 257·2 grains.
Maass . . .	Austria . .	1·245 quart.
	Switzerland .	2·64 gallons.
Maatze . . .	Netherlands .	1 decilitre.
Mace . . .	China . .	58⅓ grains.
	N. Borneo .	93⅓ lb av.
Mahud . . .	Arabia . .	2·04 lb av.
Maik . . .	Burmah . .	3 maik = cubit = 19½ inches.
Marc, or Mark .	France . .	0·2448 kilogramme (old weight).
	Sweden . .	0·4645 lb av.
	Vienna . .	4331·37 grains = 24 karato.
Marco . . .	Portugal . .	= 8 oncas = 229·5 grammes.
	Spain . .	3550·54 grains.
Maund . . .	India . .	82·286 lb av., Government. 72½ lb (old bazaar). 74·67 lb av., factory. 28 lb nearly, Bombay. 25 lb nearly, Madras. 37 to 44 lb, Juggerat. Local maunds vary on either side of 80 lb.
Megametre (astronomy)	. . . .	1,000,000 metres.
Metre (m.) . .	U. States .	39·37 inches.
	Great Britain	39·370113 inches = 1 m.
Metre, cubic .	. . . .	= 1000 c.d. = 35·315 cubic feet.
Metre, square .	. . . .	= 100 square decimetres = 10·764 square feet.
Metro . . .	Spain . . Italy . . .	1 metre.
Metz. . . .	Austria . .	1·691 bushel.
Micron (μ) . .	. . . .	= $\frac{1}{1000}$ millimetre.
Miglio . . .	Rome . .	0·925 mile.
Mijle . . .	Netherlands .	1 kilometre.
Mil, or Mill . .	Turkey . .	1000 archins (new mil).
	Denmark .	4·680 miles.
Mile	France . . Germany .	Nautical mile = 1852 metres.
Mile (postal) .	Austria . .	4·714 miles.
Milha . . .	Portugal . .	1·296 mile.
Mille . . .	France . .	1·949 kilometre.
Milligramme .	. . . .	= $\frac{1}{1000}$ gramme = 0·015 grain.
Millilitre . .	. . . .	= $\frac{1}{1000}$ litre.
Millimetre . .	. . . .	= 0·03937 inch = $\frac{1}{1000}$ m.
Miscal . . .	Persia . .	71 grains.
Mkono . . .	East Africa .	45·72 centimetres.
Mna . . .	Greece . .	1½ kilogramme = 1·172 oka.
Momme . . .	Japan . .	$\frac{1}{1000}$ kwan.
Morgen . . .	Denmark . Norway . . Prussia . .	0·631 acre.

Mou	China	Commonly 806·65 sq. yds. Varies locally. Shanghai = 6600 sq. ft. (Municipal Council). By Customs Treaty = 920·417 sq. yds., based on ch'ih of 14·1 inches.
Mud	Netherlands	1 hectolitre.
Myriagramme		= 10 kilogrammes = 22·046 lb av.
Ngoma	East Africa	7½ keilas.
Nin	Siam	13/16 inch.
Obolos	Greece	1 decigramme.
Ock	Turkey	Legal ock (1881) = 100 drachmas. New batman = 10 ocks, and kantar = 10 batmans ock = 1 kilogramme.
Octavillo	Spain	0·29 litre.
Oitavo	Portugal	1·730 litre.
Oke	Bulgaria	1·28 litre (for liquids).
		1·282 kilogramme (old).
	Cyprus	2¾ lb. av. = 400 drams (Cyprus).
	Egypt	2·751 lb av. (Customs). 2·805 lb (Alexandria).
	Greece	2·80 lb = 1·282 kilogramme.
		1·33 litre.
	Turkey	1·1518 pint. 2·834 lb av. (old weight).
Onça	Portugal	28·688 grammes.
Once	France	30·59 grammes (old).
Oncia	Rome	436·165 grains.
Onze	Netherlands	1 hectogramme. 10 onzen = pond.
Ounce	U. States	Av. ounce = 437·5 grains.
Packen	Russia	1083·382 lb av.
Palamé (Royal)	Greece	1 decimetre.
Palm	Holland	1 decimetre.
Palmo	Portugal	0·22 metre.
	Spain	8·346 inches.
Para	N. Borneo	90 lb av.
Parah	Ceylon	5·59 pints.
Parasang. See *Persakh*.		
Parmak. See *Archin*.		
Passeree	Bengal	5 seers.
Pé	Portugal	⅓ metre (old).
Pecheus (Royal)	Greece	1 metre = 1·543 old pecheuse
Pecul	China	133⅓ lb av.
Perche	France Canada	22 square pieds de roi. In Quebec 18 French feet.
Persakh, or Parasang	Persia	Probably 3·88 miles = 6000 guz.
Pfund	Germany	= 16 unzen = 32 loth } old weight. 1·01 to 1·23 lb av. } old weight.
		Zoll. pfund (1872) = 500 grammes.
	Prussia	Old zoll. lb = 1·1023 lb av.
	Switzerland	500 grammes = 16 unze.
		Apoth. pf. = 375 grammes.
	Vienna	Pfund = 560·06 grammes.
		Zoll. pfund (1871) = 500 grammes.
Pharoagh. See *Archin*.		
Pic	Cyprus	2 feet.
Picul	Japan Straits Settlements, Hong Kong	133⅓ lb av
	North Borneo	A measure of 180 lb weight of water.
Picki	Greece	0·648 metre.
	China	25 gallons (dry measure).
Pie	Rome	11·73 inches.
Pie de Burgos	Spain	11·13 inches.
Pied	Belgium	11·81 inches = 10 pounces.
	Canada	12·79 inches.
Pied de Roi	Paris	0·3248 metre.
Fike	Turkey	See *Dir'aa*.
Pint	U. States	0·8325 imperial pint.
Pinte	France	0·931 litre.
Pipa	Portugal	534 litres (Oporto).
		420 litres (Lisbon).
		500 litres (officially).
Pipe	Gibraltar	105 to 126 gallons.
Pishi. See *Keila*.		
Poide de Marc	France	0·2448 kilo = 8 onces.
Polegada	Portugal	27·77 millimetres.
Pond	Netherlands	1 kilogramme. Apothecaries pond = 375 grammes.
Pot	Denmark	1·7 pint = 4 paegle.
	Switzerland	2·64 pints or 1·5 litre.
	Belgium	1⅓ litre (dry). ⅔ litre (liquid)
	Norway	0·965 litre.
Pouce	France	1·066 inch (old measure).
	Russia	1 inch.
Poud, or Pood	Russia	0·016122 ton = 36 lb.
Pound	U. States	Standard troy lb = 5760 grains. Avoir. lb = 7000 grains.
	Russia	0·90282 lb av. (0·4095 kilogramme).
	Jersey	7561 grains = 16 oz. Jersey = 1 livre.
Pu	China	70·5 inches = 5 ch'ih.
Puddee	Madras	2·89 pints. 100 cubic inches = Government puddee.
Pulgada	Spain	0·927 inch.
Pund	Denmark	1·1023 lb av., or 500 grammes.
	Norway	0·4981 kilogramme.
	Sweden	6560 grains. Varies locally.
		5500·5 grains (apoth.).
Quart	U. States	See *Bushel*.
Quarto	Rome	2·024 bushels.
	Portugal	3·46 litres.
Quintal	Spain	100 libras (Castilian) = 101·4 lb.
	Portugal	58·752 kilogrammes, or 129½ lb av.
	Argentina	100 libras, or 101·27 lb av.
Quintal (metric)	France	= 100 kilogrammes = 1·968 cwt.
Quintale	Italy	1 metric quintal.
Ratel	Persia	1·014 lb av.
Rattel, or Rottle	Arabia	1·02 lb av., nearly (dry measure).
		17·219 lb av. weight.
Ri	Japan	2·440 miles (itinerary). 2·118 miles (natural).
Rode	Denmark	3·762 metres.
Roede	Netherlands	1 dekametre.
Rotl, or Rottolo	Egypt	0·9905 lb av. (Customs). 0·9805 lb av. (Govt.).
	Cairo	2·206 lb great rottolo.
		0·715 lb less rottolo.
	Alexandria	2·124 lb great rottolo. Rottolo mina = ⅘ oka.
Rottol	Turkey	2·513 pints (old measure).
Rubbio	Spain	1·012 quarter (dry measure).
Sagène	Russia	7 feet.
Scheffel	Germany	50 litres, formerly 14·56 metzen (Prussia).
Schepel	Netherlands	1 decalitre.
Schoppen	Germany	½ litre, formerly 0·11 gallon.
	Switzerland	0·375 litre.
Se	Japan	118·615 square yards (·9918 are).
Seer	India	Government seer = 2 1/18 lb av.
		Bengal, 80 tolas weight of rice (heaped measure), about 60 cubic inches (struck measure).
		Southern India = weight of 24 current rupees.
		Madras, 25 lb nearly.
		Juggerat, weight of 40 local rupees.
		Bombay, old seer, about 28 lb.
	Ceylon	Measure of 1·86 pint,
	Persia	16 miscals, or 1136 grains weight (Sihr).
	Note.—In India the seer, like the maund, varies considerably; usually 40 seers go to a maund.	
Seidel	Austria	0·6224 pint.
Sen	Siam	44·4 miles, nearly.
Ser	India	1 litre (Indian Law, 1871).
Shaku	Japan	0·30 metre, also 9·18273 square decimetres; also 18·039 cubic centimetres.
Sheng	China	1·813 pint.
Shih	China	160 lb.
Shóó	Japan	1·804 litre.
Skaal-pund	Sweden	435·076 grammes, or 0·959 lb av.
	Norway	0·4981 kilogramme, or officially ½ kilogramme.
Skeppe	Denmark	17·39 litres.
Skjeppe	Norway	17·37 litres.
Stab	Germany	1 metre, or 3·⅕ old fuss, but varied.
Stadron (Royal)	Greece	1 kilometre.
Stere (metric)		1 cubic metre.
Stero	Italy	1 metric stere.
Streepe	Holland	1 millimetre.
Stremma	Greece	1 metric are. 238·1 square pecheus (Constantinople).
Strich	Germany	1 millimetre.
Striche	Switzerland	3⅓ strich = 1 millimetre.
Stunde	Germany	Old itinerary measure, 2·3 to 3·4 miles.

Stunde	Switzerland	4·8 kilometres. Stunder = 5 stunden, or 24 kilometres.
Sultchek	Turkey	Cubic measure (1881) whose sides equal a parmak (decimetre).
Sung	Corea	4 lb av., nearly.
Tael	Siam	936¼ grains.
	Hong Kong	1⅓ oz. av.
	China	Silver weight, 1⅓ oz. av.
	Japan	10 momme.
	(No current *coin* of the tael.)	
Tahil	Straits Settlements	1⅓ oz. av. = 10 chee = 100 hoon.
Tam	Hong Kong	133⅓ lb av.
Tan	China	= 25 gallons. Also 133⅓ lb weight.
Tang	Burma	2 miles, nearly.
Tang-sun	China	About 3⅓ miles = 10 li.
Tank	Bombay	17 7/18 grains, or 72 tanks = 30 pice.
Tcharka	Russia	0·866 gill = 0·218 pint.
Tchetverte	Russia	5·772 bushels = 8 tchetveriks, or 2·099 hectolitres.
Teng	Burma	Burmese measures of capacity depend on the teng or basket. Officially a basket is 2218·2 cubic inches, but the teng varies locally:— Akyab = 23 lb of rice. Bassein = 51 lb of rice. Moulmein = 48 lb of rice. Rangoon = 48 to 50 lb of rice.
Thanan	Siam	1·5 pint.
Thangsat	Siam	4·688 gallons.
To	Japan	18·0391 litres = 3·9703 galls. = 1·98 pecks.
Toise	France	2·1315 yards.
Tola	India	180 grains. Legal weight of rupee.
Tomand	Arabia	187·17 lb av. of rice.
Ton	U. States	2240 lb av., also a net ton of 2000 lb.
Tönde	Denmark	131·392 litres (liquid measure). 139·121 litres (dry measure).
Tonne, or Millier	France Germany	1000 kilogrammes.
Tonne (metric)		1000 kilogrammes = 0·9842 ton.
Tonnelada	Portugal	793·15 kilogrammes.
Tonos	Greece	29·526 cwt.
Tou	China	18 pints approximately.
Tovar	Bulgaria	128·2 kilogrammes.
T'sun	China	1·41 inch (Treaty measure).
Tu	China	100·142 miles = 25 li, based on the ch'ih of 14·1 inches.
Vara	Peru	33 inches.
	Spain	2·782 feet.
	Argentina	2·841 feet.
	Portugal	1·11 metre.
Vat	Holland	1 hectolitre.
Vedro	Russia	2·7056 gallons = 10 schtoffs, or 12·3 litres.
	Bulgaria	12·8 litres.
Verchok	Russia	1·75 inch.
Versta, or Verst	Russia	0·66288 mile.
Vierkanteroede	Holland	1 metric are.
Viertel	Denmark	1·7 gallon.
	Switzerland	15 litres.
Viss	Rangoon	3 81/125 lb av.
Wa	Siam	80 inches.
Wigtje	Netherlands	1 gramme.
Wisse	Netherlands	1 metric stere.
Yard	U. States	36 inches.
	Mexico	838 centimetres.
Zac	Netherlands	1 hectolitre.
Zer (Persia). See *Gus.*		
Zoll	Switzerland	3⅓ zoll = 1 decimetre. Old zoll nearly one inch. (See also *Pfund.*)
Zolotnik	Russia	65·8306 grains, or 96 doli.

(H. J. C.)

WEIGHT-THROWING, the athletic sport of hurling heavy weights either for distance or height. Lifting and throwing weights of different kinds have always been popular in Great Britain, especially Scotland and Ireland, and on the continent of Europe, particularly in Germany, Switzerland and Austria-Hungary. No form [illegible] is included in the British athletic championship programme, although "putting the shot" (*q.v.*) and "hammer-throwing" (*q.v.*) are recognized championship events. In America throwing the 56-lb weight for distance belongs to the championship programme. It was once a common event in Great Britain at all important athletic meetings, the ordinary slightly conical half-hundredweight being used and thrown by the ring attached to the top; the ring, however, was awkward to grip, and a triangular handle was afterwards substituted. In America the 56-lb weight is a ball of iron or lead with a triangular or pear-shaped handle. The weight used to be thrown standing, but since 1888 it has been thrown from a 7-ft. circle with a raised edge, like that used for the hammer and shot in America.

In throwing the athlete stands slightly stooping, with his feet about 18 in. apart and grasping the handle with both hands opposite his thighs. The weight is swung round and back past the right leg as far as possible, then up, over and round the head, as in the hammer-throw. One complete swing round the head is usually enough, as too much momentum is apt to throw the athlete off his balance. The weight is then swung round together with the whole body as rapidly as possible, as in hammer-throwing. The athlete works himself to the front of the circle just before the moment of delivery and begins the final heave with his back towards the direction in which he wishes to throw the weight. This heave is accomplished by completing the final spin of the body, giving the legs, back and arms a vigorous upward movement at the same time, and following the weight through with the uplifted arms as it leaves the hands, but taking care not to overstep the circle. With one hand a smoother swing can be made but much less power applied. In throwing for height the athlete stands beside the high-jump uprights and casts the weight over the cross-piece, making the swing and spin in a more vertical direction with a heave upward at the moment of delivery. Throwing for height and with one hand were formerly events in the American championship programme, but have been discontinued. The record for throwing the 56-lb weight for height is 15 ft. 6¼ in., made by the American-Irishman J. S. Mitchell. The record for distance, 38 ft. 8 in., was made in 1907 by the American-Irishman John Flanagan. In throwing weights large and heavy men have an advantage over small, brute strength being the chief requisite, while a heavy body makes a better fulcrum while revolving than a light one.

WEI-HAI-WEI, a British naval and coaling station, on the N.E. coast of the Shan-tung peninsula, China, about 40 m. E. of the treaty port of Chi-fu and 115 m. from Port Arthur. It was formerly a Chinese naval station strongly fortified, but was captured by the Japanese in February 1895, and occupied by their troops until May 1898, pending the payment of the indemnity. Port Arthur having in the spring of that year been acquired by the Russian government under a lease from China, a similar lease was granted of Wei-hai-wei to the British government, and on the withdrawal of the Japanese troops the British fleet took possession, the flag being hoisted on the 24th of May 1898. No period was fixed for the termination of the lease, but it was stipulated that it should continue so long as Russia continued to hold Port Arthur. The lease of Port Arthur having been ceded to Japan in September 1905, the British lease of Wei-hai-wei was made to run for as long as Japan held Port Arthur.

The harbour is formed by an island named Liu-kung-tao running east and west across the mouth of a small bay, leaving an entrance at each end. Towards the mainland the water shoals, and the best anchorage is under the lee of the island. The native city is walled, and has a population of about 2000. The chief port is named Port Edward; it has good anchorage with a depth of 45 ft. of water. The leased area comprises, besides the harbour and island, a belt of the mainland, 10 English miles wide, skirting the whole length of the bay. The coast line of the bay is some 10 m., and the area thus leased extends to 285 sq. m. Within this area Great Britain has exclusive jurisdiction, and is represented by a commissioner under the colonial office; and has, besides, the right to erect fortifications, station troops and take any other measures necessary for defensive purposes at any points on or near the coast in that part of the peninsula east of 121° 40′ E. Within that zone, which covers 1505 sq. m., Chinese administration is not interfered with, but no troops other than Chinese and British are allowed there. The territory consists of rugged hills rising to 1600 ft. and well-cultivated valleys. The hills also, as far as possible, are terraced for cultivation and in some instances are planted with dwarf pine and scrub oak. It contains some 310 villages and a population of about 150,000. Chinese war-vessels are at liberty to use the anchorage, notwithstanding the lease; and Chinese jurisdiction may continue to be exercised within the walled city of Wei-hai-wei, so far as not inconsistent with military requirements. Wei-hai-wei was made the headquarters of a native Chinese regiment in the pay of Great Britain, and organized and led by British officers; but this regiment was disbanded in 1902. Wei-hai-wei is used by the China squadron as a sanatorium and exercising ground. Its excellent climate attracts many visitors. Wei-hai-wei being a free port no duties of any kind are collected there. The import trade consists of timber, maize, paper, crockery, sugar, tobacco, kerosene oil, &c. Gold has been found in the territory, and silver, tin, lead and iron are said to exist. In each of the years 1903–1909 the expenditure exceeded the revenue (about $70,000 in 1909–1910), deficits being made good by grants from the British parliament.

WEILBURG, a town of Germany, in the Prussian province of Hesse-Nassau, picturesquely situated on the Lahn, just above the confluence of the Weil, 50 m. N.E. from Coblenz by the railway to Giessen. Pop. (1905) 3828. The old town, built on and around a rocky hill almost encircled by the river, contains a castle of the 16th century, formerly the residence of the dukes of Nassau-Weilburg, and later of the grand-dukes of Luxemburg. It has an Evangelical and a Roman Catholic church, the former, the Stadtkirche, containing the burial vaults of the princes of Nassau, a gymnasium and an agricultural college. Its industries include wool-spinning, mining, tanning and dyeing. In the neighbourhood are the ruins of the castles of Merenberg and Freienfels. Weilburg was in the 11th century the property of the bishops of Worms, from whom it passed to the house of Nassau. From 1355 to 1816 it was the residence of the princes of Nassau-Weilburg, a branch of this house.

See C. C. Spielmann, *Führer durch Weilburg und Umgebung* (Weilburg, 1894); and *Geschichte der Stadt und Herrschaft Weilburg* (Weilburg, 1896).

WEIMAR, a city of Germany, the capital of the grand-duchy of Saxe-Weimar-Eisenach. It is situated in a fertile valley on the Ilm, a small tributary of the Saale, 50 m. S.W. of Leipzig and 141 m. S.W. of Berlin, on the main line of railway to Bebra and Frankfort-on-Main, and at the junction of three lines to Jena, Gera and Berka and Rastenberg. Pop. (1885) 21,565, (1905) 31,121. Weimar owes its importance not to any industrial development, which the grand-dukes discourage within the limits of their *Residenz*, but to its intimate association with the classical period of German literature, which earned for it the title of the "poets' city" and "the German Athens." The golden age of Weimar, covered by the reign of Charles Augustus (*q.v.*) from 1775 to 1828, has left an indelible impress on the character of the town.

In spite of its classical associations and of modern improvements, Weimar still retains much of its medieval character. The walls survive, indeed, only in isolated fragments, but the narrow winding streets of the older part of the town, and the market-place surrounded by houses with high-pitched gables and roofs are very picturesque. Of the churches the *Stadtkirche* (parish church), of which Herder became pastor in 1776, is a Gothic building dating from about 1400, but much altered in detail under "classical" influences. It contains the tombs of the princes of the house of Saxe-Weimar, including those of the elector John Frederick the Magnanimous and his wife, and of Duke Bernhard of Weimar, a hero of the Thirty Years' War. The altar-piece is a triptych, the centre-piece representing the Crucifixion; beside the cross Luther is represented, with the open Bible in his hand, while the blood from the pierced side of the Saviour pours on to his head. The picture is regarded as the masterpiece of Lucas Cranach (*q.v.*), who lived for a time at Weimar, in the *Brück'sches Haus* on the market-place. In front of the church is a statue of Herder, whose house still serves as the parsonage. The other church, the *Jakobs-* or *Hofkirche* (court church) is also ancient; its disused churchyard contains the graves of Lucas Cranach and Musaeus. The most important building in Weimar is the palace, a huge structure forming three sides of a quadrangle, erected (1789–1803) under the superintendence of Goethe, on the site of one burned down in 1774. A remnant of the old palace, with a tower, survives. The interior is very fine, and in one of the wings is a series of rooms dedicated to the poets Goethe, Schiller, Herder and Wieland, with appropriate mural paintings. Of more interest, however, is the house in which Goethe himself lived from 1782 to 1832. It was built by the duke as a surprise present for the poet on his return from his Italian tour, and was regarded at the time as a palace of art and luxury. It has therefore a double interest, as the home of the poet, and as a complete example of a German nobleman's house at the beginning of the 19th century, the furniture and fittings (in Goethe's study and bedroom down to the smallest details) remaining as they were when the poet died.[1] The house is built round a quadrangle, in which is the coach-house with Goethe's coach, and has a beautiful, old-fashioned garden. The interior, apart from the scientific and art collections made by Goethe, is mainly remarkable for the extreme simplicity of its furnishing. The Goethe-Schiller Museum, as it is now called, stands isolated, the adjoining houses having been pulled down to avoid risk of fire.

Of more pathetic interest is the *Schillerhaus*, in the *Schillerstrasse*, containing the humble rooms in which Schiller lived and died. The atmosphere of the whole town is, indeed, dominated by the memory of Goethe and Schiller, whose bronze statues, by Rietschel, grouped on one pedestal (unveiled in 1857) stand in front of the theatre. The theatre, built under Goethe's superintendence in 1825, memorable in the history of art not only for its associations with the golden age of German drama, but as having witnessed the first performances of many of Wagner's operas and other notable stage pieces, was pulled down and replaced by a new building in 1907. The most beautiful monument of Goethe's genius in the town is, however, the park, laid out in the informal "English" style, without enclosure of any kind. Of Goethe's classic "conceits" which it contains, the stone altar round which a serpent climbs to eat the votive bread upon it, inscribed to the "genius hujus loci," is the most famous. Just outside the borders of the park, beyond the Ilm, is the "garden house," a simple wooden cottage with a high-pitched roof, in which Goethe used to pass the greater part of the summer. Finally, in the cemetery is the grand ducal family vault, in which Goethe and Schiller also lie, side by side.

Wieland, who came to Weimar in 1772 as the duke's tutor, is also commemorated by a statue (1857), and his house is indicated by a tablet. The town has been embellished by several other statues, including those of Charles Augustus (1875); Lucas Cranach (1886); Marie Seibach (1889); the composer Hummel (1895) and Franz Liszt (1904). Among the other prominent buildings in Weimar are the *Grünes Schloss* (18th century), containing a library of 200,000 volumes and a valuable collection of portraits, busts and literary and other curiosities; the old ducal dower-house (*Wittumspalais*); the museum, built in 1863–1868 in the Renaissance style with some old masters and Preller's famous mural paintings illustrating the *Odyssey*. In 1896 the Goethe-Schiller Archiv, an imposing building on the wooded height above the Ilm, containing MSS. by Goethe, Schiller, Herder, Wieland, Immermann, Fritz Reuter, Mörike, Otto Ludwig and others, was opened. Weimar possesses also archaeological, ethnographical and natural science collections and the Liszt Museum (in the gardener's house in the park, for many years the musician's home). Among the educational establishments are a gymnasium, and *Realschule*, the *Sophienstift* (a large school for girls of the better class, founded by the grand-duchess Sophia), the grand-ducal school of art, geographical institutes, a technical school, commercial school, music school, teachers' seminaries, and deaf and dumb and blind asylums. An English church was opened in 1899. There are a few industries, printing, tanning and cloth-weaving.

Various points in the environs of Weimar are also interesting from their associations. A broad avenue of chestnuts, about 2 m. in length, leads southwards from the town to the grand-ducal château of Belvedere, in the gardens of which the open-air theatre, used in Goethe's day, still exists. To the north-east, at about the same distance from the town, are the tiny château and park of Tiefurt, on the banks of the Ilm, the scene of many pastoral court revels in the past. To the north-west is the Ettersberg, with the Ettersburg, a château which was another favourite resort of Charles Augustus and his friends.

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[1] To be strictly accurate, they thus remained until the death of Goethe's last descendant in 1884. The house, which had been left to the grand-duke for the nation, was then found to be so structurally rotten that the interior had to be largely reconstructed. Everything was, however, replaced in the exact position it had previously occupied.

The history of Weimar, apart from its association with Charles Augustus and his court, is of little general interest. The town is said to have existed so early as the 9th century. Till 1140 it belonged to the counts of Orlamünde; it then fell to Albert the Bear and the descendants of his second son. In 1247 Otto III. founded a separate Weimar line of counts. In 1345 it became a fief of the landgraves of Thuringia, to whom it escheated in 1385 with the extinction of the line of Otto III. At the partition of Saxony in 1485 Weimar, with Thuringia, fell to the elder, Ernestine, branch of the Saxon house of Wettin, and has been the continuous residence of the senior branch of the dukes of this line since 1572. Under Charles Augustus Weimar became a centre of Liberalism as well as of art. It had previously narrowly escaped absorption by Napoleon, who passed through the town during the pursuit of the Prussians after the battle of Jena in 1806, and was only dissuaded from abolishing the duchy by the tact and courage of the duchess Louisa.

The traditions of Charles Augustus were well maintained by his grandson, the grand-duke Charles Alexander (1818–1901), whose statue now stands in the Karlsplatz. The grand-duke's connexion with the courts of Russia and Holland—his mother was a Russian grand-duchess and his wife, Sophia Louisa (1824–1897), a princess of the Netherlands—tended to give the Weimar society a cosmopolitan character, and the grand-duke devoted himself largely to encouraging men of intellect, whether Germans or foreigners, who came to visit or to settle in the town. The art school, founded by him in 1848, has had a notable series of eminent painters among its professors, including Preller, Böcklin, Kalckreuth, Max Schmidt, Pauwels, Heumann, Verlat and Thédy. Under the patronage of Charles Alexander, also, Weimar became a famous musical centre, principally owing to the presence of Franz Liszt, who from 1848 to 1886 made Weimar his principal place of residence. Other notable conductors of the Weimar theatre orchestra were Eduard Lassen and Richard Strauss.

See Schöll, *Weimar's Merkwürdigkeiten einst und jetzt* (Weimar; 1857); Springer, *Weimar's klassische Stätten* (Berlin, 1868); Ruland, *Die Schätze des Goethe National-Museums in Weimar* (Weimar and Leipzig, 1887); Francke, *Weimar und Umgebungen* (3rd ed., Weimar, 1900); Kuhn, *Weimar in Wort und Bild* (4th ed., Jena, 1905).

WEINHEIM, a town of Germany, in the grand-duchy of Baden, pleasantly situated on the Bergstrasse at the foot of the Odenwald, 11 m. N. of Heidelberg by the railway to Frankfort-on-Main. Pop. (1905) 12,560. It is still in part surrounded by the ruins of its ancient walls. The Gothic town hall; the ruins of the castle of Windeck and the modern castle of the counts of Berckheim; the house of the Teutonic Order; and three churches are the principal buildings. The town has various manufactures, notably leather, machinery and soap, and cultivates fruit and wine. It is a favourite climatic health resort and a great tourist centre for excursions in the Odenwald range. Weinheim is mentioned in chronicles as early as the 8th century, when it was a fief of the abbey of Lorsch, and it was fortified in the 14th century. In the Thirty Years' War it was several times taken and plundered, and its fortifications dismantled.

See Hegewald, *Der Luftkurort Weinheim an der Bergstrasse* (Weinheim, 1895); Ackermann, *Führer durch Weinheim und Umgebung* (Weinheim, 1895); and Zinkgräf, *Bilder aus der Geschichte der Stadt Weinheim* (Weinheim, 1904).

WEINSBERG, a small town of Germany, in the kingdom of Württemberg, pleasantly situated on the Sulm, 5 m. E. from Heilbronn by the railway to Crailsheim. Pop. (1905) 3097. It has an ancient Romanesque church, a monument to the reformer Oecolampadius (*q.v.*), and a school of viticulture, which is the chief occupation of the inhabitants. On the Schlossberg above the town lie the ruins of the castle of Weibertreu, and at its foot is the house once inhabited by Justinus Kerner (*q.v.*), with a public garden and a monument to the poet.

The German king Conrad III. defeated Count Welf VI. of Bavaria near Weinsberg in December 1140, and took the town, which later became a free imperial city. In 1331 it joined the league of the Swabian cities, but was taken by the nobles in 1440 and sold to the elector palatine, thus losing its liberties. It was burnt in 1525 as a punishment for the atrocities committed by the revolted peasants. The famous legend of Weibertreu ("women's faithfulness"), immortalized in a ballad by Chamisso, is connected with the siege of 1140, although the story is told of other places. It is said that Conrad III. allowed the women to leave the town with whatever they could carry, whereupon they came out with their husbands on their backs.

See Bernheim, "Die Sage von den treuen Weibern zu Weinsberg" (in the *Forschungen zur deutschen Geschichte*, vol. xv., Göttingen, 1875); Merk, *Geschichte der Stadt Weinsberg und ihrer Burg Weibertreu* (Heilbronn, 1880).

WEIR, ROBERT WALTER (1803–1889), American portrait and historical painter, was born at New Rochelle, New York, on the 18th of June 1803. He was a pupil of Jarvis, was elected to the National Academy of Design in 1829, and was teacher of drawing at the United States Military Academy at West Point in 1834–1846, and professor of drawing there in 1846–1876. He died in New York City on the 1st of May 1889. Among his better-known works are: "The Embarkation of the Pilgrims" (in the rotunda of the United States Capitol at Washington, D.C.); "Landing of Hendrik Hudson"; "Evening of the Crucifixion"; "Columbus before the Council of Salamanca"; "Our Lord on the Mount of Olives"; "Virgil and Dante crossing the Styx," and several portraits, now at West Point, and "Peace and War" in the Chapel there.

His son, John Ferguson Weir (b. 1841), painter and sculptor, became a Member of the National Academy of Design in 1866, and was made director of the Yale University Art School in 1868. Another son, Julian Alden Weir (b. 1852), studied under his father, and under J. L. Gérôme, and became a distinguished portrait, figure and landscape painter. He was one of the founders of the Society of American Artists in 1877, and became a member of the National Academy of Design (1886) and of the Ten American Painters, New York.

WEIR (from O. Eng. *wer*, a dam; cognate with *werian*, to defend, guard; cf. Ger. *Wehr*, defence), a barrier placed across rivers to raise the water-level for catching fish, for mills, for navigation or for irrigation, the discharge of the river taking place over the crest or through openings made for the purpose. Rough weirs, formed of stakes and twigs, were erected across English rivers in Saxon times for holding up the water and catching fish, and fish-traps, with iron-wire meshes and eel baskets, are still used sometimes at weirs. Weirs are essential for raising the head of water for water-wheels at mills, and for diverting some of the flow of a river into irrigation canals; but they have received their greatest and most varied extension in the canalization of rivers for navigation. There are three distinct classes of weirs, namely, solid weirs, draw-door weirs, including regulating sluices for irrigation, and movable weirs, which retain the water above them for navigation during the low stage of the river, and can be lowered or removed so as to leave the channel quite open in flood-time.

Solid Weirs.—The simplest form of weir is a solid, watertight dam of firm earthwork or rubble stone, faced with stone pitching, with cribs filled with rubble, with fascine mattresses weighted with stone, or with masonry, and protected from undermining by sheet piling or one or more rows of well foundations. These weirs, if solidly constructed, possess the advantages of simplicity, strength and durability, and require no superintendence. They, however, block up the river channel to the extent of their height, and consequently raise the flood-level above them. This serious defect of solid weirs, where the riparian lands are liable to be injured by inundations, can be slightly mitigated by keeping down the crest of the weir somewhat below the required level, and then raising the water-level at the low stage of the river by placing a row of planks along the top of the weir.

Waste weirs resemble ordinary solid weirs in providing for the surplus discharge from a reservoir of an impounded river or mountain stream over their crest; but in reality they form part of a masonry reservoir dam for storing up water for water-supply or irrigation, kept purposely lower than the rest of the dam to allow the excess of water to escape down the valley (see WATER-SUPPLY).

Draw-door Weirs.—The discharge of a river at a weir can be regulated as required and considerably increased in flood-time by introducing a series of openings in the centre of a solid weir, with sluice-gates or panels which slide in grooves at the sides of upright frames or masonry piers erected at convenient intervals apart, and which can be raised or lowered as desired from a foot-bridge. This arrangement has been provided at several weirs on the Thames, to afford control of the flood discharge, and reduce the extent of the inundations; the largest of these composite weirs on that river is at the tidal limit at Teddington, where the two central bays, with a total length of 242½ ft., are closed by thirty-five draw-doors sliding between iron frames supporting a foot-bridge, from which the doors are raised by a winch.[1] Ordinary draw-doors, sliding in grooves of moderate size and raised against a small head of water, can be readily worked in spite of the friction of the sides of the doors against their supports; but with large draw-doors and a considerable head, the friction of the surfaces in contact offers a serious impediment in raising them. This friction has been greatly reduced by making the draw-doors, or sluice-gates, slide on each side against a vertical row of free-rollers suspended by an encircling chain; and the working is much facilitated by counterpoising the doors. By these arrangements the large draw-door weir across the Thames at Richmond, with three spans of 66 ft. closed by lifting doors, each 12 ft. high and weighing 32 tons, can be fully opened in seven minutes by two men raising each door from the arched double foot-bridge (figs. 1, 2 and 3). This weir retains the river above it at half-tide level, in order to cover the mud-banks which had been bared at low tide between Richmond and Teddington by the lowering of the low-water level, owing to the removal of various obstructions in the river below. The weir is raised out of the river as soon as the flood-tide on its lower side has risen to half-tide level, so as not to impede the flow and ebb of the tide up to Teddington above that level, and is not lowered till the tide has fallen again to the same level. In order that the doors when raised may not impede the view under the arches, the doors are rotated automatically at the top by grooves at the sides of the piers, so as to assume a horizontal position and pass out of sight in the central space between the two foot-ways (fig. 2). The barrage at the head of the Nile delta, and the regulating sluices across the Nile at Assiut and Esna in Upper Egypt below Assuan, are examples of draw-door weirs, with their numerous openings closed by sluice-gates sliding on free rollers, which control the discharge of water from the river for irrigation.

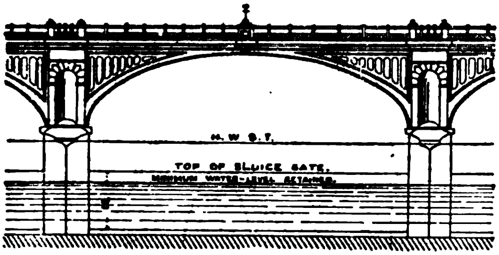

FIG. 1.—Lifting-gate Weir and Foot-bridge at Richmond, Surrey.

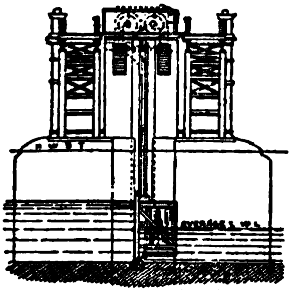

FIG. 2.—Mechanism of Lifting-gate, Richmond.

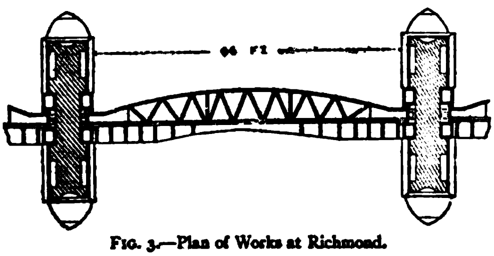

FIG. 3.—Plan of Works at Richmond.

Movable Weirs.—There are three main types of movable weirs, namely frame weirs, shutter weirs and drum weirs, which, however, present several variations in their arrangements.

Frame weir.

The ordinary form of frame weir consists of a series of iron frames placed across a river end on to the current, between 3 and 4 ft. apart, hinged to a masonry apron on the bed of the river and carrying a foot-bridge along the top, from which the actual barrier, resting against the frames and cross-bars at the top and a sill at the bottom, is put into place or removed for closing or opening the weir. The barrier was originally formed of a number of long square wooden spars which could be readily handled by one man, being inclined slightly from the vertical and placed close together for shutting the weir; but panels of wood or sheet-iron closing the space between adjacent frames and sliding in grooves at the sides, and rolling-up curtains composed of a series of horizontal wooden laths connected by leathern hinges, have also been employed. The needle weir, so called from the long, slender spars being termed *aiguilles* in France, had the merit of simplicity in its earliest form; and by means of some ingenious contrivances, comprising a hook, winch, lever and rotating bar, for assisting the weir-keepers in placing and releasing the needles, the system has been applied successfully to the weirs of greater height required on the Meuse, the Main and the Moldau (fig. 4). The needle weir has, however, attained its greatest development in the United States across the Big Sandy river at Louisa, where, instead of needles 3 to 4 in. square, beams 12 in. square and 18½ ft. long have been resorted to, provided with a steel eye at the top and a ring near the centre of gravity to enable them to be worked (fig. 5). The needles are put in place one by one against the raised frames, or trestles, by a derrick on a barge lifting them by their ring, whilst a man on the foot-bridge, taking hold of the eye at the top, arranges them in position close together. The weir is opened by joining the needles of each bay by a chain passed through the eyes at the top and a line of wire through the central rings, so that when released at the top by the tilting of the escape bar by the derrick, they float down as a raft, and are caught by a man in a boat, or, when the current is strong, they are drawn to the bank by a rope attached to them previously to their release. The trestles of this weir are, as usual, hinged to the apron, so that in flood-time they can be completely lowered into a recess across the apron by means of chains actuated by a winch, leaving the channel perfectly open for the discharge of floods and for the passage of vessels when the lock is submerged. Whereas, however, ordinary frames placed nearer together than their height overlap one another when lowered on to the apron, the trestles of the Louisa weir lie clear of each other quite flat on the apron.

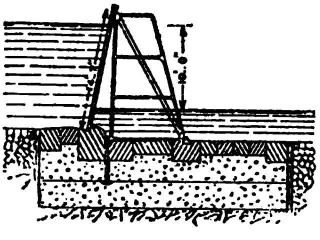

FIG. 4.—Needle Weir, River Moldau.

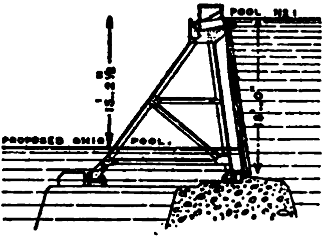

FIG. 5.—Spar Weir, Louisa, Big Sandy River, U.S.A.

The frame weir closed by sliding panels or rolling-up curtains (fig. 6) possesses the advantage that the panels or laths can be diminished in thickness towards the top in proportion to the reduced water-pressure; whereas the needles, being of uniform cross-section, have to be made stout enough to sustain the maximum bottom pressure.

An objection has occasionally been urged against frames lowered on to the bed of a river that they are liable to be covered over by detritus or drift brought down by floods, and consequently are subject to injury or impediments in being raised. In order to

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[1] L. F. Vernon-Harcourt, *Rivers and Canals*, 2nd edition, p. 114, and plate iii. figs. 15 and 16.

The name Weissenburg occurs in three other places; the town of Weissenburg-am-Sand in Bavaria (*q.v.*); a Swiss invalid resort in the Niedersimmental, above Lake Thun, with sulphate of lime springs, beneficial for bronchial affections; also a Hungarian comitat (Magyar Fejérvár), with Stuhlweissenburg as capital.

WEISSENBURG-AM-SAND, a town of Germany, in the Bavarian district of Middle Franconia, situated in a pleasant and fertile country at the western foot of the Franconian Jura, 1300 ft. above the sea, and 33 m. by rail S.W. of Nuremberg by the railway to Munich. Pop. (1905) 6709. It is still surrounded by old walls and towers, and has two Gothic churches and a Gothic town-hall. The town has a mineral spring, connected with which is a bathing establishment. A Roman castle has recently been discovered, and there is a collection of antiquities in the modern school. The old fortalice of Wülzburg (2060 ft.) overlooks the town. Gold and silver fringe, bricks, cement wares, beer and cloth are manufactured. Weissenburg dates from the 8th century, and in the 14th was made a free imperial town. It passed to Bavaria in 1806.

See C. Meyer, *Chronik der Stadt Weissenburg in Bayern* (Munich, 1904); and Fabricius, *Das Kastell Weissenburg* (Heidelberg, 1906).

WEISSENFELS, a town of Germany, in the Prussian province of Saxony, situated on the Saale 20 m. S.W. of Leipzig and 19 m. S. of Halle by the main line to Bebra and Frankfort-on-Main. Pop. (1905) 30,894. It contains three churches, a spacious market-place and various educational and benevolent institutions. The former palace, called the Augustusburg, built in 1664–1690, lies on an eminence near the town; this spacious edifice is now used as a military school. Weissenfels manufactures machinery, ironware, paper and other goods, and has an electrical power-house. In the neighbourhood are large deposits of sandstone and lignite. Weissenfels is a place of considerable antiquity, and from 1656 till 1746 it was the capital of the small duchy of Saxe-Weissenfels, a branch of the electoral house of Saxony, founded by Augustus, second son of the elector John George I. The body of Gustavus Adolphus was embalmed at Weissenfels after the battle of Lützen.

See Sturm, *Chronik der Stadt Weissenfels* (Weissenfels, 1846); and Gerhardt, *Geschichte der Stadt Weissenfels* (Weissenfels, 1907).

WEIZSÄCKER, KARL (1822–1899), German Protestant theologian, was born at Oehringen near Heilbronn in Württemberg, on the 11th of December 1822. After studying at Tübingen and Berlin, he became *Privatdozent* at Tübingen in 1847 and eventually (1861) professor of ecclesiastical and dogmatic history. From 1856 to 1878 he helped to edit the *Jahrbücher für deutsche Theologie*; and his elaborate studies *Untersuchungen über die evangelische Geschichte, ihre Quellen und den Gang ihrer Entwicklung* (1864) and *Das apostolische Zeitalter der christl. Kirche* (1886, 2nd ed. 1893; Engl. trans. 1894–1895) made him widely known and respected. He died on the 13th of August 1899. His son, Karl von Weizsäcker (b. 1853), was appointed in 1900 *Kultusminister* for Württemberg.

Weizsäcker's other works include *Zur Kritik des Barnabasbriefs* (1863) and *Ferdinand Christian Baur* (1892). Cf. Hegler, *Zur Erinnerung an Karl Weizsäcker* (1900).

WEKERLE, SANTOR [Alexander] (1848–), Hungarian statesman, was born on the 14th of November 1848 at Moór, in the comitat of Stuhlweissenburg. After studying law at the university of Budapest he graduated *doctor juris*. He then entered the government service, and after a period of probation was appointed to a post in the ministry of finance. He still, however, continued an academic career by lecturing on political economy at the university. In 1886 Wekerle was elected to the House of Deputies, became in the same year financial secretary of state, and in 1889 succeeded Tisza as minister of finance. He immediately addressed himself to the task of improving the financial position of the country, carried out the conversion of the State loans, and succeeded, for the first time in the history of the Hungarian budget, in avoiding a deficit. In November 1892 Wekerle succeeded Count Szapáry as premier, though still retaining the portfolio of finance. At the head of a strong government he was enabled, in spite of a powerful opposition of Catholics and Magnates, to carry in 1894 the Civil Marriage Bill. The continued hostility of the clerical party, however, brought about his resignation on the 22nd of December 1894, when he was succeeded by Banffy. On the 1st of January 1897 he was appointed president of the newly created judicial commission at Budapest, and for the next few years held aloof from politics, even under the *ex-lex* government of Fejérváry. On the reconciliation of the king-emperor with the coalition he was therefore selected as the most suitable man to lead the new government, and on the 8th of April 1906 was appointed prime minister, taking at the same time the portfolio of finance. He resigned the premiership on the 27th of April 1909, but was not finally relieved of his office until the formation of the Khuen-Hedérváry cabinet on the 17th of January 1910.

WELCKER, FRIEDRICH GOTTLIEB (1784–1868), German philologist and archaeologist, was born at Grünberg in the grand duchy of Hesse. Having studied classical philology at the university of Giessen, he was appointed (1803) master in the high school, an office which he combined with that of lecturer at the university. In 1806 he journeyed to Italy, and was for more than a year private tutor at Rome in the family of Wilhelm von Humboldt, who became his friend and correspondent. Welcker returned to Giessen in 1808, and resuming his school-teaching and university lectures was in the following year appointed the first professor of Greek literature and archaeology at that or any German university. After serving as a volunteer in the campaign of 1814 he went to Copenhagen to edit the posthumous papers of the Danish archaeologist Georg Zoëga (1755–1809), and published his biography, *Zoëgas Leben* (Stutt. 1819). His liberalism in politics having brought him into conflict with the university authorities of Giessen, he exchanged that university for Göttingen in 1816, and three years later received a chair at the new university of Bonn, where he established the art museum and the library, of which he became the first librarian. In 1841–1843 he travelled in Greece and Italy (cf. his *Tagebuch*, Berlin, 1865), retired from the librarianship in 1854, and in 1861 from his professorship, but continued to reside at Bonn until his death. Welcker was a pioneer in the field of archaeology, and was one of the first to insist, in opposition to the narrow methods of the older Hellenists, on the necessity of co-ordinating the study of Greek art and religion with philology.

Besides early work on Aristophanes, Pindar, and Sappho, whose character he vindicated, he edited Alcman (1815), Hipponax (1817), Theognis (1826) and the Theogony of Hesiod (1865), and published a *Sylloge epigrammatum Graecorum* (Bonn, 1828). His *Griechische Götterlehre* (3 vols., Göttingen, 1857–1862) may be regarded as the first scientific treatise on Greek religion. Among his works on Greek literature the chief are *Die Äschyleische Trilogie* (1824, 6), *Der epische Zyklus oder die Homerischen Gedichte* (2 vols. 1835, 49), *Die griechischen Tragödien mit Rücksicht auf den epischen Zyklus geordnet* (3 vols., 1839–1841). His editions and biography of Zoëga, his *Zeitschrift für Geschichte und Auslegung der alten Kunst* (Göttingen, 1817, 8) and his *Alte Denkmäler* (5 vols., 1849–1864) contain his views on ancient art.

See Kekulé, *Das Leben F. G. Welckers* (Leipzig, 1880); *W. von Humboldts Briefe an Welcker* (ed. R. Haym, Berlin, 1859); J. E. Sandys, *History of Classical Scholarship* (vol. iii., pp. 216, 7, Cambridge, 1908).

WELDING (*i.e.* the action of the verb "to weld" the same word as "to well," to boil or spring up, the history of the word being to boil, to heat to a high degree, to beat heated iron; according to Skeat, who points out that in Swedish the compound verb *uppvälla* means to boil, the simple *välla* is only used in the sense of welding), the process of uniting metallic surfaces by pressure exercised when they are in a semi-fused condition. It differs therefore from brazing and soldering, in which cold surfaces are united by the interposition of a fused metallic cementing material. The conditions in which welding is a suitable process to adopt are stated in the article Forging. The technique of the work will be considered here.

The conditions for successful welding may be summed up as clean metallic surfaces in contact, a suitable temperature and rapid closing of the joint. All the variations in the forms of welds are either due to differences in shapes of material, or to the practice of different craftsmen. The typical weld is the scarf. If, for instance, a bar has to be united to another bar or to an eye, the joint is made diagonally (scarfed) because that gives a longer surface in contact than a weld at right angles (a butt weld), and because the hammer can be brought into play better. Abutting faces for a scarfed joint are made slightly convex; the object is to force out any scale or dirt which might otherwise become entangled in the joint at the moment of closing and which would impair its union. The ends are upset (enlarged) previous to welding, in order to give an excess of metal that will permit of slight corrections being effected around the joint ("swaging") without reducing the diameter below that of the remainder of the bar. These principles are seen in other joints of diverse types, in the butt, the vee and their modifications. Joint faces must be clean, both chemically, *i.e.* free from oxides, and mechanically, *i.e.* free from dust and dirt, else they will not unite. The first condition is fulfilled by the use of a fluxing agent, the second by ordinary precautions. The flux produces with the oxide a fluid slag which is squeezed out at the instant of making the weld. The commonest fluxes are sand, used chiefly with wrought iron, and borax, used with steel; they are dusted over the joint faces both while in the fire and on the anvil. Mechanical cleanliness is ensured by heating the ends in a clean hollow fire previously prepared, and in brushing off any adherent particles of fuel before closing the weld. The scarf, the butt and the vee occur in various modifications in all kinds of forgings, but the principles and precautions to be observed are identical in all. But in work involving the use of rolled sections, as angles, tees, channels and joists, important differences occur, because the awkwardness of the shapes to be welded involves cutting and bending and the insertion of separate welding pieces ("gluts"). Welds are seldom made lengthwise in rolled sections, nor at right angles, because union is effected in such cases by means of riveted joints. But welding is essential in all bending of sections done at sharp angles or to curves of small radius. It is necessary, because a broad flange cannot be bent sharply; if the attempt be made when it is on an outer curve it is either ruptured or much attenuated, while on an inner curve it is crumpled up. The plater's smith therefore cuts the flanges in both cases, and then bends and welds them. If it is on an inner curve, the joint is a lap weld; if it is on an outer one, a fresh piece or glut is welded in. Gluts of rectangular section are used for cylindrical objects and rings of various sections. The edges to be united may or may not be scarfed, and the gluts, which are plain bars, are welded against the edges, all being brought to a welding heat in separate furnaces. The furnace tubes of boilers and the cross tubes are welded in this way, sometimes by hand, but often with a power hammer, as also are all rings of angle and other sections on the vertical web.

The temperature for welding is very important. It must be high enough to render the surfaces in contact pasty, but must not be in excess, else the metal will become badly oxidized (burnt) and will not adhere. Iron can be raised to a temperature at which minute globules melt and fall off, but steel must not be heated nearly so much, and a moderate white heat must not be exceeded. Welds in steel are not so trustworthy nor so readily made as those in iron.

Thermit Welding.—The affinity of finely powdered aluminium for metallic oxides, sulphides, chlorides, &c., may be utilized to effect a reduction of metals with which oxygen, sulphur or chlorine combine. C. Vautin in 1894 found that when aluminium in a finely divided state was mixed with such compounds and ignited, an exceedingly high temperature, about 3000° C., was developed by the rapid oxidation of the aluminium. He found that metals which are ordinarily regarded as infusible were readily reduced, and in a very high degree of purity. These facts were turned to practical account by Dr H. Goldschmidt, who first welded two iron bars by means of molten iron produced by the process, to which the name of "thermit" is now commonly applied. The method has also been applied to the production of pure metals for alloying purposes, as of chromium free from carbon and [illegible] gases in [illegible] ferro-titanium and [illegible] steels.

Thermit is a mech[illegible] finely granulated a[illegible] nesia. On ignit[illegible] the contents [illegible] closed with a [illegible] produced, the [illegible] alumina or corundum. [illegible] the slag follows [illegible] the metal is poured [illegible] practically pure wrought [illegible] 5400° F. The heat is so [illegible] clean hole through a 1 in. [illegible] pared by abutting them, and [illegible] and retain them in correct [illegible] part to be welded is enclosed [illegible] tapped from the crucible. The [illegible] numerous. A wide field is that of [illegible] numbers have been successfully welded [illegible] welded, as also have broken and [illegible] broken shafts, broken sternposts [illegible] with a capacity of 7 cwt. have been [illegible] pipes. Another application is to [illegible] introducing thermit in a block on an iron rod, [illegible] prevents or greatly lessens the amount of piping [illegible] shrinkage and occlusion of gases.

Electric Welding.—In electric welding and metal [illegible] heat may be communicated to the metal by an [illegible] or by means of the electric resistance of the metal, as in the Thomson process. Arc welding is the older [illegible] procedure, and it appears to have been first made use [illegible] of by de Meritens in 1881 for uniting the parts of storage [illegible] plates. The work-piece was placed upon a support or table, and connected with the positive pole of a source of current capable of maintaining an electric arc. The other pole was a carbon rod directed by the hand of the operator so as first to make contact with the work-piece, and then to effect the proper separation to maintain the arc. The heat of the arc was partly communicated to the work and partly dissipated in the hot gases escaping into the surrounding air. The result was a fusion of the metallic lead of the storage-battery plate which united various parts of the plate. The process was somewhat similar to the operation of lead-burning by the hydrogen and air blowpipe, as used in the formation of joints in chemical tanks made of sheet-lead. The method of de Meritens has been modified by Bernardos and Olszewski, Slavienoff, Coffin and others.

In the Bernardos and Olszewski process the work is made the negative pole of a direct current circuit, and an arc is drawn between this and a carbon rod, to which a handle is attached for manipulating. As this rod is the positive terminal, particles of carbon may be introduced as a constituent of the metal taking part in the operation, making it hard and brittle, and causing cracks in the joint or filling; the metal may, in fact, become very hard and unworkable. The Slavienoff modification of the arc-welding process consists in the employment of a metal electrode in place of the carbon rod. The metal electrode gradually melts, and furnishes fused drops of metal for the filling of vacant spaces in castings, or for forming a joint between two parts or pieces.

In arc welding, with a current source at practically constant potential, a choking resistance in series with the heating arc is needed to secure stability in the arc current, as in electric arc lighting from constant potential lines. Little effective work can be done by the Bernardos and Olszewski method with currents much below 150 amperes in the arc, and the value in some cases ranges above 500 amperes. The potential must be such that an arc of 2 to 3 in. in length is steadily maintained. This may demand a total of about 150 volts for the arc and the choking resistance together. In the Slavienoff arc the potential required will be naturally somewhat lower than when a carbon electrode is used, and the current strength will be, on the other hand, considerably greater, reaching, it appears, in certain cases, more than 4000 amperes. In some recent applications of the arc process the polarity of the work-piece and the arc-controlling electrode has, it is understood, been reversed, the work being made the positive pole and the movable electrode the negative. More heat energy is thus delivered to the work for a given total of electric energy expended.

The arc method is essentially a fusing process, though with due care it is used for heating to plasticity the edges of iron sheets to be welded by pressure and hammering. It has been found applicable in special cases to the filling of defective spots in iron castings, by fusing into blow-holes or other spaces small masses of similar metal, added gradually, and melted into union with the body of the piece by the heat of the arc. Similarly, a more or less complete union between separate pieces of iron plate ¼ to ½ in. in thickness has been effected by fusing additional metal between them. The range of operations to which the arc process is applicable is naturally somewhat limited, and depends to a large extent upon the skill acquired by the operator, who necessarily works with his eyes well screened from the glare of the large arc. Unless the space in which the work is carried on is large, the irritating vapours which rise from the arc stream add to the difficulty. Strong draughts of air which would disturb the arc must also be avoided. These factors, added to the relative slowness of the work and the uncertainty as to its result, have tended to restrict the application of arc welding in practice. Moreover, much heat-energy is dissipated in the arc flame and passes into the air, while, owing to the time required for the work, the metal undergoing treatment loses much heat by radiation. Yet the method requires little special machinery. The current may be taken from existing electric lighting and power circuits of moderate potential without transformation, and may be utilized with simple appliances, consisting chiefly of heavy wire leads, a carbon or metal electrode with a suitable handle for its manipulation, a choking or steadying resistance, and screen of dark glass for the operator's eyes.

In 1874 Werdermann proposed to use, as a sort of electric blow-pipe, the flame gases of an electric arc blown or deflected by an air jet or the like—a suggestion subsequently revived by Zerener for arc welding. The arc in this instance is deflected from the space between the usual carbon electrodes by a magnetic field. The metal to be heated takes no part in the conduction of current, the heat is communicated by the gases of the arc, and, to a small extent, by the radiation from the hot carbon electrodes between which the arc is formed. The process is scarcely to be called electric in any true sense. Another curious operation, resembling in some respects the arc methods, has been proposed for the heating of metal pieces before they are brought under the hammer for forging or welding. The end of a metal bar is plunged into an electrolytic bath while connected with the negative pole of a lighting or other electric circuit having a potential of 100 to 150 volts. The positive pole is connected with a metal plate as an anode immersed in the electrolyte, or forming the side of the containing vat or tank. A solution of sodium or potassium carbonate is a suitable electrolyte. That part of the bar which is immersed acts as a cathode of limited surface, and is at once seen to be surrounded by a luminous glow, with gas bubbles arising from it. The immersed end of the bar rapidly heats, and may even melt under the liquid of the bath. It is probable that an arc forms between the surface of the metal and the adjacent liquid layer, the intense heat of which is in part communicated to the metal and in part lost in the solution, causing thereby a rapid heating of the bath. This singular action appears to have been first made known by Holio and Lagrange. It is distinctly a form of electric heating, having no necessary relation to such subsequent operations as welding, and is, moreover, wasteful of energy, as the heat is largely carried off in the liquid bath.

Thomson process.

The process of Elihu Thomson first brought to public notice in 1886, has since that time been applied commercially on a large scale to various metal-welding operations. The metal pieces to be united are held in massive clamps and pressed together in firm contact; and a current is made to traverse the proposed joint, bringing it to the welding temperature. The union is effected by forcing the pieces together mechanically. The characteristic feature of the process is the fact that the heat is given out in the body of the metal.

The voltage does not usually exceed two or three, though it may reach four or five volts; but as the resistance of the metal pieces to be joined is low, the currents are of very large values, sometimes reaching between 50,000 and 100,000 amperes. Even for the joining of small wires the current is rarely less than 100 amperes. Such currents cannot, of course, be carried more than a few feet without excessive loss, unless the conductors are given very large section. With alternating currents, also, the effectiveness of the work speedily diminishes, on account of the inductive drop in the leads, if they are of any considerable length. The carrying of the welding currents over a distance of several feet may, in fact, lead to serious losses. These difficulties are overcome in the Thomson welding transformer, which resembles the step-down transformers used in electric lighting distribution by alternating currents, with the exception that the secondary coil or conductor, which forms part of the welding circuit, usually consists of only one turn of great section, S S [illegible] made in the form of a copper casing, w[illegible] the primary coil P P in whole or in par[illegible] wire of many turns. The second[illegible], is provided with the usual laminated iron-transformer core, I, constituting a closed iron magnetic circuit threading both primary and secondary electric circuits. The terminals of the single-turn secondary serve as connexions and supports for the welding clamps C D, which hold the work. The clamps are variously modified to suit the size, shape and character of the metal pieces, M N, to be welded, and the proportions of the transformer itself are made proper for the conditions existing in each case. The potential of the primary circuit may be selected at any convenient value, provided the winding of the coil P P is adapted thereto, but usually 300 volts is employed, and the periodicity is about 60 cycles. Inasmuch as only the proposed joint and a small amount of metal on each side of it are concerned in the operation, the delivery of energy is closely localized. The chief electrical resistance in the welding circuit is in the projections between the clamps, where the electric energy is delivered and appears as heat. A portion of the energy is, as usual, lost in the transformation and in the resistance of the circuits elsewhere, but, by proper proportioning, the loss may be kept down to a moderate percentage of the total, as in other electric work.

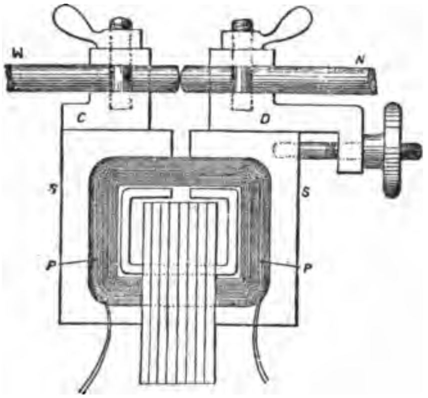

Fig. 1.—Thomson Welding Transformer.

The pieces are set firmly in the welding clamps, with the ends to be joined in abutment and in electric contact. The projection of each piece from the clamp varies with the section of the pieces, their form and the nature of the metal, and the time in which a joint is to be made; but it rarely exceeds the thickness or diameter of the pieces, except with metals of high heat conductivity such as copper. When the pieces are in place the current is turned into the primary coil of the transformer, sometimes suddenly and in full force, but more often gradually. Switches and regulating devices in the primary circuit permit complete and delicate control. At least one of the clamps, D (fig. 1), is movable through a limited range towards and from the other, and is thus the means of exerting pressure for forcing the softened metal into complete union. In large work the motion is given by a hydraulic cylinder and piston, under suitable control by valves. At about the time the current is cut off, it is usual to apply increased pressure. The softened metal is upset or pressed outwards at the joint and forms a characteristic burr, which may be removed by filing or grinding, or be hammered down while the metal is still hot. Sometimes the burr is not objectionable, and is allowed to remain. Lap welds may be made, but butt welds are found to be satisfactory for most purposes. The appearance of round bars in abutment before welding is shown in fig. 2 at A; and at B they are represented as having been joined by an electric butt weld, with the slight upset or burr at the joint. Before the introduction of the Thomson process a few only of the metals, such as platinum, gold and iron, were regarded as weldable; now nearly all metals and alloys may be readily joined. Such combinations as tin and lead, copper and brass, brass and iron, iron and nickel, brass and German silver, silver and copper, copper and platinum, iron and German silver, tin and zinc, zinc and cadmium, &c., are easily made; even brittle crystalline metals like bismuth and antimony may be welded, as well as different metals and alloys whose fusing or softening temperatures do not differ too widely.

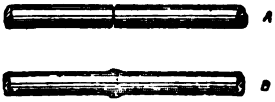

Fig. 2.

If the meeting ends conduct sufficiently to start the heating, it is not necessary that they should fit closely together, nor is it necessary that they should be quite clean, the effect of the incipient heating being to confer conductivity upon the scale and oxide at the joint.

In some cases the application of a flux, such as borax, welding to be accomplished at a lower temperature, than risk of injury by excessive heating. While the pieces are the increase of temperature may raise the specific resistance metal so that the current required will be lessened per unit of while on the other hand the growing perfection of contact welding, by increasing the conducting area at the joint, compensat for this in that it tends to the increase of current. With alloys like brass and German silver, which have a low temperature coefficient, this compensating effect is nearly absent. The increase of specific resistance of the metals with increase of temperature has another valuable effect in properly distributing the heating over the whole section of the joint. Any portion which may be for the moment at a lower temperature than other portions will necessarily have a lower relative resistance, and more current will be diverted to it. This action rapidly brings any cooler portion into equality of temperature with the rest. It also prevents the overheating of the interior portions which are not losing heat by radiation and convection. The success of the electric process in welding metals which were not formerly regarded as weldable is probably due in a measure to this cause, and also to the ease of control of the operation, for the operator may work within far narrower limits of plasticity and fusibility than with the forge fire or blowpipe. The mechanical pressure may be automatically applied and the current automatically cut off after the completion of the weld. In some more recent types of welders the clamping and releasing of the pieces are also accomplished automatically, and nothing is left for the operator to do but to feed the pieces into the clamps. Repetition-work is thus rapidly and accurately done. The automatic welder represented in fig. 3 has a capacity of nearly 1000 welds per day. The pressure required is subject to considerable variation: the more rigid the material at the welding temperature, the greater is the necessary pressure. With copper the force may be about 600 pounds per square inch of section; with wrought iron, 1200 pounds; and with steel, 1800 pounds. It is customary to begin the operation with a much lighter pressure than that used when all parts of the pieces at the joint have come into contact. The pressure exerted in completing the weld has the effect of extruding from the joint all dross and slag, together with most of the metal which is rendered plastic by the heat. The strongest electric welds are those effected by this extrusion from the joint, in consequence of heavy pressure quickly applied at the time of completion of the weld. The unhammered weld, as ordinarily made by the electric process, has substantially the same strength as the annealed metal of the bar, the break under tensile strain, when the burr at the weld is left on, usually occurring a little to one side of the joint proper, where the metal has been annealed by heating. Hammering or forging the joint while the metal cools, in the case of malleable metals such as iron or copper, will usually greatly toughen the metal, and it should be resorted to where a maximum of strength is desired. The same object is partially effected by placing the weld, while still hot, between dies pressed forcibly together so as to give to the weld some desired form, as in drop-forging.

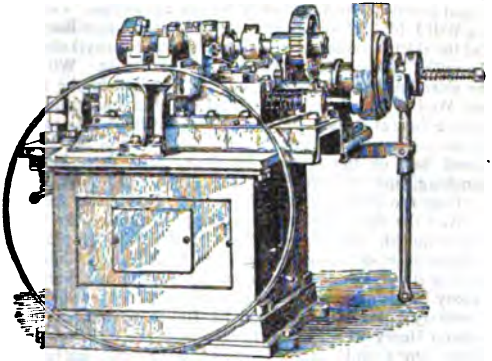

Fig. 3.—Automatic Welder.

The amount of electric energy necessary for welding by the Thomson process varies with the different metals, their electric conductivity, their heat conductivity, fusibility, the shape of the pieces, section at the joint, &c. In the following table are given some results obtained in the working of iron, brass and copper. The figures are of course only approximate, and refer to one condition alone of time-consumption in the making of each weld. The more rapidly the work is done, the less, as a rule, is the total energy required; but the rate of output of the plant must be increased with increase of speed, and this involves a larger plant, the consequent expense of which is often disadvantageous. If in the following

Section			
0·5			
1·0			
1·5			
2·0	[illegible]		
2·5	[illegible]		
3·0	[illegible]		
3·5	44,000		
4·0	50,000		
	Brass.		
·25	7,500	[illegible]	
·5	13,500	22	
·75	19,000	[illegible]	
1·0	25,000	33	
1·25	31,000	34	
1·5	36,000	42	
1·75	40,000	45	
2·0	44,000	48	
	Copper.		
·125	6,000	8	[illegible]
·25	14,000	11	[illegible]
·375	19,000	13	[illegible]
·5	25,000	16	[illegible]
·625	31,000	18	[illegible]
·75	36,500	21	766,500
·875	43,000	22	946,000
1·0	49,000	23	1,127,000

In practice, joints in solid bars or in wires are the most common, but the process is applicable to pieces of quite varied form. Joints in iron, brass, or lead pipe are readily made; strips of sheet metal are joined, as in band saws; bars or tubes are joined at various angles; sheet metal is joined to bars, &c. One of the more interesting of the recent applications of electric welding is the longitudinal seaming of thin steel pipe. The metal or skelp is in long strips, bent to form a hollow cylinder or pipe, and the longitudinal seam moves through a special welder, which passes a current across it. The work is completed by drawing the pipe through dies. The welding of a ring formed by bending a short bar into a circle affords an excellent illustration of the character of the currents employed in the Thomson process. Notwithstanding the comparatively free path around the ring through the full section of the bent bar, the current heats the abutted ends to the welding temperature. In this way waggon and carriage wheel tyres, harness rings, pail and barrel hoops, and similar objects are extensively produced. The process is also largely applied to the welding of iron and copper wires used for electric lines and conductors, of steel axles, tyres and metal frames used in carriage work, and of such parts of bicycles as pedals, crank hangers, seat posts, forks, and steel tubing for the frames. The heat, whether it be utilized in welding or brazing, is so sharply localized that no damage is done to the finish of surfaces a short distance from the weld or joint. Parts can be accurately formed and finished before being joined, as in the welding of taper shanks to drills, the lengthening of drills, screw taps, or augers, and the like. Electric welding is applicable to forms of pieces or to conditions of work which would be impracticable with the ordinary forge fire or gas blowpipe. A characteristic instance is the wire bands which hold in place the solid rubber tyres of vehicles. The proximity of the rubber forbids the application of the heat of a fire or blowpipe, but by springing the rubber back from the proposed joint and seizing the ends of wire by the electric welding clamps, the union is rapidly and easily made. When the rubber of the tyre is released, it covers

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down able ly,

ft. by March 1857. Its total depth is now about 1923 ft. with the diameter of 2 ft. 4 in. at the bottom; and it throws up a continuous stream of water at the rate of five and a half million gallons per day to a height of 54 ft. above the ground.

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the joint, regaining its complete form. Special manufactures have in some cases arisen based upon the use of electric welding.

The welding clamps, and the mechanical devices connected with them, vary widely in accordance with the work they have to do. A machine for forming metal wheels is so constructed that the hubs are made in two sections, which when brought together in the welder are caused to embrace the radiating iron or steel spokes of the wheel. The two sections are then welded, and hold the spokes in solid union with themselves. Another machine, designed for the manufacture of wire fences, makes several welds automatically and simultaneously Galvanized iron wires are fed into the machine from reels in several parallel lines about a foot apart, and at intervals are crossed at right angles by wire sections cut automatically from another reel of wire. As the wire passes, electric welds are formed between the transverse and the parallel lines. The machine delivers a continuous web of wire fencing, which is wound upon a drum and removed from time to time in large rolls. In the United States, street railway rails are welded into a continuous metal structure. A huge welding transformer is suspended upon a crane, which is borne upon a car arranged to run upon the track as it is laid. The joint between the ends of two contiguous rails is made by welding lateral strap pieces, covering the joint at each side and taking the place of the ordinary fish-plates and bolts. The exertion of a greatly increased pressure at the finish of the welding seems to be decidedly favourable to the permanence and strength of the joints. When properly made, the joint is strong enough to resist the strains of extension and compression during temperature changes. For electric railways the welded joint obviates all necessity for "bonding" the rails together with copper wires to convert them into continuous lines of return conductors for the railway current. In railway welding the source of energy is usually a current delivered from the trolley line itself to a rotary converter mounted on the welding car, whereby an alternating current is obtained for feeding the primary circuit of the welding transformer. Power from a distant station is thus made to produce the heat required for track welding, and at exactly the place where it is to be utilized. In this instance the work is stationary while the welding apparatus is moved from one joint to the next. Welding transformers are sometimes used to heat metal for annealing, for forging, bending, or shaping, for tempering, or for hard soldering. Under special conditions they are well adapted to these purposes, on account of the perfect control of the heating or energy delivery, and the rapidity and cleanliness of the operation.

Armour-plate annealing.

Divested of its welding clamps, the welding transformer has found a unique application in the armour-annealing process of Lemp, by means of which spots or lines are locally annealed in hard-faced ship's armour, so that it can be drilled or cut as desired. Before the introduction of this process, it was practically impossible to render any portion of the hardened face of such armour workable by cutting tools without detriment to the hardness of the rest. A very heavy electric current is passed through the spot or area which it is desired to soften, so that, notwithstanding the rapid conduction of heat into the body of the plate, the metal is brought to a low red heat. In order that the spot shall not reharden, it is requisite that the rate of cooling shall be slower than when the heating current is cut off suddenly, the current therefore undergoes gradual diminution, under control of the operator. The welding transformer has for its secondary terminals simply two copper blocks fixed in position, and mounted at a distance of an inch or more apart. These are placed firmly against the face of the armour plate, with the spot to be annealed bridging the contacts, or situated between them. As in track welding, the transformer is made movable, so that it can be brought into any position desired. When the annealing is to be done along a line, the secondary terminals, with the transformer, are slowly and steadily slid over the face of the plate, new portions of the plate being thus continually brought between the terminals, while those which had reached the proper heat are slowly removed from the terminals and cool gradually. (E. T.)—

WELDON, WALTER (1832–1885), English technical chemist, was born at Loughborough on the 31st of October 1832. In 1854 he began to work as a journalist in London in connexion with the *Dial*, which was afterwards incorporated in the *Morning Star*, and in 1860 he started a monthly magazine, *Weldon's Register of Facts and Occurrences relating to Literature, the Sciences and the Arts*, which was discontinued after about three years' existence. Though he was without practical knowledge of the science, Weldon turned to industrial chemistry, and in the course of a few years took out the patents which led to his "manganese-regeneration" process (see CHLORINE). This was put into operation about 1869, and by 1875 it was being used by almost every chlorine manufacturer of importance throughout Europe. He continued to work at the production of chlorine in connexion [illegible] manufacture (*q.v.*), and became a [illegible] of his later proposals [illegible] process, which was established on a commercial scale only a year or two before his death—met with equal success. He died at Burstow, Surrey, on the 20th of September 1885. He professed Swedenborgian principles and was a believer in spiritualism.

His son, WALTER FRANK RAPHAEL WELDON (1860–1906), was appointed in 1899 Linacre professor of comparative anatomy at Oxford.

WELF or **GUELPH**, a princely family of Germany, descended from Count Warin of Altorf (8th century), whose son Isenbrand is said to have named his family *Welfen*, *i.e.* whelps. From his son Welf I. (d. 824) were descended the kings of Upper Burgundy and the elder German line of Welf. Welf III. (d. 1055) obtained the duchy of Carinthia and the March of Verona. With him the elder line became extinct, but his grandson in the female line, Welf IV. (as duke, Welf I.), founded the younger line, and became duke of Bavaria in 1070. Henry the Black (d. 1126), by his marriage with a daughter of Magnus, duke of Saxony, obtained half of the latter's hereditary possessions, including Lüneburg, and his son Henry the Proud (*q.v.*) inherited by marriage the emperor Lothair's lands in Brunswick, &c., and received the duchy of Saxony. The power which the family thus acquired, and the consequent rivalry with the house of Hohenstaufen, occasioned the strife of Guelphs and Ghibellines (*q.v.*) in Italy. Henry the Lion lost the duchies of Bavaria and Saxony by his rebellion in 1180, and Welf VI. (d. 1191) left his hereditary lands in Swabia and his Italian possessions to the emperor Henry VI. Thus, although one of the Welfs reigned as the emperor Otto IV., there remained to the family nothing but the lands inherited from the emperor Lothair, which were made into the duchy of Brunswick in 1235. Of the many branches of the house of Brunswick that of Wolfenbüttel became extinct in 1884, and that of Lüneburg received the electoral dignity of Hanover in 1692, and founded the Hanoverian dynasty of Great Britain and Ireland in 1714. For its further history see HANOVER. The Hanoverian legitimists in the German Reichstag are known as Welfen.

See Sir A. Halliday, *History of the House of Guelph* (1821); R. D. Lloyd, *Origin of the Guelphs*; F. Schmidt, *Die Anfänge des welfischen Geschlechts* (Hanover, 1900).

WELHAVEN, JOHANN SEBASTIAN CAMMERMEYER (1807–1873), Norwegian poet and critic, was born at Bergen, the son of a pastor, in 1807. He first studied theology, but from 1828 onwards devoted himself to literature. In 1840 he became reader and subsequently professor of philosophy at Christiania, and delivered a series of impressive lectures on literary subjects. In 1836 he visited France and Germany; and in 1858 he went to Italy to study archaeology. His influence was extended by his appointment as director of the Society of Arts. He died at Christiania on the 21st of October 1873. Welhaven made his name as the representative of conservatism in Norwegian literature. In a violent attack on Wergeland's poetry he opposed the theories of the extreme nationalists. He desired to see Norwegian culture brought into line with that of other European countries, and he himself followed the romantic tradition, being most closely influenced by J. L. Heiberg. He represented clearness and moderation against the extravagances of Wergeland. He gave an admirable practical exposition of his aesthetic creed in the sonnet cycle *Norges Daemring* (1834). He published a volume of *Digte* in 1839; and in 1845 *Nyere Digte*. The collections of old Norse poetry made by Asbjörnsen and Moe influenced his talent, and he first showed his full powers as a poet in *Nyere Digte*. His descriptive poetry is admirable, but his best work was inspired by his poems on old Norse subjects, in which he gives himself unreservedly to patriotic enthusiasm. Other poems followed in 1848, 1851 and 1859.

His critical work includes *Ewald og de norske Digtere* (1863). *On Ludwig Holberg* (1854). Welhaven's *Samlede Skrifter* were published in 8 vols. at Copenhagen (1867–1869).

WELL, the name given to an artificial boring in the earth through which water can be obtained. Two classes may be distinguished: shallow or ordinary wells, sunk through a permeable stratum until an impermeable stratum is reached; and deep and Artesian wells (*q.v.*), the latter named from Artois in France, which are sunk through an impermeable stratum down into a water-bearing stratum which overlies an impermeable stratum. Obviously ordinary wells can supply water very cheaply, but, since impurities readily reach them, there is great risk of contamination. The same does not apply to deep wells, such water being usually free from organic impurities. In ordinary wells, and in deep wells, the water requires pumping to the surface; in artesian wells, on the other hand, the water usually spouts up to a greater or less height above it.

The Secondary and Tertiary geological formations, such as those underneath London and Paris, often present the appearance of immense basins, the boundary or rim of the basin having been formed by an upheaval of the subjacent strata. In these formations it often happens that a porous stratum is included between two impermeable layers of clay, so as to form a flat porous U tube, continuous from side to side of the valley, the outcrop on the surrounding hills forming the mouth of the tube. The rain filtering down through the porous layer to the bottom of the basin forms there a subterranean pool, which with the liquid or semi-liquid column pressing upon it constitutes a sort of huge natural hydrostatic bellows. It is obvious then, that when a hole is bored down through the upper impermeable layer to the surface of the lake, the water will be forced up by this pressure to a height above the surface of the valley greater or less according to the elevation of the level in the feeding column, thus forming a natural fountain.

In the Tertiary formations, the porous layers are not so thick as in the Secondary, and consequently the occurrence of underground lakes is not on so grand a scale; but there being a more frequent alternation of these sandy beds, we find a greater number of them, and often a series of natural fountains may be obtained in the same valley, proceeding from water-bearing strata at different depths, and rising to different heights.

It does not follow that all the essentials for an artesian well are present, though two impermeable strata with a porous one between may crop out round a basin. There must also be *continuity* of the permeable bed for the uninterrupted passage of the water, and no breach in either of the confining layers by which the water might escape. It has occasionally happened that on deepening the bore, with the hope of increasing the flow of water, it has ceased altogether, doubtless from the lower confining layer being pierced, and the water allowed to escape by another outlet. The subterranean pool is frequently of small extent, and of the nature of a channel rather than of a broad sheet of water; and the existence of one spring is no guarantee that another will be found by merely boring to the same depth in its neighbourhood. Faults also have an effect on the supply, which in many cases has been found to increase by cutting headings or adits. The most suitable strata in England are the Chalk, Oolite, New Red Sandstone and Lower Greensand; London is in part supplied by the Chalk, whilst Liverpool utilizes the New Red. The theoretical determination of the existence of artesian conditions can be arrived at only by a thorough acquaintance with the geology of the district. Although water from deep wells is free from organic matter, it usually contains salts such as calcium bicarbonate, &c., which make the water unsuitable for washing and certain manufacturing purposes although it is fit for drinking.

The mechanical appliances employed in boring for water are practically the same as in boring for petroleum (*q.v.*). The upper part of a deep well may be of brick, the continuation being lined with steel pipes, or, better, it may be lined with metal for its entire length.

One of the most remarkable artesian wells is at Grenelle, near Paris. The operation of boring extended from 1834 to 1841; after a depth of 1254 ft. had been reached (May 1837), a length of 270 ft. of the boring rods broke and fell to the bottom of the hole, and nearly fifteen months' constant labour was required to pick it up again. Discouraged by the delay, the French government was to have abandoned the project after a depth of 1500 ft. had been reached without any satisfactory result; but Arago prevailed on them to prosecute the work, and an additional depth of about 300 ft. proved the correctness of Arago's theory. On the 26th February 1841, at a depth of 1798 ft., the boring rods suddenly sank a few yards, and within a few hours a vast column of water spouted up at the rate of 600 gallons per minute, and at a temperature of nearly 82° F. Prior to this no artesian boring had reached even 1000 ft.; and that of Grenelle was the deepest executed till the completion (12th August 1850) of the salt-spring at Kissingen, in Bavaria, which throws up a column of water to the height of 58 ft. from a depth of 1878½ ft. The most remarkable feature of this spring is that the projecting force is due, not to hydrostatic pressure, but to that of carbonic acid gas generated at the junction of the gypsum with the magnesian limestone, about 1680 ft. down. Modern mechanical improvements have enabled engineers to exceed these Artesian dimensions considerably, and at a greatly diminished cost. The well at Passy, near Paris, which is supplied from the same water-bearing stratum as that of Grenelle, was bored by Kind in a very short time, having been begun on 15th September 1855, and carried to a depth of 1732 ft. by March 1857. Its total depth is now about 1923 ft. with the diameter of 2 ft. 4 in. at the bottom; and it throws up a continuous stream of water at the rate of five and a half million gallons per day to a height of 54 ft. above the ground.

Among other deep wells sunk in the Paris basin subsequently to those of Grenelle and Passy, the following may be mentioned. A gigantic bore, 5 ft. 7 in. in diameter, was begun in January 1866 at La Chapelle, and by November 1869 had reached a depth of 1811 ft., the intention being to extend it to a depth of 2950 ft. A bore of 19 in. diameter was carried down to a depth of 1570 ft. in about two and a half years (1864–1867), for the purpose of obtaining a water-supply for the sugar refinery of Say in Paris; and the same engineer who executed this work (Dru) began in 1866 an artesian boring of the huge diameter of 6½ ft. at the part of Paris named *Butte aux Cailles*, to be carried down to a depth of 2600 to 2900 ft. In the Paris basin there are a great many other wells, varying from 300 to 400 ft. in depth, and from 2 to 8 in. in the diameter of the bore-hole.

The Tertiary chalk strata over which London stands have been riddled with artesian borings for the sake of pure water supply. Many of the large London factories, railways, institutions are supplied by artesian wells over 300 ft. deep. At Merton in Surrey, at Brighton, at Southampton, all along the east coast of Lincolnshire, and in the low district between the chalk wolds near Louth and the Wash, artesian borings have long been known, and go by the name of *blow-wells* among the people of the district. The general level to which the water rises in the London district has been very sensibly lowered by the immense number of perforations that have been made; and in several wells where the water formerly rose to the surface, it now requires to be pumped up.

None of the artesian borings in England approach the depths frequent on the Continent and in America. The average depth of the water-bearing stratum around Paris is six times that of the London chalk beds; and in some parts of Germany and of America, wells have been sunk to even double the depth of the Parisian wells of Grenelle and Passy. In Chicago there are several wells more than 2000 ft. deep; and at West Chicago in Dupage county, Illinois, there is one 3081 ft. deep. In the city of St Louis, Missouri, there is an artesian well 3843½ ft. deep, yielding a few gallons of salty water (temperature, 105° F.) a minute; boring was stopped in September 1868. Among the deepest borings in the world are: a well in Putnam Heights, Windham county, Connecticut, 6004 ft. deep and 6 in. in diameter, yielding 2 gallons per minute with water rising to 4 ft. from the surface; one at Schladenbach (5735 ft.), near Leipzig; one 12 m. south-east of Pittsburg, which is 5575 ft. deep and 6½ in. in diameter; one in Lawrence county, Alabama, 5120 ft. deep and 6 in. in diameter, yielding gas, oil and salt water; and one (about 4200 ft.) at Sperenberg 20 m. from Berlin, sunk for the purpose of obtaining a supply of rock salt,—the salt deposit here is 3907 ft. thick.

The following are some of the other most important artesian sinkings that have been made. At Louisville, Kentucky, a bore of 3 in. was carried to a depth of 2086 ft. between April 1857 and the summer of 1858; it yields 264 gallons a minute and its fountain rises 170 ft. high. At Charleston, South Carolina, there are: one well 2050 ft. deep and 4 in. in diameter, yielding 450 gallons a minute; another 1945 ft. deep and 5 in. in diameter, yielding 695 gallons a minute; and three more each exceeding 1900 ft. in depth. In 1858 a well at Neusalwerk, near Minden, had reached the depth of 2288 ft. At Bourne, Lincolnshire, there is a well 95 ft. deep, which yields over half a million gallons of water per day, the pressure being sufficient to supply the town and force the water to the tops of the highest houses. There is one in Philadelphia (Mount Vernon and 13th sts.), 3031 ft. deep and 8 in. in diameter, yielding 2600 gallons a minute. There are several deep wells in South Dakota: in Aberdeen City there are two 1300 ft. deep with flows of 1350 and 1000 gallons, respectively, per minute. Two artesian wells at Croydon supply a million gallons of water per day; and Brighton draws over a million gallons from artesian sinkings. There is a well at Bages, near Perpignan, which gives 330 gallons per minute; and one at Tours, which jets about 6 ft. above ground, and gives 237 gallons per minute.

The boring of wells in the great desert of Sahara is a very ancient industry; and some oases are supplied with water wholly from artesian wells. The average depth of these is from 160 to 200 ft., and the upper strata have only to be pierced to give a constant stream. With their primitive methods of boring, the Arabs often labour for years before they reach the wished-for pool; and with only palm wood as a casing, they have great difficulty in keeping the bore-hole from closing up by the drifting of the sand, and they require to scour them out periodically. Since 1858 an immense number of perforations have been made by French engineers, and the fertilising effect upon the sandy desert plains has already made itself apparent. The importance of deep wells in such cases cannot be over-estimated.

Artesian wells have been made to supply warm water, for keeping hospitals, &c., at a constant temperature. Invariably the temperature of water from great depths is higher than that at the surface. The temperature of the water in the well at Grenelle is 82° F., and that of Passy the same, showing that they have a common source. Kissingen well has a temperature of 66° F., that of St Louis one of 73°·4 F. that of Louisville 76½° F., and that of Charleston 87° F. The average rate of increase of temperature is 1° for a descent of from 40 to 55 ft. In Württemberg the water of artesian wells is employed to maintain in large manufactories a constant temperature of 47° when it is freezing outside. Artesian waters have also been employed to reduce the extreme variations of temperature in fish-ponds.

WELLES, GIDEON (1802–1878), American political leader, was born at Glastonbury, Connecticut, on the 1st of July 1802. He studied for a time at Norwich University, Vermont, but did not graduate. From 1826 to 1837 he edited the *Hartford Times*, making it the official organ of the Jacksonian Democracy in southern New England. He served in the state House of Representatives in 1827, 1829–30, 1832 and 1834–35, was state comptroller in 1835 and 1842–43, was postmaster at Hartford in 1835–42, and was chief of the bureau of provisions and clothing in the Navy Department at Washington in 1846–1849. Leaving the Democratic party on the Kansas-Nebraska issue, he assisted in the formation of the Republican party in Connecticut, and was its candidate for governor in 1856; he was a delegate to the Republican national conventions of 1856 and 1860. On the inauguration of President Lincoln in 1861 he was appointed secretary of the navy, a position which he held until the close of President Andrew Johnson's administration in 1869. Although deficient in technical training, he handled with great skill the difficult problems which were presented by the Civil War. The number of naval ships was increased between 1861 and 1865 from 90 to 670, the officers from 1300 to 6700, the seamen from 7500 to 51,500, and the annual expenditure from $12,000,000 to $123,000,000; important changes were made in the art of naval construction, and the blockade of the Confederate ports was effectively maintained. Welles supported President Johnson in his quarrel with Congress, took part in the Liberal Republican movement of 1872, and returning to the Democratic party, warmly advocated the election of Samuel J. Tilden in 1876. He died at Hartford, Connecticut, on the 11th of February 1878.

In 1874 Welles published *Lincoln and Seward*, in which he refutes the charge that Seward dominated the Administration during the Civil War. His *Diary*, which appeared in the *Atlantic Monthly* (1909–1911), is extremely valuable for the study of the Civil War and Reconstruction. See also Albert Welles, *History of the Welles Family* (New York, 1876).

WELLESLEY, RICHARD COLLEY WESLEY (or WELLESLEY), MARQUESS (1760–1842), eldest son of the 1st earl of Mornington, an Irish peer, and brother of the famous duke of Wellington, was born on the 20th of June 1760. He was sent to Eton, where he was distinguished as a classical scholar, and to Christ Church, Oxford. By his father's death in 1781 he became earl of Mornington, taking his seat in the Irish House of Peers. In 1784 he entered the English House of Commons as member for Beeralston. Soon afterwards he was appointed a lord of the treasury by Pitt. In 1793 he became a member of the board of control over Indian affairs; and, although he was best known by his speeches in defence of Pitt's foreign policy, he was gaining the acquaintance with Oriental affairs which made his rule over India so effective from the moment when, in 1797, he accepted the office of governor-general. Wellesley seems to have caught Pitt's large political spirit during his intercourse with him from 1793 to 1797. That both had consciously formed the design of acquiring a great empire in India to compensate for the loss of the American colonies is not proved; but the rivalry with France, which in Europe placed England at the head of coalition after coalition against the French republic and empire, made Wellesley's rule in India an epoch of enormous and rapid extension of English power. Clive won and Warren Hastings consolidated the British ascendancy in India, but Wellesley extended it into an empire. On the voyage outwards he formed the design of annihilating French influence in the Deccan. Soon after his landing, in April 1798, he learnt that an alliance was being negotiated between Tippoo Sultan and the French republic. Wellesley resolved to anticipate the action of the enemy, and ordered preparations for war. The first step was to effect the disbandment of the French troops entertained by the Nizam of Hyderabad. The invasion of Mysore followed in February 1799, and the campaign was brought to a rapid close by the capture of Seringapatam. In 1803 the restoration of the peshwa proved the prelude to the Mahratta war against Sindhia and the raja of Berar. The result of these wars and of the treaties which followed them was that French influence in India was extinguished, that forty millions of population and ten millions of revenue were added to the British dominions, and that the powers of the Mahratta and all other princes were so reduced that England became the really dominant authority over all India. He found the East India Company a trading body, he left it an imperial power. He was an excellent administrator, and sought to provide, by the foundation of the college of Fort William, for the training of a class of men adequate to the great work of governing India. In connexion with this college he established the governor-general's office, to which civilians who had shown talent at the college were transferred, in order that they might learn something of the highest statesmanship in the immediate service of their chief. A free-trader, like Pitt, he endeavoured to remove some of the restrictions on the trade between England and India. Both the commercial policy of Wellesley and his educational projects brought him into hostility with the court of directors, and he more than once tendered his resignation, which, however, public necessities led him to postpone till the autumn of 1805. He reached England just in time to see Pitt before his death. He had been created an English peer in 1797, and in 1799 an Irish marquess.

On the fall of the coalition ministry in 1807 Wellesley was invited by George III. to join the duke of Portland's cabinet, but he declined, pending the discussion in parliament of certain charges brought against him in respect of his Indian administration. Resolutions condemning him for the abuse of power were moved in both the Lords and Commons, but defeated by large majorities. In 1809 Wellesley was appointed ambassador to Spain. He landed at Cadiz just after the battle of Talavera, and endeavoured, but without success, to bring the Spanish government into effective co-operation with his brother, who, through the failure of his allies, had been compelled to retreat into Portugal. A few months later, after the duel between Canning and Castlereagh and the resignation of both, Wellesley accepted the post of foreign secretary in Perceval's cabinet. He held this office until February 1812, when he retired, partly from dissatisfaction at the inadequate support given to Wellington by the ministry, but also because he had become convinced that the question of Catholic emancipation could no longer be kept in the background. From early life Wellesley had, unlike his brother, been an advocate of Catholic emancipation, and with the claim of the Irish Catholics to justice he henceforward identified himself. On Perceval's assassination he refused to join Lord Liverpool's administration, and he remained out of office till 1821, criticizing with severity the proceedings of the congress of Vienna and the European settlement of 1814, which, while it reduced France to its ancient limits, left to the other great powers the territory that they had acquired by the partition of Poland and the destruction of Venice. He was one of the peers who signed the protest against the enactment of the Corn Laws in 1815. In 1821 he was appointed lord-lieutenant of Ireland. Catholic emancipation had now become an open question in the cabinet, and Wellesley's acceptance of the viceroyalty was believed in Ireland to herald the immediate settlement of the Catholic claims. The Orange faction was incensed by the firmness with which their excesses were now repressed, and Wellesley was on one occasion mobbed and insulted. But the hope of the Catholics still remained unfulfilled. Lord Liverpool died without having grappled with the problem. Canning in turn passed away; and on the assumption of office by Wellington, who was opposed to Catholic emancipation, his brother resigned the lord-lieutenancy. He had, however, the satisfaction of seeing the Catholic claims settled in the next year by the very statesmen who had declared against them. In 1833 he resumed the office of lord-lieutenant under Earl Grey, but the ministry soon fell, and, with one short exception, Wellesley did not further take part in official life. He died on the

26th of September 1842. He had no successor in the marquisate, but the earldom of Mornington and minor honours devolved on his brother William, Lord Maryborough, on the failure of whose issue in 1863 they fell to the 2nd duke of Wellington.

See Montgomery Martin, *Despatches of the Marquess Wellesley* (1840); W. M. Torrens, *The Marquess Wellesley* (1880); W. H. Hutton, *Lord Wellesley* ("Rulers of India" series, 1893); and G. B. Malleson, *Wellesley* ("Statesmen" series, 1895).

WELLESLEY, a township of Norfolk county, Massachusetts, U.S.A., 14 m. S.W. of Boston. Pop. (1890) 3600, (1900) 5072, of whom 1306 were foreign-born and 17 were negroes, (1910 census) 5413. Area, 10·4 sq. m. Wellesley is served by the Boston & Albany railway, and is connected with Natick (3 m. W.), Newton, Needham, Boston and Worcester by electric lines. The north-eastern boundary of the township is the Charles river, which divides it from the city of Newton. The surface of the township is hilly and abundantly wooded, with many small streams and lakes; the two principal villages are Wellesley Hills and Wellesley, and smaller villages are Wellesley Falls, Wellesley Farms and Wellesley Fells. The highest point is Maugus Hill (416 ft.), near Wellesley Hills village. In the northern part of Wellesley and extending into Weston is a large forest tract known as "The Hundreds." Within the township are parts of two of the reservations of the Metropolitan Park system, 66·07 acres of the Charles river reservation, and 4·58 acres of Hemlock Gorge. Hunnewell Park is the former home of Dr W. T. G. Morton, who discovered the anaesthetic properties of sulphuric ether. West of Wellesley village, among the hills, lie Morses Pond and Lake Waban, on which are beautiful Italian gardens and (on the north side) the buildings and extensive grounds (350 acres) of Wellesley College (undenominational, 1875) for women, which was established by Henry Towle Durant (1822–1881), a prominent Boston lawyer. In 1910 the college had 130 instructors and 1319 students. The library (65,200 volumes in 1910) was endowed by Eben N. Horsford, the chemist and ethnologist; it contains a library of American linguistics collected by Major J. W. Powell and Mr Horsford, and the Frances Pearson Plimpton library of early Italian literature. There are about 30 buildings, of which twelve are residential halls or cottages. Instruction is in classical, literary and scientific branches, and the degrees of A.B. and A.M. are awarded

Wellesley was settled about 1640, being then within the limits of Dedham. When the township of Needham was set off from Dedham in 1711, Wellesley was included within the new territory, and in 1774 was organized as the west parish of Needham or West Needham. In 1881 it was incorporated under its present name.

See J. E. Fiske in D. H. Hurd's *History of Norfolk County* (Boston, 1884).

WELLHAUSEN, JULIUS (1844–), German biblical scholar and Orientalist, was born at Hameln on the Weser, Westphalia, on the 17th of May 1844. Having studied theology at the university of Göttingen under Heinrich Ewald, he established himself there in 1870 as privat-docent for Old Testament history. In 1872 he was appointed professor ordinarius of theology in Greifswald. Resigning in 1882 owing to conscientious scruples, he became professor extraordinarius of oriental languages in the faculty of philology at Halle, was elected professor ordinarius at Marburg in 1885, and was transferred to Göttingen in 1892. Wellhausen made his name famous by his critical investigations into Old Testament history and the composition of the Hexateuch, the uncompromising scientific attitude he adopted in testing its problems bringing him into antagonism with the older school of biblical interpreters. The best known of his works are *De gentibus et familiis Judaeis* (Göttingen, 1870); *Der Text der Bücher Samuelis untersucht* (Göttingen, 1871); *Die Pharisäer und Sadducäer* (Greifswald, 1874); *Prolegomena zur Geschichte Israels* (Berlin, 1882; Eng. trans., 1885; 5th German edition, 1899; first published in 1878 as *Geschichte Israels*); *Muhammed in Medina* (Berlin, 1882); *Die Komposition des Hexateuchs und der historischen Bücher des Alten Testaments* (1889, 3rd ed. 1899); *Israelitische und jüdische Geschichte* (1894, 4th ed. 1901); *Reste arabischen Heidentums* (1897); *Das arabische Reich und sein Sturz* (1902); *Skizzen und Vorarbeiten* (1884–1899); and new and revised editions of F. Bleek's *Einleitung in das Alte Testament* (4-6, 1878–1893). In 1906 appeared *Die christliche Religion, mit Einschluss der israelitisch-jüdischen Religion*, in collaboration with A. Jülicher, A. Harnack and others. He also did useful and interesting work as a New Testament commentator. He published *Das Evangelium Marci, übersetzt und erklärt* in 1903, *Das Evangelium Matthäi* and *Das Evangelium Lucae* in 1904, and *Einleitung in die drei ersten Evangelien* in 1905.

WELLINGBOROUGH, a market town in the eastern parliamentary division of Northamptonshire, England, 63½ m. N.N.W. from London by the Midland railway; served also by the London & North-Western railway. Pop. of urban district (1901), 18,412. It lies on the declivity of a hill near the junction of the Ise with the Nene, in a pleasant well-wooded district. The church of St Luke is a beautiful building with Norman and Early English portions, but is mainly Decorated, with a western tower and spire. The grammar-schools, founded in 1594 and endowed with the revenues of a suppressed gild, include a school of the second and a school of the third grade, the former a building of red brick in the Renaissance style erected in 1880, and the latter an old Elizabethan structure. Another educational endowment is Freeman's school, founded by John Freeman in 1711. There are also several charities. The principal public building is the corn exchange. The town is of some importance as a centre of agricultural trade; but the staple industry is in leather. A great impulse to the prosperity of the town was given by the introduction of the boot and shoe trade, especially the manufacture of uppers. Smelting, brewing and iron-founding are also carried on, as well as the manufacture of portable steam-engines, and iron ore is raised in the vicinity.

In 948 Edred gave the church at Wellingborough to Crowland Abbey, and the grant was confirmed by King Edgar in 966. In the reign of Edward II. the abbot was lord in full. The town received the grant of a market in 1201. It was formerly famed for the chalybeate springs to which it owes its name, and in 1621 was visited by Charles I. and his queen, who resided in tents during a whole season while taking the waters. It was after its almost total destruction by fire in 1738 that the town was built on its present site on the hill.

WELLINGTON, ARTHUR WELLESLEY, 1ST DUKE OF (1769–1852), was the fourth son of Garrett (1735–1781) Wellesley or Wesley, 2nd baron and 1st earl of Mornington, now remembered only as a musician. He was descended from the family of Colley or Cowley, which had been settled in Ireland for two centuries. The duke's grandfather, Richard Colley, 1st Baron Mornington (d. 1758), assumed the name of Wesley on succeeding to the estates of Garrett Wesley, a distant relative of the famous divine. In Wellington's early letters the family name is spelt Wesley; the change to Wellesley seems to have been made about 1790. Arthur (born in Ireland in 1769[1]) was sent to Eton, and subsequently to a military college at Angers. He entered the army as ensign in the 73rd Highlanders in 1787, passed rapidly through the lower ranks (in five different regiments), became major of the 33rd (now duke of Wellington's West Riding), and purchased the lieutenant-colonelcy of that regiment in 1793 with money advanced to him by his eldest brother. But in all these changes he did little regimental duty, for he was aide-de-camp to the lord-lieutenant of Ireland for practically the whole of these years. Before reaching full age he was returned to the Irish parliament by the family borough of Trim. Little is known of his history during these years; but neither in boyhood nor in youth does he appear to have made any mark among his contemporaries.

His first experience of active service was in the campaign of 1794–1795, when the British force under the duke of York was driven out of Holland by Pichegru. In 1796 he was sent with his regiment to India, being promoted colonel by brevet about the same time. It was thus as a commanding officer that he learnt for the first time the details of regimental duty. He mastered them thoroughly, gained a minute acquaintance with every detail of the soldier's life, learned the precise amount of food required for every mouth, the exact weight that could be carried, the distances that could be traversed without exhaustion, the whole body of conditions in short which govern the military activity of man and beast. It was to the completeness of his practical knowledge that Wellington ascribed in great part his later success. It is probable, moreover, that he at this time made a serious study of the science and history of war. His formal training at Angers was altogether too slight to account for his great technical knowledge; no record, however, exists of the stages by which this was acquired except that as soon as he landed in India he began to devote fixed hours to study, giving up cards and the violin. This study was directed chiefly to the political situation of India, and when on his advice his eldest brother, Lord Mornington, afterwards Marquess Wellesley, accepted the governor-generalship of India, he became his trusted though unofficial adviser. In the war with Tippoo Saib the 33rd was attached to the Nizam's contingent, and Colonel Wellesley commanded this division in the army of General (Lord) Harris. Though his military services in this short campaign were not of a striking character, he was appointed by his brother to the supreme military and political command in Mysore, in spite of the claims of his senior, Sir David Baird.

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[1] At 24 Upper Merrion Street, Dublin, or at Dungan Castle, Meath, on the 29th of April or on 1st May; but both place and date are uncertain.

His great faculties now for the first time found opportunity for their exercise. In the settlement and administration of the conquered territory he rapidly acquired the habits and experience of a statesman, while his military operations against Doondiah, a robber chief, were conducted with extraordinary energy and success, Doondiah being killed and his army scattered. More important, however, than the military side of these operations was their political character. When pressed in Mysore, Doondiah moved into Mahratta territory, whither Wellesley followed him. Here, negotiating and bargaining with the Mahratta chiefs, Wellesley acquired a knowledge of their affairs and an influence over them such as no other Englishman possessed. Simple and honourable himself, he was shrewd and penetrating in his judgment of Orientals; and, unlike his great predecessor Clive, he rigidly adhered to the rule of good faith in his own actions, however depraved and however exasperating the conduct of those with whom he had to deal. The result of Wellesley's singular personal ascendancy among the Mahrattas came into full view when the Mahratta War broke out. In the meantime, however, his Indian career seemed likely to be sacrificed to the calls of warfare in another quarter. Wellesley was ordered in December 1800 to take command of a body of troops collected for foreign service at Trincomalee, in Ceylon. It was at first intended that these troops should act against Java or Mauritius; their destination was, however, altered to Egypt, with a view to co-operation with Sir Ralph Abercromby's expedition, and Baird was placed in command. Though deeply mortified at the loss of the command, Wellesley in his devotion to duty moved the troops on his own responsibility from Trincomalee to Bombay, from the conviction that, if they were to be of any use in Egypt, it was absolutely necessary that they should provision at Bombay without delay. But at Bombay Wellesley was attacked by fever, and prevented from going on. The troop-ship in which he was to have sailed went down with all on board.

He returned in May 1801 to Mysore, where he remained until the Mahratta War broke out. The power of the Peshwa, nominally supreme in the Mahratta territory, had been overthrown by his rivals Holkar and others, and he had himself fled. The Indian government undertook to restore his authority. Wellesley, now a major-general, was placed in command of a division of the army charged with this task. Starting from Seringapatam, he crossed the frontier on March 12, 1803, and moved through the southern Mahratta territory on Poona. The march was one unbroken success, thanks to Wellesley's forethought and sagacity in dealing with the physical conditions and his personal and diplo[illegible] among the chieftains of the district. No hand was raised against him, and a march of 600 m. was conducted without even a skirmish. Wellesley had intended to reach Poona on the 23rd of April. On the night of the 18th he heard that a rival of the Peshwa intended to burn the city. At once Wellesley pressed on with the cavalry and an infantry battalion in light order, and after a forced march of 32 hours entered Poona on the afternoon of the 20th, in time to save the city. The Peshwa was now restored, and entered into various military obligations with Wellesley, which he very imperfectly fulfilled.

In the meantime Sindhia and Holkar, with the raja of Berar, maintained a doubtful but threatening aspect farther north. It was uncertain whether or not a confederacy of the northern Mahrattas had been formed against the British government. In these critical circumstances Wellesley was charged with "the general direction and control of military and political affairs in the territories of the Nizam, the Peshwa and the Mahratta states and chiefs." Armed with these powers, he required Sindhia, as a proof of good faith, to withdraw to the north of the Nerbudda. Sindhia not doing so, war was declared on the 6th of August 1803. Wellesley marched northwards, captured Ahmadnagar on the 11th, crossed the Godavery ten days later, and moved against the combined forces of Sindhia and the raja of Berar. Colonel Stevenson was meanwhile approaching with a second division from the east, and it was intended that the two should unite. On the 23rd of September Wellesley supposed himself to be still some miles from the enemy; he suddenly found that the entire forces of Sindhia and the raja of Berar were close in front of him at Assaye. Weighing the dangers of delay, of retreat, and of an attack with his single division of 4500 men, supported only by 5000 native levies of doubtful quality, Wellesley convinced himself that an immediate attack, though against greatly superior forces (30,000 horse, 10,000 European-drilled infantry and 100 well-served guns) in a strong position, was the wisest course. He threw himself upon the Mahratta host, and, carrying out a bold manœuvre under an intense fire, ultimately gained a complete victory though with the loss of 2500 men out of a total probably not much exceeding 7000. In comparison with the battle of Assaye, all fighting that had hitherto taken place in India was child's play. Wellesley himself had two horses killed under him. Uniting with Stevenson's division, the conqueror followed up the pursuit, and brought the war to a close by a second victory at Argaum on the 29th of November, and the storming of Gawilghur on the 15th of December. The treaties with Sindhia and the raja of Berar, which marked the downfall of the Mahratta power, were negotiated and signed by Wellesley (who was made K.B. in Sept. 1804) in the course of the following month. Not yet thirty-five years old, he had proved himself a master in the sphere of Indian statesmanship and diplomacy as on the field of battle. Had his career ended at this time, his Indian despatches alone would have proved him to have been one of the wisest and strongest heads that have ever served England in the East.

His ambitions now led him back to Europe, and in the spring of 1805 he quitted India. On his return home he was immediately sent on the abortive expedition to Hanover. In 1806 he was elected M.P. for Rye, in order to defend his brother, the governor-general, in the House, and in the following year he was Irish secretary for a few months. He was then employed in the expedition against Copenhagen, in which he defeated the Danes in the action of Kjoge (29th Oct.). In 1808, however, began the war (see PENINSULAR WAR) in which his military renown was fully established. In April he was promoted lieutenant-general and placed in command of a division of the troops destined to operate against the French in Spain or Portugal. The conduct of events is narrated in a separate article, and need only be summarized here. Finding that the junta of Corunna wished for no foreign soldiery, he followed his alternative instructions to act against Junot at Lisbon. He landed at Mondego Bay in the first week of August, and moved southwards, driving in the enemy at Roliça on the 17th of August. On the 21st the battle of Vimeiro was fought and won. In the midst of this engagement, however, Sir Harry Burrard landed, and took over the command. Burrard was in turn superseded by Sir Hew Dalrymple, and the campaign ended with the convention of Cintra, which provided for the evacuation of Portugal by the French, but gave Junot's troops a free return to France. So great was the public displeasure in England at the escape of the enemy that a court of inquiry was held. After the battle of Corunna, Wellesley, who had in the meantime resumed his duties as Irish secretary, returned to the Peninsula as chief in command. He drove the French out of Oporto by a singularly bold and fortunate attack, and then prepared to march against Madrid by the valley of the Tagus. He had the support of a Spanish army under General Cuesta; but his movements were delayed by the neglect of the Spanish government, and Soult was able to collect a large force for the purpose of falling upon the English line of communication. Wellesley, unconscious of Soult's presence in force on his flank, advanced against Madrid, and defeated his immediate opponent, King Joseph, at Talavera de la Reina (*q.v.*) on the 27th-28th of July. The victory of Talavera, however, brought prestige but nothing else. Within the next few days Soult's approach on the line of communication was discovered, and Wellesley, disgusted with his Spanish allies, had no choice but to withdraw into Portugal and there stand upon the defensive.

A peerage, with the title of Viscount Wellington and Baron Douro, was conferred upon him for Talavera. He was also made marshal-general of the Portuguese army and a Spanish captain-general. But his conduct after the battle was sharply criticized in England, and its negative results were used as a weapon against the ministry. Even on the defensive, Wellington's task was exceedingly difficult. Austria having made peace, Napoleon was at liberty to throw heavy forces into the Peninsula. Wellington, foreseeing that Portugal would now be invaded by a very powerful army, began the fortification of the celebrated lines of Torres Vedras (see FORTIFICATION). The English army wintered about Almeida. As summer approached Wellington's anticipations were realized. Masséna moved against Portugal with an army of 70,000 men. Wellington, unable to save Ciudad Rodrigo, retreated down the valley of the Mondego, devastating the country, and at length halted at Busaco and gave battle. The French attack was repelled, but other roads were open to the invader, and Wellington continued his retreat. Masséna followed, but was checked completely in front of the lines. He sought in vain for an unprotected point. It was with the utmost difficulty that he could keep his army from starving. At length, when the country was exhausted, he fell back to Santarem, where, Wellington being still too weak to attack, he maintained himself during the winter. But in the spring of 1811 Wellington received reinforcements and moved forward. Masséna retreated, devastating the country to check the pursuit, but on several occasions his rearguard was deeply engaged, and such were the sufferings of his army, both in the invasion and in the retreat, that the French, when they re-entered Spain, had lost 30,000 men. Public opinion in England, lately so hostile, now became confident, and Wellington, whose rewards for Talavera had been opposed in both Houses, began to gain extraordinary popularity.

In the meantime Soult, who was besieging Cadiz, had moved to support Masséna. But after capturing Badajoz, Soult learnt that Masséna was in retreat, and also that his own forces at Cadiz had been beaten. He in consequence returned to the south. Wellington, freed from pressure on this side, and believing Masséna to be thoroughly disabled, considered that the time had come for an advance into Spain. The fortresses of Almeida, Ciudad Rodrigo and Badajoz barred the roads. Almeida was besieged, and Wellington was preparing to attack Badajoz when Masséna again took the field, and marched to the relief of Almeida. The battle of Fuentes d'Onoro followed, in which Wellington was only able to extricate the army from a dangerous predicament which "if Boney had been there" would have been a disaster. The garrison of Almeida too escaped, after blowing up part of the fortress. In the south, in spite of the hard-won victory of Albuera, the English attack on Badajoz had to be given up. The same misfortune attended a fresh stroke against Ciudad Rodrigo, and at the end of a campaign in which he had used all his skill and care to compensate for inferior numbers, he withdrew behind the Coa. He had meanwhile been given the local rank of general and had also received the Portuguese title of Conde de Vimeiro.

Wellington had from the first seen that, whatever number of men Napoleon might send against him, it was impossible, owing to the poverty of the country, that any great mass of troops could long be held together, and that the French, used to "making war support war," would fare worse in such conditions than his own troops with their organized supply service. It was so at the end of 1811. Soult had to move southwards to live, and the English were again more than a match for the enemy in front of them. Wellington resumed the offensive, and on the 19th of January 1812 Ciudad Rodrigo was taken by storm. Again, suddenly altering the centre of gravity, Wellington invested Badajoz in the middle of March. It was necessary at whatever cost to anticipate the arrival of Soult with a relieving army, and on the 6th of April Wellington ordered the assault. The fearful slaughter which took place before the British were masters of the defences caused Wellington to be charged with indifference to loss, but a postponement of the attack would merely have resulted in more battles against Soult. Of all generals Wellington was the last to waste a single trained man, and the sight of the breaches of Badajoz after the storm for a moment unnerved even his iron sternness.

The advance from Ciudad Rodrigo into Spain was now begun. Marmont, who had succeeded Masséna, fell back to the Douro, but there turned upon his assailant, and, by superior swiftness, threatened to cut the English off from Portugal. Wellington retreated as far as Salamanca (*q.v.*), and there extricated himself from his peril by a most brilliant victory (July 22). The French fell back on Burgos. Instead of immediately following them, Wellington thought it wise to advance upon the Spanish capital. King Joseph retired, and the English entered Madrid in triumph. The political effect was great, but the delay gave the French northern army time to rally. "The vigorous following of a beaten enemy was not a prominent characteristic of Lord Wellington's warfare," as Napier says. Burgos offered an obstinate defence. Moreover, Soult, raising the siege of Cadiz, and gathering other forces to his own, pressed on towards Madrid. Wellington was compelled once more to retire into Portugal. The effect of the campaign was, however, that the southern provinces were finally cleared of the invader. During this retreat he announced in general orders that the demoralization and misconduct of the British army surpassed anything that he had ever witnessed. Such wholesale criticism was bitterly resented, but indeed throughout his career Wellington, cold and punctilious, never secured to himself the affections of officers and men as Marlborough or Napoleon did. He subjugated his army and gave it brilliant victories, but he inspired few disciples except the members of his own staff. To the end of his life his relations with the principal generals who served under him were by no means intimate.

Wellington had been made an earl after the fall of Ciudad Rodrigo, and the Spanish government created him duke of Ciudad Rodrigo about the same time. For Salamanca his reward was a marquessate, and a grant of £100,000 for the purchase of an estate. He was also made Duque da Victoria by the Portuguese regency, and before the opening of the campaign of 1813, which was to crown his work, he was given both the Garter and the Golden Fleece.

He was now invested with the supreme command of the Spanish armies. He visited Cadiz in December 1812, and offered counsels of moderation to the democratic assembly, which were not followed. During the succeeding months he was occupied with plans and preparations, and at length, in May 1813, the hour for his final and victorious advance arrived. The Russian disasters had compelled Napoleon to withdraw some of his best troops from the Peninsula. Against a weakened and discouraged adversary Wellington took the field with greatly increased numbers and with the utmost confidence. The advance of the allied army was irresistible. Position after position was evacuated by the French, until Wellington, driving everything before him, came up with the retreating enemy at Vittoria (*q.v.*), and won an overwhelming victory (June 21st). Soult's combats in the Pyrenees, and the desperate resistance of St Sebastian, prolonged the struggle through the autumn, and cost the English thousands of men. But at length the frontier was passed, and Soult forced back into his entrenched camp at Bayonne. Both armies now rested for some weeks, during which interval Wellington gained the confidence of the inhabitants by his unsparing repression of marauding, his business-like payment for supplies, and the excellent discipline which he maintained. In February 1814 the advance was renewed. The Adour was crossed, and Soult was defeated at Orthez. At Toulouse, after the allies had entered Paris, but before the abdication of Napoleon had become known, the last battle of the war was fought. Peace being proclaimed, Wellington took leave of his army at Bordeaux, and returned to England, where he was received with extraordinary honours, created duke of Wellington, and awarded a fresh grant of £400,000.

After the treaty of Paris (May 30) Wellington was appointed British ambassador at the French capital. During the autumn and winter of 1814 he witnessed and reported the mistakes of the restored Bourbon dynasty, and warned his government of the growing danger from conspiracies and from the army, which was visibly hostile to the Bourbons. His insight, however, did not extend beyond the circumstances immediately before and around him, and he failed to realize that the great mass of the French nation was still with Napoleon at heart. He remained in France until February 1815, when he took Lord Castlereagh's place at the congress of Vienna. All the great questions of the congress had already been settled, and Wellington's diplomatic work here was not of importance. His imperfect acquaintance with French feeling was strikingly proved in the despatch which he sent home on learning of Napoleon's escape from Elba. "He has acted," he wrote, "upon false or no information, and the king (Louis XVIII.) will destroy him without difficulty and in a short time." Almost before Wellington's unfortunate prediction could reach London, Louis had fled, and France was at Napoleon's feet. The ban of the congress, however, went out against the common enemy, and the presence of Wellington at Vienna enabled the allies at once to decide upon their plans for the campaign. To Wellington and Blücher were committed the invasion of France from the north, while the Russians and Austrians entered it from the east. Wellington, with the English troops and their Dutch, German and Belgian allies, took his post in the Netherlands, guarding the country west of the Charleroi road. Blücher, with the Prussians, lay between Charleroi, Namur and Liége. In the meantime Napoleon had outstripped the preparations of his adversaries. By the 13th of June he had concentrated his main army on the northern frontier, and on the 14th crossed the Sambre. The four days' campaign that followed, and the crowning victory of the 18th of June, are described in the article WATERLOO CAMPAIGN. Wellington's reward was a fresh grant of £200,000 from parliament, the title of prince of Waterloo and great estates from the king of Holland, and the order of the Saint-Esprit from Louis XVIII.

Not only the prestige of his victories, but the chance circumstances of the moment, now made Wellington the most influential personality in Europe. The emperors of Russia and Austria were still far away at the time of Napoleon's second abdication, and it was with Wellington that the commissioners of the provisional government opened negotiations preliminary to the surrender of Paris. The duke well knew the peril of delaying the decision as to the government of France. The emperor Alexander was hostile to Louis XVIII. and the Bourbons generally; the emperor Francis might have been tempted to support the cause of Napoleon's son and his own grandson, who had been proclaimed in Paris as Napoleon II.; and if the restoration of Louis—which Wellington believed would alone restore permanent peace to France and to Europe—was to be effected, the allies must be confronted on their arrival in Paris with the accomplished fact. He settled the affair in his usual downright manner, telling the commissioners bluntly that they must take back their legitimate king, and refusing—perhaps with more questionable wisdom—to allow the retention of the tricolour flag, which to him was a "symbol of rebellion." At the same time the opposition of the most influential member of the commission and the most powerful man in France, Fouché, was overcome by his appointment, on Wellington's suggestion, as minister of police. The result was that when the emperor Alexander arrived in Paris he found Louis XVIII. already in possession, and the problem before the allies was merely how to keep him there.

In the solution of this problem the common sense of Wellington and of Castlereagh, with whom the duke worked throughout in complete harmony, played a determining part; it was mainly owing to their influence that France escaped the dismemberment for which the German powers clamoured, and which was advocated for a while by Lord Liverpool and the majority of the British cabinet. Wellington realized the supreme necessity, in the interests not only of France but of Europe, of confirming and maintaining the prestige of the restored monarchy, which such a dismemberment would have irretrievably damaged. It was this conviction that inspired his whole attitude towards French affairs. If he unwillingly refused to intervene in favour of Marshal Ney, it was because he believed that so conspicuous an example of treason could not safely be allowed to go unpunished. If he bore in silence the odium that fell upon him owing to the break-up of the collection of the Louvre, it was because he knew that it would be fatal to allow it to be known that the first initiative in the matter had come from the king. In the same spirit he carried out the immense and unique trust imposed upon him by the allies when they placed him in command of the international army by which France was to be occupied, under the terms of the second peace of Paris, for five years. By the terms of his commission he was empowered to act, in case of emergency, without waiting for orders; he was, moreover, to be kept informed by the French cabinet of the whole course of business. His power was immense, and it was well and wisely used. If he had no sympathy with revolutionary disturbers of the peace, he had even less with the fatuous extravagances of the comte d'Artois and his reactionary *entourage*, and his influence was thrown into the scale of the moderate constitutional policy of which Richelieu and Decazes were the most conspicuous exponents. The administrative duties connected with the army of occupation would alone have taxed to the uttermost the powers of an ordinary man.[1] Besides this, his work included the reconstruction of the military frontier of the Netherlands, and the conduct of the financial negotiations with Messrs Baring, by which the French government was able to pay off the indemnities due from it, and thus render it possible for the powers to reduce the period of armed occupation from five years to three. He was consulted, moreover, in all matters of international importance, notably the affairs of the Spanish colonies, in which he associated himself with Castlereagh in pressing those views which were afterwards carried into effect by George Canning.

The length of time during which France was to be occupied by the allies practically depended upon Wellington's judgment. On the 10th of December 1816 Pozzo di Borgo wrote to the duke enclosing a memorandum in which the emperor Alexander of Russia suggested a reduction in the army of occupation: "no mere question of finance, but one of general policy, based on reason, equity and a severe morality"; at the same time he left the question of its postponement entirely to Wellington. To

[1] Isolated fortresses were still holding out for Napoleon in September 1815, *e.g.* Longwy, which surrendered on the 20th. Much trouble was caused by the behaviour of some of the allied troops, notably the Prussians. Detailed reports of the condition of the country for the first months of the occupation are contained in the *Bulletins de la correspondance de l'Intérieur*, copies of which are preserved in the Foreign Office records (F.O. *Congress. Paris. Castlereagh*, August, &c., 1815).

Wellington the proposal seemed premature; he would prefer to wait till "the assembly had published its conduct by its acts"; for if the new chambers were to prove as intractable as the dissolved *Chambre introuvable*, the monarchy would not be able to dispense with its foreign tutors. To Castlereagh he wrote (December 11, 1816) that although he believed that the common people of the departments occupied, "particularly those occupied by us," were delighted to have the troops and the money spent among them, among the official and middle classes the feeling was very different. In view of the weakness of the king's government, to reduce the army would be to expose the excitable elements of the population to the temptation of attacking it. "Suppose I or my officers were forced to take military action. Suppose this were to happen in the *Prussian* cantonments. The whole Prussian army would be put in motion, and all Europe would resound with the alarm of the danger to be apprehended from the Jacobins in France." [1]

The events of the next few months considerably modified his opinions in this matter. The new chambers proved their trustworthy quality by passing the budget, and the army of occupation was reduced by 30,000 men. Wellington now pressed for the total evacuation of France, pointing out that popular irritation had grown to such a pitch that, if the occupation were to be prolonged, he must concentrate the army between the Scheldt and the Meuse, as the forces, stretched in a thin line across France, were no longer safe in the event of a popular rising. But such a concentration would in itself be attended with great risk, as the detachments might be destroyed piecemeal before they could combine. These representations determined the allies to make the immediate evacuation of France the principal subject of discussion at the congress which it was arranged to hold at Aix-la-Chapelle in the autumn of 1818. Here Wellington supported the proposal for the immediate evacuation of France, and it was owing to his common-sense criticism that the proposal of Prussia, supported by the emperor Alexander and Metternich, to establish an "army of observation" at Brussels, was nipped in the bud. The conduct of the final arrangements with Messrs Baring and Hope, which made a definitive financial settlement between France and the allies possible, was left entirely to him.

On Wellington's first entry into Paris he had been received with popular enthusiasm,[2] but he had soon become intensely unpopular. He was held responsible not only for the occupation itself, but for every untoward incident to which it gave rise; even Blücher's attempt to blow up the Pont de Jéna, which he had prevented, was laid to his charge. His characteristically British temperament was wholly unsympathetic to the French, whose sensibility was irritated by his cold and slightly contemptuous justice. Two attempts were made to assassinate him.[3] After the second the prince regent commanded him to leave Paris and proceed to the headquarters at Cambrai.[4] For the first time the duke disobeyed orders; the case, he wrote, was one in which he was "principally and personally concerned," and he alone was in a position to judge what line of action he ought to pursue.[5] His work in Paris, however, was now finished, and on the 30th of October, in a final "order of the day," he took leave of the international troops under his command. On the 23rd of October, while still at Aix, he had received an offer from Lord Liverpool of the office of master-general of the ordnance, with a seat in the cabinet. He accepted, though with some reluctance, and only on condition that he should be at liberty, in the event of the Tories going into opposition, to take any line he might think proper.

For the next three years "the Duke" was little before the world. He supported the repressive policy of Liverpool's cabinet, and organized the military forces held ready in case of a Radical rising. It was his influence with George IV. that led to the readmittance of Canning to the cabinet after the affair of the royal divorce had been settled. It was only in 1822, however, that the tragic death of his friend Londonderry (Castlereagh) brought him once more into international prominence. Londonderry had been on the eve of starting for the conference at Vienna, and the instructions which he had drawn up for his own guidance were handed over by Canning, the new foreign secretary, to Wellington, who proceeded in September to Vienna, and thence in October to Verona, whither the conference had been adjourned. Wellington's official part at the congress is outlined elsewhere (see VERONA, CONGRESS OF). Unofficially, he pointed out to the French plenipotentiaries, arguing from Napoleon's experience, the extreme danger of an invasion of Spain, but at the same time explained, for the benefit of the duke of Angoulême, the best way to conduct a campaign in the Peninsula.

Wellington's intimate association for several years with the sovereigns and statesmen of the Grand Alliance, and his experience of the evils which the Alliance existed to hold in check, naturally led him to dislike Canning's aggressive attitude towards the autocratic powers, and to view with some apprehension his determination to break with the European concert. He realized, however, that in the matter of Spain and the Spanish colonies the British government had no choice, and in this question he was in complete harmony with Canning. This was also at first the case in respect to the policy to be pursued in the Eastern Question raised by the war of Greek independence. Both Canning and Wellington were anxious to preserve the integrity of Turkey, and therefore to prevent any isolated intervention of Russia; and Wellington seemed to Canning the most suitable instrument for the purpose of securing an arrangement between Great Britain and Russia on the Greek question, through which it was hoped to assure peace in the East. In February 1826, accordingly, the duke was sent to St Petersburg, ostensibly to congratulate the emperor Nicholas I. on his accession, but more especially—to use Wellington's own words—"to induce the emperor of Russia to put himself in our hands." [6] In this object he signally failed. He was, indeed, received in St Petersburg with all honour; but as a diplomatist the "Iron Duke"—whom Nicholas, writing to his brother Constantine, described as "old and broken (*cassé*)"—was no match for the "Iron Tsar." As for the Greeks, the emperor said bluntly that he took no interest in "*ces messieurs*," whom he regarded as "rebels"; his own particular quarrel with Turkey, arising out of the non-fulfilment of the treaty of Bucharest, was the concern of Russia alone; the ultimatum to Turkey had, indeed, been prepared before Wellington's arrival, and was despatched during his visit. Under stress of the imminence of the peril, which Nicholas was at no pains to conceal, the duke was driven from concession to concession, until at last the tsar, having gained all he wanted, condescended to come to an arrangement with Great Britain in the Greek question. On the 4th of April was signed the Protocol of St Petersburg, an instrument which—as events were to prove—fettered the free initiative not of Russia, but of Great Britain (see TURKEY: *History*; GREECE: *History*).[7]

After the death of the duke of York on the 5th of December 1826 the post of commander-in-chief was conferred upon Wellington. His relations with Canning had, however, become increasingly strained, and when, in consequence of Lord Liverpool's illness, Canning in April 1827 was called to the head of the administration, the duke refused to serve under him. On the day after the resignation of his seat in the cabinet he also resigned his offices of master of the ordnance and commander-in-chief, giving as his reason "the tone and temper of Mr Canning's letters," though it is difficult to see in these letters any adequate reason for such a course (see Maxwell's *Life*, ii. 199). The effect of his withdrawal was momentous in its bearing upon Eastern affairs. Canning, freed from Wellington's restraint, carried his intervention on behalf of Greece a step further, and concluded, on the 27th of July, the treaty of London, whereby France, England and Russia bound themselves to put an end to the conflict in the East and to enforce the conditions of the St Petersburg protocol upon the belligerents. Against this treaty Wellington protested, on the ground that it "specified means of compulsion which were neither more nor less than measures of war." His apprehensions were fulfilled by the battle of Navarino.

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[1] F. O. *Continent; Paris: Wellington* (No. 32).

[2] See the interesting letter of Lord Castlereagh to Lord Liverpool preserved in the Foreign Office Records (*Congress; Paris; Viscount Castlereagh*, July 7–20, 1815), dated July 8, 1815.

[3] Maxwell, *Life*, ii. 114 ff.

[4] Suppl. Despatches, xii. 326.

[5] Suppl. Despatches, ii. 335.

[6] Memorandum to Canning of January 26, 1826 (*Well. Desp.* iii.)

[7] An interesting account of Wellington's negotiations in St Petersburg, based on unpublished documents in the Russian archives, is given in T. Schiemann's *Geschichte Russlands unter Nikolaus I.* (Berlin, 1908), ii. 126–138.

Canning died on the 8th of August 1827, and was succeeded as premier by Lord Goderich. The duke was at once again offered the post of commander-in-chief, which he accepted on the 17th of August. On the fall of Lord Goderich's cabinet five months later Wellington became prime minister. He had declared some time before that it would be an act of madness for him to take this post; but the sense of public duty led him to accept it when it was pressed upon him by the king. His cabinet included at the first Huskisson, Palmerston and other followers of Canning. The repeal of the Test and Corporation Acts having been carried in the House of Commons in the session of 1828, Wellington, to the great disappointment of Tories like Lord Eldon, recommended the House of Lords not to offer further resistance, and the measure was accordingly carried through. Soon afterwards a quarrel between the duke and Huskisson led to the retirement from the ministry of all its more liberal members. It was now hoped by the so-called Protestant party that Wellington, at the head of a more united cabinet, would offer a steady resistance to Catholic emancipation. Never were men more bitterly disappointed. The Clare election and the progress of the Catholic Association convinced both Wellington and Peel that the time had come when Catholic emancipation must be granted; and, submitting when further resistance would have led to civil war, the ministry itself brought in at the beginning of the session of 1829 a bill for the relief of the Catholics. Wellington, who had hitherto always opposed Catholic emancipation, explained and justified his change of front in simple and impressive language. His undoubted seriousness and his immense personal reputation did not, however, save him from the excesses of calumny and misinterpretation; and in order to impose some moderation upon his aspersers the duke thought it necessary to send a challenge to one of the most violent of these, the earl of Winchelsea. No mischief resulted from the encounter.

Catholic emancipation was the great act of Wellington's ministry; in other respects his tenure of office was not marked by much success. The imagination and the breadth of view necessary to a statesman of the highest order were not part of his endowment, nor had he the power of working harmoniously with his subordinates. His Eastern policy was singularly short-sighted. There might have been good reason, from Wellington's point of view, for condemning Canning's treaty of London; but when, in consequence of this treaty, the battle of Navarino had been fought, the Turkish fleet sunk, and the independence of Greece practically established, it was the weakest of all possible courses to withdraw England from its active intervention, and to leave to Russia the gains of a private and isolated war. This, however, was Wellington's policy; and, having permitted Russia to go to war alone in 1828, nothing remained for him but to treat Greece as a pawn in Russia's hands, and to cut down the territory of the Greek kingdom to the narrowest possible limits, as if the restoration to the sultan of an inaccessible mountain-tract, inhabited by the bitterest of his enemies, could permanently add to the strength of the Ottoman empire. The result was the renunciation of the Greek crown by Prince Leopold; and, although, after the fall of Wellington's ministry, a somewhat better frontier was given to Greece, it was then too late to establish this kingdom in adequate strength, and to make it, as it might have been made, a counterpoise to Russia's influence in the Levant. Nor was the indulgence shown by the cabinet towards Dom Miguel and the absolutists of Portugal quite worthy of England. That Wellington actively assisted despotic governments against the constitutional movements [illegible] time. He had indeed none of the sym[illegible] which began to influence British [illegible] which became so powerful under Palmerston; but the rule which he followed in foreign affairs, so far as he considered it possible, was that of non-intervention.

As soon as Catholic emancipation was carried, the demand for parliamentary reform and extension of the franchise agitated Great Britain from end to end. The duke was ill informed as to the real spirit of the nation. He conceived the agitation for reform to be a purely fictitious one, worked up by partisans and men of disorder in their own interest, and expressing no real want on the part of the public at large. Met with a firm resistance, it would, he believed, vanish away, with no worse result than the possible plunder of a few houses by the city mobs. Wholly unaware of the strength of the forces which he was provoking, the duke, at the opening of the parliament which met after the death of George IV., declared against any parliamentary reform whatever. This declaration led to the immediate fall of his government. Lord Grey, the chief of the new ministry, brought in the Reform Bill, which was resisted by Wellington as long as anything was to be gained by resistance. When the creation of new peers was known to be imminent, however, Wellington was among those who counselled the abandonment of a hopeless struggle. His opposition to reform made him for a while unpopular. He was hooted by the mob on the anniversary of Waterloo, and considered it necessary to protect the windows of Apsley House with iron shutters.

For the next two years the duke was in opposition. On the removal of Lord Althorp to the House of Lords in 1834, William IV. unexpectedly dismissed the Whig ministry and requested Wellington to form a cabinet. The duke, however, recommended that Peel should be at the head of the government, and served under him, during the few months that his ministry lasted, as foreign secretary. On Peel's later return to power in 1841 Wellington was again in the cabinet, but without departmental office beyond that of commander-in-chief. He supported Peel in his Corn-Law legislation, and throughout all this later period of his life, whether in office or in opposition, gained the admiration of discerning men, and excited the wonder of zealots, by his habitual subordination of party spirit and party connexion to whatever appeared to him the real interest of the nation. On Peel's defeat in 1846 the duke retired from active public life. He was now nearly eighty. His organization of the military force in London against the Chartists in April 1848, and his letter to Sir John Burgoyne on the defences of the country, proved that the old man had still something of his youth about him. But the general character of Wellington's last years was rather that of the old age of a great man idealized. To the unbroken splendours of his military career, to his honourable and conscientious labours as a parliamentary statesman, life unusually prolonged added an evening of impressive beauty and calm. The passions excited during the stormy epoch of the Reform Bill had long passed away. Venerated and beloved by the greatest and the lowliest, the old hero entered, as it were, into the immortality of his fame while still among his countrymen. Death came to him at last in its gentlest form. He passed away on the 14th of September 1852, and was buried under the dome of St Paul's, in a manner worthy both of the nation and of the man. His monument, by Alfred Stevens (*q.v.*), stands in the nave of the cathedral.

AUTHORITIES.—The *Wellington Despatches*, edited by Gurwood; *Supplementary Despatches*; and *Wellington Despatches, New Series*, edited by the second duke of Wellington. Unlike Napoleon's despatches and correspondence, everything from Wellington's pen is absolutely trustworthy: not a word is written for effect, and no fact is misrepresented. Almost all the political memoirs of the period 1830–1850 contain more or less about Wellington in his later life. Those of Greville and Croker have perhaps most of interest. A good deal of information, from the unpublished Russian archives, is given in F. F. de Martens' *Recueil des traités conclus par la Russie*. See also Sir Herbert Maxwell, *Life of Wellington* (2 vols., London, 1900), and the literature of the Peninsular War (*q.v.*), Waterloo Campaign (*q.v.*).

WELLINGTON, a town of Wellington county, New South Wales, Australia, 248 m. by rail N.W. of Sydney. Pop. (1901) 2988. The river Macquarie is here spanned by a fine railway bridge. There are rich gold-bearing reefs in the vicinity of the town and gold dredging is a growing industry; wheat growing is the most considerable agricultural pursuit, but fruit trees and vines are cultivated with success. Stock-rearing also is extensively followed on account of the fine pasturage in the district. In the vicinity are the beautiful Wellington caves.

WELLINGTON, a market town in the Wellington (Mid) parliamentary division of Shropshire, England, 10½ m. by rail E. of Shrewsbury. Pop. of urban district (1901), 6283. It is an important junction on the London & North-Western and Great Western railways, being 152 m. N.W. from London by the former line. The Shropshire Union canal connects it with the Severn. The neighbourhood is picturesque, the Wrekin, about 1½ m. from the town, rising to a height of 1335 ft. The church of All Saints dates from 1790. The manufacture of agricultural implements and nails, iron and brass founding and malting are carried on. The Roman Watling Street, running near the town, gives its name to a suburb of Wellington.

Before the Conquest Wellington (*Weliton*, *Welintun*) belonged to Earl Edwin of Mercia, and after his forfeiture in 1071 was granted to Roger, earl of Shrewsbury. It came into the king's hands in 1102 through the attainder of Robert de Belême. King John in 1212 granted Wellington to Thomas de Erdington "as a reward for services rendered in Rome at the time of the Interdict." Among the numerous subsequent lords of the manor were the families of Burnell and Lovell, the present owner being Colonel Sir Thomas Mayrick, Bart. Like many other towns in Shropshire, Wellington appears to have grown into importance as a border town, and possibly had some manner of corporate community in 1177, when it paid three marks to an aid, but its privileges seem to have disappeared after the annexation of Wales, and it was never incorporated. Markets are held on Thursday and Saturday under a charter of 1691–1692 to William Forester, but the Thursday market was first granted in 1244 to Giles de Erdington. Wellington has never been represented in parliament.

WELLINGTON, a market town in the Wellington parliamentary division of Somersetshire, England, at the foot of the Blackdown hills, and near the river Tone, 170½ m. W. by S. of London by the Great Western railway. Pop. of urban district (1901), 7283. The 15th-century church of St John has a fine Perpendicular tower and chancel; while the clerestoried nave is Early English. There is a magnificent altar-tomb to Sir J. Popham, Lord Chief Justice under Elizabeth and James I. The chief buildings include the West Somerset County School and a 17th-century hospital for the aged poor, founded by Sir J. Popham. A tower, which stands on the highest peak of the Blackdowns, 2½ m. S., was erected in honour of the duke of Wellington. The town has woollen manufactures, iron foundries and brick and tile works.

WELLINGTON, the capital of New Zealand, the seat of government and of a bishop. Pop. (1901) 43,638; (1906) 58,563, and including suburbs, 63,807. It lies on the southwestern shore of North Island, on the inner shore of Port Nicholson, an inlet of Cook's Strait, the site affording a splendid harbour, walled in by abrupt hills. The original flat shore is occupied by massive walls constructed for the reclaiming of land, as the hills prevent an inland extension of the city. Wood was originally in favour as a building material, owing to the prevalence of earthquakes, but brick and stone subsequently took its place in the construction of the principal buildings. The main street is a winding thoroughfare named in different parts Thorndon Quay, Lambton Quay, Willis Street and Manners Street. It runs parallel to the shore, but the quays properly so called are separated from it by blocks of buildings. It is traversed by an electric tramway. There are two railway stations in the town and one in the southern suburb of Te Aro. Two main lines leave the town, one following the west coast, the other an inland route to Napier. The principal buildings are governmental; the houses of parliament, formerly a wooden erection, are rebuilt in brick and stone; there are also the residence of the governor and court house. The fine town hall was founded by the prince of Wales in 1901. There are several fine churches, and among educational institutions the chief is the Victoria University. An excellent school of art and several public libraries are provided, the latter including that in the house of parliament. The museum contains a beautiful Maori house of carved woodwork, and biological collections. There are several public parks and gardens on well-chosen elevated sites, the principal being the Botanical Garden, from which the city and port are well seen. Shipping is controlled by a harbour board (1880). The extensive wharves are amply served by hydraulic machinery and railways. Wellington was founded in 1840, being the first settlement of New Zealand colonists, and the seat of government was transferred here from Auckland in 1865. The town is under municipal government.

WELLS, CHARLES JEREMIAH (1798?–1879), English poet, was born in London, probably in the year 1798. He was educated at Cowden Clarke's school at Edmonton, with Tom Keats, the younger brother of the poet, and with R. H. Horne. He became acquainted with John Keats, and was the friend "who sent me some roses," to whom Keats wrote a sonnet on the 29th of June 1816:—

> "When, O Wells! thy roses came to me,
> My sense with their deliciousness was spelled;
> Soft voices had they, that, with tender plea,
> Whisper'd of peace and truth and friendliness unquelled.

Unfortunately, Wells soon afterwards played a cruel practical joke on the dying Tom Keats, and reappears in the elder poet's correspondence as "that degraded Wells." Both with Keats and Reynolds, Wells was in direct literary emulation, and his early writings were the result of this. In 1822 he published *Stories after Nature*—or rather, in the manner of Boccaccio, tempered by that of Leigh Hunt—a curious little volume of brocaded prose. At the close of 1823, under the pseudonym of H. L. Howard, appeared the Biblical drama of *Joseph and his Brethren* (dated 1824). For the next three years Wells saw Hazlitt, as he said, "every night," but in 1827 the two men were estranged. When Hazlitt died, in September 1830, Wells took Horne to see his dead friend, and afterwards raised a monument to the memory of Hazlitt in the church of St Anne's, Soho. His two books passed almost unnoticed, and although Hazlitt said that *Joseph and his Brethren* was "more than original, aboriginal, and a mere experiment in comparison with the vast things" Wells could do, he forbore to review it, and even dissuaded the young poet from writing any more. Wells was now practising as a solicitor in London, but he fancied that his health was failing and proceeded to South Wales, where he occupied himself with shooting, fishing and writing poetry until 1835, when he removed to Broxbourne, in Hertfordshire. In 1840 he left England, never to set foot in it again. He settled at Quimper, in Brittany, where he lived for some years. A story called *Claribel* appeared in 1845, and one or two slight sketches later, but several important tragedies and a great deal of miscellaneous verse belonging to these years are lost. Wells stated in a letter to Horne (November 1877) that he had composed eight or ten volumes of poetry during his life, but that, having in vain attempted to find a publisher for any of them, he burned the whole mass of MSS. at his wife's death. The only work he had retained was a revised form of *Joseph and his Brethren*, which was praised in 1838 by Wade, and again, with great warmth, by Horne, in his *New Spirit of the Age*, in 1844. The drama was then once more forgotten, until in 1863 it was read and vehemently praised by D. G. Rossetti. The tide turned at last; *Joseph and his Brethren* became a kind of shibboleth—a rite of initiation into the true poetic culture—but still the world at large remained indifferent. Finally, however, Swinburne wrote an eloquent study of it in the *Fortnightly Review* in 1875, and the drama itself was reprinted in 1876. The old man found it impossible at first to take his revival seriously, but he woke up at length to take a great interest in the matter, and between 1876 and 1878 he added various scenes, which are in the possession of Mr Buxton Forman, who published one of them in 1895. After leaving Quimper, Wells went to reside at Marseilles, where he held a professorial chair. He died on the 17th of February 1879.

From R. H. Horne, the author of *Orion*, the present writer received the following account of the personal appearance of Wells in youth. He was short and sturdy, with dark red hair, a sanguine complexion, and bright blue eyes; he used to call himself "the cub," in reference to the habitual roughness of his manners, which he was able to resolve at will into the most taking sweetness and good-humour. Wells's wife who had been a Miss Emily Jane Hill, died in 1874. Their son, after his father's death, achieved a notoriety which was unpoetical, although recorded in popular song, for he was the once-famous "man who broke the bank at Monte Carlo."

The famous *Joseph and his Brethren*, concerning which criticism has recovered its self-possession, is an overgrown specimen of the pseudo-Jacobean drama in verse which was popular in ultra-poetical circles between 1820 and 1830. Its merits are those of rich versification, a rather florid and voluble eloquence and a subtle trick of reserve, akin to that displayed by Webster and Cyril Tourneur in moments of impassioned dialogue. Swinburne has said that there are lines in Wells "which might more naturally be mistaken, even by an expert, for the work of the young Shakespeare, than any to be gathered elsewhere in the fields of English poetry." This may be the case, but even the youngest Shakespeare would have avoided the dulness of subject-matter and the slowness of evolution which impede the reader's progress through this wholly undramatic play. *Joseph and his Brethren*, in fact, although it has been covered with eulogy by the most illustrious enthusiasts, is less a poem than an odd poetical curiosity.

In 1909 a reprint was published of *Joseph and his Brethren*, with Swinburne's essay, and reminiscences by T. Watts-Dunton. (E. G.)

WELLS, DAVID AMES (1828–1898), American economist, was born in Springfield, Massachusetts, on the 17th of June 1828. He graduated at Williams College in 1847, was on the editorial staff of the *Springfield Republican* in 1848, and at that time invented a machine for folding newspapers and book-sheets. He then removed to Cambridge, graduated at the Lawrence Scientific School in 1851, and published in 1850–1865 with George Bliss (1793–1873) an *Annual of Scientific Discovery*. In 1866 he patented a process for preparing textile fabrics. His essay on the national debt, *Our Burden and Our Strength* (1864), secured him the appointment in 1865 as chairman of the national revenue commission, which laid the basis of scientific taxation in the United States. In 1866–1870 he was special commissioner of revenue and published important annual reports; during these years he became an advocate of free trade, and he argued that the natural resources of the United States must lead to industrial supremacy without the artificial assistance of a protective tariff which must produce an uneven development industrially. The creation of a Federal Bureau of Statistics in the Department of the Treasury was largely due to Wells's influence. In 1871 he was chairman of the New York State Commission on local taxation which urged the abolition of personal taxes, except of moneyed corporations, and the levy of a tax on the rental value of dwellings to be paid by the occupant; and in 1878 he reported on New York canal tolls. In 1877 he was president of the American Social Science Association. He died in Norwich, Connecticut, on the 5th of November 1898.

He edited many scientific text-books, and wrote *The Creed of the Free Trader* (1875), *Robinson Crusoe's Money* (1878), *Our Merchant Marine* (1882), *The Primer of Tariff Reform* (1884), *Practical Economics* (1885), *Principles of Taxation* (1886), *Recent Economic Changes* (1889).

WELLS, HERBERT GEORGE (1866–   ), English novelist was born at Bromley, Kent, on the 21st of September 1866, the son of Joseph Wells, a professional cricketer. He was educated at Midhurst grammar school and at the Royal College of Science, where he was trained in physics, chemistry, astronomy, geology and biology. He graduated B.Sc. of London University in 1888 with first-class honours, taught science in a private school, and subsequently did private coaching. In 1893 he began to write for the *Pall Mall Gazette*, of which he was dramatic critic in 1895. He also wrote for *Nature* and the *Saturday Review*. After the success of his fantastic story *The Time Machine* (1895) he gave his time chiefly to the writing of romances, in which the newest scientific and technical discoveries were used to advance his views on politics and sociology. But he did not confine himself to fiction. His *Anticipations* (1902) showed his real gift for sociological speculation. Beginning with a chapter on the means of locomotion in the 20th century, it went on to discuss war, the conflict of languages, faith, morals, the elimination of the unfit, and other general topics, with remarkable acuteness and constructive ability. In *The Discovery of the Future* (1902), *Mankind in the Making* (1903), *A Modern Utopia* (1905) and *New Worlds for Old* (1908) his socialistic theories were further developed. As a novelist, meanwhile, he had taken a very high place. Some earlier stories, such as *The Wheels of Chance* (1896) and *Love and Mr Lewisham* (1900), had proved his talent for drawing character, and pure phantasies like *The War of the Worlds* (1898) his abundant invention; but *Kipps* (1905) and *Tono-Bungay* (1909) showed a great advance in artistic power. The list of his works of fiction includes *The Stolen Bacillus and other Stories* (1895), *The Wonderful Visit* (1895), *The Island of Doctor Moreau* (1896), *The Plattner Story and Others* (1897), *When the Sleeper Wakes* (1899), *The First Men in the Moon* (1901), *The Food of the Gods* (1904), *In the Days of the Comet* (1906), *The War in the Air* (1908), *Anne Veronica* (1909), *The History of Mr Polly* (1910).

WELLS, SIR THOMAS SPENCER, 1st Bart. (1818–1897), English surgeon, was born at St Albans on the 3rd of February 1818, and received his medical education in Leeds, Dublin and St Thomas's Hospital, London (M.R.C.S. 1841). From 1841 to 1848 he served as a surgeon in the navy, and in 1848 he went to Paris to study pathology. In 1853 he settled in London, and took up ophthalmic surgery, interrupting his work to go out to the East in the Crimean War. In 1854 he became surgeon to the Samaritan Free Hospital for Women and Children, London. His reputation in surgery had obtained for him in 1844 the fellowship of the Royal College of Surgeons, and he subsequently became a member of council, Hunterian professor of surgery and pathology (1878), President (1882) and Hunterian Orator (1883). In 1883 he was made a baronet. His name is best known in connexion with his successful revival of the operation of ovariotomy, which had fallen into disrepute owing to the excessive mortality attending it; and in his skilful hands, assisted by modern surgical methods, the operation lost almost all its danger. His book on *Diseases of the Ovaries* was published in 1865. Sir Spencer Wells married in 1853 Miss Elizabeth Wright, and had a son and daughters. He died on the 31st of January 1897. His estate at Golder's Hill, Hampstead, was sold after his death to the London County Council and converted into a public park.

WELLS, a city, municipal borough and market town in the Wells parliamentary division of Somerset, England, 20 m. S. of Bristol, on the Great Western and Somerset & Dorset railways. Pop. (1901) 4849. It is a quiet, old-fashioned place, lying in a hollow under the Mendip Hills, whose spurs rise on all sides like islands. The city is said to have derived its name from some springs called St Andrew's Wells, which during the middle ages were thought to have valuable curative properties. During Saxon times Wells was one of the most important towns of Wessex, and in 905 it was made the seat of a bishopric by King Edward the Elder. About the year 1091–1092 Bishop John de Villula removed the see to Bath; and for some years Wells ceased to be an episcopal city. After many struggles between the secular clergy of Wells and the regulars of Bath, it was finally arranged in 1139 that the bishop should take the title of "bishop of Bath and Wells," and should for the future be elected by delegates appointed partly by the monks of Bath and partly by the canons of Wells. The foundation attached to the cathedral church of Wells consisted of a college of secular canons of St Augustine, governed by a dean, sub-dean, chancellor and other officials. The diocese covers the greater part of Somerset. The importance of the city is almost wholly ecclesiastical; and the theological college is one of the most important in England.

Wells is governed by a mayor, 4 aldermen and 12 councillors. Area 720 acres.

The cathedral, one of the most magnificent of all the secular churches of England, was executed principally by Bishops Reginald Fitz-Jocelyn (1171–1191), Savaricus (1192–1205) and Jocelyn (1206–1242). According to the usual medieval practice, the eastern part of the church was begun first, and the choir was consecrated for use long before the completion of the nave, the western part of which, with the magnificent series of statues on the façade, is commonly attributed to Bishop Jocelyn. With him was associated a famous architect in Elias de Derham, who was his steward in 1236, and died in 1245. The upper half of the two western towers has never been built. The noble central tower, 160 ft. high, was built early in the 14th century; the beautiful octagonal chapter-house on the north side, and the lady chapel at the extreme east, were the next important additions in the same century. The whole church is covered with stone groining of various dates, from the Early English of the choir to the fan vaulting of the central tower. Its plan consists of a nave (161 ft. in length and 82 in breadth) and aisles, with two short transepts, each with a western aisle and two eastern chapels. The choir and its aisles are of unusual length (103 ft.), and behind the high altar are two smaller transepts, beyond which is the very rich Decorated lady chapel, with an eastern semi-octagonal apse. On the north of the choir is the octagonal chapter-house, the vaulting of which springs from a slender central shaft; as the church belonged to secular clergy, it was not necessary to place it in its usual position by the cloister. The cloister, 160 by 150 ft., extends along the whole southern wall of the nave. The extreme length of the church from east to west is 383 ft. The oak stalls and bishop's throne in the choir are magnificent examples of 15th-century woodwork, still well preserved.

The glory of the church, and that which makes it unique among the many splendid buildings of medieval England, is the wonderful series of sculptured figures which decorate the exterior of the west front. The whole of the façade, 150 ft. wide, including the two western towers, is completely covered with this magnificent series; there are nine tiers of single figures under canopies, over 600 in number, mostly large life size, with some as much as 8 ft. in height, and other smaller statues; these represent angels, saints, prophets, kings and queens of the Saxon, Norman and Plantagenet dynasties, and bishops and others who had been benefactors to the see. There are also forty-eight reliefs with subjects from Bible history, and immense representations of the Last Judgment and the Resurrection, the latter alone containing about 150 figures. The whole composition is devised so as to present a comprehensive scheme of theology and history, evidently thought out with much care and ingenuity. As works of art, these statues and reliefs are of high merit; the faces are noble in type, the folds of the drapery very gracefully treated with true sculpturesque simplicity, and the pose of the figures remarkable for dignity. A great variety of hands and much diversity of workmanship can be traced in this mass of sculpture, but in very few cases does the work fall conspicuously below the general level of excellence.

The interior of the central tower presents an interesting example of the skilful way in which the medieval builders could turn an unexpected constructional necessity into a beautiful architectural feature. While it was being built the four piers of the great tower arches showed signs of failure, and, therefore, in order to strengthen them, a second lower arch was built below each main arch of the tower; and on this a third inverted arch was added. Thus the piers received a steady support along their whole height from top to bottom, and yet the opening of each archway was blocked up in the smallest possible degree. The contrasting lines of these three adjacent arches on each side of the tower have a very striking and graceful effect; nothing similar exists elsewhere.

On the south side of the cathedral stands the bishop's palace, a moated building, originally built in the form of a quadrangle by Bishop Jocelyn, and surrounded by a lofty circuit wall. The hall and chapel are beautiful structures, mostly of the 14th century.

The vicars' college was a secular foundation for two principals and twelve vicars; fine remains of this, dating from the 15th century, and other residences of the clergy stand within and near the cathedral close; some of these are among the most beautiful examples of medieval domestic architecture in England.

The church of St Cuthbert is one of the finest of the many fine parochial churches in Somersetshire, with a noble tower and spire at the west end. It was originally an Early English cruciform building, but the central tower fell in during the 16th century, and the whole building was much altered during the Perpendicular period. Though much damaged, a very interesting reredos exists behind the high altar; it consists of a "Jesse tree" sculptured in relief, erected in 1470. Another beautiful reredos was discovered in 1848, hidden in the plaster on the east wall of the lady chapel, which is on the north side.

There was a Roman settlement at Wells (*Theorodunum, Fonticuli, Tidington, Welliae, Welle*), this site being chosen on account of the springs from which the town takes its name, and the Roman road to Cheddar passed through Wells. King Ine founded a religious house there in 704, and it became an episcopal see in 910. To this latter event the subsequent growth of Wells is due. There is evidence that Wells had become a borough owned by the bishops of Wells before 1160, and in that year Bishop Robert granted the first charter, which exempted his burgesses from certain tolls. Other charters granted by Bishop Reginald before 1180 and by Bishop Savaric about 1201 gave the burgesses of Wells the right to jurisdiction in their own disputes. These charters were confirmed by John in 1201, by Edward I. in 1290, by Edward III. with the grant of new privileges in 1334, 1341, 1343 and 1345, by Richard II. in 1377, by Henry IV. in 1399 and by Henry VI. in 1424. Wells obtained charters of incorporation in 1589, 1683, 1688 and 1835. It was represented in parliament from 1295 to 1868. Fairs on March 3, October 14 and November 30 were granted before 1160, and in 1201 fairs on May 9, November 25 and June 25 were added. They were important in the middle ages for the sale of cloth made in the town, but the fairs which are now held on the first Tuesdays in January, May, July, November and December are noted for the sale of cheese. The market days for the sale of cattle and provisions are Wednesdays and Saturdays. Silk-making, stocking-making and gloving replaced the cloth trade in Wells, but have now given place to brush-making, corn and paper milling, which began early in the 19th century.

See *Victoria County History, Somerset*; Thomas Serel, *Lectures on Wells* (1880).

WELLSTON, a city of Jackson county, Ohio, U.S.A., about 30 m. S.E. of Chillicothe. Pop. (1880) 952; (1890) 4377; (1900) 8045, of whom 311 were foreign-born; (1910 census) 6875. Land area (1906), 6·62 sq. m. Wellston is served by the Baltimore & Ohio South-western, the Hocking Valley, the Cincinnati, Hamilton & Dayton, and the Detroit, Toledo & Ironton railways, and is connected by an electric line with Jackson (pop. in 1910, 5468), the county-seat, about 10 m. S.W. Immediately N. of the city is Lake Alma Park. Wellston is situated in a coal and iron mining country; among the city's manufactures are iron and cement, and in 1905 the value of the factory product was $1,384,295, 41·4% more than in 1900. The municipality owns and operates its water-works and its electric lighting plant. Wellston (named in honour of Harvey Wells, its founder) was settled in 1871, and was chartered as a city in 1876.

WELLSVILLE, a city of Columbiana county, Ohio, U.S.A., about 35 m. S. of Youngstown, on the Ohio river. Pop. (1890) 5247; (1900) 6146 (475 being foreign-born and 113 negroes); (1910) 7769. Wellsville is served by the Pennsylvania railway, and by an interurban electric line connecting with Rochester, Pa., and Steubenville, Ohio. It is in a region which has rich deposits of coal, natural gas, oil and clay; and there are various manufactures. The neighbourhood was first settled in 1795 by one James Clark of Washington county, Pennsylvania, who bought a tract of 304 acres here and who transferred it a year afterwards to his son-in-law, William Wells, in whose honour the settlement was named in 1820 when it was platted. From 1832 to 1852 Wellsville was an important shipping point on the Ohio, with daily steamboats to Pittsburg; it was incorporated as a village in 1848, and was chartered as a city in 1890.

WELS, a town of Austria, in Upper Austria, 17 m. S.S.W. of Linz by rail. Pop. (1900) 12,187. It is situated on the river Traun and possesses an interesting parish church, in Gothic style, rebuilt in the 15th century, but the oldest part supposed to date from the 9th century. The town draws a supply of natural gas, used for lighting, heat and motive power, from deep artesian borings first made in 1891. It has an important trade in corn, timber, horned cattle, pigs and horses, fowls, dairy produce and lard; and considerable manufactures, including machinery cast-iron, copper and brass goods, calico, gunpowder, oil, paper, articles in felt, flour, leather and biscuits. Wels stands on the site of the Roman *Ovilaba*, and was in the 8th century the residence of the dukes of Lambach-Wels. The actual town dates from the 11th century.

WELSER, the name of a famous family of German merchants, members of which held official positions in the city of Augsburg during the 13th century. The family first became important during the 15th century, when the brothers Bartholomew and Lucas Welser carried on an extensive trade with the Levant and elsewhere, and had branches in the principal trading centres of south Germany and Italy, and also in Antwerp, London and Lisbon. The business was continued by Antony (d. 1518), a son of Lucas Welser, who was one of the first among the Germans to use the sea route to the East, which had been discovered by Vasco da Gama. The Welsers were also interested in mining ventures; and, having amassed great wealth, Antony's son Bartholomew (1488–1561) lent large sums of money to Charles V., receiving in return several marks of the imperial favour. Bartholomew and his brother Antony, however, are chiefly known as the promoters of an expedition under Ambrose Dalfinger (d. 1532), which in 1528 seized the province of Caracas in Venezuela. With the consent of Charles V., this district was governed and exploited by the Welsers; but trouble soon arose with the Spanish government, and the undertaking was abandoned in 1555. After Bartholomew's death the business was carried on by three of his sons and two of his nephews; but the firm became bankrupt in 1614. Bartholomew's niece Philippine (1527–1580), the daughter of his brother Francis (1497–1572), married the Archduke Ferdinand, son of the emperor Ferdinand I.

Perhaps the most famous member of the Welser family was Antony's grandson, Marcus (1558–1614). Educated in Italy, Marcus became burgomaster of Augsburg, but was more distinguished for his scholarship and his writings. The most important of his many works is his *Rerum Boicarum libri quinque*, dealing with the early history of the Bavarians, which was translated into German by the author's brother Paul (d. 1620). His works, *Marci Velseri opera historica et philologica*, were collected and published with a biography of Marcus by C. Arnold (Nuremberg, 1682). The Augsburg branch of Welsers became extinct in 1797, and a branch which settled at Nuremberg in 1878; but the Ulm branch of the family is still flourishing.

See K. Häbler, *Die überseeischen Unternehmungen der Welser* (Leipzig, 1903); W. Böheim, *Philippine Welser* (Berlin, 1894); and A. Kleinschmidt, *Augsburg, Nürnberg und ihre Handelsfürsten* (Cassel, 1881).

WELSH LAWS, or LEGES WALLIAE. There is, comparatively speaking, no great distance of time between the *leges barbarorum* and the Laws of Wales, while the contents of the latter show a similar, nay almost the same, idea of law as the former; and, apart from the fact that Wales became permanently connected at the end of the 13th century with a Teutonic people, the English, it has been noticed that in Wales Roman and Germanic, but no traces of a specific Welsh, law are found. King Howel Dda (*i.e.* the Good), who died in 950, is the originator of the Welsh code.[1] In the preface it is stated that Howel, "seeing the laws and customs of the country violated with impunity, summoned the archbishop of Menevia, other bishops and the chief of the clergy, the nobles of Wales, and six persons (four laymen and two clerks) from each comot, to meet at a place called Y Ty Gwyn ar Dav, or the white house on the river Tav, repaired thither in person, selected from the whole assembly twelve of the most experienced persons, added to their number a clerk or doctor of laws, named Bllgywryd, and to these thirteen confided the task of examining, retaining, expounding and abrogating. Their compilation was, when completed, read to the assembly, and, after having been confirmed, proclaimed. Howel caused three copies to be written, one of which was to accompany the court for daily use, another was deposited in the court at Aberfraw, and a third at Dinevwr The bishops denounced sentence of excommunication against all transgressors, and soon after Howel himself went to Rome attended by the archbishop of St David's, the bishops of Bangor and St Asaph and thirteen other personages. The laws were recited before the pope and confirmed by his authority, upon which Howel and his companions returned home." All this could not have been effected before Howel had subjected Wales to his own rule, therefore not before 943. We have three different recensions of the code, one for Venedotia or North Wales, another for Dimetia or South Wales, a third for Gwent or North-east Wales. We do not know how far these recensions were uniform in the beginning; but a variance must have occurred shortly after, for the manuscripts in which the codes are preserved differ greatly from each other. The code was originally compiled in Welsh, but we have no older MSS. than the 12th century, and even the earliest ones (especially those of the Venedotia recension) contain many interpolations. The Latin translations of the code would seem to be very old, though even here we have no earlier MSS. (belonging to the Dimetia recension) than the 13th century. The Latin text is much shorter than the Welsh, but we do not know whether this abridgment was made on purpose, or whether the translation is an imitation of an earlier text. The texts present only a few traces of Roman law, which, however, are evidently additions of a later period.

The whole body of Welsh laws was published in one volume by Aneurin Owen under the direction of the commissioners on the public records as *Ancient Laws and Institutes of Wales* (London, 1841). The text of Howel's laws has been edited by A. W. Wade-Evans as *Welsh Medieval Law* (London, 1909).

WELSHPOOL (or Welchpool, so called because *Pool*, its old name, led to confusion with Poole, in Dorsetshire; Welsh *Trallwm*), a market town and municipal and contributary parliamentary borough of Montgomeryshire, N. Wales, in the upper Severn valley, on the Montgomeryshire canal and the Cambrian railway, 8 m. N. of Montgomery, and 182 m. from London. Pop. (1901) 6121. Its buildings and institutions include the old Gothic church of St Mary, the Powysland Museum, with local fossils and antiquities, and a library, vested (with its science and art school) in the corporation in 1887. Powis Castle (about a mile S.W. of the town) is the seat of Earl Powis, and has been in the possession of the Herberts for many generations. The flannel manufacture has been transferred to Newtown, but Welshpool has tweeds and woollen shawls, besides a fair trade in agricultural produce, malting and tanning. The town returned a member to parliament from 1536 to 1728, was again enfranchised in 1832, and now (with Llanfyllin, Llanidloes, Montgomery, Machynlleth and Newtown) forms the Montgomery district of parliamentary boroughs. A charter was granted to the town by the lords of Powis, confirmed by James I. (1615), and enlarged by Charles II. The castle was begun, in or about 1109, by Cadwgan ab Bleddyn ab Cynfyn (*Cynvyn*), and finished by Gwenwynwyn; in 1196 it was besieged, undermined and taken by Hubert, archbishop of Canterbury. Retaken by Gwenwynwyn in 1197, it was dismantled by Llewelyn, prince of N. Wales, in 1233. It then remained for several years in the hands of the lords of Powis. During the Civil War, the then lord Powis, a royalist, was imprisoned, and the castle was later demolished. Powis Castle, being of red sandstone, is usually called in Welsh Castell Coch (red castle). In the park is Llyn du (black pool), whence Welshpool is said to be named.

WEM, a market town in the northern parliamentary division of Shropshire, England, 11 m. N. of Shrewsbury on the London & North Western railway. Pop. (1901), 3796. It is a pleasantly situated town with a considerable agricultural trade. The church of St Peter and St Paul retains a Norman tower. Flour-milling and tanning are the chief industries. In the neighbourhood is the splendid domain of Hawkstone.

In the reign of Edward the Confessor Wem was held as four manors, but at the time of the Domesday Survey William

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[1] There is no historical foundation for the legendary laws of a prince Dymal (or Dyvnwal) Moel Mud, nor for the Laws of Marsia, which are said to belong to a period before the Roman invasion, even so early as 400 years before Christ. An English translation by the side of the Welsh text of the so-called triads of Dyvnwal Moel Mud is given by Owen, in *The Ancient Laws of Wales*.

Pantulf was holding the whole as one manor of Roger, earl of Shrewsbury, from whom it passed to the Botelers, barons of Wem. The famous Judge Jeffreys was among the subsequent lords of the manor and was created Baron Jeffreys of Wem in 1685, but upon the death of his only son and heir in 1720 the title became extinct. The town was a borough by prescription, but there appears to be no mention of burgesses before the 15th century. In 1459 Ralph, Lord Greystock, is said to have granted a charter, no longer extant, to his tenants in the manor, and in 1674 the freeholders, "borough-holders" and copyholders, of Wem brought an action against Daniel Wicherley, then lord of the manor, for the establishment of customs and privileges chiefly connected with the tenure of their lands and tenements, which was decided in their favour. The borough was governed by two bailiffs, both elected at the court leet of the lord of the manor, one by his steward, the other by a borough jury, but in the beginning of the 19th century there were only seventy-two burgesses and their rights seem to have gradually disappeared. An urban district council was formed in 1900. Wem has never been represented in parliament. The market was originally held on Sunday under grant from John to Warin Fitz Gerald in 1205, but in 1351, in consequence of a protest from the archbishop of Canterbury, it was changed to Thursday, on which day it is still held. The grant of 1205 also included a fair at the feast of SS. Peter and Paul, which was maintained until within recent years, when fairs were also held at the feast of St Mark, chiefly for linen cloth, under grant from Charles I. to Thomas Howard in 1636, and at the feast of St Martin, bishop of Tours, for the sale of hops. A great fire which broke out at Wem on the 3rd of March 1677 caused damage to the extent of £23,677.

See *Victoria County History, Shropshire*; Samuel Garbet, *The History of Wem* (1818).

WEMBLEY, an urban district in the Harrow parliamentary division of Middlesex, England, 10 m. W.N.W. of St Paul's Cathedral, on the Metropolitan and London & North Western railways. Pop. (1901) 4519. Wembley adjoins Sudbury on the east; the district is residential, but lacks natural attractions except in the case of Wembley Park, a pleasant wooded recreation ground, owned by a company. Here a tower was begun on the lines of the Eiffel Tower in Paris, and projected to exceed it in height, reaching 1200 ft., but only a short stage was completed. The manor of Wembley belonged to the priory of Kilburn until that foundation was dissolved by Henry VIII.

WEMYSS, EARLS OF, the title held by a Scottish family who had possessed the lands of Wemyss in Fifeshire since the 12th century, and of which various members had attained distinction. In 1628 Sir John Wemyss, who had been created a baronet in 1625, was raised to the peerage as Baron Wemyss of Elcho; and in 1633 he became earl of Wemyss, and Baron Elcho and Methel, in the peerage of Scotland. He took part with the Scottish parliament against Charles I., and died in 1649. On the death of David, 2nd earl of Wemyss (1610–1679), the estates and titles passed to his daughter Margaret, countess of Wemyss, whose son David, 3rd earl of Wemyss, succeeded on her death in 1705. His son James, 4th earl (1699–1756), married a great heiress, Janet, daughter of Colonel Francis Charteris, who had made a large fortune by gambling. His son David, Lord Elcho (1721–1787), was implicated in the Jacobite rising of 1745, and was consequently attainted, the estates passing to his younger brother James, while the title remained dormant after his father's death, though it was assumed by Elcho's brother Francis, who took the name of Charteris on inheriting his maternal grandfather's estate. A reversal of the attainder was granted in 1826 to his descendant Francis Charteris Wemyss Douglas (1772–1853), who had been created Baron Wemyss of Wemyss in the peerage of the United Kingdom in 1821, and had assumed the name of Charteris Wemyss Douglas on inheriting some of the Douglas estates through a female ancestor. Thenceforward the title descended in the direct line.

WEMYSS, a parish of Fifeshire, Scotland, embracing the villages of East and West Wemyss and the police burgh of Buckhaven, a fishing port lying on the northern shore of the Firth of Forth, 2½ m. S.W. of Leven, on the North British Railway Company's branch line from Thornton Junction to Methil. Coal mining is the principal industry of the district, the coal being exported from the port of Methil, of which the harbour was constructed by David, 2nd earl of Wemyss (d. 1679), the town being made a burgh of barony in 1662. Population of Buckhaven, including Methil and Innerleven (1901), 8828; of East Wemyss, 2522; of West Wemyss, 1253; of Wemyss parish, 15,031. The district is of much archaeological and historic interest. On the shore to the north-east are two square towers which are supposed to have formed part of Macduff's castle; and near them are the remarkable caves (weems, from the Gaelic, *uamha*) from which the district derives its name. Several of them contain archaic sculptures, held by some to be the work of the Christian missionaries who found shelter here; by others ascribed to the same prehistoric agency as the inscribed stones of northern Scotland. Near East Wemyss is Wemyss Castle, the ancient seat of the family of the same name which has played a conspicuous part in Scottish history. It was at Wemyss castle that Mary, queen of Scots, first met the earl of Darnley, in 1565, and her room is still known as "the Presence Chamber."

WENCESLAUS (1361–1419), German king, and, as Wenceslaus IV., king of Bohemia, was the son of the emperor Charles IV. and Anna, daughter of Henry II., duke of Schweidnitz. Born at Nuremberg on the 26th of February 1361, he was crowned king of Bohemia in June 1363, and invested with the margraviate of Brandenburg in 1373. In September 1370 he married Joanna (d. 1386) daughter of Albert I., duke of Bavaria, and was elected king of the Romans or German king at Frankfort on the 10th of June 1376, and crowned at Aix-la-Chapelle on the 6th of July following. He took some part in the government of the empire during his father's lifetime, and when Charles died in November 1378 became sole ruler of Germany and Bohemia, but handed over Brandenburg to his half-brother Sigismund. His reign was a period of confusion both in church and state, and although he appears to have begun to rule with excellent intentions, he was totally unfit to cope with the forces of disorder. Germany was torn with feuds, the various orders for the establishment of peace were disregarded, and after 1389 the king paid very little attention to German affairs. In 1383 he inherited the duchy of Luxemburg from his uncle Wenceslaus and in 1387 assisted his half-brother Sigismund to obtain the Hungarian throne.

For some time Wenceslaus ruled Bohemia successfully, but he fell under the influence of favourites and aroused the irritation of the nobles. A quarrel with John II., archbishop of Prague, which led to the murder of John's vicar-general, John of Pomuk, at the instigation of the king, provoked a rising led by Jobst, margrave of Moravia, a cousin of Wenceslaus; and in 1394 the king was taken prisoner and only released under pressure of threats from the German princes. Having consented to limitations on his power in Bohemia, he made a further but spasmodic effort to restore peace in Germany. He then met Charles VI., king of France at Reims, where the monarchs decided to persuade the rival popes Benedict XIII. and Boniface IX. to resign, and to end the papal schism by the election of a new pontiff. Many of the princes were angry at this abandonment of Boniface by Wenceslaus, who had also aroused much indignation by his long absence from Germany and by selling the title of duke of Milan to Gian Galleazzo Visconti. The consequence was that in August 1400 the four Rhenish electors met at Oberlahnstein and declared Wenceslaus deposed. He was charged with attempting to dismember the empire to his own advantage, with neglecting to end the schism in the church, with allowing favourites to enrich themselves, and was further accused of murder. Though he remained in Bohemia he took no steps against Rupert III. count palatine of the Rhine, who had been elected as his successor. He soon quarrelled with Sigismund, who took him prisoner in 1402 and sent him to Vienna, where he remained in captivity for nineteen months after abdicating in Bohemia. In 1404, when Sigismund was recalled to Hungary, Wenceslaus regained his freedom and with it his authority in Bohemia; and after the death of the German king Rupert in 1410 appears to have entertained hopes of recovering his former throne. Abandoning this idea, however, he voted for the election of Sigismund in 1411, but stipulated that he should retain the title of king of the Romans. His concluding years were disturbed by the troubles which arose in Bohemia over the death of John Huss, and which the vacillating king did nothing to check until compelled by Sigismund. In the midst of these disturbances he died at Prague on the 16th of August 1419. His second wife was Sophia, daughter of John, duke of Bavaria-Munich, but he left no children. Wenceslaus was a capable and educated man, but was lacking in perseverance and industry. He neglected business for pleasure and was much addicted to drunkenness. He favoured the teaching of Huss, probably on political grounds, but exercised very little influence during the Hussite struggle.

See Th. Lindner, *Geschichte des deutschen Reiches vom Ende des 14ten Jahrhunderts bis zur Reformation*, part i. (Brunswick, 1875–1880), and "Die Wahl Wenzels," in the *Forschungen zur deutschen Geschichte*, Band xiv. (Göttingen, 1862–1886), F. M. Pelzel, *Lebensgeschichte des römischen und böhmischen Königs Wenceslaus* (Prague, 1788–1790); F. Palacky, *Geschichte von Böhmen*, Bände iii. and iv (Prague, 1864–1874); H. Mau, *König Wenzel und die rheinischen Kurfürsten* (Rostock, 1887). The article by Th. Lindner in the *Allgemeine deutsche Biographie*, Band xli., should also be consulted for a bibliography, and also the same writer's work, *Das Urkundenwesen Karls IV. und seiner Nachfolger* (Stuttgart, 1882).

WÊN-CHOW-FU, a prefectural city in the province of Cheh-kiang, China, and one of the five ports opened by the Chifu convention to foreign trade, situated (28° 1′ N., 120° 31′ E.) on the south bank of the river Gow, about 20 m. from the sea. The population is estimated at 80,000. The site is said to have been chosen by Kwo P'oh (A.D. 276–324), a celebrated antiquary who recognized in the adjacent mountain peaks a correspondence with the stars in the constellation of the Great Bear, from which circumstance the town was first known as the Tow or Great Bear city. Subsequently the appearance in its vicinity of a white deer carrying a flower in its mouth was deemed so favourable an omen as to more than justify the change of its name to Luh or Deer city. Its present name, which signifies the "mild district," and is correctly descriptive of the climate, though not of the inhabitants, was given to it during the Ming dynasty (1368–1644). The walls, which were built in the 10th century, are about 4 m. in circumference, 35 ft. in height, and 12 ft. broad at the top. The streets are paved with brick and are wide, straight and clean. The gates, seven in number, were erected in 1598. Wên-chow is about 1560 m. S.S.E. by road from Peking and 600 m. E.S.E. of Hankow. The British consul and the customs outdoor staff occupy foreign-built houses on Conquest Island, which lies abreast of the city. The neighbourhood is hilly and pretty, while opposite the north-west gate Conquest Island forms a picturesque object. The island is, however, more beautiful than healthy. The port, which was opened to foreign trade in 1876, has not justified the expectations which were formed of it as a commercial centre, and in 1908 the direct foreign trade was valued at £19,000 only.

There is no foreign settlement at Wên-chow, and the foreign residents are mainly officials and missionaries. The tea trade of Wên-chow-Fu, formerly important, has declined owing to careless cultivation. A considerable native export trade in wood, charcoal, bamboo, medicines, paper umbrellas, oranges, otter skins and tobacco leaf is carried on. The imports are chiefly cotton yarn and piece goods, kerosene oil, palm-leaf fans, aniline dyes, sugar and matches.

WENDEN (Lettish *Tsesis*), a town of western Russia, in the government of Livonia, 60 m. by rail N.E. of Riga. Pop. (1897) 6327. Here are the well preserved ruins of a former castle of the Brethren of the Sword, afterwards (from 1237) of the grand-master of the Teutonic Knights. In 1577 the garrison blew it up to prevent it from falling into the hands of Ivan the Terrible of Russia. It was rebuilt, but has been in ruins since a fire in 1748.

WENDOVER, a market town in the Aylesbury parliamentary division of Buckinghamshire, England, 33 m. N.W. of London by the Metropolitan and the Great Central joint railway. Pop. (1901) 2036. It is picturesquely situated in a shallow defile of the Chiltern Hills, towards their western face. Wendover is a quiet town of no great activity. Its church of St Mary is mainly Decorated, and a few old houses remain.

Wendover (*Wendovre*, *Wandovre*, *Wendoura*) is on the Upper Icknield Way, which was probably an ancient British road, and various traces of a British settlement have been found in the town and neighbourhood. In 1087 the king held the manor of Wendover, and therefore it belonged to the ancient demesne of the crown. There is no trace of any incorporation of the town. Two burgesses were summoned to the parliaments of 1300, 1307 and 1309, but no further returns were made until 1625. In 1832 Wendover lost its right of separate representation. It is noteworthy that John Hampden and Edmund Burke both represented the borough. In 1464 Edward IV. confirmed to his tenants and the residents within the borough the market that they had always held every Thursday For a short period the day was changed to Tuesday, but the market was given up before 1888. Hugh de Gurnay held a fair in Wendover on the eve, feast and morrow of St John the Baptist, granted him in 1214. Another fair was granted to John de Molyns in 1347–1348 on the eve, feast and morrow of St Barnabas, but in 1464 Edward IV. granted two fairs to his tenants and residents in the borough, to be held on the vigils, feasts and morrows of St Matthew and of SS. Philip and James. These fairs have been held without interruption till the present day, their dates being October 2 and May 13.

WENDS, the name applied by the Germans to the Slavs (*q.v.*) wherever they came in contact with them. It is now used for the Slovenes (*q.v.*), for the Germanized Polabs (*q.v.*) in eastern Hanover, and especially for the Lusatian Wends or Sorbs (*q.v.*). It is first found in Pliny (*Venedae*) and in English is used by Alfred.

WENDT, HANS HINRICH (1853–), German Protestant theologian, was born in Hamburg on the 18th of June 1853. After studying theology at Leipzig, Göttingen and Tübingen, he became in 1885 professor ordinarius of systematic theology at Heidelberg, and in 1893 was called to Jena. His work on the teaching of Jesus (*Die Lehre Jesu*, 1886–1890; Eng. trans. of second part, 1892) made him widely known. He also edited several editions (5th to 8th, 1880–1898) of the *Commentary on the Acts of the Apostles* in H. A. W. Meyer's series. In May 1904 he delivered two addresses in London on "The Idea and Reality of Revelation, and Typical Forms of Christianity," as the *Essex Hall Lectures* (published, 1904).

His works include: *Die christliche Lehre von der menschlichen Vollkommenheit* (1882), *Der Erfahrungsbeweis für die Wahrheit des Christentums* (1897), and *Das Johannesevangelium* (1900; Eng. trans., 1902).

WENLOCK, a municipal borough in the Ludlow and Wellington parliamentary divisions of Shropshire, England, extending on both sides of the river Severn. Pop. (1901) 15,866. It includes the market towns of Broseley, Madeley and Much Wenlock (*q.v.*). The parish of Madeley includes the small towns of Ironbridge and Coalport, with part of Coalbrookedale (*q.v.*). The district is in part agricultural, but contains limestone quarries, some coal-mines and iron-works. The borough is under a mayor, 8 aldermen and 24 councillors. Area, 22,657 acres.

Wenlock (*Wenlocke*) is said to be of pre-Roman origin, but owed its early importance to the nunnery founded *c.* 680 by St Milburg, daughter of Merewald, king of Mercia. This was destroyed by the Danes but refounded as a priory by Earl Leofric in 1017. It was again deserted after the Conquest until Roger de Montgomery founded a house of the Cluniac order on its site. The town was a borough by prescription, and its privileges began with the grants made to the priory and its tenants. It was incorporated under the name of "Bailiff, Burgesses and Commonalty" by Edward IV. in 1468 at the request of Sir John Wenlock, Kt., and "in consideration of the laudable services which the men of the town performed in assisting the king to gain possession of the crown," and the charter was confirmed in

1547 by Henry VIII. and in 1631 by Charles I. The bailiff was to be chosen annually by the burgesses, but his election seems to have depended entirely upon the lord of the manor, and, after a contest in 1821 between Lord Forester and Sir W. W. Wynne, the lord of the manor at that date, was nominated by each of them alternately. In the report of 1835 the borough is said to consist of seventeen parishes and to be unfit for corporate government. By the charter of Edward IV. the town obtained the right of sending two members to parliament, but was disfranchised in 1885. The first grant of a market and fair is dated 1227, when the prior of Wenlock obtained licence to hold a fair on the vigil, day and morrow of the Nativity of St John the Baptist, and a market every Monday. The incorporation charter of 1468 granted these to the burgesses, who continue to hold them.

See *Victoria County History: Shropshire*; John Randall, *Randall's Tourists' Guide to Wenlock* (1875); "Borough of Wenlock," *The Salopian and West Midland Monthly Illustrated Journal*, March, April, November, December, 1877, April and October, 1878, March, 1879 (1877–1879).

WENLOCK GROUP (Wenlockian), in geology, the middle series of strata in the Silurian (Upper Silurian) of Great Britain. This group in the typical area in the Welsh border counties contains the following formations: Wenlock or Dudley limestone, 90-300 ft.; Wenlock shale, up to 1900 ft.; Woolhope or Barr limestone and shale, 150 ft.

The *Woolhope* beds consist mainly of shales which are generally calcareous and pass frequently into irregular nodular and lenticular limestone. In the Malvern Hills there is much shale at the base, and in places the limestone may be absent. These beds are best developed in Herefordshire; they appear also at May Hill in Gloucestershire and in Radnorshire. Common fossils are *Phacops caudatus*, *Encrinurus punctatus*, *Orthis calligramma*, *Atrypa reticularis*, *Orthoceras annulatum*.

The *Wenlock Shales* are pale or dark-grey shales which extend through Coalbrookdale in Shropshire, through Radnorshire into Carmarthenshire. They appear again southward in the Silurian patches in Gloucestershire, Herefordshire and Monmouthshire. They thicken from the south northward. The fossils are on the whole closely similar to those in the limestones above with the natural difference that corals are comparatively rare in the shales, while graptolites are abundant. Six graptolite zones have been recognized by Miss G. L. Elles in this formation.

The *Wenlock limestone* occurs either as a series of thin limestones with thin shales or as thick massive beds; it is sometimes hard and crystalline and sometimes soft, earthy or concretionary. It is typically developed in Wenlock Edge, where it forms a striking feature for some 20 m. It appears very well exposed in a sharp anticline at Dudley, whence it is sometimes called the "Dudley limestone"; it occurs also at Aymestry, Ludlow, Woolhope, May Hill, Usk and Malvern. The fossils include corals in great variety (*Halysites catenularis*, *Favosites aspera*, *Heliolites interstinctus*), crinoids (*Crotalocrinus*, *Marsupiocrinus*, *Periechocrinus*), often very beautiful specimens, and trilobites (*Calymene Blumenbachii*, the "Dudley locust," *Phacops caudatus*, *Illaenus* (*Bumbastes*)*barriensis*, *Homalonotus delphinocephalus*). Merostomatous crustaceans make their first appearance here(*Eurypterus punctatus*, *Hemiaspis horridus*). Brachiopods are abundant (*Atrypa reticularis*, *Spirifer plicatilis*, *Rhynchonella cuneata*, *Orthis*, *Leptaena*, *Pentamerus*); lamellibranchs include the genera *Avicula*, *Cardiola*, *Grammysia*; *Murchisonia*, *Bellerophon*, *Omphalotrochus* are common gasteropod genera. *Conularia Sowerbyi* is by no means rare, and there are several common cephalopod genera (*Orthoceras*, *Phragmoceras*, *Trochoceras*).

The greater part of the known Silurian fauna of Britain comes from Wenlock rocks; J. Davidson and G. Maw obtained no fewer than 25,000 specimens of brachiopods from 7 tons of the shale. Not only are there many different genera and species but individually certain forms are very numerous. The three principal zonal graptolites are, from above downwards: *Monograptus testis*, *Cyrtograptus Linnarssoni*, *Cyrtograptus Murchisoni*.

When traced northward into Denbighshire and Merionethshire the rocks change their character and become more slaty or arenaceous; they are represented in this area by the "Moel Ferna Slates," the "Pen-y-glog Grit," and "Pen-y-glog Slates," all of which belong to the lower part of a great series (3000 ft.) of slates and grits known as the "Denbighshire Grits." Similar deposits occur on this horizon still farther north, in the Lake district, where the Wenlock rocks are represented by the "Brathay Flags" (lower part of the Coniston Flags series), and in southern Scotland, where their place is taken by the variable "Riccarton beds" of Kirkcudbright Shore, Dumfriesshire, Riccarton and the Cheviots; by greywackes and shales in Lanarkshire; by mudstones, shales and grits in the Pentland Hills, and in the Girvan area by the "Blair" and "Straiton beds." In Ireland the "Ferriters Cove beds," a thick series of shales, slates and sandstones with lavas and tuffs in the Dingle promontory; the "Mweelrea beds" and others in Tipperary and Mayo are of Wenlock age. Lime and flagstones are the most important economic products of the British Wenlock rocks.

See the article SILURIAN, and for recent papers, *Geological Literature*, Geol. Soc., London, annual, and the *Q.J. Geol. Soc.*, London. (J. A. H.)

WENNERBERG, GUNNAR (1817–1901), Swedish poet, musician and politician, was born at Lidköping, of which place his father was parish priest, on the 2nd of October 1817. He passed through the public school of Skara, and in his twentieth year became a student at Upsala. He was remarkable from the first, handsome in face and tall in figure, with a finely trained singing voice, and brilliant in wit and conversation. From the outset of his career he was accepted in the inner circle of men of light and leading for which the university was at that time famous. In 1843 he became a member of the musical club who called themselves "The Juvenals," and for their meetings were written the trios and duets, music and words, which Wennerberg began to publish in 1846. In the following year appeared the earliest numbers of *Gluntarne* (or "The Boys"), thirty duets for baritone and bass, which continued to be issued from 1847 to 1850. The success of these remarkable productions, masterpieces in two arts, was overwhelming: they presented an epitome of all that was most unique and most attractive in the curious university life of Sweden. In the second volume of his collected works Wennerberg gave, long afterwards, a very interesting account of the inception and history of these celebrated duets. His great personal popularity, as the representative Swedish student, did not prevent him, however, from pursuing his studies, and he became an authority on Spinoza. In 1850 he first travelled through Sweden, singing and reciting in public, and his tour was a long popular triumph. In 1860 he published his collected trios, as *The Three*. In 1865, at the particular wish of the king, Charles XV., Wennerberg entered official life in the department of elementary education. He succeeded Fahlcrantz in 1866 as one of the eighteen of the Swedish Academy, and in 1870 became minister for education (*Ekklesiastikminister*) in the Adlercreutz government, upon the fall of which in 1875 he retired for a time into private life. He was, however, made lord-lieutenant in the province of Kronoberg, and shortly afterwards was elected to represent it in the Diet. His active parliamentary life continued until he was nearly eighty years of age. In 1881 and 1885 he issued his collected works, mainly in verse. In 1893 he was elected to the upper house. He preserved his superb appearance in advanced old age, and he died, after a very short illness, on the 24th of August 1901, at the royal castle of Leckö, where he was visiting his brother-in-law, Count Axel Rudenschöld. His wife, the Countess Hedvig Cronstedt, whom he married in 1852, died in 1900. Wennerberg was a most remarkable type of the lyrical, ardent Swedish aristocrat, full of the joy of life and the beauty of it. In the long roll of his eighty-four years there was scarcely a crumpled rose-leaf. His poems, to which their musical accompaniment is almost essential, have not ceased, in half a century, to be universally pleasing to Swedish ears; outside Sweden it would be difficult to make their peculiarly local charm intelligible. (E. G.)

WENSLEYDALE, JAMES PARKE, BARON (1782–1868), English judge, was born near Liverpool on the 22nd of March 1782. He was educated at Macclesfield grammar school and Trinity College, Cambridge. He had a brilliant career at the university, winning the Craven scholarship, Sir William Browne's gold medal, and being fifth wrangler and senior chancellor's medallist in classics. Called to the bar at the Inner Temple he rapidly acquired an excellent common law practice and in 1828 was raised to the king's bench, while still of the junior bar. In 1834 he was transferred from the king's bench to the court of exchequer, where for some twenty years he exercised considerable influence. The changes introduced by the Common Law Procedure Acts of 1854, 1855 proved too much for his legal conservatism and he resigned in December of the latter year. The government, anxious to have his services as a law lord in the House of Lords, proposed to confer on him a life peerage, but this was opposed by the House of Lords (see Peerage), and he was eventually created a peer with the usual remainder (1856). He died at his residence, Ampthill Park, Bedfordshire, on the 25th of February 1868, and having outlived his three sons, the title became extinct.

WENSLEYDALE, the name given to the upper part of the valley of the river Ure in the North Riding, Yorkshire, England. It is celebrated equally for its picturesque scenery and for the numerous points of historical and other interest within it. The Ure rises near the border of Yorkshire and Westmorland, in the uplands of the Pennine Chain. Its course is generally easterly as long as it is confined by these uplands, but on debouching upon the central plain of Yorkshire it takes a south-easterly turn and flows past Ripon and Boroughbridge to form, by its union with the Swale, the river Ouse, which drains to the Humber. The name Wensleydale is derived from the village of Wensley, some 25 m. from the source of the river, and is primarily applied to a section of the valley extending 10 m. upstream from that point, but is generally taken to embrace the whole valley from its source to a point near Jervaulx abbey, a distance of nearly 40 m., below which the valley widens out upon the plain. The dale is traversed by a branch of the North-Eastern railway from Northallerton.

As far up as Hawes, the dale presents a series of landscapes in which the broken limestone crags of the valley-walls and the high-lying moors beyond them contrast finely with the rich land at the foot of the hills. Beyond Hawes, towards the source, the valley soon becomes wide, bare and shallow, less rich in contrast, but wilder. On both sides throughout the dale numerous narrow tributary vales open out. Small waterfalls are numerous. The chief are Aysgarth Force, on the main stream, Mill Gill Force on a tributary near Askrigg, and Hardraw Scaur beyond Hawes, the finest of all, which shoots forth over a projecting ledge of limestone so as to leave a clear passage behind it. The surrounding cliffs complete a fine picture. The small river Bain, joining the Ure near Askrigg, forms a pretty lake called Semerer or Semmer Water, ¾ m. in length.

Following the valley upward, the points of chief interest apart from the scenery are these. Jervaulx Abbey was founded in 1156 by Cistercians from Byland, who had previously settled near Askrigg. The remains are mainly transitional Norman and Early English, and are not extensive. Of the great church hardly any fragments rise above ground-level, but the chapter-house, refectory and cloisters remain in part, and the ivy-clad ruins stand in a beautiful setting of woodland. Above the small town of Middleham, where there are large training stables, rises the Norman keep of Robert Fitz-Ranulph, which passed to the Nevills, being held by the "King-maker," Warwick. The subsidiary buildings date down to the 14th century. In Cover Dale near Middleham is the ruined Premonstratensian abbey of Coverham, founded here in the 13th century and retaining a gatehouse and other portions of Decorated date. Farther up Wensleydale Bolton Castle stands high on the north side. This was the stronghold of the Scropes, founded by Richard I.'s chancellor of that name. Its walls, four corner-towers and fine position still give it an appearance of great strength.

WENTWORTH, the name of an English family distinguished in the parliamentary history of the 16th and 17th centuries. The Wentworths traced descent from William Wentworth (d. 1308) of Wentworth Woodhouse, in Yorkshire, who was the ancestor of no fewer than eight distinct lines of the family, two main branches of which were settled in the 14th century at Wentworth Woodhouse and North Elmshall respectively. From the elder, or Wentworth Woodhouse branch, were descended Thomas Wentworth the celebrated earl of Strafford (*q.v.*), and through him the Watson-Wentworths, marquesses of Rockingham in the 18th century, and the earls FitzWilliam of the present day. To the younger branch belonged Roger Wentworth (d. 1452), great-great-grandson of the above-mentioned William. Roger, who was a son of John Wentworth (fl. 1413) of North Elmshall, Yorkshire, acquired the manor of Nettlestead in Suffolk in right of his wife, a grand-daughter of Robert, Baron Tibetot, in whose lands this manor had been included, and who died leaving an only daughter in 1372. Roger's son Henry (d. 1482) was twice married; by his first wife he was the ancestor of the Wentworths of Gosfield, Essex; by his second of the Wentworths of Lillingstone Lovell, Buckinghamshire.[1] Another of Roger Wentworth's sons, Sir Philip Wentworth, was the grandfather of Margery, wife of Sir John Seymour, mother of the Protector Somerset and of Henry VIII.'s wife Jane Seymour, and grandmother of King Edward VI. Margery's brother Sir Robert Wentworth (d. 1528) married a daughter of Sir James Tyrrell, the reputed murderer of Edward V. and his brother in the Tower; and Sir Robert's son by this marriage, Thomas Wentworth (1501–1551), was summoned to parliament by writ in 1529 as Baron Wentworth of Nettlestead. He was one of the peers who signed the letter to the pope in favour of Henry VIII.'s divorce from Catherine of Aragon, and was one of the judges of Anne Boleyn. He was lord chamberlain to Edward VI., and died in 1551 leaving sixteen children.

Thomas Wentworth, 2nd Baron Wentworth of Nettlestead (1525–1584), was the eldest son of the above-mentioned 1st baron. He served with distinction under his relative the Protector Somerset at the battle of Pinkie in 1547; but in 1551 he was one of the peers who condemned Somerset to death on a charge of felony. He was a trusted counsellor of Queen Mary, who appointed him deputy of Calais. Wentworth was the last Englishman to hold this post, for on the 7th of January 1558 he was compelled to surrender Calais to the French, his representations as to the defenceless condition of the fortress having been disregarded by the English Council some years earlier. Wentworth himself remained in France as a prisoner of war for more than a year, and on his return to England in 1559 he was sent to the Tower for having surrendered Calais; but he was acquitted of treason. He died on the 13th of January 1584. His eldest son William married a daughter of Lord Burghley, but predeceased his father, whose peerage consequently passed to his second son Henry (1558–1593), who was one of the judges of Mary, queen of Scots, at Fotheringay in 1586.

Thomas Wentworth, 1st earl of Cleveland (1591–1667), was the eldest son of Henry, whom he succeeded as 4th Baron Wentworth of Nettlestead in 1593. In 1614 he inherited from an aunt the estate of Toddington in Bedfordshire, till then the property of the Cheyney family, and here he made his principal residence. In 1626 he was created earl of Cleveland, and in the following year he served under Buckingham in the expedition to La Rochelle. Adhering to the king's cause in the parliamentary troubles, he attended his kinsman Strafford at his execution, and afterwards was a general on the royalist side in the Civil War until he was taken prisoner at the second battle of Newbury. Cleveland commanded a cavalry regiment at Worcester in 1651, when he was again taken prisoner, and he remained in the Tower till 1656. He died on the 25th of March 1667. His early extravagance and the fortunes of war had greatly reduced his estates, and Nettlestead was sold in 1643. Cleveland was described by Clarendon as "a man of signal courage and an excellent officer"; his cavalry charge at Cropredy Bridge was one of the most brilliant incidents in the Civil War, and it was by his bravery and presence of mind that Charles II. was enabled to escape from Worcester. At his death the earldom of Cleveland became extinct. He outlived his son Thomas (1613–1645), who was called up to the House of Lords in his father's lifetime as Baron Wentworth, and whose daughter Henrietta Maria became Baroness Wentworth in her own right on her grandfather's death. This lady, who was the duke of Monmouth's mistress, died unmarried in 1686. The barony of Wentworth then reverted to Cleveland's daughter Anne, who married the 2nd Lord Lovelace, from whom it passed to her grand-daughter Martha (d. 1745), wife of Sir Henry Johnson, and afterwards to a descendant of Anne's daughter Margaret, Edward Noel, who was created Viscount Wentworth of Wellesborough in 1762. The viscountcy became extinct at his death, and the barony again passed through the female line in the person of Noel's daughter Judith to the latter's daughter Anne Isabella, who married Lord Byron the poet; and from her to Byron's daughter Augusta Ada, whose husband was in 1838 created earl of Lovelace. The barony of Wentworth was thereafter held by the descendants of this nobleman in conjunction with the earldom of Lovelace.

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[1] In the 16th century Lillingstone Lovell was in Oxfordshire, that portion of the county being surrounded by Buckinghamshire, with which it was afterwards incorporated.

Paul Wentworth (1533–1593), a prominent member of parliament in the reign of Elizabeth, was a member of the Lillingstone Lovell branch of the family (see above). His father Sir Nicholas Wentworth (d. 1557) was chief porter of Calais. Paul Wentworth was of puritan sympathies, and he first came into notice by the freedom with which in 1566 he criticized Elizabeth's prohibition of discussion in parliament on the question of her successor. Paul, who was probably the author of the famous puritan devotional book *The Miscellanie, or Regestrie and Methodicall Directorie of Orisons* (London, 1615), died in 1593. He became possessed of Burnham Abbey through his wife, to whose first husband, William Tyldesley, it had been granted at the dissolution of the monasteries by Henry VIII.

Peter Wentworth (1530–1596) was the elder brother of the above-mentioned Paul, and like his brother was a prominent puritan leader in parliament, which he first entered as member for Barnstaple in 1571. He took a firm attitude in support of the liberties of parliament against encroachments of the royal prerogative, on which subject he delivered a memorable speech on the 8th of February 1576, for which after examination by the Star Chamber he was committed to the Tower. In February 1587 Sir Anthony Cope (1548–1614) presented to the Speaker a bill abrogating the existing ecclesiastical law, together with a puritan revision of the Prayer Book, and Wentworth supported him by bringing forward certain articles touching the liberties of the House of Commons; Cope and Wentworth were both committed to the Tower for interference with the queen's ecclesiastical prerogative. In 1593 Wentworth again suffered imprisonment for presenting a petition on the subject of the succession to the Crown; and it is probable that he did not regain his freedom, for he died in the Tower on the 10th of November 1596. While in the Tower he wrote *A Pithie Exhortation to her Majesty for establishing her Successor to the Crown*, a famous treatise preserved in the British Museum. Peter Wentworth was twice married; his first wife, by whom he had no children, was a cousin of Catherine Parr, and his second a sister of Sir Francis Walsingham, Elizabeth's secretary of state. His third son, Thomas Wentworth (*c.* 1568–1623), was an ardent and sometimes a violent opponent of royal prerogative in parliament, of which he became a member in 1604, continuing to represent the city of Oxford from that year until his death. He was called to the bar in 1594 and became recorder of Oxford in 1607. Another son, Walter Wentworth, was also a member of parliament.

Sir Peter Wentworth (1592–1675) was a grandson of Peter Wentworth, being the son of Peter's eldest son Nicholas, from whom he inherited the manor of Lillingstone Lovell. As sheriff of Oxfordshire in 1634 he was charged with the duty of collecting the levy of ship-money, in which he encountered popular opposition. He was member for Tamworth in the Long Parliament, but refused to act as a commissioner for the trial of Charles I. He was a member of the council of state during the Commonwealth; but was denounced for immorality by Cromwell in April 1653, and his speech in reply was interrupted by Cromwell's forcible expulsion of the Commons. Sir Peter, who was a friend of Milton, died on the 1st of December 1675, having never been married. By his will he left a legacy to Milton, and considerable estates to his grand-nephew Fisher Dilke, who took the name of Wentworth; and this name was borne by his descendants until dropped in the 18th century by Wentworth Dilke Wentworth, great-grandfather of Sir Charles Wentworth Dilke (*q.v.*).

See W. L. Rutton, *Three Branches of the Family of Wentworth of Nettlestead* (London, 1891); Joseph Foster, *Pedigrees of the County Families of Yorkshire* (2 vols., London, 1874); Charles Wriothesley, *Chronicle of England during the Reigns of the Tudors*, edited by W. D. Hamilton (2 vols., London, 1875–1877); Bulstrode Whitelocke, *Memorials of the English Affairs: Charles I. to the Restoration* (London, 1732); John Strype, *Annals of the Reformation* (7 vols., Oxford, 1824); Mark Noble, *Lives of the English Regicides* (2 vols., London, 1798) containing a memoir of Sir Peter Wentworth; Lord Clarendon, *History of the Rebellion* (7 vols., Oxford, 1839), and *Calendar of the Clarendon State Papers*; S. R. Gardiner, *History of England from the Accession of James I. to the Outbreak of the Civil War* (10 vols., London, 1883–1884), and *History of the Great Civil War, 1642–1649* (3 vols., London, 1886–1891); J. A. Froude, *History of England* (12 vols., London, 1856–1870); G. E. C., *Complete Peerage*, vol. viii. (London, 1898). See also articles "Wentworth" by A. F. Pollard, C. H. Firth and Sir C. W. Dilke, in *Dict. Nat. Biog.* (London, 1899). (R. J. M.)

WENTWORTH, WILLIAM CHARLES (1793–1872), the "Australian patriot," who claimed descent from the great Strafford, but apparently without sufficient reason, was born in 1793 in Norfolk Island, the penal settlement of New South Wales, where his father D'Arcy Wentworth, an Irish gentleman of Roscommon family, who had emigrated in 1790 and later became a prominent official, was then government surgeon. The son was educated in England, but he spent the interval between his schooling at Greenwich and his matriculation (1816) at Peterhouse, Cambridge, in Australia, and early attracted the attention of Governor Macquarie by some adventurous exploration in the Blue Mountains. In 1819 he published in London a work on Australasia in two volumes, and in 1823 he only just missed the chancellor's medal at Cambridge (won by W. M. Praed) with a stirring poem on the same subject. Having been called to the bar, he returned to Sydney, and soon obtained a fine practice. With a fellow barrister, Wardell, he started a newspaper, the *Australian*, in 1824, to advocate the cause of self-government and to champion the "emancipists"—the incoming class of ex-convicts, now freed and prospering—against the "exclusivists"—the officials and the more aristocratic settlers. With Wardell, Dr William Bland and others, he formed the "Patriotic Association," and carried on a determined agitation both in Australia and in England, where they found able supporters. The earlier object of their attack was the governor, Sir Ralph Darling, who was recalled in 1831 in consequence, though he was acquitted by a select committee of the House of Commons of the charges brought against him by Wentworth in connexion with his severe punishment of two soldiers, Sudds and Thompson, who had perpetrated a robbery in order to obtain their discharge (a favourite dodge at the time), and one of whom, Sudds, had died. Wentworth continued, under the succeeding governor, Sir Richard Bourke, who was guided by him, and Sir George Gipps, with whom he had constant differences, to exercise a powerful influence; and in 1842, when the Constitution Act was passed, it was generally recognized as mainly his work. He became a member of the first legislative council and led the "squatter party." He was the founder of the university of Sydney (1852), where his son afterwards founded bursaries in his honour; and he led the movement resulting in the new constitution for the colony (1854), subsequently (1861) becoming president of the new legislative council. But things had meanwhile moved fast in the colony, and Wentworth's old supremacy had waned, since Robert Lowe (afterwards Lord Sherbrooke) and others had come into prominence in the political arena. He had done his work for colonial autonomy, and was becoming an old man, somewhat out of touch with the new generation. For some years before 1861 he stayed chiefly in England, where in 1857 he founded the "General Association for the Australian Colonies," with the object of obtaining from the government a federal assembly for the whole of Australia; and in 1862 he definitely settled in England, dying on the 20th of March 1872. His body was taken to Sydney and accorded a public funeral by the unanimous vote of the New South Wales legislature.

WENZEL, KARL FRIEDRICH (1740–1793), German metallurgist, was born at Dresden in 1740. Disliking his father's trade of bookbinding, for which he was intended, he left home in 1755, and after taking lessons in surgery and chemistry at Amsterdam, became a ship's surgeon in the Dutch service. In 1766, tired of sea-life, he went to study chemistry at Leipzig, and afterwards devoted himself to metallurgy and assaying at his native place with such success that in 1780 he was appointed chemist to the Freiberg foundries by the elector of Saxony. In 1785 he became assessor to the superintending board of the foundries, and in 1786 chemist to the porcelain works at Meissen. He died at Freiberg on the 26th of February 1793.

In consequence of the quantitative analyses he performed of a large number of salts, he has been credited with the discovery of the law of neutralization (*Vorlesungen über die chemische Verwandtschaft der Körper*, 1777). But this attribution rests on a mistake first made by J. J. Berzelius and copied by subsequent writers, and Wenzel's published work (as pointed out by G. H. Hess in 1840) does not warrant the conclusion that he realized the existence of any law of invariable and reciprocal proportions in the combinations of acids and bases.

WEPENER, a town of the Orange Free State, 82 m. by rail S.E. of Bloemfontein, and 2 m. W. of the Basuto border. Pop. (1904) 1366, of whom 822 were whites. It lies in a rich grain district, and 3 m. north by the Caledon river are large flour mills. The town, named after the leader of the Boers in their war with the Basuto chief Moshesh in 1865, was founded in 1888. In April 1900 it was successfully defended against the Boers under Christiaan de Wet by a Cape force of Irregulars commanded by Colonel E. H. Dalgety.

WERDAU, a town of Germany, in the kingdom of Saxony, on the Pleisse, in the industrial district of Zwickau, and 40 m. S. of Leipzig. Pop. (1905) 19,473. Its chief industries are cotton and wool-spinning and the weaving of cloth, but machinery of various kinds, paper and a few other articles are also manufactured. In addition to the usual schools, Werdau contains a weaving-school. The town is mentioned as early as 1304 and in 1398 it was purchased by the margrave of Meissen, who afterwards became elector of Saxony.

See Stichard, *Chronik der Fabrikstadt Werdau* (2nd ed., Werdau, 1865).

WERDEN, a town of Germany, in the Prussian Rhine province, on the river Ruhr, 6 m. by rail S. of Essen. Pop. (1905) 11,029. It has an interesting Roman Catholic church which belonged to the Benedictine abbey founded about 800 by St Ludger, whose stone coffin is preserved in the crypt. The abbey buildings are used as a prison. The manufacture of cloth, woollens, shoes and paper, dyeing, tanning, brewing and distilling are the principal industries. In the neighbourhood are stone quarries and coal mines. Werden grew up around the Benedictine abbey, which was dissolved in 1802. The *Codex Argenteus* of Ulfilas, now in the university library at Upsala, was discovered here in the 16th century.

See Flügge, *Chronik der Stadt Werden* (Düsseldorf, 1887); and *Führer durch Werden* (Werden, 1887).

WERDER, KARL WILHELM FRIEDRICH AUGUST LEOPOLD, Count von (1808–1887), Prussian general, entered the Prussian Gardes du Corps in 1825, transferring the following year into the Guard Infantry, with which he served for many years as a subaltern. In 1839 he was appointed an instructor in the Cadet Corps, and later he was employed in the topographical bureau of the Great General Staff. In 1842–1843 he took part in the Russian operations in the Caucasus, and on his return to Germany in 1846, was placed, as a captain, on the staff. In 1848 he married. Regimental and staff duty alternately occupied him until 1863, when he was made major-general, and given the command of a brigade of Guard Infantry. In the Austrian War of 1866 von Werder greatly distinguished himself at Gitschin (Jičin) and Königgrätz at the head of the 3rd division. He returned home with the rank of lieutenant-general and the order *pour le mérite*. In 1870, at first employed with the 3rd Army Headquarters and in command of the Württemberg and Baden forces, he was after the battle of Wörth entrusted with the operations against Strassburg, which he captured after a long and famous siege. Promoted general of infantry, and assigned to command the new XIVth Army Corps, he defeated the French at Dijon and at Nuits, and, when Bourbaki's army moved forward to relieve Belfort, turned upon him and fought the desperate action of Villersexel, which enabled him to cover the Germans besieging Belfort. On the 15th, 16th and 17th of January 1871, von Werder with greatly inferior forces succeeded in holding his own on the Lisaine against all Bourbaki's efforts to reach Belfort, a victory which aroused great enthusiasm in southern Germany. After the war von Werder commanded the Baden forces, now called the XIVth Army Corps, until he retired in 1879. On his retirement he was raised to the dignity of count. He died in 1887 at Grüssow in Pomerania. The 30th (4th Rhenish) Infantry regiment bears his name, and there is a statue of von Werder at Freiburg in the Breisgau.

See von Conrady, *Leben des Grafen A. von Werder* (Berlin, 1889).

WERGELAND, HENRIK ARNOLD (1808–1845), Norwegian poet and prose writer, was born at Christiansand on the 17th of June 1808. He was the eldest son of Professor Nikolai Wergeland (1780–1848), who had been a member of the constitutional assembly which proclaimed the independence of Norway in 1814 at Eidsvold. Nikolai was himself pastor of Eidsvold, and the poet was thus brought up in the very holy of holies of Norwegian patriotism. He entered the university of Christiania in 1825 to study for the church, and was soon the leader of a band of enthusiastic young men who desired to revive in Norway the spirit and independence of the old vikings. His earliest efforts in literature were wild and formless. He was full of imagination, but without taste or knowledge. He published poetical farces under the pseudonym of "Siful Sifadda"; these were followed in 1828 by an unsuccessful tragedy; and in 1829 by a volume of lyrical and patriotic poems, *Digte, förste Ring*, which attracted the liveliest attention to his name. At the age of twenty-one he became a power in literature, and his enthusiastic preaching of the doctrines of the revolution of July made him a force in politics also. Meanwhile he was tireless in his efforts to advance the national cause. He established popular libraries, and tried to alleviate the widespread poverty of the Norwegian peasantry. He preached the simple life, denounced foreign luxuries, and set an example by wearing Norwegian homespun. But his numerous and varied writings were coldly received by the critics, and a monster epic, *Skabelsen, Mennesket og Messias* (Creation, Man and Messiah), 1830, showed no improvement in style. It was remodelled in 1845 as *Mennesket*. From 1831 to 1835 Wergeland was submitted to severe satirical attacks from J. S. le Welhaven and others, and his style improved in every respect. His nationalist political propaganda lacked knowledge and system. His partisans were alienated by his inconsistent admiration for King Carl Johan, by his unpopular advocacy of the Jewish cause, and by the extravagance of his methods generally. His popularity waned as his poetry improved, and in 1840 he found himself a really great lyric poet, but an exile from political influence. In that year he became keeper of the royal archives. He died on the 12th of July 1845. In 1908 a statue was erected to his memory by his compatriots at Fargo, North Dakota. His *Jan van Huysums Blomsterstykke* (1840), *Svalen* (1841), *Jöden* (1842), *Jödinden* (1844) and *Den Engelske Lods* (1844), form a series of narrative poems in short lyrical metres which remain the most interesting and important of their kind in Norwegian literature. He was less successful in other branches of letters; in the drama neither his *Campbellerne* (1837), *Venetianerne* (1843), nor *Sökadetterne* (1848), achieved any lasting success; while his elaborate contribution to political history, *Norges Konstitutions Historie* (1841–1843), is forgotten. The poems of his later years include many lyrics of great beauty, which are among the permanent treasures of Norwegian poetry.

Wergeland's *Samlede Skrifter* (9 vols., Christiania, 1852–1857) were edited by H. Lassen, the author of *Henrik Wergeland og hans Samtid* (1866), and the editor of his *Breve* (1867). See also H. Schwanenflügel, *Henrik Wergeland* (Copenhagen, 1877); and J. G. Kraft, *Norsk Forfatter-Lexikon* (Christiania, 1857), for a detailed bibliography.

WERGILD, Wergeld or Wer, the Anglo-Saxon terms for the fine paid by, *e.g.* a murderer to the relatives of the deceased in proportion to the rank of the latter. The *wer* was part of the early Teutonic and Celtic customary law, and represented the substitution of compensation for personal retaliation, resulting from the rise in authority of the power of the community as such. (See Criminal Law; Homicide; and Teutonic Peoples.)

WERMELSKIRCHEN, a town of Germany, in the Prussian Rhine province, situated 4 m. S.W. from Lennep by rail and at the junction of a line to Remscheid. Pop. (1900) 15,469. It contains an Evangelical and a Roman Catholic church and a Latin school. Wermelskirchen is the centre of many thriving industries, chief among which are the manufacture of silks, cotton and silk ribbons, plush, tobacco and steel goods.

WERMUND, an ancestor of the Mercian royal family, a son of Wihtlæg and father of Offa. He appears to have reigned in Angel, and his story is preserved by certain Danish historians, especially Saxo Grammaticus. According to these traditions, his reign was long and happy, though its prosperity was eventually marred by the raids of a warlike king named Athislus, who slew Frowinus, the governor of Schleswig, in battle. Frowinus's death was avenged by his two sons, Keto and Wigo, but their conduct in fighting together against a single man was thought to form a national disgrace, which was only obliterated by the subsequent single combat of Offa. It has been suggested that Athislus, though called king of the Swedes by Saxo, was really identical with the Eadgils, lord of the Myrgingas, mentioned in Widsith. As Eadgils was a contemporary of Ermanaric (Eormenric), who died about 370, his date would agree with the indication given by the genealogies which place Wermund nine generations above Penda. Frowinus and Wigo are doubtless to be identified with the Freawine and Wig who figure among the ancestors of the kings of Wessex.

For the story of the aggression against Wermund in his later years, told by the Danish historians and also by the *Vitae duorum Offarum*, see OFFA; also Saxo Grammaticus, *Gesta Danorum*, edited by A. Holder, pp. 105 ff. (Strassburg, 1886); *Vitae duorum Offarum* (in Wats's edition of Matthew Paris, London, 1640). See also H. M. Chadwick, *Origin of the English Nation* (Cambridge, 1907).

WERNER, ANTON ALEXANDER VON (1843–   ), German painter, was born at Frankfort-on-the-Oder, on the 9th of May 1843. He first studied painting at the Berlin Academy, pursued his studies at Carlsruhe, and, having won a travelling scholarship upon the exhibition of his early works, he visited Paris in 1867, and afterwards Italy, where he remained for some time. On his return he received several state commissions, and on the outbreak of the Franco-Prussian War in 1870 he was sent with the staff of the third corps d'armée, and stayed in France till the close of the campaign. In 1873 he was appointed professor at the Berlin Academy, of which he afterwards became director. Among his more important works must be named "The Capitulation of Sedan," "Proclamation of the German Empire at Versailles," "Moltke before Paris," "Moltke at Versailles," "The Meeting of Bismarck and Napoleon III.," "Christ and the Tribute Money," "William I. visiting the Tombs," "The Congress of Berlin," and some decorations executed in mosaic for the Triumphal Arch at Berlin. Von Werner's work is chiefly interesting for the historic value of his pictures of the events of the Franco-German War.

See *Kunst für Alle*, vol. i.; Knackfuss, *Künstler-Monographieen*, No. 9.

WERNER, ABRAHAM GOTTLOB (1750–1817), father of German geology, was born in Upper Lusatia, Saxony, on the 25th of September 1750. The family to which he belonged had been engaged for several hundred years in mining pursuits. His father was inspector of Count Solm's iron-works at Wehrau and Lorzendorf, and from young Werner's infancy cultivated in him a taste for minerals and rocks. The boy showed early promise of distinction. He began to collect specimens of stones, and one of his favourite employments was to pore over the pages of a dictionary of mining. At the age of nine he was sent to school at Bunzlau in Silesia, where he remained until 1764, when he joined his father at Wehrau with the idea of ultimately succeeding him in the post of inspector. When nineteen years of age (1769) he journeyed to Freiberg, where he attracted the notice of the officials, who invited him to attend the mining school established two years previously. This was the turning point in Werner's career. He soon distinguished himself by his industry and by the large amount of practical knowledge of mineralogy which he acquired. In 1771 he repaired to the university of Leipzig and went through the usual curriculum of study, paying attention at first chiefly to the subject of law, but continuing to devote himself with great ardour to mineralogical pursuits. While still a student he wrote his first work on the external characters of minerals, *Von den äusserlichen Kennzeichen der Fossilien* (1774), which at once gave him a name among the mineralogists of the day. In 1775 he was appointed inspector in the mining school and teacher of mineralogy at Freiberg. To the development of that school and to the cultivation of mineralogy and geognosy he thenceforth, for about forty years, devoted the whole of his active and indefatigable industry. From a mere provincial institution the Freiberg academy under his care rose to be one of the great centres of scientific light in Europe, to which students from all parts of the world flocked to listen to his eloquent teaching. He wrote but little, and though he elaborated a complete system of geognosy and mineralogy he never could be induced to publish it. From the notes of his pupils, however, the general purport of his teaching was well known, and it widely influenced the science of his time. He died at Freiberg on the 30th of June 1817.

One of the distinguishing features of Werner's teaching was the care with which he taught lithology and the succession of geological formation; a subject to which he applied the name geognosy. His views on a definite geological succession were inspired by the works of J. G. Lehmann and G. C. Fuchsel (1722–1773). He showed that the rocks of the earth are not disposed at random, but follow each other in a certain definite order. Unfortunately he had never enlarged his experience by travel, and the sequence of rock-masses which he had recognized in Saxony was believed by him to be of universal application (see his *Kurze Klassifikation und Beschreibung der verschiedenen Gebirgsarten*, 1787). He taught that the rocks were the precipitates of a primeval ocean, and followed each other in successive deposits of world-wide extent. Volcanoes were regarded by him as abnormal phenomena, probably due to the combustion of subterranean beds of coal. Basalt and similar rocks, which even then were recognized by other observers as of igneous origin, were believed by him to be water-formed accumulations of the same ancient ocean. Hence arose one of the great historical controversies of geology. Werner's followers preached the doctrine of the aqueous origin of rocks, and were known as Neptunists; their opponents, who recognized the important part taken in the construction of the earth's crust by subterranean heat, were styled Vulcanists. R. Jameson, the most distinguished of his British pupils, was for many years an ardent teacher of the Wernerian doctrines. Though much of Werner's theoretical work was erroneous, science is indebted to him for so clearly demonstrating the chronological succession of rocks, for the enthusiastic zeal which he infused into his pupils, and for the impulse which he thereby gave to the study of geology.

See S. G. Frisch, *Lebensbeschreibung A. G. Werners* (Leipzig, 1825); Cuvier, *Éloge de Werner*; Lyell, *Principles of Geology*; and Sir A. Geikie, *Founders of Geology* (1897; 2nd ed., 1906).

WERNER, FRIEDRICH LUDWIG ZACHARIAS (1768–1823), German poet, dramatist and preacher, was born on the 18th of November 1768 at Königsberg in Prussia. From his mother, who died a religious maniac, Werner inherited a weak and unbalanced nature, which his education did nothing to correct. At the university of his native place he studied law; but Rousseau and Rousseau's German disciples were the influences that shaped his view of life. For years he oscillated violently between aspirations towards the state of nature, which betrayed him into a series of rash and unhappy marriages, and a sentimental admiration—in common with so many of the Romanticists—for the Roman Catholic Church, which ended in 1811 in his conversion. Werner's talent was early recognized and obtained for him, in spite of his character, a small government post at Warsaw, which he exchanged afterwards for one at Berlin. In the course of his travels, and by correspondence, he got into touch with many of the men most eminent in literature at the time; and succeeded in having his plays put on the stage, where they met with much success. In 1814 he was ordained priest, and, exchanging the pen for the pulpit, became a popular preacher at Vienna, where, during the famous congress of 1814, his eloquent but fanatical sermons were listened to by crowded congregations. He died at Vienna on the 17th of January 1823.

Werner was the only dramatist of the Romantic movement who—thanks to the influence of Schiller—was able to subordinate his exuberant imagination to the practical needs of the stage. His first tragedy, *Die Söhne des Tals* (1803–1804), is in two parts, and it was followed by *Das Kreuz an der Ostsee* (1806). More important is the Reformation drama *Martin Luther, oder die Weihe der Kraft* (1807), which, after his conversion to Catholicism, Werner recanted in a poem *Weihe der Unkraft* (1813). His powerful one-act tragedy, *Der vierundzwanzigste Februar* (1815, but performed 1810), was the first of the so-called "fate tragedies." *Attila* (1808), *Wanda* (1810) and *Die Mutter der Makkabäer* (1820) show a falling-off in Werner's powers.

Z. Werner's *Theater* was first collected (without the author's consent) in 6 vols. (1816–1818); *Ausgewählte Schriften* (15 vols., 1840–1841), with a biography by K. J. Schütz. See also J. E. Hitzig, *Lebensabriss F. L. Z. Werners* (1823); H. Düntzer, *Zwei Bekehrte* (1873); J. Minor, *Die Schicksalstragödie in ihren Hauptvertretern* (1883) and the same author's volume, *Das Schicksalsdrama* (in Kürschner's *Deutsche Nationalliteratur*, vol. 151, 1884); F. Poppenberg, *Zacharias Werner* (1893).

WERNIGERODE, a town of Germany, in the province of Prussian Saxony, 13 m. by rail S.W. of Halberstadt, picturesquely situated on the Holzemme, on the north slopes of the Harz Mountains. Pop. (1905) 13,137. It contains several interesting Gothic buildings, including a fine town hall with a timber façade of 1498. Some of the quaint old houses which have escaped the numerous fires that have visited the town are elaborately adorned with wood-carving. The gymnasium, occupying a modern Gothic building, is the successor of an ancient grammar-school, which existed until 1825. Brandy, cigars and dye-stuffs are among the manufactures of the place. Above the town rises the château of the prince of Stolberg-Wernigerode. A pavilion in the park contains the library of 117,000 volumes, the chief feature in which is the collection of over 3000 Bibles and over 5000 volumes of hymnology. Wernigerode is the chief town of the county (*Grafschaft*) of Stolberg-Wernigerode, which has an extent of 107 sq. m., and includes the Brocken within its limits.

The counts of Wernigerode, who can be traced back to the early 12th century, were successively vassals of the margraves of Brandenburg (1268), and the archbishops of Magdeburg (1381). On the extinction of the family in 1429 the county fell to the counts of Stolberg, who founded the Stolberg-Wernigerode branch in 1645. The latter surrendered its military and fiscal independence to Prussia in 1714, but retained some of its sovereign rights till 1876. The counts were raised to princely rank in 1890.

See Förstemann, *Die Gräflich-Stolbergische Bibliothek in Wernigerode* (Nordhausen, 1866), and G. Sommer, *Die Grafschaft Wernigerode* (Halle, 1883).

WERTH [Weert], **JOHANN**, Count von (*c.* 1595–1652), German general of cavalry in the Thirty Years' War, was born between 1590 and 1600 at Büttgen in the duchy of Jülich. His parents belonged to the numerous class of the lesser nobility, and at an early age he left home to follow the career of a soldier of fortune in the Walloon cavalry of the Spanish service. In 1622, at the taking of Jülich, he won promotion to the rank of lieutenant. He served as a colonel of cavalry in the Bavarian army in 1630. He obtained the command of a regiment, both titular and effective, in 1632, and in 1633 and 1634 laid the foundations of his reputation as a swift and terrible leader of cavalry forays. His services were even more conspicuous in the great pitched battle of Nördlingen (1634), after which the emperor made him a *Freiherr* of the Empire, and the elector of Bavaria gave him the rank of lieutenant field-marshal. About this time he armed his regiment with the musket as well as the sword. In 1635 and 1636 his forays extended into Lorraine and Luxemburg, after which he projected an expedition into the heart of France. Starting in July 1636, from the country of the lower Meuse, he raided far and wide, and even urged the cardinal infante, who commanded in chief, to "plant the double eagle on the Louvre." Though this was not attempted, Werth's horsemen appeared at St Denis before the uprising of the French national spirit in the shape of an army of fifty thousand men at Compiègne forced the invaders to retire whence they had come. The memory of this raid lasted long, and the name of "Jean de Wert" figures in folk-songs and serves as a bogey to quiet unruly children. In 1637 Werth was once more in the Rhine valley, destroying convoys, relieving besieged towns and surprising the enemy's camps. In February 1638 he defeated the Weimar troops in an engagement at Rheinfelden, but shortly afterwards was made prisoner by Bernhard of Saxe-Weimar. His hopes of being exchanged for the Swedish marshal Horn were disappointed, for Bernhard had to deliver up his captive to the French. The terrible Jean de Wert was brought to Paris, amidst great rejoicings from the country people. He was lionized by the society of the capital, visited in prison by high ladies, who marvelled at his powers of drinking and his devotion to tobacco. So light was his captivity that he said that nothing bound him but his word of honour. However, he looked forward with anxiety for his release, which was delayed until March 1642 because the imperial government feared to see Horn at the head of the Swedish army and would not allow an exchange.

When at last he reappeared in the field it was as general of cavalry in the imperial and Bavarian and Cologne services. His first campaign against the French marshal Guébriant was uneventful, but his second (1643) in which Count Mercy was his commander-in-chief, ended with the victory of Tüttlingen, a surprise on a large scale, in which Werth naturally played the leading part. In 1644 he was in the lower Rhine country, but he returned to Mercy's headquarters in time to take a brilliant share in the battle of Freiburg. In the following year his resolution and bravery, and also his uncontrolled rashness, played the most conspicuous part in deciding the day at the second battle of Nördlingen. Mercy was killed in this action, and Werth succeeded to the command of the defeated army, but he was soon superseded by Field-marshal Geleen. Johann von Werth was disappointed, but remained thoroughly loyal to his soldierly code of honour, and found an outlet for his anger in renewed military activity. In 1647 differences arose between the elector and the emperor as to the allegiance due from the Bavarian troops, in which, after long hesitation, Werth, fearing that the cause of the Empire and of the Catholic religion would be ruined if the elector resumed control of the troops, attempted to take his men over the Austrian border. But they refused to follow, and escaping with great difficulty from the elector's vengeance Werth found a refuge in Austria. The emperor was grateful for his conduct in this affair, ordered the elector to rescind his ban, and made Werth a count. The last campaign of the war (1648) was uneventful, and shortly after its close he retired to live on the estates which he had bought in the course of his career, and on one of these, Benatek near Königgrätz, he died on the 16th of January 1652.

See *Lives* by F. W. Barthold (Berlin, 1826), W. von Janko (Vienna, 1874), F. Teicher (Augsburg, 1877).

WERWOLF (from A.S. *wer*; cf. Lat. *vir*, man; and wolf; or, according to a later suggestion, from O.H.G. *weri*, wear, *i.e.* wearer of the wolf-skin), a man transformed temporarily or permanently into a wolf. The belief in the possibility of such a change is a special phase of the general doctrine of lycanthropy (*q.v.*). In the European history of this singular belief, wolf transformations appear as by far the most prominent and most frequently recurring instances of alleged metamorphosis, and consequently in most European languages the terms expressive of the belief have a special reference to the wolf. Examples of this are found in the Gr. λυκάνθρωπος, Russian *volkodlák*, Eng. "werwolf," Ger. *währwolf*, Fr *loup-garou*. More general terms (*e.g.* Lat., *versipellis*; Russ., *óboroten*; O. Norse, *hamrammr*; Eng. "turnskin," "turncoat") are sufficiently numerous to furnish some evidence that the class of animals into which metamorphosis was possible was not viewed as a restricted one. But throughout the greater part of Europe the werwolf is preferred; there are old traditions of his existence in England, in Wales and in Ireland; in southern France, Germany, Lithuania, Bulgaria, Servia, Bohemia, Poland and Russia he can hardly be pronounced extinct now; in Denmark, Sweden, Norway and Iceland the bear competes with the wolf for pre-eminence.

In Greek mythology the story of Lycaon supplies the most familiar instance of the werwolf. According to one form of it Lycaon was transformed into a wolf as a result of eating human flesh; one of those who were present at periodical sacrifice on Mount Lycaon was said to suffer a similar fate. Pliny, quoting Euanthes, tells us (*Hist. Nat.* viii. 22) that a man of the family of Antaeus was selected by lot and brought to a lake in Arcadia, where he hung his clothing on an ash and swam across. This resulted in his being transformed into a wolf, and he wandered in this shape nine years. Then, if he had attacked no human being, he was at liberty to swim back and resume his former shape. Probably the two stories are identical, though we hear nothing of participation in the Lycaean sacrifice by the descendant of Antaeus. Herodotus (iv. 105) tells us that the Neuri, a tribe of eastern Europe, were annually transformed for a few days, and Virgil (*Ecl.* viii. 98) is familiar with transformation of human beings into wolves.

There are women, so the Armenian belief runs, who in consequence of deadly sins are condemned to pass seven years in the form of a wolf. A spirit comes to such a woman and brings her a wolf's skin. He orders her to put it on, and no sooner has she done this than the most frightful wolfish cravings make their appearance and soon get the upper hand. Her better nature conquered, she makes a meal of her own children, one by one, then of her relatives' children according to the degree of relationship, and finally the children of strangers begin to fall a prey to her. She wanders forth only at night, and doors and locks spring open at her approach. When morning draws near she returns to human form and removes her wolf skin. In these cases the transformation was involuntary or virtually so. But side by side with this belief in involuntary metamorphosis, we find the belief that human beings can change themselves into animals at will and then resume their own form.

The expedients supposed to be adopted for effecting change of shape may here be noticed. One of the simplest apparently was the removal of clothing, and in particular of a girdle of human skin, or the putting on of such a girdle—more commonly the putting on of a girdle of the skin of the animal whose form was to be assumed. This last device is doubtless a substitute for the assumption of an entire animal skin, which also is frequently found. In other cases the body is rubbed with a magic salve. To drink water out of the footprint of the animal in question, to partake of its brains, to drink of certain enchanted streams, were also considered effectual modes of accomplishing metamorphosis. Olaus Magnus says that the Livonian werwolves were initiated by draining a cup of beer specially prepared, and repeating a set formula. Ralston in his *Songs of the Russian People* gives the form of incantation still familiar in Russia. Various expedients also existed for removing the beast-shape. The simplest was the act of the enchanter (operating either on himself or on a victim); another was the removal of the animal girdle. To kneel in one spot for a hundred years, to be reproached with being a werwolf, to be saluted with the sign of the cross, or addressed thrice by baptismal name, to be struck three blows on the forehead with a knife, or to have at least three drops of blood drawn were also effectual cures. In other cases the transformation was supposed to be accomplished by Satanic agency voluntarily submitted to, and that for the most loathsome ends, in particular for the gratification of a craving for human flesh. "The werwolves," writes Richard Verstegan (*Restitution of Decayed Intelligence*, 1628), "are certayne sorcerers, who having annoynted their bodies with an oyntment which they make by the instinct of the devill, and putting on a certayne inchaunted girdle, doe not onely unto the view of others seeme as wolves, but to their owne thinking have both the shape and nature of wolves, so long as they weare the said girdle. And they do dispose themselves as very wolves, in wourrying and killing, and most of humane creatures." Such were the views about lycanthropy current throughout the continent of Europe when Verstegan wrote. France in particular seems to have been

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Wesley of Ireland wished to adopt his young kinsman, but
his offer was declined and the estates were left to Richard
ley on condition that he assumed the name Wesley. The
of Wellington was Colley's grandson, and appears in the
t for 1800 as the Hon. Arthur Wesley. Charles Wesley
to Christ Church in 1726. John had become fellow
e previous March. Charles lost his first twelve
d in "diversions," but whilst John was acting
ate, his brother "awoke out of his lethargy."
three other students to go with him to the
is led a young gentleman of Christ Church
new set of Methodists sprung up."
hrough the university and Oxford
In 1735 Charles Wesley was
her to Georgia as secretary to
horpe, the Governor. The
enduring many hardships
England on July the
February 1738 John
his state of health
After his evan-
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[illegible]
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was at its heig[illegible]
at Bordeaux, in [illegible]
an insane delusion [illegible]
ceased to be regarded [illegible]
his pre-Christianic po[illegible]
as which he still survives [illegible]
Prussia, Livonia and Lithua[illegible]
Magnus and Majolus, the werw[illegible]
far more destructive than "true [illegible]
heterodoxy appears from the [illegible]
accursed college" of those "desirous of [illegible]
the divine law." In England, however, [illegible]
of the 17th century the punishment of [illegible]
zealously prosecuted by James I., the wit[illegible]
extinct that that pious monarch was himself [illegible]
lib. iii.) to regard "warwoolfes" as victims of [illegible]
by "a naturall superabundance of melancholie." [illegible]
creatures, such as the cat, the hare and the weasel, [illegible]
the malignant sorcerer to transform himself into; [illegible]
firmly believed to avail himself of these agencies. [illegible]
witch-animals still survives among the uneducated classes [illegible]
parts of the United Kingdom.

The werwolves of the Christian dispensation were not, however, all heretics, all viciously disposed towards mankind. "According to Baronius, in the year 617, a number of wolves presented themselves at a monastery, and tore in pieces several friars who entertained heretical opinions. The wolves sent by God tore the sacrilegious thieves of the army of Francesco Maria, duke of Urbino, who had come to sack the treasure of the holy house of Loreto. A wolf guarded and defended from the wild beasts the head of St Edmund the martyr, king of England. St Oddo, abbot of Cluny, assailed in a pilgrimage by foxes, was delivered and escorted by a wolf" (A. de Gubernatis, *Zoological Mythology*, 1872, vol. ii. p. 145). Many of the werwolves were most innocent and God-fearing persons, who suffered through the witchcraft of others, or simply from an unhappy fate, and who as wolves behaved in a truly touching fashion, fawning upon and protecting their benefactors. Of this sort were the "Bisclaveret" in Marie de France's poem (*c.* 1200), the hero of "William and the Were-wolf" (translated from French into English about 1350), and the numerous princes and princesses, knights and ladies, who appear temporarily in beast form in the *Märchen* of the Aryan nations generally. Nay, the power of transforming others into wild beasts was attributed not only to malignant sorcerers, but also to Christian saints. "Omnes angeli, boni et mali, ex virtute naturali habent potestatem transmutandi corpora nostra," was the dictum of St Thomas Aquinas. St Patrick transformed Vereticus, king of Wales, into a wolf; and St Natalis cursed an illustrious Irish family, with the result that each member of it was doomed to be a wolf for seven years. In other tales the divine agency is still more direct, while in Russia, again, men are supposed to become werwolves through incurring the wrath of the devil.

Literature.—In the numerous medieval works directed to the study of sorcery and witchcraft, the contemporaneous phases of lycanthropy occupy a prominent place. In addition to the authors who have been already mentioned, the following may be named as giving special attention to this subject: Wier, *De praestigiis daemonum* (Amsterdam, 1563); Bodin, *Démonomanie des sorciers* (Paris, 1580); Boguet, *Discours des sorciers* (Lyons, 2nd ed. 1608);

Lancre, *Tableau de l'inconstance de mauvais anges* (Paris, 1613); Psellus, *De operatione daemonum* (Paris, 1615); see also Glanvil, *Sadducismus triumphatus*, for the English equivalents of lycanthropy. Treatises solely confined to lycanthropy are rare both in medieval and in modern times; but a few are well known, as, for instance, those of Bourquelot and Nynauld, *De la lycanthropie* (Paris, 1615). See also Leubuscher, *Über die Wehrwölfe* (1850); Grimm, *Deutsche Mythologie*, 4, ii. and iii.; Hertz, *Der Werwolf* (Stuttgart, 1862); Baring Gould, *The Book of Were-wolves* (London, 1865). Also the bibliography to LYCANTHROPY, and Andree, *Ethnographische Parallelen*, 1st series, 62–80; Tylor, *Primitive Culture*, i.; P. Sebillot, *Traditions de la Haute-Bretagne*, i. 289.

(N. W. T.; J. F. M'L.)

WESEL, JOHANN RUCHRAT VON (d. 1481), German theologian, was born at Oberwesel early in the 15th century. He appears to have been one of the leaders of the humanist movement in Germany, and to have had some intercourse and sympathy with the leaders of the Hussites in Bohemia. Erfurt was in his day the headquarters of a humanism which was both devout and opposed to the realist metaphysic and the Thomist theology which prevailed in the universities of Cologne and Heidelberg. Wesel was one of the professors at Erfurt between 1445 and 1456, and was vice-rector in 1458. In 1460 he was appointed preacher at Mainz, in 1462 at Worms, and in 1479, when an old and worn-out man, he was brought before the Dominican inquisitor Gerhard Elten of Cologne. The charges brought against him took a theological turn, though they were probably prompted by dislike of his philosophical views. They were chiefly based on a treatise, *De indulgentiis*, which he had composed while at Erfurt twenty-five years before. He had also written *De potestate ecclesiastica*. He died under sentence of imprisonment for life in the Augustinian convent in Mainz in 1481.

It is somewhat difficult to determine the exact theological position of Wesel. Ullmann claims him as a "reformer before the Reformation," but, while he mastered the formal principle of Protestantism, that scripture is the sole rule of faith, it is more than doubtful that he had that experimental view of the doctrines of grace which lay at the basis of Reformation theology. He held that Christ is men's righteousness in so far as they are guided by the Holy Ghost, and the love towards God is shed abroad in their hearts, which clearly shows that he held the medieval idea that justification is an habitual grace implanted in men by the gracious act of God. He seems, however, to have protested against certain medieval ecclesiastical ideas which he held to be excrescences erroneously grafted on Christian faith and practice. He objected to the whole system of indulgences; he denied the infallibility of the church, on the ground that the church contains within it sinners as well as saints; he insisted that papal authority could be upheld only when the pope remained true to the evangel; and he held that a sharp distinction ought to be drawn between ecclesiastical sentences and punishments, and the judgments of God.

The best account of Wesel is to be found in K. Ullmann's *Reformers before the Reformation*. His tract on *Indulgences* is published in Walch's *Monumenta Medii Aevi*, vol. i., while a report of his trial is given in Ortuin Gratius's *Fasciculus rerum expetendarum et fugiendarum* (ed. by Browne, London, 1690), and d'Argentré's *Collectio judiciorum de novis erroribus* (Paris, 1728). See also Otto Clemen's art. in Herzog-Hauck's *Realencyklopädie für prot. Theologie und Kirche* (3rd ed., Leipzig, 1908), xxi. 127.

WESEL, a fortress town of Germany, in the Prussian province of Westphalia at the confluence of the Rhine and the Lippe, 46 m. S.W. of Münster and 35 m. N.W. of Duisburg. Pop. (1905) 23,237 (43% Protestants), including a considerable garrison. There is a junction of five railway lines, and the Rhine is crossed by a large railway bridge and by a bridge of boats. The inner line of fortifications was razed in 1890, and the defensive works now consist only of the citadel and three detached forts, one of which, Fort Blücher, serves as a *tête-de-pont* on the left bank of the Rhine. Wesel contains some quaint old houses, and a town hall, dating from 1396, with an elaborate façade, and containing a valuable collection of old silver plate. The large Protestant church of St Willibrord has a choir, built 1424–1526, which is one of the noblest Gothic structures on the Lower Rhine, and a modern nave (1882–96). The Mathena church dates from 1429–1477. The two Roman Catholic churches, the castle, now the commandant's house (built in 1417), the Berliner Tor—Berlin gate—(built in 1722 and recently restored), the Lower-Rhenish museum of antiquities and the modern gymnasium and military hospital, are among the other chief buildings. Wesel carries on a considerable trade in grain, timber, colonial goods, tobacco, &c., facilitated by new harbour accommodation and wharves at the mouth of the Lippe. It has manufactures of wire, leaden pipes and other metal goods, cement, sugar, &c.

Wesel, formerly known as Lippemünde, was one of the points from which Charlemagne directed his operations against the heathen Saxons. Incorporated in 1241, it became a flourishing commercial town, and though repeatedly subject to the counts of Cleves, was a member of the Hanseatic League, and as late as 1521 a free imperial city. It was occupied by the Spaniards in 1614, by the Dutch in 1629, by the French in 1672, also during the Seven Years' War, and in 1805, and was ceded to Prussia in 1814. A monument outside the town commemorates eleven of Ferdinand von Schill's officers who were shot here on the 16th of September 1809 after their unsuccessful attempt at Stralsund. Wesel is occasionally spoken of as Unterwesel, to distinguish it from Oberwesel, a small town on the Rhine, above St Goar.

See Gantesweiler, *Chronik der Stadt Wesel* (Wesel, 1881), and Reinhold, *Verfassungsgeschichte Wesels* (Breslau, 1888).

WESER (O. Ger. *Visuracha*, *Wisura*, Lat. *Visurgis*), one of the chief rivers of Germany, formed by the union of the Werra and the Fulda at Münden, in the Prussian province of Hanover, flowing generally north and entering the North Sea below Bremerhaven, between Jade Bay and the estuary of the Elbe. The mouth is 170 m. from Münden, but the winding course of the river is 270 m. long; if the measurement be made from the source of the Werra, in the Thüringer Wald, the total length of the stream is 440 m. At Münden the river surface is 380 ft. above sea-level; the most rapid fall in its course is between Karlshafen and Minden in Westphalia. Nearly the entire course of the Weser lies in Prussia, but it also touches part of Brunswick and Lippe, and after flowing through Bremen expands into an estuary separating the duchy of Oldenburg from the Prussian province of Hanover. Between Münden and Minden its course lies through a picturesque valley flanked by irregular and disjointed ranges of hills (Reinhardswald, Sollinger Wald, Weser Hills, &c.); but after it emerges from these mountains by the narrow pass called the "Porta Westfalica," near Minden, its banks become flat and uninteresting. The breadth of the river varies from 110 yds. at Münden to 220 yds. at Minden, 250 yds. at Bremen, 1¼ m. at Elsfleth and 7½ m. at its entrance into the sea.

The Weser on the whole is shallow, and navigation above Bremen is sometimes interrupted by drought. Until 1894 the fairway up to Bremen had a minimum depth of little over 8 ft.; thereafter important works were undertaken, the minimum depth was made 18 ft., and the importance of Bremen as a port was greatly enhanced. Boats of 350 tons can ascend generally as far as Münden. A system of waterways (the Geeste and Hadelner canals, meeting one another at Bederkesa) connects the estuary of the Weser with that of the Elbe; a canal between the Hunte and the Leda gives connexion with the Ems. On the upper Weser (above Bremen) the navigation, which is interrupted by occasional rapids, is assisted by locks and weirs. The principal tributaries on the right are the Aller, Wümme, Drepte, Lune and Geeste, and on the left the Diemel, Nethe, Emmer, Werra, Aue and Hunte. The Werra and Fulda are both navigable when they unite to form the Weser, the Fulda being canalized between Cassel and the town of Fulda for a distance of 17¼ m.; the Aller, Wümme, Geeste and Hunte are also navigable. Below the junction of the Hunte the Weser, hitherto a single stream, is divided into several channels by islands. The Weser drains a basin estimated at 18,530 sq. m.

The navigation of the Weser was long hampered by the various and vexatious claims and rights of the different states through whose territories it ran. Before 1866 the joint stream, including the Werra and the Fulda, changed its ruler no less than thirty-five times on its way to the sea. In 1823, however, a treaty was made establishing a fixed toll and a uniform system of management; this was further improved in 1856 and 1865; and when Prussia took possession of Hanover and Hesse-Nassau in 1866 the chief difficulties in the way of organizing the river-trade disappeared. The principal town on the Weser is Bremen. Other towns past which it flows between Münden and the sea are Karlshafen, Höxter, Holzminden, Bodenwerder, Hameln, Rinteln, Vlotho, Minden, Stolzenau, Nienburg, Vegesack, Elsfleth, Brake, Geestemünde and Bremerhaven. The Weser gave name to a department in the short-lived kingdom of Westphalia: the chief town was Osnabrück.

WESLEY (FAMILY). The Wesley family sprang from Welswe, near Wells in Somerset. Their pedigree has been traced back to Guy, whom Athelstan made a thane about 938. One branch of the family settled in Ireland. Sir Herbert Westley of Westleigh, Devon, married Elizabeth Wellesley of Dangan in Ireland. Their third son, Bartholomew, studied both medicine and theology at Oxford, and, in 1619, married the daughter of Sir Henry Colley of Kildare. In 1660 he held the rectories of Catherston and Charmouth in Dorset valued at £35, 10s. per annum. He was ejected in 1662 and gained his living as a doctor. He was buried at Lyme Regis on February 15th, 1670.

His son, John Westley, grandfather of the founder of Methodism, was born in 1636 and studied at New Inn Hall, Oxford, where he became proficient in Oriental languages and won the special regard of John Owen, then vice-chancellor. Cromwell's Triers approved him as minister of Winterborn-Whitchurch, Dorset, in 1658. The following year he married the daughter of John White, the patriarch of Dorchester. In 1661 he was committed to prison for refusing to use the Book of Common Prayer. His candour and zeal made a deep impression on Gilbert Ironside the elder, Bishop of Bristol, with whom he had an interview. He was ejected in 1662 and became a Nonconformist pastor at Poole. He died in 1678; his widow survived him for 32 years. One of his sons, Matthew, became a surgeon in London, where he died in 1737.

Another son, Samuel, was trained in London for the Nonconformist ministry, but changed his views, and, in August 1683, entered Exeter College, Oxford, as a sizar. He dropped the "t" in his name and returned to what he said was the original spelling, Wesley. In 1689 he was ordained and married Susanna, youngest daughter of Dr Samuel Annesley, vicar of St Giles, Cripplegate, and nephew of the 1st earl of Anglesea. Annesley gave up his living in 1662 and formed a congregation in Little St Helen's, Bishopsgate, where he was honoured as the St Paul of the Nonconformists. Samuel Wesley was appointed rector of South Ormsby in 1691, and moved to Epworth in 1697. He had nineteen children, of whom eight died in infancy. His lawless parishioners could not endure his faithful preaching, and in 1705 he was confined in Lincoln Castle for a small debt. Two-thirds of his parsonage was destroyed by fire in 1702 and in 1709 it was burnt to the ground. He managed to rebuild the rectory, but his resources were so heavily strained that thirteen years later it was only half furnished. Samuel Wesley was a busy author. At Oxford in 1685 he wrote a volume of poems bearing the strange title *Maggots*. He wrote a *Life of Christ* in verse (1693), *The History of the Old and New Testament in Verse* (1701?), a noble *Letter to a Curate*, full of strong sense and ripe experience, and *Dissertations on the Book of Job* (1735). He died at Epworth in 1735. Susanna Wesley died at the Foundery, London, in 1742 and was buried in Bunhill Fields.

Their eldest son, Samuel Wesley (1690–1739), was born in London, entered Westminster School in 1704, became a Queen's scholar in 1707 and in 1711 went up to Christ Church, Oxford. He returned to Westminster as head usher, took orders and enjoyed the intimate friendship of Bishop Atterbury, Harley earl of Oxford, Addison, Swift and Prior. He became headmaster of Blundell's School at Tiverton in 1732 and died there on the 6th of November 1739. He was a finished, classical scholar, a poet and a devout man, but he was never reconciled to the Methodism of his brothers. His poems, published in 1736, reached a second edition in 1743, and were reprinted with new poems, notes and a *Life* by W. Nichols, in 1862.

Charles Wesley (1707–1788) was the eighteenth child of the Rector of Epworth, and was saved from the fire of 1709 by his nurse. He entered Westminster School in 1716, became a King's Scholar and was captain of the school in 1725. He was a plucky boy, and won the life-long friendship of the future earl of Mansfield by fighting battles on his behalf. Garret Wesley of Ireland wished to adopt his young kinsman, but this offer was declined and the estates were left to Richard Colley on condition that he assumed the name Wesley. The duke of Wellington was Colley's grandson, and appears in the Army List for 1800 as the Hon. Arthur Wesley. Charles Wesley was elected to Christ Church in 1726. John had become fellow of Lincoln the previous March. Charles lost his first twelve months at Oxford in "diversions," but whilst John was acting as their father's curate, his brother "awoke out of his lethargy." He persuaded two or three other students to go with him to the weekly sacrament. This led a young gentleman of Christ Church to exclaim: "Here is a new set of Methodists sprung up." The name quickly spread through the university and Oxford Methodism began its course. In 1735 Charles Wesley was ordained and went with his brother to Georgia as secretary to Colonel, afterwards General, Oglethorpe, the Governor. The work proved uncongenial, and after enduring many hardships his health failed and he left Frederica for England on July the 26th, 1736. He hoped to return, but in February 1738 John Wesley came home, and Charles found that his state of health made it necessary to resign his secretaryship. After his evangelical conversion on Whit Sunday (May 21st, 1738), he became the poet of the Evangelical Revival. He wrote about 6500 hymns. They vary greatly in merit, but Canon Overton held him, taking quantity and quality into consideration, to be "the great hymn-writer of all ages." Their early volumes of poetry bear the names of both brothers, but it is generally assumed that the original hymns were by Charles and the translations by John Wesley. Poetry was like another sense to Charles, and he was busy writing verse from his conversion up to his death-bed when he dictated to his wife his last lines, "In age and feebleness extreme." For some years he took a full share in the hardships and perils of the Methodist itinerancy, and was often a remarkably powerful preacher. After his marriage in 1749 his work was chiefly confined to Bristol, where he then lived, and London. He moved to London in 1771 and died in Marylebone on March the 29th, 1788. He was strongly opposed to his brother's ordinations, and refused to be buried at City Road, because the ground there was unconsecrated. He was buried in the graveyard of Marylebone Old Church, but this appears to have been unconsecrated also.

Charles Wesley married Sarah Gwynne, daughter of a Welsh magistrate living at Garth, on April 8th, 1749. She died in 1822 at the age of ninety-six. Five of their children died as infants and are buried in St James's Churchyard, Bristol. Their surviving daughter Sarah, who was engaged in literary work, died unmarried in 1828. Charles Wesley, Junr. (1759–1834) was organist of St George's, Hanover Square. He published *Six Concertos for the Organ and Harp* in 1778. He also died unmarried. Samuel, the younger brother (1766–1837), was even more gifted than Charles as an organist and composer; he was also a lecturer on musical subjects. Two of his sons were Dr Wesley, sub-dean of the Chapel Royal, and Dr Samuel Sebastian Wesley (1810–1876), the famous composer and organist of Gloucester Cathedral.

Bibliography.—A volume of Charles Wesley's sermons with memoir appeared in 1816. Lives by Thomas Jackson (1841) and John Telford (1886). Journal and Letters with Notes by Thomas Jackson (1849); *The Early Journal* (1736–1739) with additional matter (1910); *Poetical works of John and Charles Wesley* (13 vols., 1868); *Methodist Hymn Book Illustrated* by J. Telford (1906); Adam Clarke's *Memoirs of the Wesley Family* (1822); Dove's *Biographical History of the Wesley Family* (1832); G. J. Stevenson, *Memorials of the Wesley Family* (1876); Tyerman's *Life and Times of Samuel Wesley, M.A.* (1866). (J. T*.)

WESLEY, JOHN (1703–1791), English divine, was born at Epworth Rectory on the 17th of June (O.S.) 1703. He was the fifteenth child of Samuel and Susanna Wesley (see Wesley Family). His mother's training laid the foundation of his character, and under her instruction the children made remarkable progress. On February 9, 1709, the rectory was burnt down, and the children had a narrow escape. On the duke of Buckingham's nomination, Wesley was for six years a pupil at Charterhouse. In June 1720 he went up to Christ Church.

Oxford, with an annual allowance of £40 as a Charterhouse scholar. His health was poor and he found it hard to keep out of debt, but he made good use of his opportunities. A scheme of study which he drew up for 1722 with a time-table for each day of the week is still to be seen in his earliest diary, which became the property of Mr George Stampe of Great Grimsby. The diary runs from April 5, 1725, to February 19, 1727. A friend describes Wesley at this time as "a young fellow of the finest classical taste, and the most liberal and manly sentiments." He was "gay and sprightly, with a turn for wit and humour."

The standard edition of *Wesley's Journal* (1909) has furnished much new material for this period of Wesley's life, the Rev. N. Curnock having unravelled the difficult cipher and shorthand in which Wesley's early diaries were kept. He reached the conclusion that the religious friend who directed Wesley's attention to the writings of Thomas à Kempis and Jeremy Taylor, in 1725, was Miss Betty Kirkham, whose father was rector of Stanton in Gloucestershire. Up to this time Wesley says he had no notion of inward holiness, but went on "habitually and for the most part very contentedly in some or other known sin, indeed with some intermission and short struggles especially before and after Holy Communion," which he was obliged to attend three times a year. On the 25th of September 1725 he was ordained deacon, and on the 17th of March 1726 was elected fellow of Lincoln. His private diaries, seven of which are in the hands of Mr Russell J. Colman of Norwich, contain monthly reviews of Wesley's reading. It covered a wide range, and he made careful notes and abstracts of it. He generally took breakfast or tea with some congenial friend and delighted to discuss the deepest subjects. At the coffee house he saw the *Spectator* and other periodicals. He loved riding and walking, was an expert swimmer and enjoyed a game at tennis.

He preached frequently in the churches near Oxford in the months succeeding his ordination, and in April 1726 he obtained leave from his college to act as his father's curate. The new material in the *Journal* describes the simple matter of his life. He read plays, attended the village fairs, shot plovers in the fenland, and enjoyed a dance with his sisters. In October he returned to Oxford, where he was appointed Greek lecturer and moderator of the classes. He gained considerable reputation in the disputation for his master's degree in February 1727. He was now free to follow his own course of studies and began to lose his love for company, unless it were with those who were drawn like himself to religion. In August he returned to Lincolnshire, where he assisted his father till November 1729. During those two years he paid three visits to the university. In the summer of 1729 he was up for two months. Almost every evening found him with the little society which had gathered round Charles.

When he came into residence in November he was recognized as the father of the Holy Club. It met at first on Sunday evenings, then every evening was passed in Wesley's room or that of some other member. They read the Greek Testament and the classics; fasted on Wednesday and Friday; received the Lord's Supper every week; and brought all their life under review. In 1730 William Morgan, an Irish student, visited the gaol and reported that there was a great opening for work among the prisoners. The friends agreed to visit the Castle twice a week and to look after the sick in any parish where the clergyman was willing to accept their help. Wesley's spirit at this time is seen from his sermon on "The Circumcision of the Heart," preached before the university on the 1st of January 1733. In 1765 he said it "contains all that I now teach concerning salvation from all sin, and loving God with an undivided heart." Wesley rose at four, lived on £28 a year and gave away the remainder of his income. He already displayed those gifts for leadership which were to find so conspicuous a field in the evangelical revival. John Gambold, a member of the Holy Club, who afterwards became a Moravian bishop, says "he was blest with such activity as to be always gaining ground, and such steadiness that he lost none. What proposals he made to any were sure to charm them, because they saw him always the same." He wore an air of authority yet never lacked address, or "assumed anything to himself above his contemporaries." William Law's books produced a great impression on Wesley, and on his advice the young tutor began to read mystic authors, but he saw that their tendency was to make good works appear mean and insipid, and he soon laid them aside.

Wesley had not yet found the key to the heart and conscience of his hearers. He says, "From the year 1725 to 1729, I preached much, but saw no fruit to my labour. Indeed it could not be that I should; for I neither laid the foundation of repentance nor of preaching the Gospel, taking it for granted that all to whom I preached were believers, and that many of them needed no repentance. From the year 1729 to 1734, laying a deeper foundation of repentance, I saw a little fruit. But it was only a little; and no wonder: for I did not preach faith in the blood of the covenant. From 1734 to 1738, speaking more of faith in Christ, I saw more fruit of my preaching." Looking back on these days in 1777, Wesley felt "the Methodists at Oxford were all one body, and, as it were, one soul; zealous for the religion of the Bible, of the Primitive Church, and, in consequence, of the Church of England; as they believed it to come nearer the scriptural and primitive plan than any other national church upon earth." The number of Oxford Methodists was small and probably never exceeding twenty-five. John Clayton, afterwards chaplain of the Collegiate Church of Manchester, who remained a strong High Churchman; James Hervey, author of *Meditations among the Tombs*, and *Theron and Aspasio*; Benjamin Ingham, who became the Yorkshire evangelist; and Thomas Broughton, afterwards secretary of the S.P.C.K., were members of the Holy Club, and George Whitefield joined it on the eve of the Wesleys' departure for Georgia.

Wesley's father died on April 25, 1735, and in the following October John and Charles took ship for Georgia, with Benjamin Ingham and Charles Delamotte. John was sent out by the Society for the Propagation of the Gospel, and hoped to labour as a missionary among the Indians, but though he had many interesting conversations with them the mission was found to be impracticable. The cabin of the "Simmonds" became a study for the four Methodists. The calm confidence of their Moravian fellow-passengers amid the Atlantic storms convinced Wesley that he did not possess the faith which casts out fear. Closer acquaintance with these German friends in Savannah deepened the impression. Wesley needed help, for he was beset by difficulties. Mrs Hawkins and Mrs Welch poisoned the mind of Colonel Oglethorpe against the brothers for a time. Wesley's attachment to Miss Hopkey also led to much pain and disappointment. All this is now seen more clearly in the standard edition of the *Journal*. Wesley was a stiff High Churchman, who scrupulously followed every detail of the rubrics. He insisted on baptizing children by trine immersion, and refused the Communion to a pious German because he had not been baptized by a minister who had been episcopally ordained. At the same time he was accused of "introducing into the church and service at the altar compositions of psalms and hymns not inspected or authorized by any proper judicature." The list of grievances presented by Wesley's enemies to the Grand Jury at Savannah gives abundant evidence of his unwearying labours for his flock. The foundation of his future work as the father of Methodist hymnody was laid in Georgia. His first *Collection of Psalms and Hymns* (Charlestown, 1737) contains five of his incomparable translations from the German, and on his return to England he published another *Collection* in 1738, with five more translations from the German and one from the Spanish. In April 1736 Wesley formed a little society of thirty or forty of the serious members of his congregation. He calls this the second rise of Methodism, the first being at Oxford in November 1729. The company in Savannah met every Wednesday evening "in order to a free conversation, begun and ended with singing and prayer." A select company of these met at the parsonage on Sunday afternoons. In 1781 he writes, "I cannot but observe that these were the first rudiments of the Methodist societies."

In the presence of such facts we can understand the significance of the mission to Georgia. Wesley put down many severe things against himself on the return voyage, and he saw afterwards that even then he had the faith of a servant though not that of a son. In London he met Peter Böhler who had been ordained by Zinzendorf for work in Carolina. By Böhler Wesley was convinced that he lacked "that faith whereby alone we are saved." On Wednesday, May 24, 1738, he went to a society meeting in Aldersgate Street where Luther's *Preface to the Epistle to the Romans* was being read. "About a quarter before nine, while he was describing the change which God works in the heart through faith in Christ, I felt my heart strangely warmed. I felt I did trust in Christ, Christ alone, for salvation; and an assurance was given me that he had taken away *my* sins, even *mine*, and saved *me* from the law of sin and death." Mr Lecky points out the significance of that event. "It is scarcely an exaggeration to say that the scene which took place at that humble meeting in Aldersgate Street forms an epoch in English history. The conviction which then flashed upon one of the most powerful and most active intellects in England is the true source of English Methodism" (*History of England in Eighteenth Century*, ii. 558).

Wesley spent some time during the summer of 1738 in visiting the Moravian settlement at Herrnhuth and returned to London on September 16, 1738, with his faith greatly strengthened. He preached in all the churches that were open to him, spoke in many religious societies, visited Newgate and the Oxford prisons. On New Year's Day, 1739, the Wesleys, Whitefield and other friends had a Love Feast at Fetter Lane. In February Whitefield went to Bristol, where his popularity was unbounded. When the churches were closed against him he spoke to the Kingswood colliers in the open air; and after six memorable weeks wrote urging Wesley to come and take up the work. Wesley was in his friend's congregation on April 1, but says, "I could scarcely reconcile myself to this strange way of preaching in the fields . . . having been all my life (till very lately) so tenacious of every point relating to decency and order, that I should have thought the saving of souls almost a sin, if it had not been done in a church." Next day Wesley followed Whitefield's example. His fears and prejudices melted away as he discerned that this was the very method needed for reaching the multitudes living in almost heathen darkness. He already had the means of shepherding those who were impressed by the preaching. On the 1st of May 1738 he wrote in his journal: "This evening our little society began, which afterwards met in Fetter Lane." Among its "fundamental rules" we find a provision for dividing the society into bands of five or ten persons who spoke freely and plainly to each other as to the "real state" of their hearts. The bands united in a conference every Wednesday evening. The society first met at James Hutton's shop, "The Bible and Sun," Wild Street, west of Temple Bar. About the 25th of September it moved to Fetter Lane. Wesley describes this as the third beginning of Methodism. After the field preaching began converts multiplied. They found all the world against them, and Wesley advised them to strengthen one another and talk together as often as they could. When he tried to visit them at their homes he found the task beyond him, and therefore invited them to meet him on Thursday evenings. This meeting was held in the end of 1739 at the Foundery in Moorfields which Wesley had just secured as a preaching place. Grave disorders had arisen in the society at Fetter Lane, and on the 25th of July 1740 Wesley withdrew from it. About 25 men and 48 women also left and cast in their lot with the society at the Foundery. The centenary of Methodism was kept in 1839, a hundred years after the society first met at the Foundery.

Wesley's headquarters at Bristol were in the Horse Fair, where a room was built in May 1739 for two religious societies which had been accustomed to meet in Nicholas Street and Baldwin Street. To meet the cost of this Captain Fox suggested that each member should give a penny per week. When it was urged that some were too poor to do this, he replied, "Then put eleven of the poorest with me; and if they can give anything, well: I will call on them weekly, and if they can give nothing I will give for them as well as for myself." Others followed his example and were called leaders, a name given as early as the 5th of November 1738 to those who had charge of the bands in London. Wesley saw that here was the very means he needed to watch over his flock. The leaders thus became a body of lay pastors. Those under their care formed a class. It proved more convenient to meet together and this gave opportunity for religious conversation and prayer. As the society increased Wesley found it needed "still greater care to separate the precious from the vile." He therefore arranged to meet the classes himself every quarter and gave a ticket "under his own hand" to every one "whose seriousness and good conversation" he found no reason to doubt. The ticket furnished an easy means for guarding the meetings of the society against intrusion. "Bands" were formed for those who wished for closer communion. Love-feasts for fellowship and testimony were also introduced, according to the custom of the primitive church. Watchnights were due to the suggestion of a Kingswood collier in 1740. Wesley issued the rules of the united societies in February 1743. Those who wished to enter the society must have "a desire to flee from the wrath to come, to be saved from their sins." When admitted they were to give evidence of their desire for salvation "by doing no harm; by doing good of every possible sort; by attending upon all the means of grace." It was expected that all who could do so would contribute the penny a week suggested in Bristol, and give a shilling at the renewal of their quarterly ticket. Wesley had at first to take charge of the contributions, but as they grew larger he appointed stewards to receive the money, to pay debts, and to relieve the needy. The memorable arrangement in Bristol was made a few weeks before Wesley's field of labour was extended to the north of England in May 1742. He found Newcastle ripe for his message. English Christianity seemed to have no power to uplift the people. Dram-drinking was spreading like an epidemic. Freethinkers' clubs flourished. "The old religion," Lecky says, "seemed everywhere loosening round the minds of men, and indeed it had often no great influence even on its defenders." Some of the clergy in country parishes were devoted workers, but special zeal was resented or discouraged.

The doctrine of election had led to a separation between Whitefield and the Wesleys in 1741. Wesley believed that the grace of God could transform every life that received it. He preached the doctrine of conscious acceptance with God and daily growth in holiness. Victory over sin was the goal which he set before all his people. He made his appeal to the conscience in the clearest language, with the most cogent argument, and with all the weight of personal conviction. Hearers like John Nelson felt as though every word was aimed at themselves. No preacher of the century had this mastery over his audience. His teaching may be described as Evangelical Arminianism and its standards are his own four volumes of sermons and his *Notes on the New Testament*.

Up till 1742 Wesley's work was chiefly confined to London and Bristol, with the adjacent towns and villages or the places which lay between them. On his way to Newcastle that year Wesley visited Birstal, where John Nelson, the stone-mason, had already been working. On his return he held memorable services in the churchyard at Epworth. Methodism this year spread out from Birstal into the West Riding. Societies were also formed in Somerset, Wilts, Gloucestershire, Leicester, Warwickshire, Nottinghamshire and the south of Yorkshire. In the summer Charles Wesley visited Wednesbury, Leeds and Newcastle. Next year he took Cornwall by storm. The work in London was prospering. In 1743 Wesley secured a west-end centre at West Street, Seven Dials, which for fifty years had a wonderful history. In August 1747 Wesley paid his first visit to Ireland, where he had such success that he gave more than six years of his life to the country and crossed the Irish Channel forty-two times. Ireland has its own conference presided over by a delegate from the British conference. Wesley's first visit to Scotland was in 1751. He paid twenty-two visits, which stirred up all the Scottish churches.

Such extension of his field would have been impossible had not Wesley been helped by a heroic band of preachers. Wesley says: "Joseph Humphreys was the first lay preacher that assisted me in England, in the year 1738." That was probably help in the Fetter Lane Society, for Wesley then had no preaching place of his own. John Cennick, the hymn-writer and schoolmaster at Kingswood, began to preach there in 1739. Thomas Maxwell, who was left to meet and pray with the members at the Foundery during the absence of the Wesleys, began to preach. Wesley hurried to London to check this irregularity, but his mother urged him to hear Maxwell for himself, and he soon saw that such assistance was of the highest value. The autobiographies of these early Methodist preachers are among the classics of the Evangelical Revival. As the work advanced Wesley held a conference at the Foundery in 1744. Besides himself and his brother, four other clergymen were present and four "lay brethren." It was agreed that "lay assistants" were allowable, but only in cases of necessity. This necessity grew more urgent every year as Methodism extended. One of the preachers in each circuit was the "assistant," who had general oversight of the work, the others were "helpers." The conference became an annual gathering of Wesley's preachers. In the early conversations doctrine took a prominent place, but as Methodism spread the oversight of its growing organization occupied more time and more attention. In February 1784 Wesley's deed of declaration gave the conference a legal constitution. He named one hundred preachers who after his death were to meet once a year, fill up vacancies in their number, appoint a president and secretary, station the preachers, admit proper persons into the ministry, and take general oversight of the societies. In October 1768, a Methodist chapel was opened in New York. At the conference of 1769 two preachers, Richard Boardman and Joseph Pilmoor, volunteered to go out to take charge of the work. In 1771, Francis Asbury, the Wesley of America, crossed the Atlantic. Methodism grew rapidly, and it became essential to provide its people with the sacraments. In September 1784 Wesley ordained his clerical helper, Dr Coke, superintendent (or bishop), and instructed him to ordain Asbury as his colleague. Richard Whatcoat and Thomas Vasey were ordained by Wesley, Coke and Creighton to administer the sacraments in America. Wesley had reached the conclusion in 1746 that bishops and presbyters were essentially of one order (see METHODISM, sect. "United States").

He told his brother in 1785: "I firmly believe that I am a scriptural *ἐπίσκοπος* as much as any man in England or in Europe; for the uninterrupted succession I know to be a fable, which no man ever did or can prove." Other ordinations for the administration of the sacraments in Scotland, the colonies and England followed. The interests of his work stood first with Wesley. He did everything that strong words against separation could do to bind his societies to the Church of England; he also did everything that legal documents and ordinations could do to secure the permanence of that great work for which God had raised him up. In the words of Canon Overton and Rev. F. H. Relton (*Hist. of Eng. Ch.* 1714–1800): "It is purely a modern notion that the Wesleyan movement ever was, or ever was intended to be, except by Wesley, a church movement." Despite his strong sayings, it was Wesley who broke the links to the church, for, as Lord Mansfield put it, "ordination is separation."

Wesley's account of his itinerancy is given in his famous *Journal*, of which the first part appeared about 1739. Mr Birrell has called it "the most amazing record of human exertion ever penned by man." It is certainly Wesley's most picturesque biography and the most vivid account of the evangelical revival that we possess. The rapid development of his work made a tremendous strain upon Wesley's powers. He generally travelled about 5000 m. a year and preached fifteen sermons a week. He had constant encounters with the mob, but his tact and courage never failed. His rule was always to look a mob in the face. Many delicious stories are told of his presence of mind and the skilful appeals which he made to the better feeling of the crowd.

Wesley's writings did much to open the eyes of candid men to his motives and his methods. Besides the incomparable *Journal*, his *Appeals to Men of Reason and Religion* also produced an extraordinary effect in allaying prejudice and winning respect. He constantly sought to educate his own people. No man in the 18th century did so much to create a taste for good reading and to supply it with books at the lowest prices. Sir Leslie Stephen pays high praise to Wesley's writings, which went "straight to the mark without one superfluous flourish." As a social reformer Wesley was far in advance of his time. He provided work for the deserving poor, supplied them with clothes and food in seasons of special distress. The profits on his cheap books enabled him to give away as much as £1400 a year. He established a lending stock to help struggling business men and did much to relieve debtors who had been thrown into prison. He opened dispensaries in London and Bristol and was keenly interested in medicine.

Wesley's supreme gift was his genius for organization. He was by no means ignorant of this. "I know this is the peculiar talent which God has given me." Wesley's special power lay in his quickness to avail himself of circumstances and of the suggestions made by those about him. The class-meeting, the love-feast, the watch-night, the covenant service, leaders, stewards, lay preachers, all were the fruit of this readiness to avail himself of suggestions made by men or events. Wesley skilfully wove these into his system, and kept the whole machinery moving harmoniously. He inspired his preachers and his people with his own spirit and made everything subordinate to his overmastering purpose, the spread of scriptural holiness throughout the land.

In 1751 Wesley married Mary Vazeille, a widow, but the union was unfortunate and she finally left him. John Fletcher, the vicar of Madeley, to whom Wesley had turned as a possible successor, died in 1785 He had gone to Wesley's help at West Street after his ordination at Whitehall in 1757 and had been one of his chief allies ever since. He was beloved by all the preachers, and his *Checks to Antinomianism* show that he was a courteous controversialist. Charles Wesley died three years after Fletcher. During the last three years of his life John Wesley reaped the harvest he had sown. Honours were lavished upon him. His people hailed every appearance among them with delight, and his visits to various parts of the country were public holidays. His interest in everything about him continued unabated. He had a wealth of happy stories which made him the most delightful of companions in the homes of his people. Robert Southey never forgot how Wesley kissed his little sister and put his hand on his head and blessed him. Alexander Knox says, "So fine an old man I never saw! The happiness of his mind beamed forth in his countenance. Every look showed how fully he enjoyed 'The gay remembrance of a life well spent.' Wherever Wesley went, he diffused a portion of his own felicity." He preached his last sermon in Mr Belson's house at Leatherhead on Wednesday, the 23rd of February 1791; wrote next day his last letter to Wilberforce, urging him to carry on his crusade against the slave trade; and died in his house at City Road on the 2nd of March 1791, in his eighty-eighth year. He was buried on the 9th of March in the graveyard behind City Road chapel. His long life enabled him to perfect the organization of Methodism and to inspire his preachers and people with his own ideals, while he had conquered opposition by unwearying patience and by close adherence to the principles which he sought to teach.

See also METHODISM, and the articles on the separate Methodist bodies; see also WESLEY FAMILY. (J. T.*)

WESLEY, SAMUEL (1766–1837), English musical composer, son of Charles Wesley (see above), was born at Bristol on the 24th of February 1766, and developed so precocious a talent for music that at three years old he played the organ and at eight composed an oratorio entitled *Ruth*—a fact which is duly chronicled on a curious portrait, painted in 1774, and afterwards engraved, wherein he is represented in the childish costume of the period. Though suffering for many years from an accidental injury to the brain, Wesley was long regarded as the most brilliant organist and the most accomplished extempore fugue-player in England. He may indeed be regarded as the father of modern organ-playing; for he it was who, aided by his friends Benjamin Jacob and C. F. Horn, first introduced the works of Sebastian Bach to English organists, not only by his superb playing, but by editing with Horn, in 1810, the first copy of *Das wohltemperirte Clavier* ever printed in England. Wesley's last performance took place on the 12th of September 1837 at Christ Church, Newgate Street, London, where, after hearing the wonderful performances of Mendelssohn, he was himself induced to play an extempore fugue. He died on the 11th of October 1837, leaving a vast number of MS. and printed compositions.

His brother Charles (1757–1815) was also an accomplished organist, and still more famous was his son, Samuel Sebastian (*q.v.*).

WESLEY, SAMUEL SEBASTIAN (1810–1876), English composer and organist, natural son of Samuel Wesley, the eminent composer, was born in London on the 14th of August 1810. He was one of the Children of the Chapel Royal from 1819, held various unimportant posts as organist from the age of fifteen, and in 1832 was appointed to Hereford Cathedral. His career as a composer began with his splendid anthem, "The Wilderness," which was probably written for the opening of the Hereford organ in that year. In 1834 it fell to him to conduct the Festival of the Three Choirs, and in the following year he resigned Hereford for Exeter Cathedral; and during the next six years his name became gradually more and more widely known. In 1842 Dr Hook, afterwards dean of Chichester, offered him a large salary to become organist of Leeds parish church, and at Leeds much of his finest work as a composer was done. In 1849 he quitted this post for Winchester, in order to secure educational advantages for his sons. He was at Winchester until 1865, when he offered himself as a candidate for Gloucester Cathedral, the last of his many posts. He again conducted the Three Choirs Festivals of 1865, 1868, 1871 and 1874. A civil list pension of £100 a year was conferred on him in 1873; he died at Gloucester on the 19th of April 1876, and was buried at Exeter.

Like his father he was a very eccentric man, but his compositions show powers that are found in very few Englishmen of his date. If the list of his compositions is smaller than that of his father's, it must be remembered that his anthems, in which is contained his best work, are far more important and more extensive than most compositions so called: in many of them the whole anthem is no longer sung, but even the selections from them make up anthems of ordinary length. They are masterly in design, fine in inspiration and expression, and noble in character. His "Blessed be the God and Father," "The Wilderness," already mentioned, "Ascribe unto the Lord," "O Lord, Thou art my God," and many others, are masterpieces in their way, and in all of these, as in the service in E, published with a rather trenchant preface in 1845, there is a happy combination of the modern resources of harmony with the dignified cathedral style, a combination which naturally alarmed the orthodox party of his time.

WESLEYAN METHODIST CHURCH, one of the chief branches of Methodism (*q.v.*). On the day of John Wesley's death the preachers in London sent a brief note to those stationed in the country: "Dear Brother, The melancholy period we have so long dreaded is now arrived. Our aged and honoured Father, Mr Wesley, is no more! He was taken to Paradise this morning, in a glorious manner, after a sickness of five days. We have not time to say more at present relative to his Demise. Only what respects out future Oeconomy. This injunction he laid upon us, and all our Brethren on his death-bed, That we each continue in our respective Station till the time appointed for the next Conference at Manchester. We have, therefore, no doubt but you will, with us, readily comply with his Dying Request. The more so, as this is consonant with the determination of the Conference held at Bristol when he was supposed to be near death there, and confirmed in succeeding Conferences."

In 1790 there were 294 preachers and 71,668 members in Great Britain, 19 missionaries and 5300 members on the mission stations; 198 preachers and 43,265 members in the United States. The 6th of April was kept as a day of fasting and prayer, and the 1st of July was thus set apart in order to seek divine guidance for the approaching conference. The crisis was serious. The large proportion of Wesley's members had been gathered by the labours of himself and his helpers. They had been taught to observe the sacraments and naturally desired that provision should be made for their administration in their own chapels. Some felt that they could not go to the Lord's Table where the clergyman was a worldly man; others went, but with much fear and doubt The Church party was influential and resolute to maintain close relations with the Church of England. Their object was to prevent Methodism becoming independent. There was also a small but determined party that leaned to dissent. The struggle between these conflicting tendencies soon began. On the 30th of March 1791 nine preachers sent out the famous Halifax circular making suggestions as to the choice of president and other matters that must come before the conference. The first signature to this circular was that of William Thompson who was afterwards elected as the first president. On the 4th of May eighteen laymen met at Hull and expressed their conviction that the usefulness of Methodism would be promoted by its continued connexion with the Church of England. They would not consent to the administration of the sacraments by the preachers in Hull, nor to Methodist preaching at the time when services were held in church. A trenchant reply to this circular was prepared by Alexander Kilham (*q.v.*), one of the younger Methodist preachers.

The conference met in Manchester on the 26th of July 1791. A letter from Wesley (dated Chester, April 7, 1785) was read, beseeching the members of the Legal Conference not to use their powers for selfish ends but to be absolutely impartial in stationing the preachers, selecting boys for education at Kingswood School, and disposing of connexional funds. The conference at once resolved that all privileges conferred by Wesley's Poll Deed should be accorded to every preacher in full connexion. To supply the lack of Wesley's supervision the circuits were now grouped together in districts. At first the preachers of the district elected their own chairman, but they were afterwards appointed by the conference. Regulations as to its business were issued in 1812. As to the sacraments and the relations of Methodism to the Church of England the decision was: "We engage to follow strictly the plan which Mr Wesley left us." This was ambiguous and was interpreted variously. Some held that it forbade the administration of the sacraments except where they were already permitted; others maintained that it left Methodism free to follow the leadings of Providence as Wesley had always done. During the year the difficulties of the situation became more apparent. Wesley had given the sacrament to the societies when he visited them and this privilege was greatly missed. The conference of 1792 was so much perplexed that it resorted to the casting of lots. The decision was thus reached that the sacraments should not be administered that year. This was really shelving the question, but it gave time for opinion to ripen, and in 1793 it was resolved by a large majority that "the societies should have the privilege of the Lord's Supper where they unanimously desired it." In 1794, this privilege was definitely granted to ninety-three societies. The feeling in Bristol was very strong. The trustees of Broadmead, who were opposed to the administration of the sacrament by the preachers, forbade Henry Moore to occupy that pulpit. Nearly the whole society thereupon withdrew to Portland Chapel. The conference of 1795 had to deal with this controversy. It prepared a "Plan of Pacification" which was approved by the conference and by an assembly of trustees, and was welcomed by the societies. The Lord's Supper, baptism, the burial of the dead and service in church hours were not to be conducted by the preachers unless a majority of the trustees, stewards and leaders of any chapel approved, and assured the conference that no separation was likely to ensue. The consent of conference had to be given before any change was made.

In 1796, Alexander Kilham, who refused to abstain from agitation for further reform, and accused his brethren of priestcraft, was expelled from their ranks and the New Connexion was formed with 5000 members (see METHODIST NEW CONNEXION). The conference of 1797 set itself to remove any ground for distrust among the societies and to enlist their hearty support in all branches of the work. Annual accounts were to be published of various funds. The Circuit Quarterly Meeting had to approve the arrangements for the support of the preachers. The preachers had long been accustomed to consult the leader's meetings of their societies, but it was now clearly decided that stewards and leaders should be appointed in connexion with the leaders' meeting, and certain rights were granted to that meeting as to the admission and expulsion of members. Local preachers had to be accepted by the local preachers' meeting, and the powers of trustees of chapels were considerably extended. The constitution of Methodism thus practically took the shape which it retained till the admission of lay representatives to conference in 1878. No period in the history of Methodism was more critical than this, and in none was the prudence and good sense of its leaders more conspicuous. Advance was quietly made along the lines now laid down. The preachers had agreed in 1793 that all distinction between those whom Wesley had ordained and their brethren should cease. In the minutes of conference for 1818 "Rev." appears before the names of preachers who were members of the Missionary Committee. Jabez Bunting (*q.v.*), who had become the acknowledged leader of the conference, wished to have its young ministers set apart by the imposition of hands, but this scriptural custom was not introduced till 1836.

Meanwhile, Methodism was growing into a great missionary church. Its work in the West Indies was firmly established in Wesley's lifetime. In 1786 eleven hundred negroes were members of the society in Antigua. The burden of superintending these missions and providing funds for their support rested on Dr Coke, who took his place as the missionary bishop of Methodism. In 1813 he prevailed on the conference to sanction a mission to Ceylon. He sailed with six missionaries on the 30th of December, but died in the following May in the Indian Ocean. To meet these new responsibilities a branch Missionary Society had been formed in Leeds in October 1813, and others soon sprang up in various parts of the country. The Centenary of the Missionary Society falls in 1913, but Methodist Missions really date from 1786 when Dr Coke landed at Antigua. The area of operations gradually extended. Missions were begun in Madras, at the Cape of Good Hope, in Australia, and on the west coast of Africa. Two missionaries were sent to the Friendly Islands in 1826, and in 1835 a mission was undertaken among the cannibals of Fiji, which spread and deepened till the whole group of islands was transformed. The work in China began in 1851; the Burma mission was established in 1887. The rapid progress of the Transvaal and Swaziland missions has been almost embarrassing. The Missionary Jubilee in 1863–1868 yielded £179,000 for the work abroad. As the growth of the missions permitted conferences have been formed in various countries. Upper Canada had its conference in 1834, France in 1852, Australia in 1855, South Africa in 1882. The missionary revival which marked the Nottingham Conference of 1906 quickened the interest at home and abroad and the *Foreign Field* (monthly) is prominent among missionary periodicals. The Women's Auxiliary, founded in 1858, kept its jubilee in 1908. It supports schools and medical missions, homes and orphanages. In 1828 the erection of an organ in Brunswick Chapel, Leeds, led to a violent agitation and a small body of "Protestant Methodists" was formed. A more formidable division was led by Dr Warren, a preacher of ability and influence, who was disappointed because no place was found for him in the newly-formed Theological Institution. He tried to awaken general opposition to the Institution scheme, and being suspended from his office as superintendent by a special district meeting, appealed to the law courts, which sustained the action of the district meeting. He was expelled from the conference and joined the Wesleyan Methodist Association in 1836, but shortly afterwards became a clergyman in Manchester. In his first conference in 1744 Wesley asked, "Can we have a seminary for labourers?" The answer was: "If God spare us to another Conference." Next year the subject was broached with the reply: "Not till God give us a proper tutor." The idea was not realized in his lifetime, but Wesley did everything in his power to train his preachers. He gathered them together and read with them as he had done with his pupils at Oxford; he urged them to spend at least five hours a day in reading the best books. He made this challenge, "I will give each of you, as fast as you will read them, books to the value of £5." In 1834 Hoxton Academy was taken as a training place for ministers; and in 1839 the students moved to Abney House, Stoke Newington. Didsbury College was opened in 1842, Richmond in 1843. Headingley was added in 1868, Handsworth in 1881.

The Centenary of Methodism was celebrated in 1839 and £221,939 was raised as a thank-offering: £71,609 was devoted to the colleges at D[illegible]ed; £70,000 was given to the missionary [illegible] on the site and building of a mission-[illegible] £38,000 was set apart for the removal [illegible]

[illegible] as one of the great moral and [illegible] progress was rapid, but in 1849 [illegible] was much jealousy of Dr Bunting, the master mind of Methodism, to whose foresight and wisdom large part of its success was due. *Fly-sheets* were issued attacking him and other eminent ministers. James Everett, Samuel Dunn and William Griffith were expelled from the ministry, and an agitation began which robbed Wesleyan Methodism of 100,000 members. Those who now left the Connexion joined the reformers of 1828 and 1836 and formed the Methodist Free Churches. In 1852 the constitution of the Quarterly Meeting was clearly defined, and the June Quarterly Meeting obtained the right to approach conference with memorials. Various other provisions were made which increased confidence. It was not till 1856 that the Connexion began to recover from the loss caused by this agitation.

Methodism began its work for popular education in a very modest way. In 1837 it had nine infant schools and twenty-two schools for elder children. A grant of £5000 was made from the Centenary Fund for the provision of Wesleyan day-schools. The conference of 1843 directed that greater attention must be given to this department, and a committee met in the following October which resolved that 700 schools should be established if possible within the next seven years, and an Education Fund raised of £5000 a year. In 1849 the Normal Training College for the education of day-school teachers was opened in Westminster, and in 1872 a second college was opened in Battersea for school-mistresses. Westminster provides for 120 and Southlands for 110 students. They supply teachers not only for Wesleyan, but for council schools all over the country, and no colleges have a higher reputation. Besides its day-schools, Methodism possesses the Leys School at Cambridge, Rydal Mount at Colwyn Bay and prosperous boarding-schools for boys and girls in many parts of the country.

Methodism has from the beginning done much work in the army. Dr William Harris Rule (1802–1890), who was appointed chaplain at Gibraltar in 1832, won for it fuller recognition from the authorities. Charles H. Kelly, his colleague at Aldershot, and R. W. Allen had a large share in the struggle by which Methodist work both in the army and the navy was developed. Capitation grants have made it possible to organize the work at every station at home and abroad. No homes for soldiers and sailors are more efficient or better liked by the men. The service done by Methodist chaplains in war time, and especially in the Boer War, won the warmest recognition from the authorities.

In 1878, laymen were introduced into the Wesleyan conference. They had been members of the committee appointed in 1803 to "guard our privileges in these perilous times," and had gradually taken their place on the missionary and other committees. Circuit stewards had attended the district meetings before 1817 but in that year their right to attend was established. The Financial District Meeting of which they were members was created in 1819 and the financial business of each district soon came under its control. Out of the Annual Home Missionary gathering sprang a system of committees of review which, in 1852, James H. Rigg suggested might be enlarged and combined into a kind of diet composed of ministers and laymen who should consider reports from the various departments. The time was not ripe for such a scheme, but in 1861 the principle of direct representation was introduced into the committees of review. The Representative Session which met in 1878 consisted of 240 ministers and 240 laymen. The Pastoral Session of ministers met first to deal with pastoral affairs. In 1891 the Representative Session was sandwiched between the two parts of the Pastoral Session. In 1898 it met first and its numbers were enlarged to 300 ministers and 300 laymen. In 1892 the district meeting became known as the District Synod, and in 1893 the circuits began to choose representatives to the Synod in addition to the circuit stewards. The great advance in organization made with such peace and goodwill was commemorated in 1878 by the Thanksgiving Fund which reached £297,500. Dr Rigg, the president of that year, put all his strength into the movement, and every department of Methodist work at home and abroad shared in the benefits of the fund.

The Forward Movement in Methodism dates from that period. A bolder policy won favour. Methodism realized its strength and its obligations. In 1885 the Rev. S. F. Collier was appointed to Manchester and the Rev. Peter Thompson was sent to work in the East End. Next year the Revs. Hugh Price Hughes and Mark Guy Pearse began the West London Mission. Every succeeding year has witnessed development and growth. Large mission-halls have been built in the principal towns of England, Scotland and Ireland. Great congregations have been gathered, and the work done for uplifting the fallen and outcast has earned the gratitude of all good men. The Manchester mission is regarded as one of the glories of that city. The Forward Movement will always be associated with the name of Hugh Price Hughes (*q.v.*). Village Methodism shared in the quickening which the Forward Movement brought to the large towns. Chapels which had been closed were reopened; an entrance was found into many new villages. Weak circuits were grouped together and gained fresh energy and hope by the union.

No work has been dearer to Methodists than that of the National Children's Home and Orphanage founded by Dr Bowman Stephenson in 1869. Its headquarters are in Bethnal Green, but it has branches in various parts of the country and an emigration depôt in Canada. It cares not only for waifs and strays, but for cripples and delicate children. Orphans of respectable parents have a home at Birmingham, and the reformatory school has done splendid service for lads who have committed a first offence. Dr A. E. Gregory, who in 1900 succeeded Dr Stephenson, has seen remarkable progress in all departments of the great institution under his care. "Sisters of the People" and deaconesses, for whom there is a training home at Ilkley, founded by Dr Stephenson in 1902, have also done much to help in these modern developments of Methodism.

The Chapel Committee, which has its headquarters in Manchester, has general oversight of 9070 trusts with property valued at about twenty-five millions. The number of Methodist chapels in 1818 was 2000; in 1839, 3500; in 1910, 8606. The sitting increased from a million in 1851 to about 2,375,000 in 1910. The outlay on trust property in that period was more than fifteen millions. Debts amounting to £3,266,013 have been paid off since 1854 More than half a million has been advanced in loans and of this nothing has been lost. In 1907 and 1908 £1,292,282 was spent on trust property, and of this £892,114 was contributed. London Methodism owes more than can be told to the Metropolitan Chapel Building Fund which was founded in 1861. The names of the Rev. William Arthur, Sir Francis Lycett, Sir W. McArthur, will always be associated with this fund which has promoted the erection of some hundred new chapels. The Extension Fund, established in 1874, largely by the help of Sir Francis Lycett and Mr Mewburn, has done similar work for country towns and villages. About two thousand chapels have been assisted with grants and loans. Similar work has been done in Scotland by a fund established in 1878. North and South Wales also have their Chapel Funds. A secretary and committee were appointed in 1910 to carry out various developments of work in London. The work of the Metropolitan Chapel Building Fund and the London Mission is taken over by this new committee.

John Wesley felt a lively interest in the Sunday schools which began to spring up all over England in the last years of his life. The first rules for the management of Methodist Sunday schools were issued by the Conference in 1827. In 1837 there were 3339 Methodist Sunday schools with 59,297 teachers and 341,443 scholars. A quarter of the preaching places, however, had no schools. The Education Committee was formed in 1838 to take oversight of the work in day and Sunday schools. The Methodist Sunday School Union, founded in 1873, was formed into a department in 1907 and is doing much to guide and develop the work. The Temperance Committee was formed in 1875; a temperance secretary was set apart in 1890. The department has its monthly organ and has its offices in Westminster. The Wesley Guild Movement, established in 1901, has its headquarters in Leeds and is doing a great work for the young people of Methodism.

The centenary of Wesley's death was kept in 1891. Memorable services were held in City Road Chapel, which was restored and rendered more worthy of its historic position. Wesley's statue was placed in the forecourt. In 1898 the rooms in Wesley's house, where he studied and where he died, were set apart as a Methodist Museum. The first Methodist Oecumenical Conference was held in London in 1881, the second in Washington in 1891, the third in London in 1901, the fourth being fixed for Toronto in 1911. The Methodist Assembly which met in Wesley's Chapel, London, in 1909 brought the branches of British Methodism together with good results. A considerable extension of the three years' term has been secured in certain cases by a legal device for escaping the provisions of the eleventh clause of Wesley's Deed Poll, but some more satisfactory method of dealing with the subject is under consideration.

The great event of recent Methodist history was the Twentieth Century Fund inaugurated by Sir Robert W. Perks in 1898 To his unwearying zeal and business ability the triumph secured was chiefly due. The Rev. Albert Clayton, the secretary of the fund, lavished his strength on his vast task and the total income exceeded £1,073,782. The grants were · General Chapel Committee, £290,617; Missionary Society, £102,656; Education Committee, £193,705; Home Missions, £96,872; Children's Home, £48,436. The Royal Aquarium at Westminster was purchased and a central hall and church house as the headquarters of Methodism erected. For this object £242,206 was set apart.

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WESSEL, JOHAN[1] (*c.* 1420–1489), Dutch theologian, was born at Groningen. He was educated at the famous school at Deventer, which was under the supervision of the Brothers of Common Life, and in close connexion with the convent of Mount St Agnes at Zwolle, where Thomas à Kempis was then living. At Deventer, where the best traditions of the 14th-century mysticism were still cultivated, Wessel imbibed that earnest devotional mysticism which was the basis of his theology and which drew him irresistibly, after a busy life, to spend his last days among the Friends of God in the Low Countries. From Deventer he went to the Dominican school at Cologne to be taught the Thomist theology, and came in contact with humanism. He learnt Greek from monks who had been driven out of Greece, and Hebrew from some Jews. The Thomist theology sent him to study Augustine, and his Greek reading led him to Plato, sources which largely enriched his own theological system. Interest in the disputes between the realists and the nominalists in Paris induced him to go to that city, where he remained for sixteen years as scholar and teacher. There he eventually took the nominalist side, prompted as much by his mystical anti-ecclesiastical tendencies as by any metaphysical insight; for the nominalists were then the anti-papal party. A desire to know more about humanism sent him to Rome, where in 1470 he was the intimate friend of Italian scholars and under the protection of Cardinals Bessarion and Francis Della Rovere (general of the Franciscan order and afterwards Pope Sixtus IV.). It is said that Sixtus would have gladly made Wessel a bishop, but that he had no desire for any ecclesiastical preferment. From Rome he returned to Paris, and speedily became a famous teacher, gathering round him a band of enthusiastic young students, among whom was Reuchlin. In 1475 he was at Basel and in 1476 at Heidelberg teaching philosophy in the university. As old age approached he came to have a growing dislike to the wordy theological strife which surrounded him, and turned away from that university discipline, "non studia sacrarum literarum sed studiorum commixtae corruptiones." After thirty years of academic life he went back to his native Groningen, and spent the rest of his life partly as director in a nuns' cloister there and partly in the convent of St Agnes at Zwolle. He was welcomed as the most renowned scholar of his time, and it was fabled that he had travelled through all lands, Egypt as well as Greece, gathering everywhere the fruits of all sciences—"a man of rare erudition," says the title-page of the first edition of his collected works, "who in the shadow of papal darkness was called the light of the world." His remaining years were spent amid a circle of warm admirers, friends and disciples, to whom he imparted the mystical theology, the zeal for higher learning and the deep devotional spirit which characterized his own life. He died on the 4th of October 1489, with the confession on his lips, "I know only Jesus the crucified." He is buried in the middle of the choir of the church of the "Geestlichen Maegden," whose director he had been.

Wessel has been called one of the "reformers before the Reformation," and the title is justifiable if by it is meant a man of deeply spiritual life, who protested against the growing paganizing of the papacy, the superstitious and magical uses of the sacraments, the authority of ecclesiastical tradition, and that tendency in later scholastic theology to lay greater stress, in a doctrine of justification, upon the instrumentality of the human will than on the objective work of Christ for man's salvation. His own theology was, however, essentially medieval in type, and he never grasped that experimental thought of justification on which Reformation theology rests.

Martin Luther in 1521 published a collection of Wessel's writings[2] which had been preserved as relics by his friends, and said that if he (Luther) had written nothing before he read them, people might well have thought that he had stolen all his ideas from them. The books are of an aphoristical character, the ideas being rather mechanically arranged, so that it is not possible to single out any one as the centre of the whole system. The authority of the Bible Wessel would support when necessary, not by the priest but by the divinity professor His views on the sacraments anticipated those of Zwingli rather than of Luther.

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[1] His correct name was Wessel Harmens Gansfort (or Ganzevort), the Christian name Wessel being a corruption of Basilius, and the surname Gansfort being that of a Westphalian village from which his family came.

[2] The collection included *De providentia*, *De causis et effectibus incarnationis et passionis*, *De dignitate et potestate ecclesiastica*, *De sacramente, poenitentiae*, *Quae sit vera communio sanctorum*, *De purgatorio* and a number of letters.

See *Vita Wesseli Groningensis*, by Albert Hardenberg, published in an incomplete form in the preface to Wessel's collected works (Amsterdam, 1614; this preface also contains extracts from the works of several writers who have given facts about the life of Wessel); W. Muurling, *Com. Hist. Theol. de Wesseli Gansfortii vita*, &c. (1831); K. Ullmann, *Reformers before the Reformation* (the second volume of the German edition is a second and enlarged edition of a previous work entitled *Johann Wessel, ein Vorgänger Luthers* (1834); J. Friedrich, *Johann Wessel, ein Bild aus der Kirchengeschichte des 15ten Jahrhunderts* (1862); A. Ritschl, *History of the Christian Doctrine of Justification and Reconciliation* (Edinburgh, 1872); J. J. Doedes, "Hist.-litterarisches zur Biographie J. Wessels" in *Theol. Studien und Kritiken* (1870).

WESSELÉNYI, MIKLÓS, BARON (1796–1850), Hungarian statesman, son of Baron Miklós Wesselényi and Ilona Cserei, was born at Zsibó, and was educated at his father's castle by Mózes Pataky in the most liberal and patriotic direction. In 1823 he permanently entered public life and made the acquaintance of Count Stephen Széchenyi whose companion he was on a long educative foreign tour, on his return from which he became one of the leaders of the liberal movement in the Upper House. In 1833 appeared his *Balitéletek* (Prejudices), which was for long a prohibited book. He was the foremost leader of the Opposition at the diet of 1834, and his freely expressed opinions on land-redemption, together with his efforts to give greater publicity to the debates of the diet by printing them, involved him in two expensive crown prosecutions. He was imprisoned at Gräfenberg, whither he had gone to be cured of an eye trouble, and two years later became quite blind. Subsequently he did much for agriculture, children's homes and the introduction and extension of the silk industry in Hungary. The events of 1848 brought him home from a long residence abroad, but he was no longer the man he had been, and soon withdrew again to Gräfenberg. He died on the 21st of April 1850, on his way back to Hungary.

See Ferencz Szilágyi, *Life and Career of Baron Nicholas Wesselényi the Younger* (Hung. Budapest, 1876). (R. N. B.)

WESSEX, one of the kingdoms of Anglo-Saxon Britain. The story of its origin is given in the Saxon Chronicle. According to this the kingdom was founded by two princes, Cerdic, and Cynric his son, who landed in 494 or 495 and were followed by other settlers in 501 and 514. After several successful battles against the Welsh they became kings in 519. Very few of the localities connected with the story of these princes have been identified with certainty, but such identifications as there are point to the southern part of Hampshire. In 530 Cerdic and Cynric are said to have conquered the Isle of Wight, which they gave to two of their relatives, Stuf and Wihtgar. Cerdic died in 534. Cynric defeated the Britons at Salisbury in 552 and again in conjunction with his son Ceawlin at Beranburh, probably Barbury Hill, in 556. At his death in 560 he was succeeded by Ceawlin, who is mentioned by Bede as the second of the English kings to hold an *imperium* in Britain. With him we enter upon a period not perhaps of history, but at least of more or less reliable tradition. How far the earlier part of the story deserves credence has been and still is much debated. At all events no value can be attached to the dates given in the Chronicle. The preface to this work places Cerdic's assumption of the sovereignty six years after his landing, that is, in the year 500, and assigns him a reign of sixteen years, which makes his death fall eighteen years before 534, the date recorded in the annals. Again, while the annals record Ceawlin's accession in 560 and his expulsion in 592, the preface with other early authorities assigns him a reign of only seventeen years. Further a number of genealogies, both in the Chronicle and elsewhere, represent Cynric as grandson of Cerdic and son of a certain Creoda. Suspicion likewise attaches to the name Cerdic, which seems to be Welsh, while we learn from Bede that the Isle of Wight, together with part at least of the Hampshire coast, was colonized by Jutes, who apparently had a kingdom distinct from that of Wessex. For these reasons the story of the foundation of Wessex, though it appears to possess considerable antiquity, must be regarded as open to grave suspicion. It is worthy of note that the dynasty claimed to be of the same origin as the royal house of Bernicia and that two of Cerdic's ancestors, Freawine and Wig, figure in the story of Wermund, king of Angel.

Whatever may be the truth about the origin of the kingdom, and it is by no means impossible that the invasion really proceeded from a different quarter, we need not doubt that its dimensions were largely increased under Ceawlin. In his reign the Chronicle mentions two great victories over the Welsh, one at a place called Bedcanford in 571, by which Aylesbury and the upper part of the Thames valley fell into the hands of the West Saxons, and another at Deorham in 577, which led to the capture of Cirencester, Bath and Gloucester. Ceawlin is also said to have defeated Æthelberht at a place called Wibbandun (possibly Wimbledon) in 568. In 592 he was expelled and died in the following year. Of his successors Ceol and Ceolwulf we know little though the latter is said to have been engaged in constant warfare. Ceolwulf was succeeded in 611 by Cynegils, whose son Cwichelm provoked a Northumbrian invasion by the attempted murder of Edwin in 626. These kings are also said to have come into collision with the Mercian king Penda, and it is possible that the province of the Hwicce (*q.v.*) was lost in their time. After the accession of Oswald, who married Cynegils's daughter, to the throne of Northumbria, both Cynegils and Cwichelm were baptized. Cynegils was succeeded in 642 by his son Cenwalh, who married and subsequently divorced Penda's sister and was on that account expelled by that king. After his return he gained a victory over the Welsh near Pen-Selwood, by which a large part of Somerset came into his hands. In 661 he was again attacked by the Mercians under Wulfhere. At his death, probably in 673, the throne is said to have been held for a year by his widow Sexburh, who was succeeded by Aescwine, 674–676, and Centwine, 676–685. According to Bede, however, the kingdom was in a state of disunion from the death of Cenwalh to the accession of Ceadwalla in 685, who greatly increased its prestige and conquered the Isle of Wight, the inhabitants of which he treated with great barbarity. After a brief reign Ceadwalla went to Rome, where he was baptized, and died shortly afterwards, leaving the kingdom to Ine. By the end of the 7th century a considerable part at least of Devonshire as well as the whole of Somerset and Dorset seems to have come into the hands of the West Saxons. On the resignation of Ine, in 726, the throne was obtained by Æthelheard, apparently his brother-in-law, who had to submit to the Mercian king Æthelbald, by whom he seems to have been attacked in 733. Cuthred, who succeeded in 740, at first acted in concert with Æthelbald, but revolted in 752. At his death in 756 Sigeberht succeeded. The latter, however, on account of his misgovernment was deserted by most of the leading nobles, and with the exception of Hampshire the whole kingdom came into the hands of Cynewulf. Sigeberht, after putting to death the last of the princes who remained faithful to him, was driven into exile and subsequently murdered; but vengeance was afterwards taken on Cynewulf by his brother Cyneheard. Cynewulf was succeeded in 786 by Berhtric, who married Eadburg, daughter of the Mercian king Offa. Her violent and murderous conduct led to the king's death in 802; and, it is said, caused the title of queen to be denied to the wives of later kings. Berhtric was succeeded by Ecgberht (*q.v.*), the chief event of whose reign was the overthrow of the Mercian king Beornwulf in 825, which led to the establishment of West Saxon supremacy and to the annexation by Wessex of Sussex, Surrey, Kent and Essex.

Æthelwulf (*q.v.*), son of Ecgberht, succeeded to the throne of Wessex at his father's death in 839, while the eastern provinces went to his son or brother Æthelstan. A similar division took place on Æthelwulf's death between his two sons Æthelbald and Æthelberht, but on the death of the former in 858 Æthelberht united the whole in his own hands, his younger brothers Æthelred and Alfred renouncing their claims. Æthelberht was succeeded in 865 by Æthelred, and the latter by Alfred in 871. This was the period of the great Danish invasion which culminated in the submission of Guthrum in 878. Shortly afterwards the kingdom of the Mercians came to an end and their leading earl Æthelred accepted Alfred's overlordship. By 886 Alfred's authority was admitted in all the provinces of England which were not under Danish rule. From this time onwards the history of Wessex is the history of England.

Kings of Wessex.

Cerdic	519	Æthelheard	728 (726)
Cynric	534	Cuthred	741 (740)
Ceawlin	560 (*c.* 571)	Sigeberht	754 (756)
Ceol	592 (*c.* 588)	Cynewulf	755 (757)
Ceolwulf	597 (*c.* 594)	Berhtric	784 (786)
Cynegils	611	Ecgbert	800 (802)
Cenwalh	643 (*c.* 642)	Æthelwulf	836 (839)
Sexburh	672 (*c.* 673)	Æthelbald	855 (858)
Æscwine	674	Æthelberht	860
Centwine	676	Æthelred	866
Ceadwalla	685	Alfred	871
Ine	688		

The dates are those of the annals in the *Chronicle*, with approximate corrections in brackets.

See *Anglo-Saxon Chronicle*, edited by Earle and Plummer (Oxford, 1892–1899); Bede, *Hist. Eccl.* and *Continuatio*, edited by C. Plummer (Oxford, 1896); "Annales Lindisfarnenses," in the *Monumenta Germ. hist.* xix. 502-508 (Hanover, 1866); Asser, *Life of King Alfred*, edited by W. H. Stevenson (Oxford, 1904); W de G. Birch, *Cartularium Saxonicum* (London, 1885–1893). (F G. M. B.)

WEST, BENJAMIN (1738–1820), English historical and portrait-painter, was born on the 10th of October 1738, at Springfield, Pennsylvania, of an old Quaker family from Buckinghamshire. When a boy of seven he began to show his inclinations to art. According to a well-known story, he was sitting by the cradle of his sister's child, watching its sleep, when the infant happened to smile in its dreams, and, struck with its beauty, young Benjamin got some paper, and drew its portrait. The career thus begun was prosecuted amid many difficulties; but his perseverance overcame every obstacle, and at the age of eighteen he settled in Philadelphia as a portrait-painter. After two years he removed to New York, where he practised his profession with considerable success. In 1760, through the assistance of some friends, he was enabled to complete his artistic education by a visit to Italy, where he remained nearly three years. Here he acquired reputation, and was elected a member of the principal academies of Italy. On the expiry of his Italian visit he settled in London as an historical painter. His success was not long doubtful. George III. took him under his special patronage; and commissions flowed in upon him from all quarters. In 1768 he was one of the four artists who submitted to the king the plan for a royal academy, of which he was one of the earliest members; and in 1772 he was appointed historical painter to the king. He devoted his attention mainly to the painting of large pictures on historical and religious subjects, conceived, as he believed, in the style of the old masters, and executed with great care and much taste. So high did he stand in public favour that on the death of Sir Joshua Reynolds, in 1792, he was elected his successor as president of the Royal Academy, an office which he held for twenty-eight years. In 1802 he took advantage of the opportunity afforded by the peace of Amiens to visit Paris, and inspect the magnificent collection of the masterpieces of art, pillaged from the gallery of almost every capital in Europe, which then adorned the Louvre. On his return to London he devoted himself anew to the labours of his profession, which were, however, somewhat broken in upon by quarrels with some of the members of the Royal Academy. In 1804 he resigned his office, but an all but unanimous request that he should return to the chair induced him to recall his resignation. Time did not at all weaken the energy with which he laboured at his easel. When sixty-five he painted one of his largest works, "Christ healing the Sick." This was originally designed to be presented to the Quakers in Philadelphia, to assist in erecting a hospital. On its completion it was exhibited in London to immense crowds, and was purchased by the British Institution for 3000 guineas, West sending a replica to Philadelphia. His subsequent works were nearly all on the same grand scale as the picture which had been so successful, but they did not meet with very ready sale. He died in London on the 11th of March 1820, and was buried in St Paul's.

West's works, which fond criticism ranked during his life with the great productions of the old masters, are now considered as in general formal, tame, wanting that freedom of nature and that life which genius alone can breathe into the canvas. His "Death of Wolfe" is interesting as introducing modern costume instead of the classical draperies which had been previously universal in similar subjects by English artists; and his "Battle of La Hogue" is entitled to an honourable place among British historical paintings.

An account of West's life was published by Galt (*The Progress of Genius*, 1816). See also H. T. Tuckerman, *Book of the Artists* (N.Y., 1868).

WEST, NICHOLAS (1461–1533), English bishop and diplomatist, was born at Putney, and educated at Eton and at King's College, Cambridge, of which he became a fellow in 1483. He was soon ordained and appointed rector of Egglescliffe, Durham, receiving a little later two other livings and becoming chaplain to King Henry VII. In 1509 Henry VIII. appointed him dean of St George's chapel, Windsor, and in 1515 he was elected bishop of Ely. West's long and successful career as a diplomatist began in 1502 through his friendship with Richard Fox, bishop of Durham. In the interests of Henry VII. he visited the German king Maximilian I. and George, duke of Saxony; in 1506 he negotiated an important commercial treaty with Flanders, and he attempted to arrange marriages between the king's daughter Mary and the future emperor Charles V., and between the king himself and Charles's sister Margaret. By Henry VIII. West was sent many times to Scotland and to France. Occupied mainly during the years 1513 and 1514 with journeys to and from Scotland, he visited Louis XII. of France in the autumn of 1514 and his successor Francis I. in 1515. In 1515 also he arranged a defensive treaty between England and France, and he was principally responsible for treaties concluded between the two countries in 1518 and 1525, and at other times. He was trusted and employed on personal matters by Cardinal Wolsey. He died on the 28th of April 1533. The bishop built two beautiful chapels, one in Putney church and the other in Ely cathedral, where he is buried.

WESTALL, RICHARD (1765–1836), English subject painter, was born in Hertford in 1765, of a Norwich family. In 1779 he went to London, and was apprenticed to an engraver on silver, and in 1785 he began to study in the schools of the Royal Academy. He painted "Esau seeking Jacob's Blessing," "Mary Queen of Scots going to Execution" and other historical subjects in water-colour, and some good portraits in the same medium, but he is mainly known as a book-illustrator. He produced five subjects for the Shakespeare Gallery, illustrated an edition of Milton, executed a very popular series of illustrations to the Bible and the prayer-book, and designed plates for numerous other works. In 1808 he published a poem, *A Day in Spring*, illustrated by his own pencil. His designs are rather tame, mannered and effeminate. He became an associate of the Royal Academy in 1792, and a full member in 1794; and during his later years he was a pensioner of the Academy. He died on the 4th of December 1836. His brother, William Westall, A.R.A. (1781–1850), landscape painter, is mainly known by his illustrations to works of travel.

WESTBORO, a township of Worcester county, Massachusetts, U.S.A., about 12 m E. of Worcester. Pop. (1890) 5195; (1900) 5400 (1127 being foreign-born); (1905, state census) 5378; (1910) 5446. Westboro is served by the Boston & Albany railway and by interurban electric lines. Area, about 22 sq. m. It has a public library, which has belonged to the township since 1857; and here are the Lyman School for Boys, a state industrial institution (opened in 1886 and succeeding a state reform school opened in 1846), and the Westboro Insane Hospital (homoeopathic, 1884), which is under the general supervision of the State Board of Insanity. There are manufactures of boots and shoes, straw and leather goods, carpets, &c. Westboro was the birthplace of Eli Whitney, inventor of the cotton gin. The first settlement here was made about 1659 in a part of Marlboro called Chauncy (because of a grant of 500 acres here to Charles Chauncy, president of Harvard College, made in 1659 and revoked in 1660 by the General Court of Massachusetts). In 1717 this part of Marlboro, with other lands, was erected into the township of Westboro, to which parts of Sutton (1728), Shrewsbury (1762 and 1793) and Upton (1763) were subsequently annexed, and from which Northboro was separated in 1766.

WEST BROMWICH, a market town and municipal, county and parliamentary borough of Staffordshire, England, 6 m. N.W. of Birmingham, on the northern line of the Great Western railway. Pop. (1891) 59,538, (1901) 65,175. The appearance of the town, like its growth as an industrial centre of the Black Country, is modern. It is, however, of ancient origin; thus the church of All Saints, formerly St Clement, was given by Henry I. to the convent of Worcester, from which it passed to the priors of Sandwell, who rebuilt it in the Decorated period, the present structure (1872) following their plan. The chief public buildings are the town hall (1875), the Institute (1886), providing instruction in science and art, under the corporation since 1894, the free library (1874) and law-courts (1891). The picturesque Oak House, of the 16th century, was opened as a museum and art gallery in 1898. Among schools is one for pauper children in which engineering, baking, spade-husbandry, &c., are taught. Sandwell Hall, formerly a seat of the earls of Dartmouth, contains a school for daughters of clergymen, &c. The house, standing in pleasant wooded grounds, is on the site of the Benedictine priory of Sandwell, founded in the time of Henry II. There are charities founded by the families of Stanley and Whorwood (1613 and 1614). Dartmouth Park is a recreation ground of about 60 acres; others are Farley, Kenwick and Hill Top Park. Numerous mines work the extensive coalfields, which include a thirty-foot seam. There are large iron and brass foundries and smelting furnaces, and malting and brickmaking are carried on. The parliamentary borough returns one member. The town is governed by a mayor 6 aldermen and 18 councillors. Area, 5860 acres.

WESTBROOK, a city of Cumberland county, Maine, U.S.A., on the Presumpscot river, 5 m. N.W. of Portland. Pop. (1890) 6632, (1900) 7283 (1673 foreign-born), (1910) 8281. It is served by the Maine Central and the Boston & Maine railways. In Westbrook are the Walker Memorial Library (1894) and the Warren Library (1879). The river provides water-power, and among the manufactures are paper, silks, cotton goods, &c. In 1814 Westbrook was separated from Falmouth and incorporated as a township under the name of Stroudwater, and in 1815 the present name was adopted in honour of Colonel Thomas Westbrook, who had distinguished himself in wars with the Indians. In 1871 Deering, now a part of Portland, was taken from the township. A city charter was granted to Westbrook in 1889 and adopted in 1891.

WESTBURY, RICHARD BETHELL, 1st Baron (1800–1873), lord chancellor of Great Britain, was the son of Dr Richard Bethell, and was born at Bradford, Wilts. Taking a high degree at Oxford in 1818, he was elected a fellow of Wadham College. In 1823 he was called to the bar at the Middle Temple. On attaining the dignity of queen's counsel in 1840 he rapidly took the foremost place at the Chancery bar and was appointed vice-chancellor of the county palatine of Lancaster in 1851. His most important public service was the reform of the then existing mode of legal education, a reform which ensured that students before call to the bar should have at least some acquaintance with the elements of the subject which they were to profess. In 1851 he obtained a seat in the House of Commons, where he continued to sit, first as member for Aylesbury, then as member for Wolverhampton, until he was raised to the peerage. Attaching himself to the liberals, he became solicitor-general in 1852 and attorney-general in 1856 and again in 1859. On June 26, 1861, on the death of Lord Campbell, he was created lord high chancellor of Great Britain, with the title of Baron Westbury of Westbury, county Wilts. The ambition of his life was to set on foot the compilation of a digest of the whole law, but for various reasons this became impracticable. The conclusion of his tenure of the chancellorship was unfortunately marked by events which, although they did not render personal corruption imputable to him, made it evident that he had acted with some laxity and want of caution. Owing to the reception by parliament of reports of committees nominated to consider the circumstances of certain appointments in the Leeds Bankruptcy Court, as well as the granting a pension to a Mr Leonard Edmunds, a clerk in the patent office, and a clerk of the parliaments, the lord chancellor felt it incumbent upon him to resign his office, which he accordingly did on the 5th of July 1865, and was succeeded by Lord Cranworth. After his resignation he continued to take part in the judicial sittings of the House of Lords and the privy council until his death. In 1872 he was appointed arbitrator under the European Assurance Society Act 1872, and his judgments in that capacity have been collected and published by Mr F. S. Reilly. As a writer on law he made no mark, and few of his decisions take the highest judicial rank. Perhaps the best known is the judgment delivering the opinion of the judicial committee of the privy council in 1863 against the heretical character of certain extracts from the well-known publication *Essays and Reviews*. His principal legislative achievements were the passing of the Divorce Act 1857, and of the Land Registry Act 1862 (generally known as Lord Westbury's Act), the latter of which in practice proved a failure. What chiefly distinguished Lord Westbury was the possession of a certain sarcastic humour; and numerous are the stories, authentic and apocryphal, of its exercise. In fact, he and Mr Justice Maule fill a position analogous to that of Sydney Smith, convenient names to whom "good things" may be attributed. Lord Westbury died on the 20th of July 1873, within a day of the death of Bishop Wilberforce, his special antagonist in debate.

See *Life* of Lord Westbury by T. A. Nash.

WESTBURY, an urban district in the Westbury parliamentary division of Wiltshire, England, on the river Biss, a small tributary of the Lower Avon. Pop. (1901) 3305. It is 95¾ m. W. by S. of London by the Great Western railway, and lies within 3 m. of the Somerset border, sheltered on the east by the high tableland of Salisbury Plain. All Saints' church is Norman and later, with a magnificent nave. In the south transept stands a monument to Sir James Ley, earl of Marlborough and president of the council in 1629; the "good earl" addressed in a sonnet by Milton. A chained black-letter copy of Erasmus' "Paraphrase of the New Testament" is preserved in the south chapel. In the suburb of Westbury Leigh is the "Palace Garden," a moated site said to have been a royal residence in Saxon times.

Westbury (*Westberie, Westburi*) figures in Domesday as a manor held by the king. The manor was granted by Henry II. to Reginald de Pavely in 1172–1173, and from then onwards passed through various families until in 1810 it was purchased by Sir M. M. Lopez from the earl of Abingdon. A post mote was held for Westbury in 1361–1362, but the earliest mention of the town as a borough occurs in 1442–1443. The charter of incorporation is lost (tradition says it was burnt), and the town possesses no other charter. The title of the corporation was "Mayor and Burgesses of Westbury," and it consisted of a mayor, recorder and 13 capital burgesses. The borough returned two members to parliament from 1448. In 1832 the number was reduced to one, and in 1885 the representation was merged in that of the county. In 1252 Henry III. granted to Walter de Pavely a yearly fair for three days from October 31, and a weekly market on Friday. Henry VI. in 1460 granted three fairs yearly for three days from April 22, Whit Monday and September 13 respectively, and a market on Thursdays. In 1835 the mayor's fair was held at Whitsuntide, and the lord of the manor's at Easter. In 1875 a yearly sheep fair took place on the first Tuesday in September and a pleasure fair on Easter and Whit Monday; in 1888 on the first Tuesday in September and on the 24th of that month; the former still exists. In 1673 there was a market on Friday, in 1835 a nominal one on Tuesday and after 1875 it ceased. During the 18th and 19th centuries there was a considerable trade in malt, bricks, tiles and cloth. The last, once the most extensive, has now sunk into insignificance, while the others exist also only on a small scale.

WEST CHESTER, a borough and the county-seat of Chester county, Pennsylvania, U.S.A., about 20 m. W. of Philadelphia. Pop. (1890) 8028; (1900) 9524, of whom 566 were foreign-born and 1777 were negroes; (1910 census) 11,767. West Chester is served directly by the Pennsylvania and the Philadelphia, Baltimore & Washington railways and by an interurban electric line to Philadelphia, electric lines connect with the Philadelphia & Reading at Lenape, 4 m. to the south-west, and at Coatesville, 10 m. to the west. The borough lies about 450 ft. above sea-level in an undulating country. At West Chester are the West Chester State Normal School (1871), the Darlington Seminary (non-sectarian; for girls), founded in 1851 by Smedley Darlington (1827–1899; principal of the school in 1851–1861 and a representative in Congress in 1887–1891), the Friends' Graded School and the Friends' (Orthodox) Select School. There are fine botanical gardens in Marshall Square. Among the public buildings are a county court house (1847–1848), a county jail and a county hospital (1892–1893), the public library and a large Y.M.C.A. building. The colonial Turk's Head Hotel here has been so called since 1768 and was probably first opened in 1762. West Chester is in a farming country with important market-gardens and dairy farms; among its manufactures are dairy implements, foundry and machine-shop products and carriage and wagon materials. The factory product in 1905 was valued at $2,121,185. There are several large nursery farms here. West Chester was first settled in 1713, succeeded Chester as the county-seat in 1784–1786, and was incorporated as a town in 1788 and as a borough in 1799. During the War of Independence the battle of Brandywine was fought about 7 m. S. of West Chester on the 11th of September 1777, and on the 20th General Anthony Wayne, with a small force, was surprised and routed by the British at Paoli, about 8 m. N.E.

WESTCOTT, BROOKE FOSS (1825–1901), English divine and bishop of Durham, was born on the 12th of January 1825 in the neighbourhood of Birmingham. His father, Frederick Brooke Westcott, was a botanist of some distinction. Westcott was educated at King Edward VI. school, Birmingham, under James Prince Lee, where he formed his friendship with Joseph Barber Lightfoot (*q.v.*). In 1844 Westcott obtained a scholarship at Trinity College, Cambridge. He took Sir William Browne's medal for a Greek ode in 1846 and 1847, the Members' Prize for a Latin essay in 1847 as an undergraduate and in 1849 as a bachelor. He took his degree in January 1848, obtaining double-first honours. In mathematics he was twenty-fourth wrangler, Isaac Todhunter being senior. In classics he was senior, being bracketed with C. B. Scott, afterwards headmaster of Westminster. After obtaining his degree, Westcott remained for four years in residence at Trinity. In 1849 he obtained his fellowship; and in the same year he was ordained deacon and priest by his old headmaster, Prince Lee, now bishop of Manchester. The time spent at Cambridge was devoted to most strenuous study. He took pupils; and among his pupils there were reading with him, almost at the same time, his school friend Lightfoot and two other men who became his attached and lifelong friends, E. W. Benson and F. J. A. Hort (*qq.v.*). The inspiring influence of Westcott's intense enthusiasm left its mark upon these three distinguished men; they regarded him not only as their friend and counsellor, but as in an especial degree their teacher and oracle. He devoted much attention to philosophical, patristic and historical studies, but it soon became evident that he would throw his strength into New Testament work. In 1851 he published his Norrisian prize essay with the title *Elements of the Gospel Harmony*.

In 1852 he became an assistant master at Harrow, and soon afterwards he married Miss Whithard. He prosecuted his school work with characteristic vigour, and succeeded in combining with his school duties an enormous amount both of theological research and of literary activity. He worked at Harrow for nearly twenty years under Dr C. J. Vaughan and Dr Montagu Butler, but while he was always conspicuously successful in inspiring a few senior boys with something of his own intellectual and moral enthusiasm, he was never in the same measure capable of maintaining discipline among large numbers. The writings which he produced at this period created a new epoch in the history of modern English theological scholarship. In 1855 he published the first edition of his *History of the New Testament Canon*, which, frequently revised and expanded, became the standard English work upon the subject. In 1859 there appeared his *Characteristics of the Gospel Miracles*. In 1860 he expanded his Norrisian essay into an *Introduction to the Study of the Gospels*, a work remarkable for insight and minuteness of study, as well as for reverential treatment combined with considerable freedom from traditional lines. Westcott's work for Smith's *Dictionary of the Bible*, notably his articles on "Canon," "Maccabees," "Vulgate," entailed most careful and thorough preparation, and led to the composition of his subsequent valuable popular books, *The Bible in the Church* (1864) and a *History of the English Bible* (1869). To the same period belongs *The Gospel of the Resurrection* (1866). As a piece of consecutive reasoning upon a fundamental Christian doctrine it deservedly attracted great attention. Its width of view and its recognition of the claims of historical science and pure reason were thoroughly characteristic of Westcott's mode of discussing a theological question. At the time when the book appeared his method of apologetic showed both courage and originality, but the excellence of the work is impaired by the difficulty of the style.

In 1865 he took his B.D., and in 1870 his D.D. He received in later years the honorary degrees of D.C.L. from Oxford (1881) and of D.D. from Edinburgh (1883). In 1868 Westcott was appointed examining chaplain by Bishop Connor Magee (of Peterborough); and in the following year he accepted a canonry at Peterborough, which necessitated his leaving Harrow. For a time he contemplated with eagerness the idea of a renovated cathedral life, devoted to the pursuit of learning and to the development of opportunities for the religious and intellectual benefit of the diocese. But the regius professorship of divinity at Cambridge fell vacant, and Lightfoot, who was then Hulsean professor, declining to become a candidate himself, insisted upon Westcott's standing for the post. It was due to Lightfoot's support almost as much as to his own great merits that Westcott was elected to the chair on the 1st of November 1870. This was the turning-point of his life. He now occupied a great position for which he was supremely fitted, and at a juncture in the reform of university studies when a theologian of liberal views, but universally respected for his massive learning and his devout and single-minded character, would enjoy a unique opportunity for usefulness. Supported by his friends Lightfoot and Hort, he threw himself into the new work with extraordinary energy. He deliberately sacrificed many of the social privileges of a university career in order that his studies might be more continuous and that he might see more of the younger men. His lectures were generally on Biblical subjects. His *Commentaries* on St John's Gospel (1881), on the Epistle to the Hebrews (1889) and the Epistles of St John (1883) resulted from his public lectures. One of his most valuable works, *The Gospel of Life* (1892), a study of Christian doctrine, incorporated the materials upon which he was engaged in a series of more private and esoteric lectures delivered on week-day evenings. The work of lecturing was an intense strain to him, but its influence was immense: to attend one of Westcott's lectures—even to watch him lecturing—was an experience which lifted and solemnized many a man to whom the references to Origen or Rupert of Deutz were almost ludicrously unintelligible. Between the years 1870 and 1881 Westcott was also continually engaged in work for the revision of the New Testament, and, simultaneously, in the preparation of a new text in conjunction with Hort. The years in which Westcott, Lightfoot and Hort could thus meet frequently and naturally for the discussion of the work in which they were all three so deeply engrossed formed a happy and privileged period in their lives. In the year 1881 there appeared the famous Westcott and Hort text of the New Testament, upon which had been expended nearly thirty years of incessant labour. The reforms in the regulations for degrees in divinity, the formation and first revision of the new theological tripos, the inauguration of the Cambridge mission to Delhi, the institution of the Church Society (for the discussion of theological and ecclesiastical questions by the younger men), the meetings for the divinity faculty, the organization of the new Divinity School and Library and, later, the institution of the Cambridge Clergy Training School, were all, in a very real degree, the result of Westcott's energy and influence as regius professor. To this list should also be added the Oxford and Cambridge preliminary examination for candidates for holy orders, with which he was from the first most closely identified. The success of this very useful scheme was due chiefly to his sedulous interest and help.

The departure of Lightfoot to the see of Durham in 1879 was a great blow to Westcott. Nevertheless it resulted in bringing him into still greater prominence. He was compelled to take the lead in matters where Lightfoot's more practical nature had previously been predominant. In 1883 Westcott was elected to a professorial fellowship at King's. Shortly afterwards, having previously resigned his canonry at Peterborough, he was appointed by the crown to a canonry at Westminster, and accepted the position of examining chaplain to Archbishop Benson. His little edition of the *Paragraph Psalter* (1879), arranged for the use of choirs, and his admirable lectures on the Apostles' Creed, entitled *Historic Faith* (1883), are reminiscences of his vacations spent at Peterborough. He held his canonry at Westminster in conjunction with the regius professorship. The strain of the joint work was very heavy, and the intensity of the interest and study which he brought to bear upon his share in the labours of the Ecclesiastical Courts Commission, of which he had been appointed a member, added to his burden.

Preaching at the Abbey gave him a valued opportunity of dealing with social questions. His sermons were generally portions of a series; and to this period belong the volumes *Christus Consummator* (1886) and *Social Aspects of Christianity* (1887).

In March 1890 he was nominated to the see of Durham, there to follow in the steps of his beloved friend Lightfoot, who had died in December 1889. He was consecrated on the 1st of May at Westminster Abbey by Archbishop Thompson (of York), Hort being the preacher, and enthroned at Durham cathedral on the 15th of May. The change of work and surroundings could hardly have been greater. But the sudden immersion in the practical administration of a northern diocese gave him new strength. He surprised the world, which had supposed him to be a recluse and a mystic, by the practical interest he took in the mining population of Durham and in the great shipping and artisan industries of Sunderland and Gateshead. Upon one famous occasion in 1892 he succeeded in bringing to a peaceful solution a long and bitter strike which had divided the masters and men in the Durham collieries; and his success was due to the confidence which he inspired by the extraordinary moral energy of his strangely "prophetic" personality, at once thoughtful, vehement and affectionate. His constant endeavour to call the attention of the Church to the religious aspect of social questions was a special note in his public utterances. He was a staunch supporter of the co-operative movement. He was practically the founder of the Christian Social Union. He continually insisted upon the necessity of promoting the cause of foreign missions, and he gladly gave four of his sons for the work of the Church in India. His energy was remarkable to the very end. But during the last two or three years of his life he aged considerably. His wife, who had been for some years an invalid, died rather suddenly on the 28th of May 1901, and he dedicated to her memory his last book, *Lessons from Work* (1901). He preached a farewell sermon to the miners in Durham cathedral at their annual festival on the 20th of July. Then came a short, sudden illness, and he passed away on the 27th of July.

Westcott was no narrow specialist. He had the keenest love of poetry, music and art. He was himself no mean draughtsman, and used often to say that if he had not taken orders he would have become an architect. His literary sympathies were wide. He would never tire of praising Euripides, while few men had given such minute study to the writings of Robert Browning. He followed with delight the development of natural science studies at Cambridge. He spared no pains to be accurate, or to widen the basis of his thought. Thus he devoted one summer vacation to the careful analysis of Comte's *Politique positive*. He studied assiduously *The Sacred Books of the East*, and earnestly contended that no systematic view of Christianity could afford to ignore the philosophy of other religions. The outside world was wont to regard him as a mystic; and the mystical, or sacramental, view of life enters, it is true, very largely into his teaching. He had in this respect many points of similarity with the Cambridge Platonists of the 17th century, and with F. D. Maurice, for whom he had profound regard. But in other respects he was very practical; and his strength of will, his learning and his force of character made him really masterful in influence wherever the subject under discussion was of serious moment. He was a strong supporter of Church reform, especially in the direction of obtaining larger powers for the laity.

He kept himself aloof from all party strife. He describes himself when he says, "The student of Christian doctrine, because he strives after exactness of phrase, because he is conscious of the inadequacy of any one human formula to exhaust the truth, will be filled with sympathy for every genuine endeavour towards the embodiment of right opinion. Partial views attract and exist in virtue of the fragment of truth—be it great or small—which they include; and it is the work of the theologian to seize this no less than to detect the first spring of error. It is easier and, in one sense, it is more impressive to make a peremptory and exclusive statement, and to refuse to allow any place beside it to divergent expositions; but this show of clearness and power is dearly purchased at the cost of the ennobling conviction that the whole truth is far greater than our individual minds. He who believes that every judgment on the highest matters different from his own is simply a heresy must have a mean idea of the faith; and while the qualifications, the reserve, the lingering sympathies of the real student make him in many cases a poor controversialist, it may be said that a mere controversialist cannot be a real theologian" (*Lessons from Work*, pp. 84-85). His theological work was always distinguished by the place which he assigned to Divine Revelation in Holy Scripture and in the teaching of history. His own studies have largely contributed in England to the better understanding of the doctrines of the Resurrection and the Incarnation. His work in conjunction with Hort upon the Greek text of the New Testament will endure as one of the greatest achievements of English Biblical criticism. The principles which are explained in Hort's introduction to the text had been arrived at after years of elaborate investigation and continual correspondence and discussion between the two friends. The place which it almost at once took among scientific scholars in Great Britain and throughout Europe was a recognition of the great advance which it represented in the use and classification of ancient authorities. His commentaries rank with Lightfoot's as the best type of Biblical exegesis produced by the English Church in the 19th century.

The following is a bibliography of Westcott's more important writings, giving the date of the first editions:—*Elements of the Gospel Harmony* (1851); *History of the Canon of First Four Centuries* (1853); *Characteristics of Gospel Miracles* (1859); *Introduction to the Study of the Gospels* (1860); *The Bible in the Church* (1864); *The Gospel of the Resurrection* (1866); *Christian Life Manifold and One* (1869); *Some Points in the Religious Life of the Universities* (1873); *Paragraph Psalter for the Use of Choirs* (1879); *Commentary on the Gospel of St John* (1881); *Commentary on the Epistles of St John* (1883); *Revelation of the Risen Lord* (1882); *Revelation of the Father* (1884); *Some Thoughts from the Ordinal* (1884); *Christus Consummator* (1886); *Social Aspects of Christianity* (1887); *The Victory of the Cross: Sermons in Holy Week* (1888); *Commentary on the Epistle to the Hebrews* (1889); *From Strength to Strength* (1890); *Gospel of Life* (1892); *The Incarnation and Common Life* (1893); *Some Lessons of the Revised Version of the New Testament* (1897); *Christian Aspects of Life* (1897); *Lessons from Work* (1901).

Lives by his son B. F. Westcott (1903), and by J. Clayton (1906). (H. E. R.*)

WESTERLY, a township of Washington county, Rhode Island, U.S.A., in the extreme S.W. part of the state, about 44 m. S.S.W. of Providence, separated from Connecticut on the W. by the Pawcatuck river, which forms the northern boundary of the township also. Pop. (1890) 6813, (1900) 7541, (1788 being foreign-born and 185 negroes), (1905, state census) 8381, (1910) 8696. Area, about 31 sq. m. Westerly is served by the New York, New Haven & Hartford railway, and by interurban electric lines connecting with Norwich and New London, Conn. The township includes several small villages, connected by electric railways, the best known being Watch Hill, which has fine sea-bathing. Larger villages are Westerly, in the western part of the township and at the head of navigation (for small vessels) on the Pawcatuck river, and Niantic, in the north-eastern part of the township. In Westerly there is a public library (1894), with 23,323 volumes in 1909. Beyond Watch Hill Point on the S.W. point of an L-shaped peninsula, running first W. and then N., is Napatree Point, on which is Fort Mansfield, commanding the N.E. entrance to Long Island Sound. The township is the centre of the granite industry of the state; the quarries are near the villages of Westerly and Niantic. The granite is of three kinds: white statuary granite, a quartz monzonite, with a fine even-grained texture, used extensively for monuments; blue granite, also a quartz monzonite and also much used for monuments; and red granite, a biotite granite, reddish grey in colour and rather coarse in texture, used for buildings.[1] Among the manufactures are cotton and woollen goods, thread and printing presses. The water supply is from artesian wells. The first settlement here was made in 1661, and the township was organized in 1669, when the present name was adopted instead of the Indian Misquamicut (meaning "salmon") by which it had been called. In 1686 the name was changed to Haversham, but in 1689 the present name was restored.

See Frederic Denison, *Westerly and its Witnesses, for Two Hundred and Fifty Years, 1626–1876* (Providence, R.I., 1878).

WESTERMANN, FRANÇOIS JOSEPH (d. 1794), French general, was born at Molsheim in Alsace. At an early age he entered a cavalry regiment, but soon left the service and went to Paris. He embraced enthusiastically the ideas of the Revolution, and in 1790 became *greffier* of the municipality of Haguenau. After a short imprisonment on a charge of inciting *émeutes* at Haguenau, he returned to Paris, where he joined Danton and played an important part in the attack on the Tuileries on the 10th of August 1792. He accompanied Dumouriez on his campaigns and assisted him in his negotiations with the Austrians, being arrested as an accomplice after the general's defection. He succeeded, however, in proving his innocence, and was sent with the rank of general of brigade into La Vendée, where he distinguished himself by his extraordinary courage, by the audacity of his manœuvres, and by his severe treatment of the insurgents. After suffering a defeat at Châtillon, he vanquished the Vendéans at Beaupréau, Laval, Granville and Baugé, and in December 1793 annihilated their army at Le Mans and Savenay. He was then summoned to Paris, where he was proscribed with the Dantonist party and executed on the 5th of April 1794.

See P. Holl, *Nos généraux alsaciens . . . Westermann* (Strassburg, 1900).

WESTERN AUSTRALIA, a British colonial state, forming part of the Commonwealth of Australia. (For Map, see AUSTRALIA.) This portion of Australia lies to the west of 129° E. long., forming considerably more than one-third of the whole; it has an area of 1,060,000 sq. m., is 1400 m. in length and 850 in breadth, and has a coast-line of 3500 m. It is divided into five districts—Central, Central Eastern, South-Eastern, North and Kimberley. The Central or settled district, in the south-west, is divided into twenty-six counties. Apart from the coast lands, the map presents almost a blank, as the major portion is practically a dry waste of stone and sand, relieved by a few shallow salt lakes. The rivers of the south are small—the Blackwood being the most considerable. To the north of this are the Murray, the well-known Swan, the Moore, the Greenough and the Murchison. The last is 400 m long. Shark's Bay receives the Gascoyne (200 m. long), with its tributary the Lyons. Still farther north, where the coast trends eastward, the principal rivers are the Ashburton, the Fortescue and the De Grey. Kimberley district to the north-east has some fine streams—the Fitzroy and Ord and their tributaries, on some of which (the Mary, Elvira, &c.) are the goldfields, 250 m. south of Cambridge Gulf. The Darling mountain range is in the south-west, Mount William reaching 3000 ft.; in the same quarter are Toolbrunup (3341 ft.), Ellen's Peak (3420), and the Stirling and Victoria ranges. Gardner and Moresby are flat-topped ranges. Mount Elizabeth rises behind Perth. Hampton tableland overlooks the Bight. In the north-west are Mount Bruce (4000 ft.), Augustus (3580), Dalgaranger (2100), Barlee, Pyrton and the Capricorn range. Kimberley has the King Leopold, M'Clintock, Albert Edward, Hardman, Geikie, Napier, Lubbock, Oscar, Mueller and St George ranges. The lake district of the interior is in the Gibson and Victoria deserts from 24° to 32° S. The lakes receive the trifling drainage of that low region. Almost all of them are salt from the presence of saline marl.

Geology.—The main mass of Westralia consists of a vast block of Archean rocks, which forms the whole of the western half of the Australian continent. The rocks form a plateau, which faces the coast, in a series of scarps, usually a short distance inland. The edge of this plateau is separated from the Southern Ocean by the Nullarbor limestones, at the head of the Great Australian Bight; but they gradually become narrower to the west; and the Archean rocks reach the coast at Port Dempster and to the east of Esperance Bay. Thence the southern boundary of the Archean rocks extends due west, while the coast trends southward, and is separated by a belt of Lower Palaeozoic and Mesozoic deposits; but the reappearance of the granitic rocks at King George Sound and Albany may be due to an outlier of the Archean tableland. Along the western coast, the scarp of the Archean plateau forms the Darling Range behind Perth. Further north, behind Shark's Bay, the plateau recedes from the coast, and trends north-westward through the Hammersley Mountains and the highlands of Pilbarra. The Archean rocks underlie the Kimberley Goldfield; but they are separated from the main Archean plateau to the south by the Lower Palaeozoic rocks, which extend up the basin of the Fitzroy river and form the King Leopold and Oscar Ranges.

The Archean rocks are of most interest from the auriferous lodes which occur in them. The Archean rocks of the area between the Darling Range and the goldfield of Coolgardie were classified by H. P. Woodward into six parallel belts, running northward and southward, but with a slight trend to the west. The westernmost belt consists of clay slates, quartzites and schists, and is traversed by dykes of diorite and felstone; the belt forms the western foot of the Archean plateau, along the edge of the coastal plain. The second belt consists of gneisses and schists, and forms the western part of the Archean plateau. Its chief mineral deposit is tin, in the Green-bushes tin-field, and various other minerals, such as graphite and asbestos. Then follows a wide belt of granitic rocks; it has no permanent surface water and is bare of minerals, and, therefore, formed for a long time an effective barrier to the settlement or prospecting of the country to the east. This granitic band ends to the east in the first auriferous belt, which extends from the Phillips river, on the southern coast, to Southern Cross, on the Perth to Kalgoorlie railway; thence it goes through Mount Magnet, Lake Austin and the Murchison Goldfield at Nannine, and through the Peak Goldfield to the heads of the Gascoyne and Ashburton rivers. To the east of this belt is a barren band of granites and gneisses, succeeded again eastward by the second auriferous belt, including the chief goldfields of Westralia. They begin on the south with the Dundas Goldfield, and the mining centre of Norseman; then to the north follow the goldfields of Kalgoorlie, with its Golden Mile at Boulder, and the now less important field of Coolgardie. This line continues thence through the goldfields of Leonora and Mount Margaret, and reappears behind the western coast in the Pilbarra Goldfield. The rocks of the goldfields consist of amphobolite-schists and other basic schists, traversed by dykes of granite, diorite and porphyrite, with some peridotites. Some of the amphibolites have been crushed and then silicified into jasperoids, so that they much resemble altered sedimentary slates.

The Palaeozoic group is represented by the Cambrian rocks of the Kimberley Goldfield, which have yielded *Olenellus forresti*. There appear to be no certain representatives of the Ordovician system; while the Silurian is represented in the King Leopold Range of Kimberley, and, according to H. P. Woodward, in the contorted, unfossilliferous quartzites and shales of the Stirling Range, north of Albany. The Upper Palaeozoic is well represented by an area of some 2000 sq. m. of Devonian sedimentary and volcanic rocks in the Kimberley district, and by the Carboniferous system, including both a lower, marine type, and an upper, terrestrial type. The Lower Carboniferous limestones occur in the Napier, Oscar and Geikie Ranges of Kimberley, and in the basin of the Gascoyne river, where they contain the glacial deposits discovered by Gibb-Maitland, between the Wooramel and Minilya rivers. The upper and terrestrial type of the Carboniferous include sandstones with *Stigmaria* and *Lepidodendron* in the Kimberley district, and the coals of the Irwin coalfield, the age of which is proved by the interstratification of the coal seams with beds containing *Productus subquadratus*, *Cyrtina carbonaria* and *Aviculopecten subquinquelineatus*. The Mesozoic rocks were discovered in 1861, and their chief outcrop is along the western coast plains of Westralia between Geraldton and Perth. They have been pierced by many bores put down for artesian wells. The fossils indicate a Lower Jurassic age; and, according to Etheridge, some of the fossils are Lower Cretaceous. The Collie coalfield, to the east of Bunbury, is generally regarded as Mesozoic. Its coal is inferior in quality to that of Eastern Australia, and contains on an average of 34 analyses 11·77% of moisture, and 8·62% of ash. According to Etheridge its age is Permo-Carboniferous. The Kainozoic rocks include the marine limestones in the Nullarbor Plains at the head of the Great Australian Bight, whence they extend inland for 150 m. They have no surface water, but the rainfall in this district nourishes artesian wells. The occurrence of marine Kainozoic beds under the western coastal plain is proved by the bores, as at Carnarvon, where they appear to be over 1000 ft. in thickness. The coastal region also includes sheets of clay and sandstone, with deposits of brown coal as on the Fitzgerald river on the southern coast, and in the basin of the Gascoyne. The Archean plateau of the interior is covered by wide sheets of subaerial and lacustrine deposits, which have accumulated in the basins and river valleys. They include mottled clays, lateritic ironstones and conglomerates. In places the materials have been roughly assorted by river action, as in the deep lead of Kanowna. The clays contain the bones of the *Diprotodon*, so that they are probably of Upper Pliocene or Pleistocene age. The Kainozoic volcanic period of Australia is represented by the basalts of Bunbury and Black Point, east of Flinders Bay.

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[1] See T. N. Dale, *The Chief Commercial Granites of Massachusetts, New Hampshire and Rhode Island* (Washington, 1908), Bulletin 354 of the United States Geological Survey.

A bibliography of Westralian geology has been issued by Maitland, Bulletin Geol. Survey, No. 1, 1898. An excellent summary of the mineral wealth of the state has been given by Maitland, Bulletin 8, No. 4, 1900, pp. 7-23, also issued in the Year-book of Western Australia. The main literature of the geology of Westralia is in the Bulletins of the Geol. Survey, and in the reports of the Mines Department. A general account of the gold-mining has been given by A. G. Charleton, 1902; and also by Donald Clark, *Australian Mining and Metallurgy* (1904). (J. W. G.)

Flora.—Judged by its vegetable forms, Western Australia would seem to be older than eastern Australia, South Australia being of intermediate age. Indian relations appear on the northern side, and South African on the western. There are fewer Antarctic and Polynesian representatives than in the eastern colonies. European forms are extremely scarce. Compared with the other side of Australia, a third of the genera on the south-west is almost wanting in the south-east. In the latter, 55, having more than ten species each, have 1260 species; but the former has as many in 55 of its 80 genera. Of those 55, 36 are wanting in the south-east, and 17 are absolutely peculiar. There are fewer natural orders and genera westward, but more species. Baron von Müller declared that "nearly half of the whole vegetation of the Australian continent has been traced to within the boundaries of the Western Australian territory." He includes 9 Malvaceae, 6 Euphorbiaceae, 2 Rubiaceae, 9 Proteaceae, 47 Leguminosae, 10 Myrtaceae, 12 Compositae, 5 Labiatae, 6 Cyperaceae, 13 Convolvulaceae, 16 Gramineae, 3 Filices, 10 Amaranthaceae. Yet over 500 of its tropical species are identified with those of India or Indian islands. While seven-tenths of the orders reach their maximum south-west, three-tenths do so south-east. Cypress pines abound in the north, and ordinary pines in Rottnest Island. Sandalwood (*Santalum cygnorum*) is exported. The gouty stem baobab (*Adansonia*) is in the tropics. *Xanthorrhoea*, the grass tree, abounds in sandy districts. Mangrove bark yields a purple tan. Palms and zamias begin in the north-west. The *Melaleuca Leucadendron* is the paperbark tree of settlers. The rigid-leafed *Banksia* is known as the honeysuckle. *Casuarinae* are the he and she oaks of colonists, and the *Exocarpus* is their cherry tree. Beautiful flowering shrubs distinguish the south-west; and the deserts are all ablaze with flowers after a fall of rain. Poison plants are generally showy Leguminosae, *Sida* and the *Gastrolobium*.

The timber trees of the south-west are almost unequalled. Of the Eucalypts, the jarrah or mahogany, *E. marginata*, is first for value. It runs over five degrees of latitude, and its wood resists the teredo and the ant. Sir Malcolm Fraser assigns 14,000 sq. m. to the jarrah, 10,000 to *E. viminalis*, 2300 to the karri (*E. colossea* or *E. diversicolor*), 2400 to York gum (*E. loxophleba*), 800 to the red gum (*E. calophylla*) and 500 to tuart or native pear (*E. gomphocephala*). Not much good wood is got within 20 m. of the coast. The coachbuilder's coorup rises over 300 ft. Morrel furnishes good timber and rich oil. An ever-increasing trade is done in the timber of the south-western forests.

Fauna.—Among the mammals are the *Macropus giganteus*, *M. irma*, *M. dama*, *M. brachyurus*, *Lagorchestes fasciatus*, *Bettongia penicillata*, *Phalangista vulpecula*, *Pseudochirus cooki*, *Dasyurus geoffroyi*, *Tarsipes rostratus*. *Antechinus apicalis*, *Perameles obesula*, *Perameles myosurus*, *My* Fossil forms partake of the existing marsupial character, *Diprotodon* being allied to the wombat and kangaroo. Nail-bearing kangaroos are in the north-west; the banded one, size of a rabbit, is on Shark's Bay. Nocturnal phalangers live in holes of trees or in the ground. Carnivorous *Phascogalae* are found in south-west. There are three kinds of wombat. The rock-loving marsupial *Osphranter* is only in the north-east, and *Perameles bougainvillei* at Shark's Bay. The dalgyte or *Petrogale lagotis* is at Swan river and *Hypsiprymnus* in the south. The colony has only two species of wallabies to five in New South Wales. The *Halmaturus* of the Abrolhos is a sort of wallaby; a very elegant species is 18 in. long. The pretty *Dromicia*, 6 in. long, lives on stamens and nectar, like the *Tarsipes*, having a brush at the tip of its tongue; its tail is prehensile. The hare-like *Lagorchestes fasciatus* is a great leaper. The *Hapalotis* of the interior has nests in trees. Beaver rats and other small rodents are troublesome, and bats are numerous. The dingo is the wild dog. The platypus (*Ornithorhynchus*) and the *Echidna* are the only forms of the *Monotremata*. The seal, whale and dugong occur in the adjacent seas.

The west is not so rich as the east of Australia in birds. Many forms are absent and others but poorly represented, though some are peculiar to the west. The timbered south-west has the greatest variety of birds, which are scarce enough in the dry and treeless interior. Of lizards the west has 12 genera not found in eastern Australia. Of snakes there are but 15 species to 3 in Tasmania and 31 in New South Wales. While the poisonous sorts are 2 to 1 in the east, they are 3 to 1 in the west. The turtle is obtained as an article of food. The freshwater fishes are not all like those of the east. They include the mullet, snapper, ring fish, guard fish, bonita, rock cod, shark, saw fish, parrot fish and cobbler. Under the head of fisheries may be mentioned the pearl oyster, which is dived for by natives at Shark's Bay; the trepang or bêche-de-mer is also met with in the north. Insects are well represented, especially Coleoptera, Lepidoptera, Hymenoptera, Hemiptera and Diptera.

Climate.—With little or no cold anywhere, the heat of summer over the whole area is considerable. Western Australia differs from the country to the east in having no extensive ranges to collect vapour, while the trade winds blow off the dry land instead of from the ocean; for these two reasons the climate is very dry. Thunderstorms often supply almost the only rainfall in the interior. The south-western corner, the seat of settlements, is the only portion where rains can be depended on for cultivation; but even there few places have a rainfall of 40 in. As one goes northward the moisture lessens. The north-west and all the coast along to Kimberley, with most of that district, suffer much from dryness. The north-east comes in summer within the sphere of the north-west monsoons, though just over the low coast-range few showers are known. The south coast, exposed to polar breezes, with uninterrupted sea, has to endure lengthened droughts. In the Swan river quarter the rainfall is in winter, being brought by north-west winds, and summer days have little moisture. While the south wind cools the settled region, it comes over the parched interior to the northern lands. The hot wind of Swan river is from the east and north-east; but it is from the south in summer to Kimberley and the north-west. In one season the land breeze is hot, in another cool, but always dry.

The climate of Perth is typical of the south-western districts. There are two distinct seasons, the winter and the summer. The winter commences somewhat abruptly, being ushered in by heavy rains; it begins usually not earlier than the middle of April or later than the middle of May, and continues until towards the end of October. The winters are, as a rule, very mild, but there is some cold weather in July and August, and though there is little at the coast, frost is not uncommon inland. The summer is heralded by an occasional hot day in October, in November the weather becomes settled and continues warm until the end of March In the four months, December to March, the maximum temperature in the shade exceeds 90° on an average on 37 days, but as a rule the heat does not last long, the evenings and nights being tempered by a cool breeze.

In the interior the climate resembles that of the south-west in regard to the occurrence of two seasons only The winter, however, has much less rain than on the coast, and is cold, clear and bracing. The summer is, as a rule, hot, but is tempered in the south by occasional cool changes, though unrelieved as the tropic is approached. Within the tropics there are two seasons, the wet and the dry. The wet season is most unpleasant, the temperature rarely falling below 100°; the dry season, which lasts from April to November, is usually fine, clear and calm. The average rainfall at Perth is 33 in. falling on 110 days; the mean maximum temperature is 74·9° and the minimum 54·8°; at Coolgardie the mean maximum is 77·8° and the mean minimum 52·4°; at Wyndham, on the north-west coast, the mean maximum is 93·9° and the minimum 75·4°.

Population.—Population made very slow increase under the old conditions of settlement, and even when gold was discovered in 1882 at Kimberley, and five years later at Yilgarn, no great impetus was given to the colony, and at the census of 1891 the population was still under 50,000. The sensational gold finds at Coolgardie in 1892, however, had a most important influence in drawing population, and in three and a half years the population was doubled: during a portion of this time the rush of miners to the gold-fields was so great as to be reminiscent of the experience of the eastern colonies during the 'fifties. At the end of 1905 the population was 254,779, comprising 150,495 males and 104,284 females. The slowness of the early growth and the more rapid strides of later years will be gathered from the following figures: pop. (1860) 15,227, (1870) 25,084, (1880) 29,019, (1890) 46,290, (1895) 101,238, (1901) 194,889. The chief towns of Western Australia are: Perth—the capital—56,000, Fremantle 23,008, Kalgoorlie 6780, Boulder 5658. The number of people in all gold-field towns fluctuates very greatly. Coolgardie, for example, was returned in July 1894 as having within its municipal boundaries 12,000 people; in 1905 it had only 3830.

The births during 1905 numbered 7582 and the deaths 2709, the rates per thousand of population being respectively 30·30 and 10·83, showing a net increment of 19·47 per 1000. In the period 1861–1865 the birth-rate was 39·07 per 1000. Between 1886 and 1890 it stood at 36·88; then came a rapid decline, and in 1896 was reached the low level of 22·67 per 1000. In 1904 the rate was 30·34 per 1000. The decline in the birth-rates has been a common experience of all the Australian states; in Western Australia it was due in a large degree to the decline in the proportion of females to males. In 1870 the females numbered 62% of the males, and in 1880 75%, while in 1895 the proportion was only 45%. The illegitimate births during 1905 were 4·19% of the total births. The death-rate, which in 1897 was 16·99 per 1000, has steadily declined in recent years. The large influx of young unmarried men in the years 1894–1898 was followed by the arrival of a large number of single women, and the marriage-rates increased from 7 per 1000 in the five years 1891–1895 to 10·7 per 1000 in 1897. In 1905 the rate stood at the more normal level of 8·48. Except for a slight influx of population in the three years 1885–1887, due to the gold discoveries at Kimberley, there was very little immigration to Western Australia prior to 1891; in that year, however, there was a considerable inpouring of population from the eastern colonies, notably from Victoria and South Australia, and in the seven years which closed with 1897 the population of the colony gained nearly 110,000 by immigration alone. In 1898 there was still a large inflow of population, but the outflow was also great, and in 1898 and the following year the two streams balanced one another; but 1900 showed an excess of 6000, and 1905 of 7617 gained by immigration.

Western Australia is the most sparsely populated of all the states; only the coastal fringe and the gold-fields show any evidences of settlement, and if the area were divided amongst the population there would be but ten persons to 52 sq. m. The population is almost exclusively of British origin, and only differs from that of the other states in that there is a larger body of Australian-born, who are not natives of the colony itself. About 45% of the population are members of the Church of England; one-fourth belong to other Protestant denominations, and one-fourth are Roman Catholics.

Administration.—In 1890 Western Australia, up to that time a crown colony administered by a governor, was granted responsible government. The legislative authority is vested in a parliament composed of two Houses—a Legislative Council, whose thirty members are elected for six years, and a Legislative Assembly of fifty members, elected by adult suffrage (men and women). As a portion of the Commonwealth, Western Australia sends six senators and five representatives to the federal parliament. In a country so sparsely settled municipal government has little scope for operation.

So far forty-four municipalities have been gazetted. Besides the municipalities there are district roads boards, elected by the ratepayers of their respective districts to take charge of the formation, construction and maintenance of the public roads throughout their districts. There were in 1905 ninety-four such boards in existence. Some of the districts are of enormous size: Pilbarra, for example, has an area of 14,356 sq. m.; Coolgardie North has 75,968 sq. m.; Nullagine has 90,438 sq. m., and the Upper Gascoyne has 136,000 sq. m. Over areas so vast little effective work can be accomplished, but where the districts are small the administration is much the same as in the municipalities. The receipts from rates of all local districts in 1905 was £104,760, and the grants by the government £80,938, making a total of £185,698.

Education.—Attendance at school is compulsory upon all children over six years and under fourteen years of age. Instruction is imparted only in secular subjects, but the law allows special religious teaching to be given during half an hour each day by clergymen to children of their own denomination. Children can claim free education on account of inability to pay fees, of living more than a mile from school, or of having attended school for more than 400 half-days during the preceding year. The state expended in 1905 £131,585 on public instruction, the great bulk of which was devoted to primary schools. The number of schools supported by the state in that year was 335, the teachers numbered 888, the net enrolment of scholars was 27,978, and the average attendance 23,703. There were in 1905 99 private schools with 350 teachers and 7353 scholars, the average attendance being 6128.

Judged by the number of persons arrested, crime is more prevalent than in any other part of Australia. The gold-fields have attracted some of the best and most enterprising of the Australian population; at the same time many undesirable persons flocked to the state expecting to reap a harvest in the movement and confusion of the gold diggings. These latter form a large part of the criminal population of the state. The arrests in 1905 numbered 14,646, of which 2104 were for serious offences; so that for every thousand of the population 49 were arrested for trivial and 8 for serious crimes.

Finance.—The discovery of gold and the settlement on the gold-fields of a large population, for the most part consumers of dutiable goods, has entirely revolutionized the public finances of the state. In 1891 the revenue was £497,670, that is, £10, 15s. per inhabitant; in 1895 it rose to £1,125,941, or £12, 10s. per inhabitant; and in 1897 to £2,842,751, or £20, 12s. 2d. per inhabitant. For 1905 the figures were £3,615,340, or £14, 18s. 5d. per inhabitant. The chief sources of revenue in 1905 were: customs and excise, £1,027,898; other taxation, £221,738; railways, £1,629,956; public lands (including mining), £207,905; all other sources, £527,843. The expenditure has risen with the revenue, the figures for 1905 being £3,745,224, equal to £15, 9s. 2d. per head of population. The chief items of expenditure in 1905 were: railway working expenses, £1,297,499; public works, £337,927; interest and charges upon debt, £578,704; mines, £248,496; education, £149,552. The public debt is of comparatively recent creation. In August 1872 an act was passed authorizing the raising of certain sums for the construction of public works; in 1881 the amount owing was not more than £511,000, and in 1891 only £1,613,000 or £30, 5s. 8d. per inhabitant; from the year last named the indebtedness has increased by leaps and bounds, and in 1905 had mounted up to £16,642,773, a sum equal to £66, 10s. 4d. per inhabitant, involving an interest charge of £574,406 or £2, 5s. 1d. per inhabitant. The proceeds of the loans were used largely for the purpose of railway extension—the expenditure on this service at the middle of 1906 was £9,618,970; on water supply and sewerage works, £2,892,390; on telegraphs and telephones, £269,308; on harbour and river improvements, £2,182,529; on development of gold-fields, £973,082; on development of agriculture, £597,189.

Defence.—The local defence force of Western Australia in 1905 comprised 57 permanent artillerymen, 772 militia, 580 volunteers, and 2534 riflemen—a total of 3943. The defence of the state is undertaken by the federal government.

Minerals.—Gold-mining is the main industry, and in 1905 16,832 miners were directly engaged in it; as large a number is indirectly engaged in the industry. Gold, silver, coal, tin and copper are the chief minerals mined; the mineral production of the state in 1905 was valued at £8,555,841. The value of the gold produced was £8,305,654, a falling off of £118,572 as compared with 1904. The dividends paid by the gold-mining companies for that year amounted to £2,167,639 as against £2,050,547 in 1904. Up to 1905 the total recorded mineral production of Western Australia amounted in value to £65,012,499—gold representing £63,170,911 of that sum; while £13,739,842 had been paid in dividends.

Western Australia ranks as the largest gold producer of the Australian group. Coal is worked at Collie, 25 m. E. of Bunbury; boring operations which had been going on between Greenough and Mullewa on the Geraldton-Cue railway line were discontinued in 1905, the bore hole, carried to a depth of 1418 ft. having failed to disclose any coal seams. The export of copper in 1905 was valued at £16,266; of tin, £86,840; of silver, £44,278. The value of the coal produced in that year was £55,312.

Industries.—The agricultural possibilities of the state are more restricted than those of the eastern states, as the rainfall in the southern and temperate portion does not extend far from the coast, and the land where the fall is satisfactory is only good over small areas. The area cultivated in 1871 was 52,000 acres; in 1881 it was 53,000 acres; in 1891, 64,000 acres; and in 1905, 467,122 acres. The principal crops grown in the year last named were: wheat, 195,071 acres; oats, 15,713 acres; hay, 124,906 acres. The wheat yield was 11·83 bushels per acre, and the hay crop 1·12 tons per acre. In 1905 the number of sheep depastured was 3,120,703; cattle, 631,825; horses, 97,397. These figures show an increase for all classes of stock. There are in the state about 2000 camels. The number of sheep has increased considerably in late years. In 1871, 2,000,000 lb of wool were exported; in 1881, 4,100,000 lb; in

1891, 8,800,000 lb; in 1900, 9,514,000 lb; and in 1905, 17,489,402 lb; the value of the latter being £594,872.

Western Australia has very extensive forests of timber, and it has been estimated that the forest surfaces cover more than 20 million acres, of which 8 million acres are jarrah; 1,200,000 acres, karri; 200,000 acres, tuart; 7 million acres, wandoo; and 4 million acres, York gum, yate, sandalwood and jam. The principal timber exported is jarrah, karri, and sandalwood, the value of the exports being about £656,000 annually. There are 30 saw-mills in operation, employing altogether 2750 hands.

Fisheries are taking an important position; they comprise pearl shell fishing bêche-de-mer, and preserved or tinned fish. The pearl shell fisheries in the north-west and in Shark's Bay have been a considerable source of wealth, the export of pearls and pearl shell being valued at £110,667 in 1899, £106,607 in 1900 and £171,237 in 1903. In 1892 the export was valued at £119,519.

Mandurah, at the mouth of the Murray, and Fremantle have preserving sheds for mullet and snapper. Guano beds are worked to much advantage at the Lacepede Isles. Salt is produced largely at Rottnest Island. Raisins are dried, and the oil of castor trees is expressed. The mulberry tree succeeds well, and sericulture is making progress. Dugong oil is got from Shark's Bay. Honey and wax are becoming valuable exports; from the abundance of flowers the hives can be emptied twice a year. Manna and gums of various kinds are among the resources of the country. Among the wines made are the Riesling, Burgundy, Sweetwater, Hock and Fontainebleau.

Commerce.—All the great lines of steamers trading between Australia and Europe make one of the ports a place of call both on the inward and outward voyage; this makes the shipping tonnage very large compared with the population. In 1891 the tonnage entered and cleared equalled 21 tons per head, and in 1905 14·3 tons. The increase of tonnage is shown by the following figures: 1881, tonnage entered, 145,048; 1891, 533,433; 1905, 1,839,227. In 1905 the tonnage entering Fremantle was 1,176,982, and the imports were valued at £6,030,415. The shipping entering Albany had a tonnage of 519,377, and the imports were valued at £160,305. The trade of Bunbury was: shipping 92,281 tons, imports £59,197; Broome, shipping 32,191 tons, imports £48,653; other ports, shipping 18,396 tons, imports £182,739.

The trade has increased very rapidly under the influence of the gold discoveries, as the following figures show:—

Year.	Imports.				Exports.			
	Total.	Per Head.			Total.	Per Head.		
		£	s.	d.		£	s.	d.
1861	147,913	9	9	8	95,789	6	2	10
1871	226,000	9	0	10	209,196	8	6	11
1881	404,831	13	14	3	502,770	17	0	8
1891	1,280,093	25	2	5	799,466	15	13	9
1901	6,454,171	34	4	5	8,515,623	45	3	0
1905	6,481,309	25	18	1	9,871,219	39	9	1

About 54% of the trade is with Great Britain and 21% with the other Commonwealth states.

Railways.—Western Australia is the only state of Australia in which there is any considerable length of railway lines not owned by the state. The total railway mileage in 1905 was 2260, of which 655 m. were privately owned. The divergence of the policy of Western Australia from that pursued by other states was caused by the inability of the government to construct lines at a time when the extension of the railway was most urgently required in the interests of settlement. Private enterprise was therefore encouraged by liberal grants of land to undertake the work of construction. Changed conditions have modified the state policy in respect of land grants, and in 1897 the government acquired the Great Southern railway, 243 m. in length, one of the two trunk lines in private hands. The cost of constructing and equipping the state lines open for traffic in 1905 was £9,808,458; the earnings for that year amounted to £1,610,129, the working expenses were £1,256,003, and the net receipts £354,126; this represents a return of 3·61% upon the capital cost.

Posts and Telegraphs.—The postal business has grown enormously since the gold discoveries. In 1905 there were 295 post offices as compared with 86 in 1891. In the latter year the letters despatched and received numbered 3,200,000, and the newspapers 1,665,000; in 1905 the letters and postcards totalled 22,107,000, and the newspapers and packets 14,800,000, being respectively 88 and 59 per head of population. There were in the same year 188 telegraph stations, 6389 m. of line, and 9637 m. of telegraph wire in use, while the number of telegrams sent and received was 1,634,597. There were sixteen public telephone exchanges and 4857 telephones in use at the end of that year.

Banking.—There are six banks of issue, with 109 branches in various parts of the country. The liabilities of these banks in 1904 averaged £5,206,170, and the assets £6,399,305; the note circulation was £354,810; the deposits bearing interest £1,475,616; deposits not bearing interest £3,258,294, making the total deposits £4,733,910. The gold and silver held by the banks, including bullion, was £2,129,304. The savings banks are directly controlled by the government and are attached to the post offices; in 1904 there were 54,873 depositors in these banks with £2,079,764 to their credit—an average of £37, 18s. per depositor. In 1891 there were only 3564 depositors and £46,181 at credit.

AUTHORITIES.—James Bonwick, *Western Australia, its Past and Future*, 8vo (London, 1885); Very Rev. J. Brady, *Descriptive Vocabulary of the Native Language of Western Australia* (Rome, 1845); Hon. D. W. Carnegie, *Spinifex and Sand* (London, 1898); Ernest Favenc, *The Great Australian Plain*, 8vo (Sydney, 1881), *Western Australia, its Past History, Present Trade and Resources, &c.* (Sydney, 1887); Sir John Forrest, *Explorations in Australia*, 8vo (London, 1875); M. A. C. Frazer, *Western Australia Year-Book*, annually (Perth). (T. A. C.)

History.—Both the western and northern coasts of the colony are pretty accurately laid down on maps said to date from 1540 to 1550, where the western side of the continent terminates at Cape Leeuwen. The discovery of the coast may be attributed to Portuguese and Spanish navigators, who were in the seas northward of Australia as early as 1520. The next visitors, nearly a century later, were the Dutch. John Edel explored northward in 1619, and De Witt in 1628. The "Gulde Zeepaard" in 1627 sailed along the south coast for 1000 m., the territory being named Nuyt's Land. Tasman made a survey of the north shore in 1644, but did not advance far on the western border. Dampier was off the north-west in 1688 and 1696, naming Shark's Bay. Vancouver entered King George Sound in 1791. The French, under D'Entrecasteaux, were off Western Australia in 1792; and their commodore Baudin, of the "Géographe" and "Naturaliste," in 1801 and 1802 made important discoveries along the western and north-western shores. Captain Flinders about the same time paid a visit to the Sound, and traced Nuyt's Land to beyond the South Australian boundary. Freycinet went thither in 1818. Captain King surveyed the northern waters between 1818 and 1822.

The earliest settlement was made from Port Jackson, at the end of 1825. Owing to a fear that the French might occupy King George Sound, Major Lockyer carried thither a party of convicts and soldiers, seventy-five in all, and took formal British possession, though Vancouver had previously done so. Yet the Dutch had long before declared New Holland, which then meant only the western portion of Australia, to be Dutch property. This convict establishment returned to Sydney in 1829. In 1827 Captain Stirling was sent to report upon the Swan river, and his narrative excited such interest in England as to lead to an actual free settlement at the Swan river. Captain Fremantle, R.N., in 1827 took official possession of the whole country. Stirling's account stimulated the emigration ardour of Sir F. Vincent, and Messrs Peel, Macqueen, &c., who formed an association, securing from the British government permission to occupy land in Western Australia proportionate to the capital invested, and the number of emigrants they despatched thither. In this way Mr Peel had a grant of 250,000 acres, and Colonel Latour of 103,000. Captain (afterwards Sir James) Stirling was appointed lieutenant-governor, arriving June 1, 1829. The people were scattered on large grants. The land was poor, and the forests heavy; provisions were at famine prices; and many left for Sydney or Hobart Town. The others struggled on, finding a healthful climate, and a soil favouring fruits and vegetables, whilst their stock grazed in the more open but distant quarters. The overland journey of Eyre from Adelaide to King George Sound in 1839–1840, through a waterless waste, discouraged settlers; but Grey's overland walk in 1838 from Shark's Bay to Perth revealed fine rivers and good land in Victoria district, subsequently occupied by farmers, graziers and miners. The difficulties of the settlers had compelled them to seek help from the British treasury, in the offer to accept convicts. These came in 1850; but transportation ceased in 1868, in consequence of loud protests from the other colonies.

The progressive history of Western Australia may be said to commence in 1870, when its energetic and capable governor Sir Frederick Weld, began to inaugurate public works on a large scale. It was still the day of small things, for the co[illegible] though of the enormous extent of 1,000,000 sq. m., was pr[illegible]tically unknown, its resources were restricted, and its popula[illegible] scanty. However, a beginning was then made, and the fir[illegible] Loan Bill to raise money for pushing on telegraphs, for surveying lines of projected railways, and above all for starting exploring expeditions, passed the Legislative Council. The colony was fortunate in possessing two brothers of the best practical type of explorer, John and Alexander Forrest. The object of their earliest expeditions was to find more land available for pastoral or agricultural settlement. Vast distances in various directions were covered, and severe hardships, chiefly from want of water, undergone by these intrepid pioneers. Perhaps the most famous of these journeys was that accomplished by Mr (afterwards Sir) John Forrest between Eucla and Adelaide in 1870. Other dauntless explorers—notably Mr Ernest Giles, the Gregorys and Mr Austin—had also contributed to the growing knowledge of the resources of the vast territory, and the state owes and gratefully acknowledges its debt to these stalwart and splendid pioneers. Although, in consequence of the vast amount of gold which had been found in the eastern colonies, principally in Victoria, all these explorers had carefully examined any likely country for traces of gold, it was not until 1882 that the government geologist reported indications of auriferous country in the Kimberley district, and the first payable gold-field was shortly afterwards "proclaimed" there. Exploring expeditions in every direction were then started both privately and publicly, and prosecuted with great vigour. Within five years gold-fields were proclaimed at Yilgarn, about 200 m. to the east of Perth, and the discovery of patches of rich alluvial gold in the Pilbarra district quickly followed, but the rush for the Coolgardie and Kalgoorlie gold-fields did not begin until 1893.

The year 1889 found the colony on the eve of responsible government. Two years before, a practically unanimous vote of the Legislature had affirmed the principle of autonomy, and the general election in the following year showed still more plainly the desire of the people of Western Australia for the self-government which had enabled the eastern colonies to control their own affairs successfully for thirty years. The new Legislative Council of 1889 therefore drafted a Constitution Bill, which after some discussion was forwarded to Lord Knutsford, the Secretary of State for the Colonies. This Bill was duly laid before the Imperial Parliament; but the measure was then rejected by that assembly, chiefly owing to the misunderstanding of vital questions, such as the control of crown lands, the scantiness of the scattered population, and other less important details. However, the governor of that day, Sir Frederick Napier Broome, K.C.M.G., having satisfied himself that the constitutional change was necessary not only for the immediate needs of the rapidly growing colony, but in view of the larger question of Imperial Federation, supported the demands of the Legislature in every possible way. A clear and able statement of the colonists' case, which appeared above his signature in *The Times* in the summer of that year, helped to bring about a better understanding of the subject; and a slightly modified Constitution Bill having been passed by the new Legislative Council, the governor and two members of the Legislature (Sir T. C. Campbell and Mr S. H. Parker, Q.C.) were selected to proceed to England as delegates to explain and urge the wishes of the colonists upon the Imperial Parliament. A select committee, with Baron de Worms as chairman, was appointed, and the matter was carefully considered; with the satisfactory result that the Bill enabling the Queen to grant a constitution to Western Australia passed its third reading in the House of Commons on 4th July, and received the royal assent on 15th August 1890.

Since then the colony has made great progress. Sir John Forrest, who was for ten years its Premier, brought to his arduous task not only administrative ability of a very high order, but a thorough and intimate knowledge of the needs and resources of the vast colony over so much of which he had travelled.

For a long time the advantages of Federation were not so apparent [illegible] teleg[illegible] one [illegible] to co[illegible] accus[illegible] desire to b[illegible] signed pet[illegible] regarded in [illegible] Still there wa[illegible] of Western Au[illegible] pledge for the r[illegible] early in 1900 Sir J[illegible] this concession from [illegible] unsuccessful, as was Mr [illegible] accompanied the dele[illegible] endeavoured to obtain the [illegible] recommendations of the [illegible] the people of Western Au[illegible] therefore it was considered [illegible] of the electors, when a ma[illegible] favour of Federation, as the C[illegible] state should have the right to [illegible] sister states for the desired five [illegible] rate of one-fifth of the amount of the [illegible] disappeared.

WESTFIELD, a township of Hampden [illegible] U.S.A., on the Westfield river, about 10 m. W. [illegible] (1890) 9805; (1900) 12,310 (2441 being fore[illegible] census) 13,611; (1910) 16,044. It is serve[illegible] New Haven & Hartford and the Boston & Al[illegible] is connected with Springfield, Holyoke and Hu[illegible] lines. The township lies in and on either side of a [illegible] valley, 6-7 m. long from east to west and 2-3 m. w[illegible] includes the large village of Westfield and the small v[illegible] East Farms, Mundale, Middle Farms, Little River, We[illegible] and Wyben. In the township are the Westfield State N[illegible] School (1844), the Westfield Atheneum (incorporated in [illegible]) which in 1910 had a library of 25,000 volumes, and the N[illegible] hospital (1893). Westfield Academy, a famous secondary school, chartered in 1793 and opened in 1800, was closed in 1866 and its building and grounds were sold in 1877 to the township for a public high school. Woronoco Park (200 acres), in the western part of the township, is a tract of great natural beauty. Westfield manufactures more whips than any other place in the United States, the factory of the United States Whip Company being one of the largest in the world; this industry was begun here early in the 19th century. Other important manufactures are foundry and machine-shop products, paper, thread and bicycles. In 1905 the value of the factory product was $5,818,130, an increase of 31% since 1900. A trading post, known by the Indian name Woronoco (or Woronoko), was established here about 1640. In 1669 the township, which had previously been part of Springfield, was erected under its present name—it was then the westernmost township in Massachusetts. Land was added to it in 1713, and parts were taken from it to add to Southwick (1770 and 1779), to Montgomery (1780), to Russell (1792), and to West Springfield (1802).

See James C. Greenough, "The Town of Westfield," in vol. ii. (pp. 317-456) of *A History of Hampden County, Massachusetts* (3 vols., 1902), edited by Alfred M. Copeland; and John Alden, *History of Westfield* (Springfield, 1851).

WESTGATE-ON-SEA, a watering-place in the Isle of Thanet parliamentary division of Kent, England, 2 m. W. by S. of Margate on the South-Eastern & Chatham railway. Pop. (1901) 2738. It is of modern growth and noted for its healthy climate. Facing the sea there are gardens and promenades over 1 m. in length, and there is a marine drive along the top of the cliffs. There are also golf links and other appointments of a popular resort. BIRCHINGTON, immediately to the west (pop. 2128), is also a growing resort. The church of All Saints is

Perpendicular, with an Early English tower, and contains some interesting monuments.

WEST HAM, a municipal, county, and parliamentary borough of Essex, England, forming an eastward suburb of London. Pop. (1891) 204,903, (1901) 267,358. The parish stretches north and south from Wanstead and Leyton to the Thames, and east and west from East Ham to the river Lea. It is divided into four wards—Church Street, Stratford-Langthorne, Plaistow and Upton. The church of All Saints has a good Perpendicular tower, but the remainder is extensively restored. There are a number of old monuments. In the restoration of 1866 some early mural painting was discovered, and a transition Norman clerestory was discovered, remaining above the later nave. There are several modern churches, and a Franciscan monastery and school (St Bonaventure's). West Ham Park (80 acres) occupies the site of Ham House and park, for many years the residence of Samuel Gurney, the banker and philanthropist. The place was purchased for £25,000, and vested in the corporation of London for the use of the public. Of this amount the Gurney family contributed £10,000 and the corporation the same sum, the remaining £5000 being collected from the inhabitants of West Ham. The house was taken down, and the park was opened in 1874. Mrs Elizabeth Fry lived in a house in Upton Lane, on the confines of her brother's park. In 1762 the number of houses in West Ham parish was stated to be 700, of which "455 are mansions and 245 cottages." Now few large houses remain, but the smaller houses have greatly increased. There are numerous chemical and other manufactures which have been removed from London itself; and the large population can also be traced in part to the foundation of the Victoria and Albert docks at Plaistow. Included within the borough are the extensive railway works of the Great Eastern railway at Stratford. This industrial centre is continued eastward in the urban district of East Ham (pop. 96,018), where the old village church of St Mary Magdalene retains Norman portions. West Ham is governed by a mayor, 12 aldermen and 36 councillors. Area 4683 acres.

At the time of the Conquest West Ham belonged to Alestan and Leured, two freemen, and at Domesday to Ralph Gernon and Ralph Peverel. West Ham village was included in the part which descended to the Gernons, who took the name of Montfichet. The manor of West Ham was settled upon Stratford-Langthorne Abbey, founded by William de Montfichet in 1135 for monks of the Cistercian order. The abbey stood in the marshes, on a branch of the Lea known as the Abbey Creek, about ½ m. south of Stratford Broadway. West Ham received the grant of a market and annual fair in 1253. The lordship was given to the abbey of Stratford, and, passing to the crown at the dissolution, formed part of the dowry of Catherine of Portugal, and was therefore called the Queen's Manor. In 1885 the urban sanitary district was erected into a parliamentary borough, returning two members for the northern and southern divisions respectively. It was incorporated in 1886.

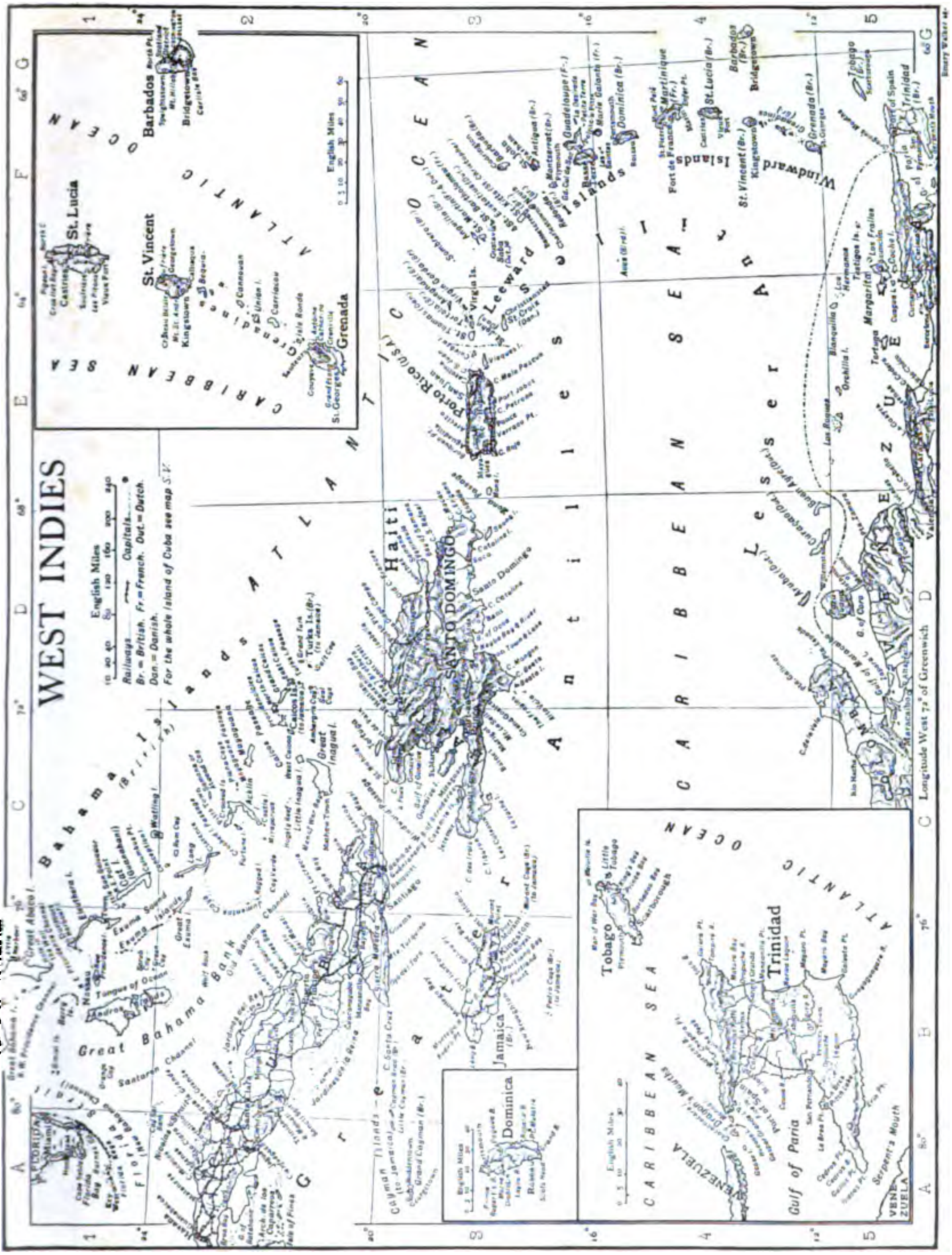
WEST HAVEN, a borough of Orange township, New Haven county, Connecticut, U.S.A., on New Haven Harbor and separated from New Haven by the West river. Pop., (1900) 5247 (893 foreign-born); (1910) 8543. West Haven is served by the New York, New Haven, & Hartford railway. It is mainly a residential suburb of New Haven. There is a public park, and Savin Rock, rising from Long Island Sound, is a summer resort. West Haven was set apart from New Haven in 1822 and was united with North Milford to form the township of Orange; it was incorporated as a borough in 1873.

WEST HOBOKEN, a town of Hudson county, New Jersey, U.S.A., in the N.E. part of the state, adjoining Hoboken and Jersey City. Pop. (1890) 11,665; (1900) 23,094, of whom 9119 were foreign-born; (1910, census) 35.403. For transportation facilities the town depends upon the railways serving Hoboken and Jersey City. West Hoboken lies about ¾ m. W. of the Hudson river, occupies a pleasant site somewhat higher than that of its neighbouring municipalities, and commands a fine view of the surrounding country. Among the prominent buildings are a Carnegie library, St Michael's Monastery (containing a theological school), a Dominican Convent, and several fine churches; and there are two Roman Catholic orphanages. The town is an important centre for the manufacture of silk and silk goods; in 1905 the value of these products was $4,211,018. West Hoboken was created a separate township in 1861, from a part of the township of North Bergen, and in 1884 was incorporated as a town.

WESTHOUGHTON, an urban district in the Westhoughton parliamentary division of Lancashire, England, 5 m. W.S.W. of Bolton on the Lancashire and Yorkshire railway. Pop. (1901) 14,377. There are coal mines in the neighbourhood, and the town possesses silk factories, print-works and cotton mills. Westhoughton before the time of Richard II. was a manor belonging to the abbey of Cockersand. It was confiscated at the Reformation, and since then has been vested in the crown. The army of Prince Rupert assembled on Westhoughton moor before the attack on Bolton.

WEST INDIES, THE, sometimes called the Antilles (*q.v.*), an archipelago stretching in the shape of a rude arc or parabola from Florida in North America and Yucatan in Central America to Venezuela in South America, and enclosing the Caribbean Sea (615,000 sq. m.) and the Gulf of Mexico (750,000 sq. m. in area). The land area of all the islands is nearly 100,000 sq. m., with an estimated population of about 6½ millions; that of the British islands about 12,000 sq. m. The islands differ widely one from another in area, population, geographical position, and physical characteristics. They are divided into the Bahamas, the Greater Antilles (Cuba, Jamaica, Haiti and Porto Rico), and the Lesser Antilles (comprising the remainder). The Lesser Antilles are again divided into the Windward Islands and Leeward Islands. Geographically, the Leeward Islands are those to the north of St Lucia, and the Windward, St Lucia and those to the south of it; but for administrative purposes the British islands in the Lesser Antilles are grouped as is shown in the table given later.

Geology.—The West Indies are the summits of a submerged mountain chain, the continuation of which towards the west must be sought in the mountains of Honduras. In Haiti the chain divides, one branch passing through Jamaica and the other through Cuba, the Cayman Islands and the Misteriosa Bank. In *Das Antlitz der Erde*, E. Suess divides the Antilles into three zones: (1) The first or interior zone, which is confined to the Lesser Antilles, is entirely of volcanic origin and contains many recent volcanic cones. It forms the inner string of islands which extends from Saba and St Kitts to Grenada and the Grenadines. The western part of the deep-cleft island Guadeloupe belongs to this zone. (2) The second zone consists chiefly of Cretaceous and early Tertiary rocks. In the west it is broad, including the whole of the Greater Antilles, but in the east it is restricted to a narrow belt which comprises the Virgin Islands (except Anegada), Anguilla, St Bartholomew, Antigua, the eastern part of Guadeloupe and part of Barbados. (3) The third and outermost zone is formed of Miocene and later beds, and the islands which compose it are flat and low. Like the second zone it is broad in the west and narrow in the east. It includes the Bahamas, Anegada, Sombrero, Barbuda and part of Barbados. Geologically, Florida and the plain of Yucatan may be looked upon as belonging to this zone. Neither Trinidad nor the islands off the Venezuelan coast can be said to belong to any of these three zones. Geologically they are a part of the mainland itself. They consist of gneisses and schists, supposed to be Archaean, eruptive rocks, Cretaceous, Tertiary and Quaternary deposits; and the strike of the older rocks varies from about W.S.W. to S.W. Geologically, in fact, these islands are much more nearly allied to the Greater Antilles and to Central America than they are to the Lesser Antilles; and there is accordingly some reason to believe that the arc formed by the West Indian Islands is really composite in origin. Although the three zones recognized by Suess are fairly clearly defined, the geological history of the Greater Antilles, with which must be included the Virgin Islands, differs considerably from that of the Lesser. In Cuba and Haiti there are schists which are probably of pre-Cretaceous age, and have, indeed, been referred to the Archaean; but the oldest rocks which have yet been certainly identified in the West Indies belong to the Cretaceous period. Throughout the Greater Antilles the geological succession begins as a rule with volcanic tuffs and conglomerates of hornblende-andesite, &c., in the midst of which are intercalated occasional beds of limestone with *Rudistes* and other Cretaceous fossils. These are overlaid by sediments of terrigenous origin, and the whole series was folded before the deposition of the next succeeding strata. The nature of these Cretaceous deposits clearly indicates the neighbourhood of an extensive area of land;


WEST INDIES
English Miles 0 10 20 40 80 120 160 200 240
Railways
Capitals
Br. = British. Fr. = French. Dut. = Dutch.
Dan. = Danish.
For the whole island of Cuba see map S.V.
Bahama Islands (British)
Great Bahama Bank
Florida
Andros I.
Nassau
Great Abaco I.
Eleuthera I.
Cat I.
Watling I.
Long I.
Exuma Sound
Tongue of Ocean
Old Bahama Channel
Crooked I.
Acklin
Mayaguana I.
Caicos Is.
Turks Is. (Br.)
Great Inagua I.
Little Inagua I.
Cuba
Santiago
Cayman Islands (to Jamaica)
Grand Cayman (Br.)
Jamaica (Br.)
Kingston
Haiti
SANTO DOMINGO
Santo Domingo
Porto Rico (U.S.A.)
Virgin Is.
St. Thomas
St. Croix (Dan.)
Leeward Islands
Antigua (Br.)
Guadeloupe (Fr.)
Montserrat
Dominica (Br.)
Martinique (Fr.)
Fort de France
St. Lucia (Br.)
Barbados (Br.)
Bridgetown
St. Vincent (Br.)
Kingstown
Windward Islands
Grenada (Br.)
Tobago (Br.)
Trinidad (Br.)
Port of Spain
Margarita
Tortuga
Curaçao (Dut.)
Aruba (Dut.)
Bonaire (Dut.)
Orchilla I.
Blanquilla
Los Roques
Aves (Br.)
VENEZUELA
Maracaibo
G. of Maracaibo
Valencia
Greater Antilles
Lesser Antilles
ATLANTIC OCEAN
CARIBBEAN SEA
St. Lucia
Castries
St. Vincent
Grenadines
Bequia
Carriacou
Grenada
St. George's
Barbados
Bridgetown
Dominica
Roseau
Tobago
Scarborough
Trinidad
Gulf of Paria
Serpent's Mouth
Dragon's Mouths
Port of Spain
San Fernando
Longitude West 72° of Greenwich
A B C D E F G
1 2 3 4 5
Emery Walker sc.

but during the succeeding Eocene period and the early part of the Oligocene, a profound subsidence led to the deposition of the Globigerina chalks and white Radiolarian earths of Jamaica, Cuba and Haiti. The Greater Antilles must at this time have been almost completely submerged, and the similar deposits of Barbados and Trinidad point to a similar submergence beyond the Windward Islands. In the middle of the Oligocene period a mighty upheaval, accompanied by mountain folding and the intrusion of plutonic rocks, raised the Greater Antilles far above their present level, and united the islands with one another, and perhaps with Florida. A subsequent depression and a series of minor oscillations finally resulted in the production of the present topography.

The geology of the Lesser Antilles is somewhat different. In some of the islands there are old volcanic tuffs which may possibly be the equivalents of the Cretaceous beds of Jamaica, but volcanic activity here continued throughout the Tertiary period and even down to the present day. Another important difference is that except in Trinidad and Barbados, which do not properly belong to the Caribbean chain, no deep-sea deposits have yet been found in the Lesser Antilles and there is no evidence that the area ever sank to abysmal depths.

In the foregoing account the chronology of R. T. Hill has been followed; but there is still considerable difference of opinion as to the ages and correlation of the various Tertiary deposits and consequently as to the dates of the great depression and elevation. J. W. Spencer, for example, places the greatest elevation of the Antilles in the Pliocene and Pleistocene periods. Moreover, chiefly on the evidence of submerged valleys, he concludes that practically the whole of the Caribbean Sea was land and that a complete connexion existed, by way of the West Indian bridge, between North and South America.[1]

The mineral wealth of the islands is not remarkable. Gold, silver, iron, copper, tin, platinum, lead, coal of a poor quality, cobalt, mercury, arsenic, antimony, manganese, and rock salt either have been or are worked. Asphalt is worked to considerable advantage among the pitch lakes of Trinidad. Opal and chalcedony are the principal precious stones.

Climate.—As in most tropical countries where considerable heights are met with—and here over 15,500 sq. m. lie at an elevation of more than 1500 ft. above sea-level—the climate of the West Indies (in so far at least as heat and cold are concerned) varies at different altitudes, and on the higher parts of many of the islands a marked degree of coolness may generally be found. With the exception of part of the Bahamas, all the islands lie between the isotherms of 77° and 82° F. The extreme heat, however, is greatly tempered by the sea breezes, and by long, cool, refreshing nights. Frost is occasionally formed in the cold season when hail falls, but snow is unknown. The seasons may be divided as follows. The short wet season, or spring, begins in April and lasts from two to six weeks, and is succeeded by the short dry season, when the thermometer remains almost stationary at about 80° F. In July the heat increases to an extent well nigh unbearable. No change occurs till after a period varying from the end of July to the beginning of October, when the great rainfall of the year begins, accompanied by tremendous and destructive hurricanes. This season is locally known as the "hurricane months." The annual rainfall averages 65 in. These storms arise in the Atlantic and towards the east. For a day or two they follow a westerly course, inclining, at the same time, one or two points towards the north, the polar tendency becoming gradually more marked as the distance from the equator increases. When the hurricanes reach latitude 25° N., they curve to the north-east, and almost invariably wheel round on arriving at the northern portion of the Gulf of Mexico, after which they follow the coast line of North America. Their rate of speed varies considerably, but may be said to average 300 m. per day among the islands. The usual signs of the approach of the cyclones are an ugly and threatening appearance of the weather, sharp and frequent puffs of wind, increasing in force with each blast, accompanied with a long heavy swell and confused choppy sea, coming from the direction of the approaching storm. December marks the beginning of the long dry season, which, accompanied by fresh winds and occasional hail showers, lasts till April. The average temperature of the air at Barbados, which may be taken as a favourable average, is, throughout the year, 80° F. in the forenoon, and about 82° in the afternoon. The maximum is 87°, and the minimum 75°.

Flora.—The flora of the islands is of great variety and richness, as plants have been introduced from most parts of the globe, and flourish either in a wild state or under cultivation; grain, vegetables, and fruits, generally common in cool climates, may be seen growing in luxuriance within a short distance of like plants which only attain perfection under the influence of extreme heat, nothing being here required for the successful propagation of both but a difference in the height of the lands upon which they grow. The forests, which are numerous and wide-spreading, produce the most valuable woods and delicious fruits. Palms are in great variety, and there are several species of gum-producing trees. Some locust trees have been estimated to have attained an age of 4000 years, and are of immense height and bulk. *Piptadenia*, on account of its almost imperishable character when in the ground, is used as a material for house-building. *Xanthoxylon*, the admired and valuable satin-wood of commerce, is common, *Sapindus* finds a ready market on account of its toughness; crab-wood yields a useful oil and affords reliable timber; and tree ferns of various species are common. Pimento is peculiar to Jamaica. But it is to the agricultural resources of the islands that the greatest importance attaches. For centuries almost the whole care of the planters was bestowed upon the cultivation of the sugar-cane and tobacco plant, but in modern times, as will be seen later, attention has been turned to the production of other and more varying crops. Crops of tobacco, beans, peas, maize, and Guinea corn are popular, and a species of rice, which requires no flooding for its successful propagation, is largely produced. *Hymenachne striatum* covers many of the plains, and affords food for cattle.

Fauna.—The fauna of the region is Neotropical, belonging to that region which includes South and part of Central America, although great numbers of birds from the North-American portion of the Holarctic realm migrate to the islands. The resident birds, however, eighteen genera of which are certainly Neotropical, show beyond doubt to which faunal region the islands properly belong. Mammals are, as in most island groups, rare. The agouti abounds, and wild pigs and dogs are sufficiently numerous to afford good sport to the hunter, as well as smaller game, in the shape of armadillos, opossums, musk-rats and raccoons. The non-migrating birds include trogons, sugar-birds, chatterers, and many parrots and humming birds. Waterfowl and various kinds of pigeons are in abundance. Reptiles are numerous: snakes—both the boa and adder—are innumerable, while lizards, scorpions, tarantulas and centipedes are everywhere. Insects are in great numbers, and are often annoying. Among domestic animals mules are largely reared, and where the country affords suitable pasture and forage cattle-breeding is practised. Goats abound, and large flocks of sheep are kept for the sake of their flesh alone, as the climate is not adapted for wool-growing.

Area and Population.—The following list of the West Indian islands gives their area and population. Notwithstanding the

Name.	Area, sq. m.	Population.	
		1881.	1901 (unless stated).
British—			
Bahamas	5,450	43,521	53,735
Jamaica	4,207	584,170	806,690[1]
Turks Island	169	4,732	5,287
Leeward Islands:			
Virgin Islands	58	5,287	4,908
St Kitts	63	41,001	29,782
Nevis	50		12,774
Antigua	108	34,964	34,178
Montserrat	32½	10,083	12,215
Dominica	291	28,211	28,894
Barbados	166	171,860	195,588
Windward Islands:			
St Lucia	233	38,551	49,833
St Vincent	140	40,548	44,000[2]
Grenada	133	42,430	63,438
Trinidad	1,754	171,179	233,397
Tobago	114		18,751
French—			
Guadeloupe	688	..	182,110
Martinique	380	..	182,024[3]
St Martin (part)	17	..	3,000[6]
Dutch—			
St Martin (part)	21	..	3,187[4]
Curaçao	212	..	30,883
Buen Ayre	95	..	6,233
Aruba	69	..	8,555
St Eustatius	8	..	1,283
Saba	5	..	2,294
Danish—			
St Thomas	33	..	11,012
St John	21	..	925
St Croix	84	..	18,590
U.S.A.—			
Porto Rico	3,606	..	1,118,012[5]
Republics—			
Santo Domingo	18,045	..	500,000[6]
Haiti	10,240	..	800,000[6]
Cuba (and adjacent islands)	45,000	..	2,048,980[7]

[1] Estimate, 1905. [2] Estimate, 1906. [3] 1905.
[4] Populations of all Dutch islands are for 1908.
[5] 1910. [6] Estimate. [7] 1907.

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[1] See E. Suess, *Das Antlitz der Erde* (Wien, 1885; Eng. trans., Oxford, 1904); J. W. Spencer, "Reconstruction of the Antillean Continent," *Bull. Geol. Soc. Amer.*, vol. vi. (1895), p. 103 (Abstract in Geol. Mag., 1894, pp. 448-451); see also a series of papers by J. W. Spencer in *Quart. Journ. Geol. Soc.*, vols. lxvii., lxviii. (1901, 1902); R. T. Hill, "The Geology and Physical Geography of Jamaica," *Bull. Mus. Comp. Zool. Harvard*, vol. xxxiv. (1899).

operations of educational institutions and of large numbers of missionaries of various religious denominations, the percentage of illegitimate births among the population of the British West Indian islands remains very high—in Barbados about 54, in Jamaica, 63; in Trinidad, 59% of the general births; and 79% of the East Indian.

The population of the West Indies represents many original stocks, the descendants of which have developed variations of habits and customs in their New World environment. They may be divided into six main classes: (1) Europeans—immigrants (British, French, Spanish and in a lesser degree Dutch, Danish and German) and West Indian born; (2) African negroes—immigrants (a fast vanishing quantity) and West Indian born; (3) a mixture of Europeans and Africans, (4) coolies from India—imported and West Indian born; (5) Chinese, (6) aboriginal Indians of more or less pure descent. Of these, the people of pure African blood are in a large majority, the "coloured" race of mixed European and African blood being next in numerical importance. Under British influence the negroes of the West Indies have become British in thought and habit; and it would seem that the stimulating influence of European direction and encouragement is absolutely necessary for the future development and progress of these islands. In the republics of Santo Domingo and Haiti the negroes are left to drift along, while the French and Danish islands show no great sign of progress.

British Colonies, Government, &c.—The British West India colonies[1] are either crown colonies—that is to say, their government is absolutely under the control of the British Colonial Office, the official members of their councils predominating, and the unofficial members being nominated by the crown, as in the Windward and Leeward Islands—or they have a measure of representative government, as in the Bahamas, Barbados and Jamaica, in which all or part of the legislatures are elected and are more or less independent of crown control. The laws of the various colonies are English, with local statutes to meet local needs. The governors and high officials are appointed by the crown; other officials are appointed by the governor. Each governor acts under the advice of a privy council. In matters of detail the colonies present a variety of forms of government (for which see the separate articles). Federation has been widely discussed and is held desirable by many, but in view of the insular character of the colonies, the considerable distances separating some of them, and in many instances the lack of common interests (apart from certain broad issues), the project appears to be far from realization.

The only fortified places in the British West Indies are Jamaica, Barbados and St Lucia—all of importance as coaling stations. In many of the islands there are local volunteer forces. The police forces of the colonies are in the main modelled on the Irish constabulary, supplemented by rural constabulary. The force is usually officered by Europeans.

Economic Conditions.—The West Indian colonies have suffered from periods of severe economic depression, though from the early years of the 20th century there has been good evidence of recovery and development. An obvious reason for temporary depression is the liability of the islands to earthquakes and hurricanes, in addition to eruptions in the volcanic islands, such as those in St Vincent and Martinique in 1902. For example, the great earthquake of January 1907 in Jamaica may be recalled, and hurricanes caused serious damage in Jamaica in August 1903 and November 1909, and in the Bahamas in September and October 1908. A treasury fund has been established in Jamaica as a provision against the effects of such disasters. It has been stated that the excessive rainfall which accompanies these storms is of great ultimate benefit to the soil.

The British West Indian colonies do not offer opportunities for ordinary labouring immigrants. Barbados is the only island where the land is entirely settled. But the settlement, planting [illegible] of lands elsewhere involve a considerable [illegible], and manual labour is provided by the natives or East Indian coolies. Attempts to settle European labourers have been unsuccessful. The West Indian negro, as a labouring class, has frequently been condemned as averse from regular work, apathetic in regard to both his own and his colony's affairs, immoral and dishonest. In so far as these shortcomings exist, they are due to the tendencies inherited from the period of slavery, to the ease with which a bare livelihood may be obtained, and to other such causes. But for the most part the negroes appreciate their advantages under British government and are quick to assimilate British customs and ideas. Advances in the system of peasant proprietorship have brought beneficial results. The drafting of large numbers of labourers from the West Indies to the Panama canal works early in the 20th century, though causing a shortage of labour and involving legislation in some of the islands, exercised a moral effect on the natives by enlarging their horizon.

The growth of general prosperity in the British West Indies is assigned[2] "to the revival of the sugar industry, to the development of the fruit trade; to the increase in the cultivation of cocoa and cotton, to the volume of tourist travel, which swells year by year; and to such local developments as the 'boom' in Trinidad oil." It was pointed out in the *Report* of the Royal Commission on Trade Relations between Canada and the West Indies (Cd. 5369, London, 1910) that "the geographical position of the West Indian Colonies must always tend to throw them under the influence of the fiscal system either of the United States or of the Dominion of Canada. Attempts have been made from time to time to obtain for these Colonies special advantages in the markets of the United States. . . . The Colonial policy of the United States has now finally stopped advance in that direction," and the connexion with the Dominion has therefore become of paramount importance. The Dominion government admitted the West Indies to the British preferential tariff (25% under existing duties) in 1898. The percentage was raised to 33⅓ in 1900. In 1903 the duties imposed on bounty-fed beet sugar in the United States, which had opened the market there to West Indian sugar, were abolished, and a surtax (since removed) was placed on German imports into Canada. Both acts enhanced the value of the Canadian market to the West Indies, while that of the American sugar market was further reduced when in 1901 sugar from Porto Rico began to be admitted thereto free of duty, and when special terms were extended to sugar from the Philippine Islands and Cuba in 1902 and 1903 respectively. The Canadian connexion was thus largely instrumental in saving the sugar industry in the West Indies from severe depression, if not from the actual extinction foreseen by a Royal Commission in 1897. This commission pointed out, in particular, the danger which threatened those colonies where sugar provided practically the sole industrial and commercial interest. On a recommendation of this commission the Imperial Department of Agriculture was established in 1898, its cost being met from imperial funds. It is under a commissioner with headquarters at Barbados. Its functions are to maintain and supervise botanical and experimental stations, to establish agricultural schools, arrange agricultural teaching in other schools, create scholarships, and issue publications. The department has been largely instrumental in establishing new industries and thus relieving many islands from dependence on the sugar industry alone.

The negotiations for commercial relations between the West Indies and Canada began in 1866; in 1872 proposals for steamship subsidies were accepted. The Commission of 1909 recommended that the governments should continue to subsidize a service, for which they suggested various improvements. In 1901 a line of subsidized steamers had been started between Jamaica and England, but this contract expired, and the mail contract was determined in 1910, and recommendations were put forward for a steamship service between Canadian and West Indian ports with improvements additional to those recommended by the Commission. It may be added that the

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[1] [illegible] practice to include British Guiana with these, [illegible] is confined to the insular colonies.

[2] In *The Times* of May 24, 1910, where, in an imperial supplement, a number of articles on the West Indian colonies appear.

Commission also made recommendations for the reduction of the high cable rates between the West Indies and the United Kingdom.

Besides sugar, the principal products of the islands are cocoa, fruits and cotton. Cotton-growing reached importance in a very short time owing largely to the efforts of the Imperial Department of Agriculture, Sea Island seed having been planted in St Vincent only in 1903, and in that island and elsewhere (Antigua, St Kitts, Montserrat) good crops are now obtained. Grenada is almost entirely, and Trinidad, Dominica and St Lucia are largely, dependent upon cocoa. The fruit and spice trade is of growing importance, and there is a demand for bottled fruit in Canada and elsewhere. The variety of fruits grown is great; the bananas and oranges of Jamaica, the limes of Montserrat, Dominica and St Lucia, and the pine-apples of the Bahamas may be mentioned as characteristic. It must be borne in mind, however, that the islands as a whole cannot be said to possess a community of commercial interests. Even the industries already indicated are by no means equally distributed throughout the islands; moreover there are certain local industries of high importance, such as the manufacture of rum in Jamaica, the production of asphalte and the working of the oilfields (the development of which was first seriously undertaken about 1905) in Trinidad, and the production of arrowroot in St Vincent. Sponges are an important product of the Bahamas, and salt of the Turks Islands. Rubber plantation has been successfully exploited in several islands, such as Trinidad, Dominica and St Lucia. (See further articles on the various islands.)

Religion.—In all the British colonies there is full religious toleration. The Church of England Province of the West Indies is divided into the following bishoprics: Jamaica, Nassau (*i.e.* Bahamas), Trinidad, (British) Honduras, Antigua (*i.e.* Leeward Islands), Barbados, Windward Islands, (British) Guiana. With the exception of Barbados and British Guiana, the Church of England is disestablished, disendowment taking place gradually, the churches thus becoming self-supporting. In Barbados the Church is both established and endowed. In the Bahamas and Jamaica disendowment is gradually taking place; in Trinidad and British Guiana the Church of England receives endowment concurrently with other religious bodies. The Windward Islands, Leeward Islands and British Honduras are totally disendowed. In all the islands, except Trinidad, St Lucia, Grenada and Dominica, the Church of England, though in all cases in a minority when compared with the aggregate of other bodies, is the most numerous of any denomination. There are Roman Catholic bishops at Port-of-Spain (Trinidad), Roseau (Dominica—for the Leeward Islands), Jamaica, British Guiana and Barbados (resident at Georgetown), British Honduras, Guadeloupe, Martinique, Haiti (archbishop and four bishops), Santo Domingo (archbishop), Cuba (archbishop and bishop), Porto Rico and Curaçao. Other religious denominations working actively in the West Indies are the Baptists, Wesleyans, Presbyterians, Congregationalists and Moravians.

History.—The archipelago received the name of the West Indies from Columbus, who hoped that, through the islands, he had found a new route to India. The name of Antilles was derived from the fact that Columbus, on his arrival here, was supposed to have reached the fabled land of Antilia. Columbus first landed on San Salvador, generally identified with Watling Island of the Bahamas, and several voyages to this new land were made in rapid succession by the great discoverer, resulting in the finding of most of the larger islands, and a more intimate knowledge of those already known. The importance of its latest possession was at once recognized by the court of Spain, and, as a first move towards turning the West Indies to profitable account, numbers of the natives, for the most part a harmless and gentle people, were shipped overseas and sold into slavery, others being employed in forced labour in the mines which the Spaniards had opened throughout the archipelago, and from which large returns were expected. Thus early in its history began that traffic in humanity with which the West India plantations are so widely associated, and which endured for so long a time. Goaded to madness by the wrongs inflicted upon them, the aborigines at last took arms against their masters, but with the result which might have been expected—their almost utter extirpation. Many of the survivors sought release from their sufferings in suicide, and numbers of others perished in the mines, so that the native race soon almost ceased to exist. Spain was not long allowed to retain an undisputed hold upon the islands: British and Dutch seamen soon sought the new region, accounts concerning the fabulous wealth and treasure of which stirred all Europe, and a desultory warfare began to be waged amongst the various voyagers who flocked to this El Dorado, in consequence of which the Spaniards found themselves gradually but surely forced from many of their vantage grounds, and compelled very materially to reduce the area over which they had held unchecked sway. The first care of the English settlers was to find out the real agricultural capabilities of the islands, and they diligently set about planting tobacco, cotton and indigo. A French West India Company was incorporated in 1625, and a settlement established on the island of St Christopher, where a small English colony was already engaged in clearing and cultivating the ground; these were driven out by the Spaniards in 1630, but only to return and again assume possession. About this time, also, the celebrated buccaneers, Dutch smugglers, and British and French pirates began to infest the neighbouring seas, doing much damage to legitimate traders, and causing commerce to be carried on only under force of arms, and with much difficulty and danger. Indeed, it was not till the beginning of the 18th century—some time after Spain had, in 1670, given up her claim to the exclusive possession of the archipelago—that these rovers were rendered comparatively harmless; and piracy yet lingered off the coasts down to the early years of the 19th century. In 1640 sugar-cane began to be systematically planted, and the marvellous prosperity of the West Indies began; it was not from the gold and precious stones, to which the Spaniards had looked for wealth and power, but from the cane that the fortunes of the West Indies were to spring. The successful propagation of this plant drew to the islands crowds of adventurers, many of them men of considerable wealth. The West Indies were for many years used by the English government as penal settlements, the prisoners working on the plantations as slaves. In 1655 a British force made an unsuccessful attack on Haiti, but a sudden descent on Jamaica was more fortunate in its result, and that rich and beautiful island has since remained in the possession of Great Britain. The Portuguese were the first to import negroes as slaves, and their example was followed by other nations having West-Indian colonies, the traffic existing for about 300 years. In 1660 a division of the islands was arranged between England and France, the remaining aborigines being driven to specified localities, but this treaty did not produce the benefits expected from it, and as wars raged in Europe the islands (see separate articles) frequently changed hands.

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WESTMACOTT, SIR RICHARD (1775–1856), British sculptor, was born in London, and while yet a boy learned the rudiments of the plastic art in the studio of his father, who was then a sculptor of some reputation. In 1793, at the age of eighteen, he went to Rome and became a pupil of Canova, then at the height of his fame. Under the prevailing influences of Italy at that time, Westmacott devoted all his energies to the study of classical sculpture, and throughout his life his real sympathies were with pagan rather than with Christian art. Within a year of his arrival in Rome he won the first prize for sculpture offered by the Florentine academy of arts, and in the following year (1795) he gained the papal gold medal awarded by the Roman Academy of St Luke with his bas-relief of Joseph and his brethren. In 1798, on the 20th of February, he married Dorothy Margaret, daughter of Dr Wilkinson of Jamaica. On his return to London Westmacott began to exhibit his works yearly at the Royal Academy, the first work so exhibited being his bust of Sir William Chambers. In 1805 he was elected an associate, and in 1811 a full member of the Royal Academy, his diploma work being a "Ganymede" in high relief; in 1827 he was appointed to succeed Flaxman as Royal Academy professor of sculpture, and in 1837 he was knighted. A very large number of important public monuments were executed by him, including many portrait statues; but little can be said in praise of such works as the statue on the duke of York's column (1833), the portrait of Fox in Bloomsbury Square, or that of the duke of Bedford in Russell Square. Much admiration was expressed at the time for Westmacott's monuments to Collingwood and Sir Ralph Abercromby in St Paul's Cathedral, and that of Mrs Warren in Westminster Abbey; but subjects like these were far less congenial to him than sculpture of a more classical type, such as the pedimental figures representing the progress of civilization over the portico of the British Museum, completed in 1847, and his colossal nude statue of Achilles in bronze, copied from the original on Monte Cavallo in Rome, and reared in 1822 by the ladies of England in Hyde Park as a compliment to the duke of Wellington. He died on the 1st of September 1856.

WESTMEATH, EARL OF, a title held in the Irish family of Nugent since 1621. During the reign of Henry II. Sir Gilbert Nugent received the lordship or barony of Delvin in Meath, which soon passed by marriage from the Nugents to the family of Fitzjohn. About two hundred years later the barony returned to the Nugent family, Sir William Nugent (d. *c.* 1415) marrying Catherine, daughter of John Fitzjohn. The barony, however, is considered to date from the time of Sir William Nugent and not from that of Sir Gilbert, 1389 being generally regarded as the date of its creation.

Sir William Nugent, who is generally called the 1st, but sometimes the 9th, baron Delvin, was succeeded by his son Sir Richard (d. *c.* 1460) as 2nd baron. In 1444 and 1449 Sir Richard was lord deputy of Ireland. His grandson, Richard, the 4th baron (d. *c.* 1538), was summoned to the Irish parliament in 1486. During his whole life he was loyal to the English king, and both before and after the years 1527 and 1528 when he was lord deputy, he took a vigorous part in the warfare against the Irish rebels. Among his descendants was Robert Nugent, Earl Nugent (*q.v.*). Richard's grandson, Christopher, the 6th baron (*c.* 1544–1602), also served England well, but about 1576 he fell under the displeasure of Queen Elizabeth and he was several times imprisoned, being in the intervals employed in Ireland. He was a prisoner in Dublin Castle when he died. Delvin wrote *A Primer of the Irish Language, compiled at the request and for the use of Queen Elizabeth.*

His son, Richard, the 7th baron (1583–1642), took part in 1606 in a plot against the English government and was imprisoned, but he soon escaped from captivity and secured a pardon from James I. In 1621 he was created earl of Westmeath. Having refused in 1641 to join the Irish rebellion, he was attacked by a party of rebels and was so seriously injured that he died shortly afterwards. His grandson, Richard, the 2nd earl (d. 1684), served Charles II. against Cromwell in Ireland and afterwards raised some troops for service in Spain. His grandson Thomas, the 4th earl (1656–1752), served James II. in Ireland. Thomas's brother, John, the 5th earl (1672–1754), left Ireland after the final defeat of James II. and took service in France. He fought against England at the battles of Ramillies, Oudenarde and Malplaquet and remained on active service until 1748. He died in Brabant on the 3rd of July 1754. His son Thomas, the 6th earl (d. 1792), also served in the French army; later he conformed to the established religion, being the first Protestant of his house, and took his seat in the Irish House of Lords in 1755. His son George Frederick, the 7th earl (1760–1814), a member of the Irish House of Commons before 1792, was succeeded by his son George Thomas John (1785–1871), who was created marquess of Westmeath in 1822 and who was an Irish representative peer from 1831 to 1871. He died without legitimate sons on the 5th of May 1871, when th[illegible]ame extinct.

The earldom of Westmeath now passed to a distant cousin, Anthony Francis Nugent (1805–1879), a descendant of Thomas Nugent (d. 1715) of Pallas, Galway, who was a son of the 2nd earl. Thomas was chief justice of Ireland from 1687 until he was outlawed by the government of William III. In 1689 he was created by James II. baron of Riverston, but the validity of this title has never been admitted. In 1883 his descendant, Anthony Francis (b. 1870), became the 11th earl.

Cadets of the Nugent family were Nicholas Nugent (d. 1582), chief justice of the common bench in Ireland, who was hanged for treason on the 6th of April 1582; William Nugent (d. 1625) an Irish rebel during the reign of Elizabeth; Sir George Nugent, Bart. (1757–1849), who, after seeing service in America and in the Netherlands, was commander-in-chief in India from 1811 to 1813 and became a field-marshal in 1846; and Sir Charles Edmund Nugent (*c.* 1759–1844), an admiral of the fleet. More famous perhaps was Lavall, Count Nugent (1777–1862), who rose to the rank of field-marshal in the Austrian army and was made a prince of the empire. His long and honourable military career began in 1793 and sixty-six years later he was present at the battle of Solferino. His most distinguished services to Austria were during the war with France in 1813 and 1814, and he was also useful during the revolution in Hungary in 1849.

See D'Alton, *Pedigree of the Nugent Family;* and *Historical Sketch of the Nugent Family,* printed by J. C. Lyons (1853).

WESTMEATH, a county of Ireland in the province of Leinster, bounded N.W. by Longford, N. by Cavan, N.E. and E. by Meath, S. by King's county, and W. by Roscommon. The area is 454,104 acres, or about 709 sq. m. The Shannon forms the western boundary. The average height of the surface of the county is over 250 ft. above sea-level. The highest summits are Knocklayde (795 ft.), Hill of Ben (710 ft.) and Knockayon (707 ft.). A large surface is occupied by bog. A special feature of Westmeath is the number of large loughs, which have a combined area of nearly 17,000 acres. In the north, on the borders of Cavan, is Lough Sheelin, with a length of 5 m., and an average breadth of between 2 and 3 m., and adjoining it is the smaller Lough Kinale. In the centre of the county there is a group of large loughs, of which Lough Dereveragh is 6 m. long by 3 broad at its widest part. To the north of it are Loughs Lene, Glore, Bawn and others, and to the south Loughs Iron and Owel. Farther south is Lough Ennell or Belvidere, and in the south-west Lough Ree, a great expansion of the river Shannon, forming part of the boundary with Roscommon. The river Inny, which rises in Co. Cavan, enters Westmeath from Lough Sheelin, and, forming for parts of its course the boundary with Longford, falls into Lough Ree. The Inny has as one of its tributaries the Glore, flowing from Lough Lene through Lough Glore, a considerable part of its course being underground. From Lough Lene the Dale also flows southwards to the Boyne and so to the Irish Sea, and thus this lake sends its waters to the opposite shores of the island. The Brosna flows from Lough Ennell southwards by King's county into the Shannon. The Westmeath loughs have a peculiar fame among anglers for the excellence of their trout-fishing.

Westmeath is essentially a county of the great Carboniferous Limestone plain, with numerous lakes occupying the hollows. Two or three little inliers of Old Red Sandstone, as at Killucan and Moate, form distinctive hills, about 500 ft. in height. At Sron Hill near Killucan, a core of Silurian strata appears within the sandstone dome. A considerable system of eskers, notably north of Tullamore, diversifies the surface of the limestone plain.

The soil is generally a rich loam of great depth resting on limestone, and is well adapted both for tillage and pasturage. The occupations are almost wholly agricultural, dairy farming predominating. Flour and meal are largely produced. The only textile manufactures are those of friezes, flannels, and coarse linens for home use. The only mineral of any value is limestone.

The main line of the Midland Great Western railway enters the county from E. and passes W. by Mullingar and Athlone. From Mullingar a branch runs N.W. to Inny Junction, where lines diverge N. to Cavan (county Cavan), and W.N.W. to Longford (county Longford) and Sligo. A branch of the Great Southern & Western railway runs from Portarlington (Queen's county) to Athlone, and this and the Midland Great Western main line are connected by a short line between Clare and Streamstown, worked by the latter company. Water communication with Dublin is furnished by the Royal Canal, traversing the centre of the county. A branch of the Grand Canal reaches Kilbeggan in the south.

The population (68,611 in 1891; 61,629 in 1901) decreases in excess of the average shown by the Irish counties, and emigration is considerable. About 92% of the total are Roman Catholics, and about 86% constitute the rural population. The principal towns are Athlone (pop. 6617), of which the part formerly in Roscommon was added to Westmeath by the Local Government (Ireland) Act of 1898, and Mullingar (4500), the county town. Castlepollard and Moate are lesser market towns. By the Redistribution Act of 1885 Westmeath was formed into two parliamentary divisions, North and South, each returning one member, Athlone being included in the county representation. The county is divided into twelve baronies. Assizes are held at Mullingar and quarter sessions at Mullingar and Moate. The county is in the Protestant dioceses of Dublin, Killaloe and Ossory, and in the Roman Catholic dioceses of Kildare and Leighlin, Killaloe and Ossory.

Westmeath was severed from Meath (*q.v.*) in 1543. The plan for the insurrection of 1641 was concerted in the abbey of Multifarnham, and both in the wars of this period and those of 1688 the gentry of the county were so deeply implicated that the majority of the estates were confiscated. There are a considerable number of raths or encampments: one at Rathconrath is of great extent; another at Ballymore was fortified during the wars of the Cromwellian period and those of 1688, and was afterwards the headquarters of General Ginkell, when preparing to besiege Athlone; and there is a third of considerable size near Lough Lene. The ruins of the Franciscan abbey of Multifarnham, founded in 1236 by William Delaware, picturesquely situated near Lough Dereveragh, include a tower 93 ft. in height.

WESTMINSTER, MARQUESSES AND DUKES OF. The title of marquess of Westminster was bestowed in 1831 upon Robert Grosvenor, 2nd Earl Grosvenor (1767–1845), whose grandson, Hugh Lupus Grosvenor (1825–1899), was created duke of Westminster in 1874. The family of Grosvenor is of great antiquity in Cheshire, the existence of a knightly house of this name (Le Grosvenur) in the palatine county being proved by deeds as early as the 12th century (see *The Ancestor*, vi. 19). The legend of its descent from a nephew of Hugh Lupus, earl of Chester, perpetuated in the name of the first duke, and the still more extravagant story, repeated by the old genealogists and modern "peerages," of its ancestors, the "grand huntsmen" (*gros veneurs*) of the dukes of Normandy, have been exploded by the researches of Mr W. H. B. Bird (see "The Grosvenor Myth" in *The Ancestor*, vol. i. April 1902). The ancestors of the dukes of Westminster, the Grosvenors of Eaton, near Chester, were cadets of the knightly house mentioned above, and rose to wealth and eminence through a series of fortunate marriages. Their baronetcy dates from 1622.

Sir Thomas Grosvenor, the 3rd baronet (1656–1700), in 1676 married Mary (d. 1730), heiress of Alexander Davies (d. 1665), a scrivener. This union brought to the Grosvenor family certain lands, then on the outskirts of London, but now covered by some of the most fashionable quarters of the West End. Sir Thomas's sons, Richard (1689–1732), Thomas (1693–1733) and Robert (d. 1755), succeeded in turn to the baronetcy, Robert being the father of Sir Richard Grosvenor (1731–1802), created Baron Grosvenor in 1761 and Viscount Belgrave and Earl Grosvenor in 1784. The 1st earl, a great breeder of racehorses, was succeeded by his only surviving son Robert (1767–1845), who rebuilt Eaton Hall and developed his London property, which was rapidly increasing in value. In the House of Commons, where he sat from 1788 to 1802, he was a follower of Pitt, who made him a lord of the admiralty and later a commissioner of the board of control, but after 1806 he left the Tories and joined the Whigs. He was created a marquess at the coronation of William IV. in 1831. His son, Richard, the 2nd marquess, (1795–1869), was a member of parliament from 1818 to 1835 and lord steward of the royal household from 1850 to 1852. The latter's son, Hugh Lupus (1825–1899), created a duke in 1874, was from 1847 to 1869 member of parliament for Chester and from 1880 to 1885 master of the horse under Gladstone, but he left the Liberal party when the split came over Home Rule for Ireland. His great wealth made him specially conspicuous; but he was a patron of many progressive movements. His eldest son, Victor Alexander, Earl Grosvenor (1853–1884), predeceased him, and he was succeeded as 2nd duke by his grandson, Hugh Richard Arthur Grosvenor (b. 1879), who in 1901 married Miss Cornwallis-West. Earl Grosvenor's widow, Countess Grosvenor, a daughter of the 9th earl of Scarborough, had in 1887 married Mr George Wyndham (b. 1863), a grandson of the 1st baron Leconfield, who subsequently became well-known both as a *littérateur* and as a Unionist cabinet minister.

Two other peerages are held by the Grosvenor family. In 1857 Lord Robert Grosvenor (1801–1893), a younger son of the 1st marquess, after having sat in the House of Commons since 1822, was created Baron Ebury. He was an energetic opponent of ritualism in the Church of England; and he was associated in philanthropic work with the earl of Shaftesbury. On his death his son, Robert Wellesley Grosvenor (b. 1834), became the 2nd baron. In 1886, Lord Richard Grosvenor (b. 1837), a son of the 2nd marquess, was created Baron Stalbridge; from 1880 to 1885 he had been "chief whip" of the Liberal party. In 1891 he became chairman of the London & North Western railway.

WESTMINSTER, a part of London, England; strictly a city in the administrative county of London, bounded E. by "the City," S. by the river Thames, W. by the boroughs of Chelsea and Kensington, and N. by Paddington, St Marylebone and Holborn. Westminster was formed into a borough by the London Government Act of 1899, and by a royal charter of the 29th of October 1900 it was created a city. The council consists of a mayor, 10 aldermen and 60 councillors. The city comprises the parliamentary boroughs of the Strand, Westminster and St George's, Hanover Square, each returning one member. Area, 2502·7 acres. The City of Westminster, as thus depicted, extends from the western end of Fleet Street to Kensington Gardens, and from Oxford Street to the Thames, which it borders over a distance of 3 m., between Victoria (Chelsea) Bridge and a point below Waterloo Bridge. It thus includes a large number of the finest buildings in London, from the Law Courts in the east to the Imperial Institute in the west, Buckingham and St James's palaces, the National Gallery, and most of the greatest residences of the wealthy classes. But the name of Westminster is more generally associated with a more confined area, namely, the quarter which includes the Abbey, the Houses of Parliament, the government and other buildings in Whitehall, the Roman Catholic Cathedral, and the parts immediately adjacent to these.

Tradition and history.

Westminster Abbey.—The Abbey of St Peter is the most widely celebrated church in the British empire. The Thames, bordered in early times by a great expanse of fen on either hand from Chelsea and Battersea downward, washed, at the point where the Abbey stands, one shore of a low island perhaps three-quarters of a mile in circumference, known as Thorney or Bramble islet. Tributary streams from the north formed channels through the marsh, flanking the island north and south, and were once connected by a dyke on the west. These channels belonged to the Tyburn, which flowed from the high ground of Hampstead. Relics of the Roman occupation have been excavated in the former island, and it is supposed that traffic on the Watling Street, from Dover to Chester, crossed the Thames and the marshes by way of Thorney before the construction of London Bridge; the road continuing north-west in the line of the modern Park Lane (partly) and Edgware Road. Tradition places on the island a temple of Apollo, which was destroyed by an earthquake in the reign of the emperor Antoninus Pius. On the site King Lucius is said to have founded a church (*c.* A.D. 170). The irruption of the Saxons left Thorney desolate. Traditional still, but supported by greater probability, a story states that Sebert, king of the East Saxons, having taken part in the foundation of St Paul's Cathedral, restored or refounded the church at Thorney "to the honour of God and St Peter, on the west side of the City of London" (Stow). A splendid legend relates the coming of St Peter in person to hallow his new church. The sons of Sebert relapsed into idolatry and left the church to the mercy of the Danes. A charter of Offa, king of Mercia (785), deals with the conveyance of certain land to the monastery of St Peter; and King Edgar restored the church, clearly defining by a charter dated 951 (not certainly genuine) the boundary of Westminster, which may be indicated in modern terms as extending from the Marble Arch south to the Thames and east to the City boundary, the former river Fleet. Westminster was a Benedictine foundation. In 1050 Edward the Confessor took up the erection of a magnificent new church, cruciform, with a central and two western towers. Its building continued after his death, but it was consecrated on Childermas Day, 28th December 1065; and on the following "twelfth mass eve" the king died, being buried next day in the church. In 1245 Henry III. set about the rebuilding of the church east of the nave, and at this point it becomes necessary to describe the building as it now appears.

The church.

Westminster Abbey is a cruciform structure consisting of nave with aisles, transepts with aisles (but in the south transept the place of the western aisle is occupied by the eastern cloister walk), and choir of polygonal apsidal form, with six chapels (four polygonal) opening north and south of it, and an eastern Lady Chapel, known as Henry VII.'s chapel. There are two western towers, but in the centre a low square tower hardly rises above the pitch of the roof. The main entrance in common use is that in the north transept. The chapter-house, cloisters and other conventual buildings and remains lie to the south. The total length of the church (exterior) is 531 ft. and of the transepts 203 ft. in all. The breadth of the nave without the aisles is 38 ft. 7 in. and its height close upon 102 ft. These dimensions are very slightly lessened in the choir. Without, viewed from the open Parliament Square to the north, the beautiful proportions of the building are readily realized, but it is somewhat dwarfed by the absence of a central tower and by the vast adjacent pile of the Houses of Parliament. From this point (considered as a building merely) it appears only as a secondary unit in a magnificent group. Seen from the west, however, it is the dominant unit, but here it is impossible to overlook the imperfect conception of the "Gothic humour" (as he himself termed it) manifested by Wren, from whose designs the western towers were completed in 1740. The north front, called Solomon's Porch from a former porch over the main entrance, is from the designs of Sir G. G. Scott, considerably altered by J. L. Pearson.

Within, the Abbey is a superb example of the pointed style. The body of the church has a remarkable appearance of uniformity, because, although the building of the new nave was continued with intermissions from the 14th century until Tudor times, the broad design of the Early English work in the eastern part of the church was carried on throughout. The choir, with its unusual form and radiating chapels, plainly follows French models, but the name of the architect is lost. Exquisite ornament is seen in the triforium arcade, and between some of the arches in the transept are figures, especially finely carved, though much mutilated, known as the censing angels. Henry VII.'s Chapel replaces an earlier Lady Chapel, and is the most remarkable building of its period. It comprises a nave with aisles, and an apsidal eastward end formed of five small radiating chapels. Both within and without it is ornamented with an extraordinary wealth and minuteness of detail. A splendid series of carved oak stalls lines each side of the nave, and above them hang the banners of the Knights of the Bath, of whom this was the place of installation when the Order was reconstituted in 1725. The fan-traceried roof, with its carved stone pendants, is the most exquisite architectural feature of the chapel.

The choir stalls in the body of the church are modern, as is the organ, a fine instrument with an "echo" attachment, electrically connected, in the triforium of the south transept. The reredos is by Sir G. G. Scott, with mosaic by Salviati. In Abbot Islip's chapel there is a series of effigies in wax, representing monarchs and others. The earliest, which is well preserved, is of Charles II., but remnants of older figures survive. Some of the effigies were carried in funeral processions according to custom, but this was not done later than 1735. There are, however, figures of Lord Chatham and Nelson, set up by the officials who received the fees formerly paid by visitors to the exhibition.

Ceremonies and monuments.

But the peculiar fame of the Abbey lies not in its architecture, nor in its connexion with the metropolis alone, but in the fact that it has long been the place of the coronation of sovereigns and the burial-place of many of them and of their greatest subjects. The original reason for this was the reverence attaching to the memory of the Confessor, whose shrine stands in the central chapel behind the high altar. The Norman kings were ready to do honour to his name. From William the Conqueror onward every sovereign has been crowned here excepting Edward V. The coronation chairs stand in the Confessor's chapel. That used by the sovereign dates from the time of Edward I., and contains beneath its seat the stone of Scone, or stone of destiny, on which the Celtic kings were crowned. It is of Scottish origin, but tradition identifies it with Jacob's pillow at Bethel. Here also are kept the sword and shield of Edward III., still used in the coronation ceremony. The second chair was made for Mary, consort of William III. Subsequent to the Conquest many kings and queens were buried here, from Henry III. to George II. Not all the graves are marked, but of those which are the tomb of Henry VII. and his queen, Elizabeth of York, the central object in his own chapel, is the finest. The splendid recumbent effigies in bronze, of Italian workmanship, rest upon a tomb of black marble, and the whole is enclosed in a magnificent shrine of wrought brass. Monuments, tombs, busts and memorials crowd the choir, its chapels and the transepts, nor is the nave wholly free of them. All but the minority of the Gothic period (among which the canopied tombs of Edmund Crouchback and Aymer de Valence, in the sanctuary, are notable) appear incongruous in a Gothic setting. Many of the memorials are not worthy of their position as works of art, nor are the subjects they commemorate always worthy to lie here, for the high honour of burial in the Abbey was not always so conscientiously guarded as now. Eliminating these considerations, however, a wonderful range of sculptural art is found. A part of the south transept is famed under the name of the Poet's Corner. The north transept contains many monuments to statesmen.

Conventual and other buildings.

The monastery was dissolved in 1539, and Westminster was then erected into a bishopric, but only one prelate, Thomas Thurleby, held the office of bishop. In 1553 Mary again appointed an abbot, but Elizabeth reinstated the dean, with twelve prebendaries. Of the conventual buildings, the cloisters are of the 13th and 14th centuries. On the south side of the southern walk remains of a wall of the refectory are seen from without. From the eastern walk a porch gives entry to the chapter house and the chapel of the Pyx. The first is of the time of Henry III., a fine octagonal building, its vaulted roof supported by a slender clustered column of marble. It was largely restored by Sir Gilbert Scott. There are mural paintings of the 14th and 15th centuries. The chapel or chamber of the Pyx is part of the undercroft of the original dormitory, and is early Norman work of the Confessor's time. It was used as a treasury for the regalia and other articles of value in early times, and here were kept the standard coins of the realm used in the trial of the pyx now carried out at the Mint. The undercroft is divided into compartments by walls, and part of it appears in the gymnasium of Westminster School. Above it is now the chapter library. To the south-east lies the picturesque Little Cloister, with its court and fountain, surrounded by residences of canons and officials. Near it are slight ruins of the monastic infirmary chapel of St Catherine. West of the main cloisters are the Deanery, Jerusalem chamber and College Hall, the building surrounding a small court and dating in fabric mainly from the 14th century. This was the Abbot's house. Its most famous portion is the Jerusalem chamber, believed to be named from the former tapestries on its walls, representing the holy city. Here died Henry IV. in 1413, as set forth in Shakespeare's *Henry IV.* (Pt. ii., Act iv. Sc. 4). It is a beautiful room, with open timber roof, windows partly of stained glass, and walls tapestried and panelled. The College Hall, adjoining it, is of similar construction, but plainly fitted in the common manner of a refectory, with a dais for the high table at the north and a gallery at the south. It is now the dining-hall of Westminster School.

Westminster School.—St Peter's College, commonly called Westminster School, is one of the most ancient and eminent public schools in England, and the only school of such standing still occupying its original site in London. A school was maintained by the monks from very early times. Henry VIII. took steps to raise it in importance, but the school owes its present eminence to Queen Elizabeth, who is commemorated as the foundress at a Latin commemoration service held periodically in the Abbey, where, moreover, the daily school service is held. The school buildings lie east of the conventual buildings, surrounding Little Dean's Yard, which, like the cloisters, communicates with Dean's Yard, in which are the picturesque houses of the headmaster, canons of the Abbey, and others. The buildings are modern or large modernized. The Great Schoolroom is a fine panelled hall, bearing on its walls the arms and names of many eminent *alumni*; it is entered by a gateway attributed to Inigo Jones, also covered with names. Ashburnham House, now containing one of the school houses, the library and class-rooms, is named from the family for whom it was built, traditionally but not certainly, by Inigo Jones. The finest part remaining is the grand staircase. The number of scholars, called King's Scholars, on the foundation is 60, of which 40, who are boarders, represent the original number. The great proportion of the boys are home boarders (Town Boys). In the College dormitory a Latin play is annually presented, in accordance with ancient custom. It is preceded by a prologue, and followed by a humorous epilogue, in Latin adapted to subjects of the moment. Other customs for which the school is noted are the acclamation of the sovereign at coronation in the Abbey, in accordance with a privilege jealously held by the boys; and the "Pancake Greaze," a struggle in the Great Schoolroom on Shrove Tuesday to obtain possession of a pancake carrying with it a reward from the Dean. The number of boys is about 250. Valuable close scholarships and exhibitions at Christ Church, Oxford, and Trinity College, Cambridge, are awarded annually.

St Margaret's.—On the north side of the Abbey, close beside it, is the parish church of St Margaret. It was founded in or soon after the time of the Confessor, but the present building is Perpendicular, of greater beauty within than without. St Margaret's is officially the church of the House of Commons. It is frequently the scene of fashionable weddings, which are rarely held in the Abbey. On the south side of Dean's Yard is the Church House, a memorial of Queen Victoria's Jubilee (1887), consisting of a spacious hall of brick and stone, with offices for numerous Church societies.

Westminster Palace: Houses of Parliament.—A royal palace existed at Westminster at least as early as the reign of Canute, but the building spoken of by Fitzstephen as an "incomparable structure furnished with a breastwork and a bastion" is supposed to have been founded by Edward the Confessor and enlarged by William the Conqueror. The Hall, called Westminster Hall, was built by William Rufus and altered by Richard II. In 1512 the palace suffered greatly from fire, and thereafter ceased to be used as a royal residence. St Stephen's chapel, originally built by King Stephen, was used from 1547 for the meetings of the House of Commons, which had been held previously in the chapter house of the Abbey. The Lords used another apartment of the palace, but on the 16th of October 1834 the whole of the buildings, except the hall, was burnt down. In 1840 the building of the New Palace, or Houses of Parliament, began, and it was completed in 1867, at a cost of about three millions sterling. (For plan, &c., see ARCHITECTURE: *Modern*.) It covers an area of about 8 acres, and has a frontage of about 300 yds. to the Thames. The architect was Sir Charles Barry, and the style is late Perpendicular.

Towards the river it presents a rich *façade* with a terrace rising directly from the water. At the south-west corner rises the vast Victoria tower, above the royal entrance, 340 ft. high, and 75 ft. square. At the north is the clock tower, 320 ft. high, bearing the great clock which chimes the quarters on four bells, and strikes the hours on a bell weighing over 13 tons, named Big Ben after Sir Benjamin Hall, First Commissioner of Works at the time when the clock was erected. The building incorporates Westminster Hall, which measures 290 ft. in length, 68 in width, and 90 in height. It has a magnificent open roof of carved oak, and is used as the vestibule of the Houses of Parliament. Of the modern rooms, the House of Peers is a splendidly ornate chamber, 97 ft. in length; that of the Commons is 70 ft. long, and less lavishly adorned. The sitting of parliament is signified by a flag on Victoria Tower in daytime and by a light at the summit of the clock tower at night.

Whitehall.—Northward from Parliament Square a broad, slightly curving thoroughfare leads to Trafalgar Square. This is Whitehall, which replaced the narrow King Street. Here, between the Thames and St James's Park, formerly stood York House, a residence of the archbishops of York from 1248. Wolsey beautified the mansion and kept high state there, but on his disgrace Henry VIII. acquired and reconstructed it, employed Holbein in its decoration, and made it his principal residence. Inigo Jones designed a magnificent new palace for James I., but only the banqueting hall was completed (1622), and this survived several fires, by one of which (1697) nearly the whole of the rest of the palace was destroyed. The hall, converted into a royal chapel by George I., and now housing the museum of the Royal United Service Institution, the buildings of which adjoin it, is a fine specimen of Palladian architecture, and its ceiling is adorned with allegorical paintings by Rubens, restored and rehung in 1907. The museum contains military and naval relics, models and other exhibits. Through this hall Charles I. passed on his way to execution beneath its windows; and the palace was the scene of the death of Henry VIII., Cromwell and Charles II.

The principal government offices are situated in Whitehall. On the left, following the northerly direction, are buildings completed in 1908, from the designs of J. M. Brydon, for the Boards of Education, Trade, Local Government, &c. The Home, Foreign, Colonial and India Offices occupy the next block, a heavy building, adorned with allegorical figures, by Sir G. G. Scott (1873). Downing Street, separating these from the Treasury, contains the official residences of the First Lord of the Treasury and the Chancellor of the Exchequer. The Treasury itself dates from 1737, but the façade is by Sir Charles Barry. The Horse Guards, containing the offices of various military departments, is a low but not unpicturesque building surrounding a court-yard, built in 1753 on the site of a guard-house for the security of Whitehall palace, dating from 1631. On the parade ground between it and St James's Park the ceremony of trooping the colour is held at the celebration of the sovereign's birthday. The portion of the Admiralty facing Whitehall dates from 1726 and is plain and sombre; but there are handsome new buildings on the Park side. On the right of Whitehall, besides the banquet hall, are the fine War Office, completed in 1906, from the designs of W. Young, and Montagu House, the residence of the duke of Buccleuch. In front of the War Office an equestrian statue of the duke of Cambridge (d. 1904) was unveiled in 1907.

Trafalgar Square is an open space sloping sharply to the north. On the south side, facing the entry of Whitehall, is the Nelson column (1843) by W. Railton, 145 ft. in height, a copy in granite from the temple of Mars Ultor in Rome, crowned with a statue of Nelson by E. H. Baily, and having at its base four colossal lions in bronze modelled by Sir Edwin Landseer. The centre of the square is levelled and paved with asphalte, and contains two fountains. There are statues of George IV., Napier, Havelock and Gordon. Behind the terrace on the north rises the National Gallery (1838), a Grecian building by William Wilkins, subsequently much enlarged, with its splendid collection of paintings. The National Portrait Gallery is contained in a building (1895) on the north-east side of the National Gallery.

Westminster Cathedral.—A short distance from Victoria Street, towards its western end, stands Westminster Cathedral (Roman Catholic). Its foundation was laid in 1896, and its consecration took place at the close of 1903. Its site is somewhat circumscribed, and this and its great bulk renders impossible any general appreciation of its complex outline; but its stately domed campanile, 283 ft. in height, forms a landmark from far over London. The style was described by the architect, J. F. Bentley, as early Christian Byzantine, and the material is mainly red brick. The extreme length is 360 ft., the breadth 156 ft., the breadth of the nave 60 ft., and its height (domes within) 112 ft.

WESTMINSTER, STATUTES OF, two English statutes passed during the reign of Edward I. Parliament having met at Westminster on the 22nd of April 1275, its main work was the consideration of the statute of Westminster I. This was drawn up, not in Latin, but in Norman French, and was passed "par le assentement des erceveskes, eveskes, abbes, priurs, contes, barons, et la communaute de la tere ileokes somons." Its provisions can be best summarized in the words of Stubbs (*Const. Hist.* cap. xiv.):—

> "This act is almost a code by itself; it contains fifty-one clauses, and covers the whole ground of legislation. Its language now recalls that of Canute or Alfred now anticipates that of our own day; on the one hand common right is to be done to all, as well poor as rich, without respect of persons; on the other, elections are to be free, and no man is by force, malice or menace, to disturb them. The spirit of the Great Charter is not less discernible: excessive amercements, abuses of wardship, irregular demands for feudal aids, are forbidden in the same words or by amending enactments. The inquest system of Henry II., the law of wreck, and

the institution of coroners, measures of Richard and his ministers, come under review as well as the Provisions of Oxford and the Statute of Marlborough."

The second statute of Westminster was passed in the parliament of 1285. Like the first statute it is a code in itself, and contains the famous clause *De donis conditionalibus* (*q.v.*), "one of the fundamental institutes of the medieval land law of England." Stubbs says of it: "The law of dower, of advowson, of appeal for felonies, is largely amended; the institution of justices of assize is remodelled, and the abuses of manorial jurisdiction repressed; the statute *De religiosis*, the statutes of Merton and Gloucester, are amended and re-enacted. Every clause has a bearing on the growth of the later law."

The statute *Quia Emptores* of 1290 is sometimes called the statute of Westminster III.

WESTMINSTER, SYNODS OF. Under this heading are included certain of the more important ecclesiastical councils held within the present bounds of London. Though the precise locality is occasionally uncertain, the majority of the medieval synods assembled in the chapter-house of old St Paul's, or the former chapel of St Catherine within the precincts of Westminster Abbey or at Lambeth. The councils were of various types, each with a constitutional history of its own. Before the reign of Edward I., when convocation assumed substantially its present form (see Convocation), there were convened in London various diocesan, provincial, national and legatine synods; during the past six centuries, however, the chief ecclesiastical assemblies held there have been convocations of the province of Canterbury.

The first really notable council at St Paul's was that of 1075 under the presidency of Lanfranc; it renewed ancient regulations, forbade simony and permitted three bishops to remove from country places to Salisbury, Chichester and Chester respectively. In 1102 a national synod at Westminster under Anselm adopted canons against simony, clerical marriages and slavery. The councils of 1126, 1127 and 1138 were legatine, that of 1175 provincial; their canons, chiefly re-enactments, throw light on the condition of the clergy at that time. The canons of 1200 are based in large measure on recommendations of the Lateran Council of 1179. At St Paul's the legatine constitutions of Otto were published in a synod of 1237, those of Ottobon in 1268: these were the most important national councils held after the independence of York had been established. A synod at Lambeth in 1281 put forth canons none too welcome to Edward I.; they included a detailed scheme for the religious instruction of the faithful. During the next two centuries the councils devoted much attention to heresy: eight propositions concerning the body of Christ after his death were rejected at St Mary-le-Bow in 1286; the expulsion of the Jews from England was sanctioned by a legatine synod of Westminster in 1291; ten theses of Wiclif's were condemned at the Dominican friary in 1382, and eighteen articles drawn from his *Trialogus* met the same fate at St Paul's in 1396; and the doom of Sir John Oldcastle was sealed at the latter place in 1413. The 14th-century synods at St Paul's concerned themselves largely with the financial and moral status of the clergy, and made many quaint regulations regarding their dress and behaviour (1328, 1342, 1343; cf. 1463). From the time of Edward VI. on, many of the most vital changes in ecclesiastical discipline were adopted in convocations at St Paul's and in the Abbey. To enumerate them would be to give a running commentary on the development of the Church of England; among the most important were those of 1547, 1552, 1554, 1562, 1571, 1604, 1605, 1640 and 1661. In 1852 there was held the first of a series of synods of the newly organized Roman Catholic archdiocese of Westminster. For the "Pan-Anglican Synods" see Lambeth Conferences.

Bibliography.—For acts of synods prior to the Reformation see Spelman, Hardouin, W. Lynwood, *Provinciale* (Oxford, 1679), and best of all Wilkins; for the canons and proceedings of convocations from 1547 to 1717 consult E. Cardwell, *Synodalia* (2 vols., Oxford, 1842); for translations and summaries, Guérin, Landon and Hefele, *Conciliengeschichte*, vol. iv. ff.; see also T. Lathbury, *A History of the Convocation of the Church of England* (2nd enlarged edition, London, 1853); A. P. Stanley, *Historical Memorials of Westminster Abbey* (4th and revised ed., London, 1876), 411-413, 495-504; H. H. Milman, *Annals of S. Paul's Cathedral* (2nd ed., London, 1869). Full titles under Councils. (W. W. R.*)

WESTMORLAND, EARLS OF. Ralph Neville, 4th Baron Neville of Raby, and 1st earl of Westmorland (1364–1425), eldest son of John, 3rd Baron Neville, and his wife Maud Percy (see Neville, *Family*), was knighted by Thomas of Woodstock, afterwards duke of Gloucester, during the French expedition of 1380, and succeeded to his father's barony in 1388. He had been joint warden of the west march in 1386, and was reappointed for a new term in 1390. In 1391 he was put on the commission which undertook the duties of constable in place of the duke of Gloucester, and he was repeatedly engaged in negotiations with the Scots. His support of the court party against the lords appellant was rewarded in 1397 by the earldom of Westmorland. He married as his second wife Joan Beaufort, half-sister of Henry of Lancaster, afterwards Henry IV., whom he joined on his landing in Yorkshire in 1399. He already held the castles of Brancepeth, Raby, Middleham and Sheriff Hutton when he received from Henry IV. the honour and lordship of Richmond for life. The only rivals of the Nevilles in the north were the Percies, whose power was broken at Shrewsbury in 1403. Both marches had been in their hands, but the wardenship of the west marches was now assigned to Westmorland, whose influence was also paramount in the east, which was under the nominal wardenship of the young Prince John, afterwards duke of Bedford. Westmorland had prevented Northumberland from marching to reinforce Hotspur in 1403, and before embarking on a new revolt he sought to secure his enemy, surrounding, but too late, one of Sir Ralph Eure's castles where the earl had been staying. In May the Percies were in revolt, with Thomas Mowbray, earl marshal, and Archbishop Scrope. Westmorland met them on Shipton Moor, near York, on the 29th of May 1405, and suggested a parley between the leaders. By pretending accord with the archbishop, the earl induced him to allow his followers to disperse. Scrope and Mowbray were then seized and handed over to Henry at Pontefract on the 3rd of January. The improbabilities of this narrative have led some writers to think, in face of contemporary authorities, that Scrope and Mowbray must have surrendered voluntarily. If Westmorland betrayed them he at least had no share in their execution. Thenceforward he was busily engaged in negotiating with the Scots and keeping the peace on the borders. He did not play the part assigned to him by Shakespeare in *Henry V.*, for during Henry's absence he remained in charge of the north, and was a member of Bedford's council. He consolidated the strength of his family by marriage alliances. His daughter Catherine married in 1412 John Mowbray, second duke of Norfolk, brother and heir of the earl marshal, who had been executed after Shipton Moor; Anne married Humphrey, first duke of Buckingham; Eleanor married, after the death of her first husband Richard le Despenser, Henry Percy, 2nd earl of Northumberland; Cicely married Richard, duke of York, and was the mother of Edward IV. and Richard III. The sons by his second marriage were Richard Neville, earl of Salisbury, William, Baron Fauconberg, George, Baron Latimer, Robert, bishop of Salisbury and then of Durham, and Edward, Baron Abergavenny. The earl died on the 21st of October 1425, and a fine alabaster tomb was erected to his memory in Staindrop church close by Raby Castle.

See J. H. Wylie, *History of England under Henry IV.* (4 vols., 1884–1898).

Ralph, 2nd earl of Westmorland (*c.* 1404–1484), the son of John, Lord Neville (d. 1423), succeeded his grandfather in 1425, and married as his first wife Elizabeth Clifford, daughter of Sir Henry Percy (Hotspur), thus forming further bonds with the Percies. The 3rd earl, Ralph Neville (1456–1499), was his nephew, and the son of John Neville, Lord Neville, who was slain at Towton. His grandson Ralph, 4th earl of Westmorland (1499–1550), was an energetic border warrior, who remained faithful to the royal cause when the other great northern lords joined the Pilgrimage of Grace. He was succeeded by his son Henry, 5th earl (*c.* 1525–1563).

Charles, 6th earl (1543–1601), eldest son of the 5th earl by his first wife Jane, daughter of Thomas Manners, 1st earl of Rutland, was brought up a Roman Catholic, and was further attached to the Catholic party by his marriage with Jane, daughter of Henry Howard, earl of Surrey. He was a member of the council of the north in 1569 when he joined Thomas Percy, 7th earl of Northumberland, and his uncle Christopher Neville, in the Catholic rising of the north, which had as its object the liberation of Mary, queen of Scots. On the collapse of the ill-organized insurrection Westmorland fled with his brother earl over the borders, and eventually to the Spanish Netherlands, where he lived in receipt of a pension from Philip II. of Spain, until his death on the 16th of November 1601. He left no sons, and his honours were forfeited by his formal attainder in 1571. Raby Castle remained in the hands of the crown until 1645.

The title was revived in 1624 in favour of Sir Francis Fane (*c.* 1574–1629), whose mother, Mary Neville, was a descendant of a younger son of the first earl. He was created baron of Burghersh and earl of Westmorland in 1624, and became Lord le Despenser on his mother's death in 1626. His son Mildmay Fane, 2nd or 8th earl of Westmorland (*c.* 1602–1666), at first sided with the king's party, but was afterwards reconciled with the parliament. John Fane, 7th or 13th earl of Westmorland (1682?–1762), served under Marlborough, and was made in 1739 lieutenant-general of the British armies.

John Fane, 11th or 17th earl (1784–1859), only son of John, 10th earl, was known as Lord Burghersh until he succeeded to the earldom in 1841. He entered the army in 1803, and in 1805 took part in the Hanoverian campaign as aide-de-camp to General Sir George Don. He was assistant adjutant-general in Sicily and Egypt (1806–1807), served in the Peninsular War from 1808 to 1813, was British military commissioner to the allied armies under Schwarzenberg, and marched with the allies to Paris in 1814. He was subsequently promoted major-general (1825), lieutenant-general (1838) and general (1854), although the latter half of his life was given to the diplomatic service. He was British resident at Florence from 1814 to 1830, and British ambassador at Berlin from 1841 to 1851, when he was transferred to Vienna. In Berlin he had mediated in the Schleswig-Holstein question, and in Vienna he was one of the British plenipotentiaries at the congress of 1855. He retired in 1855, and died at Apthorpe House, Northamptonshire, on the 16th of October 1859. Himself a musician of considerable reputation and the composer of several operas, he took a keen interest in the cause of music in England, and in 1822 made proposals which led to the foundation in the next year of the Royal Academy of Music. His wife Priscilla Anne (1793–1879), daughter of William Wellesley-Pole, 3rd earl of Mornington, was a distinguished artist.

His published works include *Memoirs of the Early Campaigns of the Duke of Wellington in Portugal and Spain* (1820), and *Memoir of the Operations of the Allied Armies under Prince Schwarzenberg and Marshal Blücher* (1822).

Francis William Henry, 12th or 18th earl (1825–1891), fourth son of the preceding, was also a distinguished soldier. He entered the army in 1843 and served through the Punjab campaign of 1846; was made aide-de-camp to the governor-general in 1848, and distinguished himself at Gujrat on the 21st of February 1849. He went to the Crimea as aide-de-camp to Lord Raglan, and was promoted lieutenant-colonel in 1855. On his return to England he became aide-de-camp to the duke of Cambridge, and received the Crimean medal. The death of his elder brother in 1851 gave him the style of Lord Burghersh, and after his accession to the earldom in 1859 he retired from the service with the rank of colonel. He died in August 1891 and was succeeded by his son, Anthony Mildmay Julian Fane (b. 1859), as 13th earl.

WESTMORLAND, a north-western county of England, bounded N.W. by Cumberland, N.E. for a short distance by Durham, E. by Yorkshire, S. and S.W. by Lancashire. It reaches the sea in the Kent estuary in Morecambe Bay. The area is 786·2 sq. m. Physically the county may be roughly divided into four areas. (1) The great upland tract in the north-eastern part, bordering on the western margin of Yorkshire and part of Durham, consists mainly of a wild moorland area, rising to elevations of 2780 ft. in Milburn Forest, 2403 in Dufton Fell, 2446 in Hilton Fell, 2024 in Bastifell, 2328 in High Seat, 2323 in Wild Boar Fell and 2235 in Swarth Fell. (2) The second area comprises about a third of the Lake District (*q.v.*), westward from Shap Fells. This area includes High Street (2663 ft.), Helvellyn (3118) and Fairfield (2863), Langdale Pikes (2401) and on the boundary Bow Fell (2960), Crinkle Crags (2816) and Pike o' Blisco (2304). It must also be taken to cover the elevated area on the Yorkshire border which includes the Ravenstonedale and Langdale Fells to the N. and the Middleton and Barbon Fells to the S., of an intrusive angle of Yorkshire. This area, however, which reaches in some points over 2200 ft. of altitude, is marked off from the Lake District mountains by the Lune valley. All but the lower parts of the valleys within these two areas lie at or above 1000 ft. above Ordnance datum; and more than half the remainder lies between that elevation and 1750 ft., the main mass of high land lying in the area first mentioned. (3) The third area includes the comparatively low country between the northern slopes of that just described and the edge of the uplands to the north-east thereof. This covers the Vale of Eden. About three-fifths of this area lies between the 500 and the 1000 ft. contour. (4) The Kendal area consists mainly of undulating lowlands, varied by hills ranging in only a few cases up to 1000 ft. More than half this area lies below the 500 ft. contour. Westmorland may thus be said to be divided in the middle by uplands ranging in a general south-easterly direction, and to be bordered all along its eastern side by the elevated moorlands of the Pennine chain. The principal rivers are—in the northern area the higher part of the Tees, the Eden with its main tributaries, the Lowther and the Eamont, and in the southern area the Lune and the Kent, with their numerous tributary becks and gills. The lakes include Windermere, part of Ullswater, Grasmere, Hawes Water and numerous smaller lakes and tarns, which are chiefly confined to the north-western parts of the county. Amongst the other physical features of more or less interest are numerous crags and scars, chiefly in the neighbourhood of the lakes; others are Mallerstang Edge, Helbeck, above Brough; Haikable or High Cup Gill, near Appleby; Orton Scars, and the limestone crags west of Kirkby Lonsdale. Among the waterfalls are Caldron Snout, on the northern confines of the county, flowing over the Whin Sill, and Stock Gill Force, Rydal Falls, Skelwith Force, and Dungeon Gill Force, all situated amongst the volcanic rocks in the west. Hell Gill, near the head of the Eden, and Stenkrith, near Kirkby Stephen, are conspicuous examples of natural arches eroded by the streams flowing through them.

Geology.—The diversity of scenery and physical features in this county are directly traceable to the influence of geological structure. In the mountainous north-western portion, which includes the heights of Helvellyn, Langdale Pikes, and Bow Fell, and the lakes Ullswater, Hawes Water, Grasmere and Elterwater, we find the great mass of igneous rocks known as the Borrowdale volcanic series—andesites, basalts and tuffs—of Ordovician age. On the northern and north-western sides these volcanic rocks pass into the neighbouring county of Cumberland; their southern boundary runs north-easterly from the upper end of Windermere by Kentmere and past the granitic mass of Shap Fell; thence the boundary turns north-westward through Rasgill to the east end of Ullswater. Narrow strips of Ordovician Skiddaw slate occur on the south banks of Ullswater and fringe the Borrowdale rocks for some distance east of Windermere. A large area of Silurian rocks occupies most of the south-western part of the county from Windermere to near Ravenstonedale and southward to Sedbergh, Kendal and Kirkby Lonsdale. The Ordovician and Silurian rocks are bordered on the east and south by Carboniferous limestone from the river Eamont southward through Clifton, Shap, Crosby Garrett and Ravenstonedale; and again south of Kendal, down the Kent valley and eastward to Kirkby Lonsdale. Outlying patches of limestone rest on the Silurian at Grayrigg, Mealbank and elsewhere. The Carboniferous limestone is found again on the east side of the Eden valley in Milburn Forest, Dufton Fell, Stainmore and Winster Fell. Here and there in the south-east corner Millstone Grit and Shales cap the limestone and some little distance east of Brough under Stainmore a small patch of Coal Measures remains. At the base of the Carboniferous rocks in this county is a red conglomeratic deposit, the lower part of which may be regarded as of Old Red Sandstone age; it may be traced from Ullswater through Butterwick, Rasgill and Tebay, and it appears again at Sedbergh, Barton and around Kendal. In the limestones on the east side of the Eden the Great Whin Sill, a diabase dike, may be followed for a considerable distance. In the Eden valley two sets of red sandstones occur, that on the western side is of Permian age and includes the conglomerate beds known as "brockram." The Permian extends as a belt from 4 to 2 m. wide between Penrith, Appleby and Kirkby Stephen. The sandstone on the eastern side of the valley is of Bunter age. The eastern side of the valley is strongly faulted so that small patches of Ordovician and Silurian rocks appear all along the margin of the Carboniferous limestone. Evidences of glaciation are abundant in the form of morainic accumulations and transported or striated blocks.

Climate and Agriculture.—The rainfall is very heavy, especially in the western part (see LAKE DISTRICT), whence it diminishes eastward. Thus at Kendal, on the eastern flank of the Lake District, the mean annual rainfall is still as high as 48·71 in., whereas at Appleby in the Eden valley it is only 32·45 in. The greater part of the county may, however, be considered to lie within an area having 40 to 60 in. mean annual fall. The average temperature in January at Appleby is 35·8° F., but at Windermere it is 37·4°. The summer temperature is mild; thus at the same two points 58·4° and 58·7° are recorded. The principal characteristic of the climate is the preponderance of cloudy, wet and cold days, especially in the spring and autumn,—combining to retard the growth of vegetation. The late stay of cold winds in the spring has much to do with the same, especially in the lowlands extending along the foot of the Cross Fell escarpment from Brough north-westwards. The helm-wind (*q.v.*) is characteristic of this district. Scarcely one-half of the total area of the county is under cultivation, and of this acreage about five-sixths is in permanent pasture, both cattle and sheep being largely kept. Large portions of the valleys are well wooded. Nearly the whole of the acreage under corn crops is occupied by oats; a little barley is grown, but the wheat crop is insignificant. About three-fourths of the acreage under green crops is occupied by turnips. The meadow-land yields excellent grass. Grass of inferior value characterizes the pasture-lands; while on the fell (or unenclosed) land, except in limestone areas, the herbage consists chiefly of the coarser kinds of grass, bents and heather. These, however, furnish nourishment for the hardier breeds of sheep, which are pastured there in large numbers. It is from the sale of these, of their stock cattle, horses and pigs, and of their dairy produce that the staple of the farmers' income is derived. A large part of Westmorland was formerly in the hands of "statesmen" (see CUMBERLAND) whose holdings were usually of small extent, but were sufficient, with careful management, for the respectable maintenance of themselves and their families. The proportion of landowners of this class has greatly decreased.

Manufactures.—The manufacturing industries, owing to the absence of any large supplies of native fuel, are not numerous. The principal is woollen manufacture in one form or another, and this is chiefly confined to the low country in and near Kendal. Bobbin-making, the manufacture of explosives, fulling, snuff-grinding and several small industries are carried on, and use the water-power available at so many points. Paper-making is also carried on. The quarries occupy a considerable number of hands at various points, as in the case of the green slate quarries which are detrimental to the scenery in the lower part of Langdale.

Communications.—The main line of the London and North-Western railway from the south serves Oxenholme (branch to Kendal and Windermere), Low Gill (branch to Ingleton in Yorkshire), and Tebay, leaving the county after surmounting the heavy gradient at Shap. The Midland main line, with a parallel course, serves Appleby. A branch of the North Eastern system from Darlington serves Kirkby Stephen and Tebay, and another branch connects Kirkby Stephen with Appleby and Penrith.

Population and Administration.—The area of the ancient county is 503,160 acres, with a population in 1891 of 66,098 and in 1901 of 64,303. The natives are prevalently tall, wiry, long-armed, big-handed, dark-grey-eyed and fresh-coloured. In disposition they are cautious, reserved and unemotional and thrifty beyond measure. The general character of the dialects of Westmorland is that of a basis of Anglian speech, influenced to a certain extent by the speech current amongst the non-Anglian peoples of Strathclyde. This is overlaid to a much greater though variable extent by the more decidedly Scandinavian forms of speech introduced at various periods between the 10th and the 12th centuries. Three well-marked dialects can be made out.

The area of the administrative county is 505,330 acres. The county contains four wards (corresponding to hundreds). The municipal boroughs are Appleby, the county town (pop. 1764) and Kendal (14,183). The urban districts are Ambleside (2536), Bowness and Windermere (5061), Grasmere (781), Kirkby Lonsdale (1638) and Shap (1226). The county is in the northern circuit, and assizes are held at Appleby. It has one court of quarter sessions, and is divided into five petty sessional divisions. The borough of Kendal has a separate commission of the peace. There are 115 civil parishes. Westmorland is in the diocese of Carlisle, and contains 86 ecclesiastical parishes or districts, wholly or in part. There are two parliamentary divisions, Northern or Appleby and Southern or Kendal, each returning one member.

History.—The earliest English settlements in the district which is now Westmorland were effected by the Anglian tribes who entered Yorkshire by the Humber in the 6th century and laid the foundations of the kingdom of Deira, which included within its bounds that portion of Westmorland afterwards known as the barony of Kendal. The northern district, corresponding to the later barony of Appleby, meanwhile remained unconquered, and it was not until the close of the 7th century that Ecgfrith drove out the native Britons and established the Northumbrian supremacy over the whole district. With the Danish invasions of the 9th century the Kendal district was included in the Danelaw, while the barony of Appleby formed a portion of the land of Carlisle. The first mention of Westmorland in the Saxon Chronicle occurs under 966, when it was harried by Thored son of Gunnar, the term here applying only to the barony of Appleby, which at this period was being extensively colonized by Norwegian settlers, traces of whose occupation are especially noticeable in the place-names of the Lake District.

The Domesday Survey describes only the barony of Kendal which appears as part of Amounderness in Yorkshire. Before the Conquest it had formed part of the earldom of Tostig of Northumbria, and had been bestowed by William I. on Roger of Poitou, but, owing to the forfeiture of his estates by the latter, at the time of the survey it was in the hands of the crown. The annexation of the northern portion of Westmorland to the crown of England was accomplished by William Rufus, who in 1092 drove out Dolfin from the land of Carlisle, and fortified Brough-under-Stainmore, Brougham, Appleby and Pendragon. In the reign of Henry I. the barony of Appleby was included in the grant to Ranulph Meschin of the earldom of Carlisle, but on the accession of Ranulph to the earldom of Chester in 1120 it was surrendered to the crown, and its inclusion in the pipe roll of 1131 shows that Westmorland was now definitely established on the administrative basis of an English county.

The barony of Kendal was held in the 12th century by the Mowbrays, and from them passed to the family of Lancaster, who held it as of the honour of Westmorland. In the 13th century it was separated into two moieties; the Lindsay moiety which passed from the Lindsays to the Copelands and Coucys and in the reign of Henry VI. to the Beauforts and Richmonds, whence was derived its later name of Richmond Fee; the Brus moiety, which became subdivided into the Marquis Fee held by the Parr family, ancestors of Katherine Parr, and the Lumley Fee which passed from the Thwengs to the Lumleys and Hothams. The barony of Appleby, with the hereditary shrievalty, was bestowed by King John on the family of Veteripont, from whom it passed by female descent to the Cliffords in the 13th century, and in the 16th century to the Tuftons, afterwards earls of Thanet, who retained the dignity until their descendant, Mr Barham of Trecwn, yielded his rights to the crown.

The division of Westmorland into wards originated with the system of defence against the inroads of the Scots, each barony being divided into two wards, and each ward placed under a high constable, who presided over the wards to be maintained at certain fords and other appointed places. The barony of Kendal was divided into Kendal and Lonsdale wards, and the barony of Appleby, called the Bottom, into east and west wards, there being anciently a middle ward between these last two. The shire court and assizes for the county were held at Appleby.

The barony of Appleby was included in the diocese of York from the 7th century, and in 1291 formed the deaneries of

Lonsdale and Kendal within the archdeaconry of Richmond. The barony of Appleby, which had been bestowed by Henry I. in the see of Carlisle, formed in 1291 the deanery of Westmorland within the archdeaconry and diocese of Carlisle. The barony of Kendal was placed by Henry VIII. in his new diocese of Chester, of which it remained a part until in 1856 it was constituted the archdeaconry of Westmorland within the diocese of Carlisle. In 1859 the Westmorland portion of the archdeaconry of Carlisle was subdivided into the deaneries of Appleby, Kirkby Stephen and Lowther; and the additional deanery of Ambleside was formed within the archdeaconry of Westmorland. The only religious foundation of any importance in Westmorland was the Premonstratensian house at Shap founded by Thomas, son of Gospatric, in the 12th century.

The early political history of Westmorland after the Conquest is a record of continuous inroads and devastations from the Scots. In the Scottish invasion of the northern counties which followed the battle of Bannockburn Brough and Appleby were burnt, and the county was twice harried by Robert Bruce in the ensuing years. In 1385 a battle was fought at Hoff near Appleby against the Scots under Earl Douglas, and in 1388, after Otterburn, the Scots sacked Appleby with such effect that nine-tenths of it lay in ruins and was never rebuilt. In the Wars of the Roses, Westmorland, under the Clifford influence, inclined to favour the Lancastrian cause, but was not actively concerned in the struggle. In the Civil War of the 17th century the chief families of the county were royalist, and in 1641 Anne, countess of Pembroke, hereditary high sheriff of the county, garrisoned Appleby Castle for the king, placing it in charge of Sir Philip Musgrave, the colonel of the train-bands of Westmorland and Cumberland. In 1642 a memorial was presented to Charles signed by nearly 5000 of the inhabitants of Westmorland and Cumberland protesting their loyalty and readiness to sacrifice their lives and fortunes in his service. Appleby Castle surrendered in 1648, but the strength of the royalist feeling was shown in the joy which greeted the news of the Restoration, the mayor of Appleby publicly destroying the charter which the town had received from Cromwell. The Jacobite rising of 1745 found many adherents in Westmorland, and a skirmish took place on Clifton Moor between the forces of Lord George Murray and the duke of Cumberland.

The economic development of Westmorland, both on account of natural disadvantages and of the ravages of border strife, has been slow and unimportant; the rugged and barren nature of the ground being unfavourable to agricultural prosperity, while the lack of fuel hindered the growth of manufactures. Sheep-farming was carried on in the moorland districts, however, and the Premonstratensian house at Shap supplied wool to the Florentine and Flemish markets in the 13th and 14th centuries. The clothing industry, which spread from Kendal to the surrounding districts, is said to have been introduced by one John Kempe of Flanders, who settled there in the reign of Edward III., and a statute of 1465 alludes to cloths of a distinct make being manufactured at Kendal. In 1589 the county suffered severely from the ravages of the plague, 2500 deaths being recorded in the deanery of Kendal alone. Speed, writing in the 17th century, says of Westmorland that "it is not commended either for plenty of corn or cattle, being neither stored with arable grounds to bring forth the one, nor pasturage to lead up the other; the principal profit that the people of this province raise unto themselves is by clothing." The comb manufacture was established at Kendal in 1700, and about the same time the development of the boot and shoe trade to some extent supplemented the loss consequent on the decline of the clothing industry There were two paper-mills at Milnthorpe in 1777, one of which existed eighty years before.

Westmorland returned two knights for the county to the parliament of 1290, and in 1295 two burgesses for the borough of Appleby. Under the Reform Act of 1832 Appleby was disfranchised and Kendal returned one member.

Antiquities.—Notable ecclesiastical buildings are almost entirely wanting in Westmorland, though mention may be made of the ruins of Shap Abbey, which lies near the small market town of that name in the bleak upper valley of the Lowther. The Perpendicular western tower and other fragments remain. Late Norman work is preserved in some of the churches, as at Kirkby Lonsdale, and in a few castles. Among the castles, those at Appleby, Brough, Brougham and Kendal are notable, but examples are numerous. Among old houses, Levens Hall dates from the 16th century, and Sizergh Hall embodies part of an ancient castle; both are in the Kendal district. The formal gardens at Levens Hall are remarkable. Lowther Castle, near Penrith, the seat of the earl of Lonsdale, is a fine modern mansion, in a Gothic style more satisfactory in broad effect than in detail.

See Joseph Nicholson and Richard Burn, *The History and Antiquities of the Counties of Westmorland and Cumberland* (2 vols., London, 1777); William Whellan, *The History and Topography of the Counties of Cumberland and Westmorland* (Pontefract, 1860); *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society* (Kendal, 1870, &c.), R. S. Ferguson, *History of Westmorland* (Popular County Histories, 1894); Sir D. Fleming, *Description of Westmorland* (1671); T. Gibson, *Legends and Notes on Places of North Westmorland* (London, 1887); M. W Taylor, *Manorial Halls of Westmorland* (Kendal, 1892); T. Ellwood, *Landnama Book of Iceland as it illustrates the Dialect and Antiquities of Westmorland* (Kendal, 1894); *Victoria County History, Westmorland.*

WESTON, THOMAS (1737–1776), English actor, was the son of a cook. His first London appearance was about 1759, and from 1763 until his death he was admitted to be the most amusing comedian on the English stage. Foote wrote for him the part of Jerry Sneak in the *Mayor of Garratt*. Abel Drugger in the *Alchemist* was one of his famous performances; and Garrick, who also played this part, praised him highly for it.

WESTON-SUPER-MARE, a seaside resort in the Wells parliamentary division of Somersetshire, England, on the Bristol Channel, 137½ m. W. by S. of London by the Great Western railway. Pop. of urban district (1901), 19,048. It is built partly on level ground near the shore, and partly on the slopes of Worlebury Hill, which aids in giving shelter from the north and east. Among the fir-clad slopes of the neighbourhood, which command a fine view of the Welsh hills across the Channel, there are many beautiful walks and drives. An esplanade extends for about 3 m., and public gardens have been laid out on Worlebury Hill, from the far end of which a long pier projects, linking the rocky islet of Birnbeck to the town. Grove Park, once the manor-house, is owned by the council, and is used as a free library, its grounds being open. Other institutions include a museum opened in honour of Queen Victoria's Diamond Jubilee, and the West of England Sanatorium, to which two large conservatories are attached, as a winter-garden for invalids. The town has long been famous for its potteries, and there are mineral water-works and fisheries. Large quantities of sprats are caught. Intermittent springs exist in Weston, which are affected by the ebb and flow of the tide.

WEST ORANGE, a town of Essex county, New Jersey, U.S.A., in the N.E. part of the state, about 13 m. W. of New York City. Pop. (1890) 4358, (1900) 6889 (1772 foreign-born); (1905, state census) 7872; (1910) 10,980. It is served by the Orange branch of the Erie railroad, and is connected with neighbouring towns and cities by electric lines. The town has an area of about 7 sq. m. It is crossed in a N E. and S.W. direction by two ridges —the First (also called the Orange or Watchung) Mountain and the Second Mountain. Eagle Rock (about 650 ft.), on the summit of First Mountain, commands a splendid view. On the eastern slope of First Mountain are Hutton Park, containing the grounds of the Essex County Country Club, and Llewellyn Park, a beautiful residential tract of 750 acres, named in honour of its originator, Llewellyn S. Haskell (1815–1872). West Orange has various manufactures, including phonographs, lawn mowers and felt hats. In 1862 parts of the townships of Orange, Caldwell and Livingston were united into a new township named Fairmount. In 1863 another part of Orange was added and the name of the new township was changed to West Orange. In 1900 West Orange was chartered as a town.

See H. Whittemore, *The Founders and Builders of the Oranges* (Newark, 1896).

WESTPHAL, RUDOLF (1826–1892), German classical scholar, was born at Obernkirchen in Schaumburg on the 3rd of July 1826 He studied at Marburg and Tübingen, and was professor at Breslau (1858–1862) and Moscow (1875–1879). He subsequently lived at Bückeburg, and died at Stadthagen in Schaumburg-Lippe on the 10th of July 1892. Westphal was a man of varied attainments, but his chief claim to remembrance rests upon his contributions on Greek music and metre. His chief works are. *Griechische Metrik* (3rd ed., 1885–1889); *System der antiken Rhythmik* (1865), Hephaestion's *De metris enchiridion* (1866); *Aristoxenus of Tarentum* (translation and commentary, 1883–1893, vol. ii. being edited after his death by F. Saran); *Die Musik des griechischen Altertums* (1883); *Allgemeine Metrik der indogermanischen und semitischen Völker* (1892). He made translations of Catullus (1870) and of Aristophanes' *Acharnians* (1889), in which he successfully reproduced the Dorisms in Plattdeutsch.

WESTPHALIA (Ger. *Westfalen*), a province of the kingdom of Prussia. The ancient duchy and the Napoleonic kingdom of the same name, neither of which was conterminous with the modern province, are dealt with in the historical part of this article. The area of the province is 7801 sq. m., its length both from N. to S. and from E. to W. is about 130 m., and it is bounded N. by Hanover, E. by Schaumburg-Lippe, Hanover, Lippe-Detmold, Brunswick, Hesse-Nassau and Waldeck, S. and S.W. by Hesse-Nassau and the Rhine Province, and N.W. by the kingdom of the Netherlands.

Nearly half of Westphalia is an extension of the great North-German plain, which here stretches S.E. into an acute angle enclosed on the N.E. by the long low range of the Teutoburger Wald and its southern prolongation the Eggegebirge, and on the S. by the line of hills called the Haar or Haarstrang, which divides the basins of the Lippe and Ruhr. The Westphalian plain is broken by extensive outcrops of the underlying cretaceous beds, and is not very fertile, except in the Hellweg, a zone between the Haarstrang and the Lippe. There are extensive fens in the N. and W., and N. of Paderborn is a sandy waste called the Senne. The plain is drained in the N. by the Ems and in the S. by the Lippe, which rise close together in the Teutoburger Wald. Between their basins are the Vechte and other small rivers flowing into the Zuider Zee. The triangular southern portion of Westphalia, most of which is included in Sauerland ("south land"), is a rugged region of slate hills and wooded valleys drained chiefly by the Ruhr with its affluents the Lenne, Möhne, &c., and in the S. by the Sieg and Eder. The hills rise in the S.E. to the Rotlager or Rothaargebirge, culminating in the Winterberg plateau with the Kahler Asten (2713 ft.), the highest summit in the province. The Rotlagergebirge, Eggegebirge and Teutoburger Wald form with some intermediate ranges the watershed between the basin of the Weser and those of the Rhine and Ems. In the N.E. corner of the province the Weser divides the Wiehengebirge from the Wesergebirge by the narrow pass called *Porta Westfalica*.

The climate is temperate except in the south, which is cold in winter and has a heavy rainfall. Of the total area 43% is occupied by arable land and gardens, 18% by meadows and pastures and 28% by forests. The best agricultural land is in the Hellweg and the Weser basin. The number of peasant proprietors is proportionately greater than in any other part of Prussia, and as a class they are well-to-do. The crops include grain of all kinds (not sufficient, however, for the needs of the province), peas and beans, buckwheat, potatoes, fruit and hemp. The cultivation of flax is very extensive, especially in the N.E. Swine, which are reared in great numbers in the plains, yield the famous Westphalian hams; and the rearing of cattle and goats is important. The breeding of horses is fostered by the government.

The mineral wealth is very great, especially in coal and iron. The production of coal is greater than that of any other province of Prussia, and amounted in 1906 to 53,000,000 tons. The great Ruhr coal-field extends from the Rhineland into the province as far as Unna, the centre being Dortmund, and there is a smaller coal-field in the N. at Ibbenbüren. The production of iron ore, chiefly S. of the Ruhr (1,360,000 tons in 1905) is exceeded in Prussia only by that of the Rhine province. After coal and iron the most valuable minerals are zinc, lead, pyrites and copper. Antimony, quicksilver, stone, marble, slate and potter's clay are also worked, and there are brine springs in the Hellweg and mineral springs at Lippspringe, Oynhausen, &c.

The manufacturing industry of the province, which chiefly depends upon its mineral wealth, is very extensive. Iron and steel goods are produced in the so-called "Enneper Strasse," the valley of the Ennepe, a small tributary of the Ruhr with the town of Hagen, and in the neighbouring towns of Bochum, Dortmund, Iserlohn and Altena, and also in the Siegen district. The brass and bronze industries are carried on at Iserlohn and Altena, those of tin and Britannia metal at Lüdenscheid; needles are made at Iserlohn and wire at Altena. The very important linen industry of Bielefeld, Herford, Minden and Warendorf has flourished in this region since the 14th century. Jute is manufactured at Bielefeld and cotton goods in the W. Paper is extensively made on the lower Lenne, and leather around Siegen. Other manufactures are glass, chemicals, sugar, sausages and cigars. An active trade is promoted by several trunk lines of railway which cross the province (total mileage in 1906, 1889 m., exclusive of light railways) and by the navigation of the Weser (on which Minden has a port), Ems, Ruhr and Lippe. Beverungen is the chief market for corn and Paderborn for wool.

The population in 1905 was 3,618,090, or 464 per sq. m. It is very unevenly distributed, and in the industrial districts is increasing very rapidly. In recent years there has been a great influx of Poles into these parts, attracted by the higher wages. In 1900 they already numbered more than 100,000. Between 1895 and 1900 the mean annual increase of the population was 3·3%, the highest recorded in the German empire, but between 1900 and 1905 it fell to 2·5%. The percentage of illegitimate births (2·6) is the lowest in Germany. 51·0% of the inhabitants are Roman Catholics, 47·9% Protestants. The distribution of the two communions still closely follows the lines of the settlement at the peace of Westphalia. Thus the former duchy of Westphalia and the bishoprics of Münster and Paderborn which remained in ecclesiastical hands are almost entirely Roman Catholic, while the secularized bishopric of Minden and the former counties of Ravensberg and Mark, which fell or had fallen to Brandenburg, and the Siegen district, which belonged to Nassau, are predominantly Protestant.

The province is divided into the three governmental departments (*Regierungsbezirke*) of Minden, Münster and Arnsberg. Münster is the seat of government and of the provincial university. Westphalia returns thirty-one members to the Prussian Lower House and seventeen to the Reichstag.

The inhabitants are mainly of the Saxon stock and speak Low German dialects, except in the Upper Frankish district around Siegen, where the Hessian dialect is spoken.

Westphalia, "the western plain" (in early records *Westfalahi*), was originally the name of the western province of the early duchy of Saxony, including the western portion of the modern province and extending north to the borders of Friesland. When Duke Henry the Lion of Saxony fell under the ban of the empire in 1180, and his duchy was divided, the bishops of Münster and Paderborn became princes of the empire, and the archbishop of Cologne, Philip of Heinsberg, received from the emperor Frederick I. the Sauerland and some other districts which became the duchy of Westphalia. Within the duchy were some independent secular territories, notably the county of Mark, while other districts were held as fiefs from the archbishops, afterwards electors. From 1368 the electors themselves held the county of Arnsberg as an imperial fief. The duchy received a constitution of its own, and was governed for the elector by a marshal (*Landmarschall*, after 1480 *Landdrost*) who was also stadtholder, and presided over the Westphalian chancellery. This system lasted till 1803. By Maximilian's administrative organization of the empire in 1500 the duchy of Westphalia was included as an appanage of Cologne in the scattered circle of the Lower Rhine. The Westphalian circle which was formed at the same time comprised nearly all the rest of the modern province (including Mark) and the lands north of it between the Weser and the frontier of the Netherlands, also Verden, Schaumburg, Nassau, Wied, Lippe, Berg, Cleves, Jülich, Liége, Bouillon and Cambrai.

Brandenburg laid the foundations of her dominion in Westphalia by obtaining the counties of Mark and Ravensberg in 1614 (confirmed 1666), to which the bishopric of Minden was added by the peace of Westphalia in 1648 and Tecklenburg in 1707. By the settlement of 1803 the church lands were secularized, and Prussia received the bishopric of Paderborn and the eastern part of Münster, while the electoral duchy of Westphalia was given to Hesse-Darmstadt.

After the peace of Tilsit the kingdom of Westphalia was created by Napoleon I. on the 18th of August 1807, and given to his brother Jerome (see BONAPARTE). It included the present governmental department of Minden, but by far the larger part of the kingdom lay outside and chiefly to the east of the modern province, and comprised the Hanoverian department of Hildesheim and in part that of Arensberg, Brunswick, the northern part of the province of Saxony as far as the Elbe, Halle, and most of Hesse-Cassel. The area was 14,627 sq. m., and the population nearly two millions. Cassel was the capital. A constitution on the French imperial pattern granted by the king remained practically inoperative, an arbitrary bureaucratic régime was instituted, the finances were from the beginning in a hopeless condition, and the country was drained of men and money for Napoleon's wars. In January 1810 most of Hanover was added, but at the end of the same year half the latter, together with the city of Minden, was annexed to the French empire. There had already been serious revolts and raids, and after the battle of Leipzig the Russians drove the king from Cassel (October 1813), the kingdom of Westphalia was dissolved and the old order was for a time re-established. At the congress of Vienna (1815) Hesse-Darmstadt surrendered her share of Westphalia to Prussia, and the present province was constituted.

See Weddigen, *Westfalen, Land und Leute* (Paderborn, 1896); G. Schulze, *Heimatskunde der Provinz Westfalen* (Minden, 1900); Lemberg, *Die Hütten- und Metallindustrie Rheinlands und Westfalens* (4th ed., Dortmund, 1905); J. S. Seibertz, *Landes- und Rechtsgeschichte des Herzogtums Westfalen* (4 vols., Arnsberg, 1839–1875); R. Wilmans, *Die Kaiserurkunden der Provinz Westfalen* (2 vols., Münster, 1867–1881); M. Jansen, *Die Herzogsgewalt der Erzbischöfe von Köln in Westfalen* (Munich, 1895); Holzapfel, *Das Königreich Westfalen* (Magdeburg, 1895); G. Servières, *L'Allemagne française sous Napoléon I^{er}* (Paris, 1904); Haselhoff, *Die Entwickelung der Landeskultur in der Provinz Westfalen im 19ten Jahrhundert* (Münster, 1900).

WESTPHALIA, TREATY OF, a collective name given to the two treaties concluded on the 24th of October 1648 by the empire with France at Münster and with Sweden and the Protestant estates of the empire at Osnabrück, by which the Thirty Years' War (*q.v.*) was brought to an end.

As early as 1636 negotiations had been opened at Cologne at the instance of Pope Urban VIII., supported by the seigniory of Venice, but failed owing to the disinclination of Richelieu to stop the progress of the French arms, and to the refusal of Sweden to treat with the papal legate. In 1637 the agents of the emperor began to negotiate at Hamburg with Sweden, though the mediation of Christian IV., king of Denmark, was rejected by Sweden, and the discussions dragged on for years without result. In the meantime the new emperor Ferdinand III. proposed at the diet of Regensburg in 1640 to extend the peace of Prague to the whole empire, on the basis of an amnesty, from which, however, those Protestant estates who were still leagued with foreign powers were to be excluded. His aim was by settling the internal affairs of the empire to exclude the German princes from participation in negotiations with foreign powers; but these efforts had no result.

A more practical suggestion was made by the Comte d'Avaux, the French envoy at Hamburg, who proposed in 1641 that the negotiations at Cologne and Hamburg should be transferred to Münster and Osnabrück, two cities in the Westphalian circle not more than 30 m. apart. A preliminary treaty embodying this proposal was concluded between the representatives of the emperor, France and Sweden at Hamburg on the 25th of December 1641. A dispute as to precedence between France and Sweden, and the refusal of the latter power to meet the papal nuncio, made the choice of a single meeting-place impossible. It was arranged, however, that the two assemblies should be regarded as a single congress, and that neither should conclude peace without the other.

The date fixed for the meeting of the two conventions was the 11th of July 1643, but many months elapsed before all the representatives arrived, and the settlement of many questions of precedence and etiquette caused further delays. England, Poland, Muscovy and Turkey were the only European powers unrepresented. The war continued during the deliberations, which were influenced by its fortunes.

The chief representative of the emperor was Count Maximilian von Trautmansdorff, to whose sagacity the conclusion of peace was largely due. The French envoys were nominally under Henry of Orleans, duke of Longueville, but the marquis de Sablé and the comte d'Avaux were the real agents of France. Sweden was represented by John Oxenstierna, son of the chancellor, and by John Adler Salvius, who had previously acted for Sweden at Hamburg. The papal nuncio was Fabio Chigi, afterwards Pope Alexander VII. Brandenburg, represented by Count Johann von Sayn-Wittgenstein, played the foremost part among the Protestant states of the empire. On the 1st of June 1645 France and Sweden brought forward propositions of peace, which were discussed by the estates of the empire from October 1645 to April 1646. The settlement of religious matters was effected between February 1646 and March 1648. The treaty was signed at Münster by the members of both conventions on the 24th of October 1648, and ratifications were exchanged on the 8th of February 1649. The papal protest of January 3, 1651, was disregarded.

The results were determined in the first place by the support given to each other by France and Sweden in their demands for indemnification, the concession of which necessitated compensation to the German states affected, and secondly by the determination of France to weaken the power of the emperor while strengthening the Roman Catholic states, especially Bavaria.

Sweden received western Pomerania with Rügen and the mouths of the Oder, Wismar and Poel, in Mecklenburg, and the lands of the archbishopric of Bremen and the bishopric of Verden, together with an indemnity of 5,000,000 thalers. The privileges of the Free Towns were preserved. Sweden thus obtained control of the Baltic and a footing on the North Sea, and became an estate of the empire with three deliberative voices in the diet.

The elector of Brandenburg received the greater part of eastern Pomerania, and, as he had a claim on the whole duchy since the death of the last duke in 1635, he was indemnified by the bishoprics of Halberstadt, Minden and Kammin, and the reversion of the archbishopric of Magdeburg, which came to him on the death of the administrator, Prince Augustus of Saxony, in 1680. The elector of Saxony was allowed to retain Lusatia. As compensation for Wismar, Mecklenburg-Schwerin obtained the bishoprics of Schwerin and Ratzeburg and some lands of the Knights of St John. Brunswick-Lüneburg restored Hildesheim to the elector of Cologne, and gave Minden to Brandenburg, but obtained the alternate succession to the bishopric of Osnabrück and the church lands of Walkenried and Gröningen. Hesse-Cassel received the prince-abbacy of Hersfeld, the county of Schaumburg, &c. The elector of Bavaria was confirmed in his possession of the Upper Palatinate, and in his position as an elector which he had obtained in 1623. Charles Louis, the son and heir of Frederick V., the count palatine of the Rhine, who had been placed under the ban of the empire, received back the Lower Palatinate, and a new electorate, the eighth, was created for him.

France obtained the recognition of the sovereignty (which she had enjoyed *de facto* since 1552) over the bishoprics and cities of Metz, Toul and Verdun, Pinerolo in Piedmont, the town of Breisach, the landgraviate of Upper and Lower Alsace, the Sundgau, the advocacy (*Landvogtei*) of the ten imperial cities in Alsace, and the right to garrison Philippsburg. During the Thirty Years' War France had professed to be fighting against the house of Austria, and not against the empire. It was stipulated that the immediate possessions of the empire in Alsace should remain in enjoyment of their liberties (*in ea libertate et possessione immedietatis erga imperium Romanum, qua hactenus gavisae sunt*), but it was added as a condition that the sovereignty of France in the territories ceded to her should not be impaired (*ita tamen, ut praesenti hac declaratione nihil detractatum intelligatur de eo omni supremi dominii iure, quod supra concessum est*). The intention of France was to acquire the full rights of Austria in Alsace, but as Austria had never owned the landgraviate of Lower Alsace, and the *Landvogtei* of the ten free cities did not in itself imply possession, the door was left open for disputes. Louis XIV. afterwards availed himself of this ambiguous clause in support of his aggressive policy on the Rhine. The independence of Switzerland was at last formally recognized, as was that of the United Netherlands in a separate treaty signed by Spain at Münster.

Apart from these territorial changes, a universal and unconditional amnesty to all those who had been deprived of their possessions was declared, and it was decreed that all secular lands should be restored to those who had held them in 1618. Some exceptions were made in the case of the hereditary dominions of the emperor.

Even more important than the territorial redistribution was the ecclesiastical settlement. By the confirmation of the treaty of Passau of 1552 and the religious peace of Augsburg of 1555, and the extension of their provisions to the Reformed (Calvinist) Church, toleration was secured for the three great religious communities of the empire. Within these limits the governments were bound to allow at least private worship, liberty of conscience and the right of emigration, but these measures of toleration were not extended to the hereditary lands of the house of Habsburg. The Protestant minority in the imperial diet was not to be coerced by the majority, but religious questions were to be decided by amicable agreement. Protestant administrators of church lands obtained seats in the diet. Religious parity was established in the imperial chamber (*Reichskammergericht*), and in the imperial deputations and commissions.

The difficult question of the ownership of spiritual lands was decided by a compromise. The edict of restitution of 1629 was annulled. In Württemberg, Baden and the Palatinate these lands were restored to the persons who had held them in 1618 or their successors, but for the rest of the empire possession was determined by the fact of occupation on the 1st of January 1624 (*annus decretorius* or normal year). By the provision that a prince should forfeit his lands if he changed his religion an obstacle was placed in the way of a further spread of the Reformation. The declaration that all protests or vetoes by whomsoever pronounced should be null and void dealt a blow at the intervention of the Roman curia in German affairs.

The constitutional changes made by the treaty had far-reaching effects. The territorial sovereignty of the states of the empire was recognized. They were empowered to contract treaties with one another and with foreign powers, provided that the emperor and the empire suffered no prejudice. By this and other changes the princes of the empire became absolute sovereigns in their own dominions. The emperor and the diet were left with a mere shadow of their former power. The emperor could not pronounce the ban of the empire without the consent of the diet. The diet, in which the 61 imperial cities gained the right of voting on all imperial business, and thus were put on an equality with the princes, retained its legislative and fiscal powers in name, but practically lost them by the requirement of unanimity among the three colleges, which, moreover, were not to give their several decisions by majorities of their members, but by agreement between them.

Not only was the central authority replaced almost entirely by the sovereignty of about 300 princes, but the power of the empire was materially weakened in other ways. It lost about 40,000 sq. m. of territory, and obtained a frontier against France which was incapable of defence. Sweden and France as guarantors of the peace acquired the right of interference in the affairs of the empire, and the former gained a voice in its councils. For many years Germany thus became the principal theatre of European diplomacy and war. But if the treaty of Westphalia pronounced the dissolution of the old order in the empire, it facilitated the growth of new powers in its component parts, especially Austria, Bavaria and Brandenburg.

The treaty was recognized as a fundamental law of the German constitution, and formed the basis of all subsequent treaties until the dissolution of the empire.

See the text in Dumont, *Corps universel diplomatique* (The Hague, 1726–1731), vi. 429 ff.; J. G. von Meiern, *Acta pacis Westphalicae publica* (6 vols., Hanover and Göttingen, 1734–1736), *Instrumenta pacis Caesareo-Suecicae et Caesareo-Gallicae* (Göttingen, 1738); "A. A." [Bishop Adam Adami], *Arcana pacis Westphalicae* (Frankfort, 1698), edited by J. G. von Meiern (Leipzig, 1737); K. T. Heigel, "Das Westfälische Friedenswerk von 1643–1648" in the *Zeitschrift für Geschichte und Politik* (1888); F. Philippi and others, *Der Westfälische Frieden, ein Gedenkbuch* (Münster, 1898); *Journal du Congrès de Munster par F. Ogier, aumônier du comte d'Avaux*, edited by A. Boppe (Paris, 1893); *Cambridge Modern History*, iv. p. 395 ff. and bibliography, p. 866 ff.; J. Bryce, *The Holy Roman Empire*, ch. xix. (A. B. Go.)

WEST POINT, a village and military post, in Orange county, New York, U.S.A., on the west bank of the Hudson river, 50 m. above New York City. It is served by the West Shore railway, and is connected by ferry with the New York Central railway at Garrison. The United States Military Academy occupies a plateau 180 ft. above the river, reached by a roadway cut into the cliff and commanding a view up and down the river for many miles. Between 1902 and 1908 Congress appropriated about $7,500,000 for the reconstruction of the academy, but most of the old buildings of historic interest have been incorporated. The Headquarters Building and Grant Hall (the mess hall) contain portraits of famous American soldiers. The military library is one of the finest in existence (80,000 volumes in 1910), and its building contains interesting memorials, by Saint Gaudens, to J. McNeill Whistler and Edgar Allan Poe, both former cadets in the academy. Cullum Memorial Hall (1899) was the gift of Major-General George Washington Cullum (1809–1892), superintendent of the academy in 1864–1866. Opposite it is a monument (1845) to Major F. L. Dade's command of 110 men who were ambushed and killed by the Seminole Indians in Florida in December 1835. In the S.E. corner of the parade ground (60 acres) is a granite statue to Colonel Sylvanus Thayer (1785–1872), who was superintendent of the academy from 1817 to 1833. In the N.W. angle is the bronze statue (1868) of Major-General John Sedgwick, U.S. Volunteers, who was killed by a sharpshooter, on the 9th of May 1864, while making a personal reconnaissance at Spottsylvania. Between Trophy Point and the hotel is the Battle Monument (1874, 78 ft. high, surmounted by a statue of Victory by MacMonnies), a memorial to the soldiers of the regular army who died in the Civil War. Above the cliff towards the N. and E. of the plain is Fort Clinton; in its E. front stands a monument erected in 1828 by the Corps of Cadets to Kosciuszko, who planned the original fortifications here in 1778. About 1 m. N. of the academy is "West Point Cemetery" (about 14 acres) on the E. angle of an elevated plain overlooking the river, formerly known as "German Flats," in which rest the remains of Thayer, Winfield Scott, Robert Anderson and other distinguished soldiers. The Cadet Monument (1817) stands on the E. angle overlooking the river. High above the academy on Mount Independence (490 ft.) still stands old Fort Putnam, commanding a fine view for miles up and down the Hudson. In 1908, as the gift of Mrs Russell Sage and Miss Anna B. Warner, there was added to the military reservation Constitution Island (about 280 acres), lying directly opposite West Point, with the remains of two forts built during the War of Independence.

West Point, "the Gibraltar of the Hudson," was first occupied as a military post in January 1778, when a chain of redoubts was erected at various strategic points along the Hudson. At West Point were built a half-dozen earthwork fortifications, of which Fort Putnam on Mt. Independence, Fort Clinton on the extremity of the point (not to be confused with the Fort Clinton captured by the British in 1777 farther down the river) and Battery Knox, just above the river landing, were the largest. These were the fortifications that Benedict Arnold, their commander, in 1780 agreed to deliver into British hands. After the discovery of his treason, Washington made his headquarters for some time at West Point before removing to Newburgh. Later Washington recommended West Point as a site for a military school. Such an establishment had been suggested by Henry Knox in May 1776; and in October of that year the Continental Congress passed a resolution appointing a committee to draw plans for "a military academy of the army." A Corps of Invalids was established in June 1777, was organized in Philadelphia in July 1777, and was transferred to West Point in 1781; this corps was "to serve as a military school for young gentlemen previously to their being appointed to marching regiments." Three buildings had been erected here to house a library, an engineers' school and a laboratory, and practical experiments in gunnery had been begun here in February 1780. In 1783, at Newburgh, Washington laid before his officers the matter of a military academy such as Knox had suggested. A school for artillerists, engineers and cadets of the corps was established here on the president's recommendation in 1794, and continued until the buildings were destroyed by fire in 1796. In July 1801, Henry Dearborn, Jefferson's secretary of war, directed that all cadets of the corps of artillerists, a subordinate rank which had been established in 1794, should report at West Point for instruction, and in September of that year a school was opened with five instructors, four of them army officers. On the 16th of March 1802, President Jefferson approved an act establishing a military academy at West Point, and on the 4th of July it was formally opened with ten cadets present. Acts of 1802 and 1808 authorized 40 cadets from the artillery, 100 from the infantry, 16 from the dragoons and 20 from the riflemen. But few of these were actually appointed, and for several years instruction was disorganized and desultory. In 1811–1812 instruction was practically abandoned, and in March 1812 the "academy" was without a single instructor. Up to this time 88 cadets had been graduated, but they had been admitted without any sort of examination, and at any age between 12 and 34. An act of Congress of the 29th of April 1812 reorganized the academy, and laid down the general principles and plan on which it has since been conducted. A maximum of 250 cadets was then authorized. Under the able superintendency of Major Sylvanus Thayer this plan was perfected and put into successful operation. Up to 1843 no territorial requirement was necessary for appointment, but in that year a custom that had grown up of providing for one cadet from each Congressional district, each Territory and the District of Columbia, was embodied in the law.

By acts of 1900, 1902, 1903 and 1908 the Corps of Cadets as now constituted consists of one cadet from each congressional district (appointed on recommendation by members of Congress), one from each Territory, one from the District of Columbia, one from Porto Rico, two from each state at large (on recommendation of the senators), and 40 from the United States at large, all to be appointed by the president. Four Filipinos may also receive instruction and become eligible on graduation for commissions in the Philippine scouts. The maximum number of cadets under the apportionment of the twelfth census was 533. Candidates for admission must be between 17 and 22 years, unmarried, and at least 5 ft. 4 in. high. For entrance there are physical examinations, and examinations in algebra, plane geometry, English grammar, composition and literature, geography and general history. In 1902 the entrance requirements were raised and the actual amount of work done in the academy was thus decreased. The principal courses are: tactics for all classes; civil and military engineering (first class); practical military engineering (fourth, third, second and first classes); mechanics and astronomy (third and second classes); mathematics (new cadets, fourth and third classes); chemistry, mineralogy and geology (third and second classes); drawing (third and second classes); modern languages, *i.e.* French and Spanish (fourth, third, second and first classes); law (first class); ordnance and gunnery (first class); military hygiene (second class); and English and history (new cadets and fourth class). The course is four years, and academic instruction continues from the 1st of September to the 5th of June. The summer months are devoted to field work and encampments. Each cadet while in attendance receives pay at the rate of $600 a year and one ration per day, or commutation thereof at thirty cents per day, amounting to $709·50. The number of graduates from 1802 to 1909 inclusive was 4852. The superintendents of the academy have been: in 1802–1803 and in 1805–1812, Jonathan Williams; in 1812–1814, Joseph Gardner Swift (1783–1865); in 1815–1817, Alden Partridge (1785–1854); in 1817–1833, Sylvanus Thayer; in 1833–1838 René E. De Russy (1796–1864); in 1838–1845 and in 1856–1861, Richard Delafield (1798–1873); in 1845–1852, Henry Brewerton (1801–1879); in 1852–1855, Robert E. Lee; in 1855–1856, John Gross Barnard (1815–1882); in January 1861, P. G. T. Beauregard; in 1861–1864, Alexander Hamilton Bowman (1803–1865); in 1864, Zealous Bates Tower (1819–1900); in 1864–1866, G. W. Cullum; in 1866–1871, Thomas Gamble Pitcher (1824–1895); in 1871–1876, Thomas Howard Ruger (1833–1907); in 1876–1881, J. M. Schofield; in 1881–1882, O. O. Howard; in 1882–1887, Wesley Merritt; in 1887–1889, John Grubb Park (1827–1900); in 1889–1893, John Moulden Wilson (b. 1837); in 1893–1898, Oswald Herbert Ernst (b. 1842); in 1898–1906, Albert Leopold Mills (b. 1854); in 1906–1910, H. L. Scott (b. 1853); and, 1910, T. H. Barry (b. 1855).

See G. W. Cullum, *Biographical Register of the Officers and Graduates of the United States Military Academy* (4 vols., New York, 1891–1904); E. C. Boynton, *History of West Point* (ibid. 1863); J. P. Farley, *West Point in the Early Sixties* (Troy, 1902); Morris Schaff, *The Spirit of Old West Point* (Boston, 1907); and the annual reports of the superintendent.

WESTPORT, a market-town, seaport and seaside resort of County Mayo, Ireland, near the mouth of a small river in Clew Bay. Pop. (1901) 3892. The town is 160 m. W. from Dublin by the Midland Great Western railway, Westport Quay at the river mouth being served by a branch line. There is a small export trade in grain. The beautiful demesne of the marquess of Sligo enriches the neighbourhood. Clew Bay, thickly studded with islands and surrounded with mountains, is one of the most magnificent of the great inlets on the W. coast. Near the S. shore is Croagh Patrick (2510 ft.), an isolated conical hill of singularly perfect form, in wide repute as a place of pilgrimage.

WEST PRUSSIA (Ger. *Westpreussen*), a province of Prussia, bounded on the N. by the Baltic, on the E. by East Prussia, on the S. by Russian Poland and the province of Posen, and on the W. by Brandenburg and Pomerania. The area is 9862 sq. m. The greater part is occupied by the low Baltic plateau, intersected by a network of streams and lakes, and rising to the Turmberg (1086 ft.) near Danzig. East of Konitz is an extensive moorland, 70 m. long, called the Tucheler Heide. The lakes, though very numerous, are not large. The Vistula, here of great width, and subject to destructive floods, enters the province near Thorn, and flowing north in a valley which divides the plateau, enters Danzig Bay by a large delta, the Werder. The other rivers are chiefly tributaries of the Vistula, as the Drewenz on its right bank and the Brahe on its left.

In general physical characteristics the province resembles East Prussia, but the climate is less harsh and the fertility of the soil greater. Arable land and gardens occupy 55·6% of the area, meadows and pastures 12·9%, forests 21·7%, and the rest is mostly waste. The valley and delta of the Vistula are very fertile, and produce good crops of wheat and pasturage for horses, cattle and sheep. Besides cereals, the chief crops are potatoes, hay, tobacco, garden produce, fruit and sugar-beet. Poultry, fish and timber are important sources of wealth. Cavalry horses (especially at the government stud farm of Marienwerder) and merino sheep are reared. The minerals are unimportant, except amber, peat and clay. Shipbuilding is carried on at Danzig and Elbing, and in various places there are iron and glass works, saw-mills, sugar factories and distilleries. Much of the trade passes through the ports of Danzig and Elbing.

The population in 1905 was 1,641,746, showing a mean density of 166 to the sq. m. Of these 567,318 or 34·5 % were Poles, a larger proportion than in any other Prussian province except Posen. They are increasing somewhat faster than the Germans, and the efforts of the colonization commission have done little to promote the immigration of German farmers. The Kashubes (*q.v.*), nearly all of whom (less than 200,000) live in W. Prussia, chiefly in the west, from Putzig to Konitz, are here reckoned with the Poles. The Poles proper chiefly inhabit the centre of the province, and the borders of Russian Poland. Among the Germans, who are most numerous in the north-east, Low German dialects are spoken, except in a Swabian colony round Kulmsee. Roman Catholics number 51·4% and Protestants 46·6% of the population, and there are 16,000 Jews. The Poles are almost all Roman Catholics.

The province is divided into the governmental departments of Danzig and Marienwerder. It returns twenty-two members to the Prussian Lower House and thirteen to the Reichstag. Danzig is the capital, and the only large town.

West Prussia, with the exception of southern Pomerania (around Marienwerder) which belonged to Prussia, was a possession of Poland from 1466 till the first partition of Poland in 1772, when it was given to Prussia with the exception of Danzig and Thorn, which Poland retained till 1793. The present province was formed in 1808, but from 1824 to 1878 was united with East Prussia. For its history see also PRUSSIA and POLAND.

See K. Lohmeyer, *Geschichte von Ost- und Westpreussen* (part i., 3rd ed., Gotha, 1906); Vallentin, *Westpreussen seit den ersten Jahrzehnten dieses Jahrhunderts* (Tübingen, 1893); Ambrassat, *Westpreussen, ein Handbuch der Heimatkunde* (Danzig, 1906).

WEST SPRINGFIELD, a township of Hampden county, Massachusetts, U.S.A., on the Connecticut river, opposite Springfield. Pop. (1890) 5077; (1900) 7105 (1501 foreign-born); (1910) 9224. Area, about 18 sq. m. The township is served by the Boston & Albany railway, and by interurban electric railways to Holyoke and Hartford. The principal villages are Merrick and West Springfield on the Connecticut river and Mittineague on the Westfield river. West Springfield was originally a part of Springfield. The first settlement was not made, however, until about 1653, and there were few settlers until after King Philip's War (1676). In 1696 West Springfield was organized as a separate parish, and in 1774 was made a separate township. Holyoke was set off from it in 1860, and Agawam in 1855.

WEST VIRGINIA, the north-westernmost of the so-called Southern states of the United States of America, lying between latitudes 37° 10′ and 40° 40′ N., and longitudes 77° 40′ and 82° 40′ W. It is bounded on the north-west by Ohio, from which it is separated by the Ohio river, on the north by Pennsylvania and Maryland, the Potomac river dividing it from the latter state; on the east and south-east by Pennsylvania, Maryland and Virginia, the boundary lines in the first two cases being meridians, in the last case a very irregular line following the crest of mountain ridges in places; and on the south-west by Virginia and Kentucky, the Big Sandy river separating it from the latter state. The extreme length of the state from north to south is about 240 m., the extreme breadth from east to west about 265 m. Area, 24,170 sq. m., of which 148 sq. m. is water surface.

Physical Features.—The state is divided into two distinct physiographic provinces; the Alleghany Plateau on the west, comprising perhaps two-thirds of the area of the state, and forming a part of the great Appalachian Plateau Province which extends from New York to Alabama; and the Newer Appalachians or Great Valley Region on the east, being a part of the large province of the same name which extends from Canada to Central Alabama. The Alleghany Plateau consists of nearly horizontal beds of limestone, sandstone and shales, including important seams of coal; inclines slightly toward the north-west, and is intricately dissected by extensively branching streams into a maze of narrow canyons and steep-sided hills. Along the Ohio river, these hills rise to an elevation of 800 to 1000 ft. above sea-level, while toward the south-east the elevation increases until 3500 and 4000 ft. are reached along the south-east margin of the plateau, which is known as the Alleghany Front. The entire plateau area is drained by the Ohio river and its tributaries. Along the flood-plains of the larger rivers are fertile "bottomlands," but the ruggedness of the plateau country as a whole has retarded the development of the state, much of which is still sparsely populated. The coal beds are of enormous extent, and constitute an important element in the wealth of the state. Petroleum and natural gas also occur in the plateau rocks in great quantities.

In the Newer Appalachian region, the beds which still lie horizontal in the plateau province were long ago thrown into folds and planed off by erosion, alternate belts of hard and soft rock being left exposed. Uplift permitted renewed erosion to wear away the soft belts, leaving mountain ridges of hard rock separated by parallel valleys. Hence the region is variously known as the Ridge and Valley Belt, the Great Valley Region, or the Folded Appalachians. The mountain ridges vary in height up to 4000 ft. and more, the highest point in the state being Spruce Knob (4860 ft.). The parallel valleys are drained by north-east and south-west flowing streams, those in the north-east being tributary to the Potomac, those farther south tributary to the Great Kanawha. Although the valleys between the ridges are not always easy of access, they give broad areas of nearly level agricultural land.

Flora.—The plateau portion of West Virginia is largely covered by hardwood forests, but along the Ohio river and its principal tributaries the valuable timber has been removed and considerable areas have been wholly cleared for farming and pasture lands. Among the most important trees of this area are the white and chestnut oaks, the black walnut, the yellow poplar, and the cherry, the southern portion of the state containing the largest reserve supply. In the area of the Newer Appalachian Mountains, the eastern Panhandle region has a forest similar to that of the plateau district; but between these two areas of hardwood there is a long belt where spruce and white pine cover the mountain ridges. Other trees common in the state are the persimmon, sassafras, and, in the Ohio Valley region, the sycamore. Hickory, chestnut, locust, maple, beech, dogwood, and pawpaw are widely distributed. Among the shrubs and vines are the blackberry, black and red raspberry, gooseberry, huckleberry, hazel and grape. Ginseng is an important medicinal plant. Wild ginger, elder and sumach are common, and in the mountain areas, rhododendrons, mountain laurel and azaleas.

Climate.—Inasmuch as the state has a range of over 4000 ft. in altitude, the climate varies greatly in different districts. The mean a[illegible] for typical sections are as follows: Ohio Valley north of the thirty-ninth parallel, 53° F.; south-western part of state, 56°; central plateau district, 52°; mountainous belt along south-eastern boundary of state, 48° to 50°. Wellsburg, in the northern Panhandle, has a mean winter temperature of 27°, a summer mean of 70°. Parkersburg, farther down the Ohio Valley, has a winter mean of 34° and a summer mean of 74°. Martinsburg, in the eastern Panhandle, has nearly the same means, 32° and 74°. Terra Alta, in the north-eastern mountains, has a winter mean of 26°, a summer mean of only 67°. The first killing frosts generally occur about the middle of October in the Ohio Valley region, and about the first of October in the higher plateau and mountain region; the average dates for the last killing frosts in the same localities are the middle and last of April respectively. In the Ohio Valley and eastern Panhandle the summer mean temperature is 74°, the winter mean 31° to 34°. The highest recorded temperature for the state is 107°, the lowest −35°. Temperatures above 100° and below −15° are rare. Precipitation is greatest in the mountains, over 50 in.; and least over the Ohio Valley, the eastern Panhandle and the extreme south-east, 35 to 40 in. Snows are frequent during the winter, and sometimes deep in the higher plateau and mountain districts. The prevailing winds are from south to west.

AGRICULTURE.—The state is primarily agricultural. In general the richer western part is devoted to crops, and the eastern part to raising live-stock. The crop of Indian corn in 1909 was 27,632,000 bushels, and the acreage 880,000. The wheat crop was 4,810,000 bushels, and the acreage 370,000. The crop of buckwheat was 499,000 bushels (grown on 22,000 acres). The rye crop was 148,000 bushels, and the acreage 11,000. The production of oats was 2,156,000 bushels (grown on 98,000 acres). In 1909 the acreage of hay alone was 675,000 acres, and the crop was 844,000 tons, valued at $11,225,000. Tobacco is grown throughout the state; in 1909 on 12,000 acres was grown a crop of 12,000,000 lb, valued at $1,663,200.

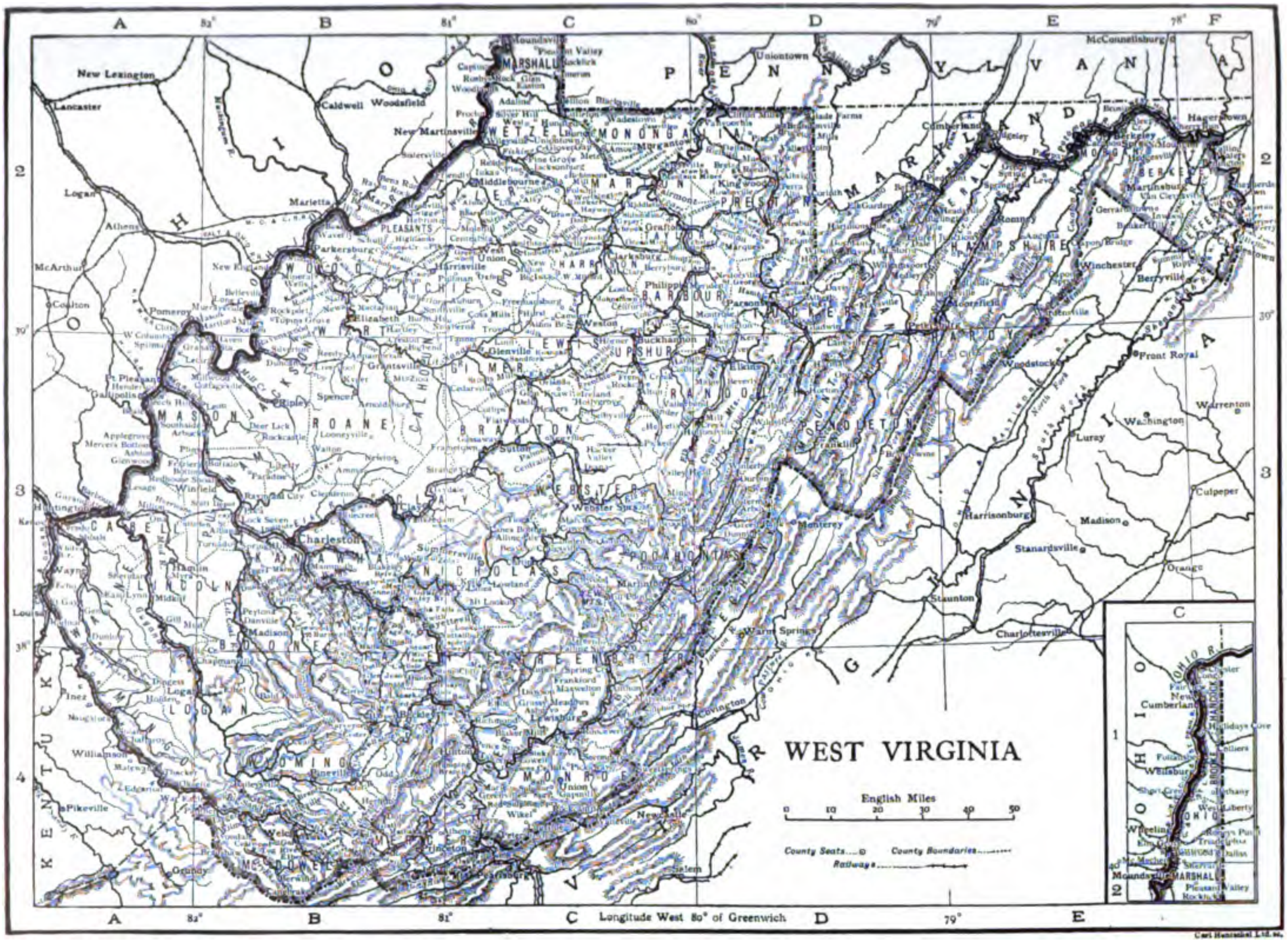
Stock-raising is an important industry, especially in the eastern part of the state.

Mines and Quarries.—The state's great mineral wealth is in coals of various kinds, petroleum, and natural gas.

The coal deposits underlie about 17,000 sq. m. (more than 70% of the total) of the state's area, and bituminous coal has been found in 51 of the 55 counties; this is one of the largest continuous coal fields in the world. The principal districts are the Fairmont (or Upper Monongahela) and the Elk Garden (or Upper Potomac) in the northern, and the Pocahontas (or Flat Top) and the New and Kanawha rivers districts in the southern part of the state. The total output of the state was 44,648 tons in 1863, when the first shipments outside the state were made; and 41,897,843 tons (valued at $40,009,054) in 1908, when the output of West Virginia was third in quantity and in value among the states of the Union, being exceeded only by that of Pennsylvania and of Illinois. The seams are principally above water levels and in many cases have been laid bare by erosion; and the supply is varied—besides a "fat coking, gassy bituminous," there are an excellent grade of splint coal (first mined in 1864 at Coalburg, Kanawha county) and (except that in Kentucky) the only important supply of cannel coal in the United States. Most of the mines are operated under "non-union" rules. The bituminous coal of West Virginia is a particularly good coking coal, and in 1905, 1906, 1907 and 1908 West Virginia ranked second (to Pennsylvania) among the states of the Union in the amount of coke manufactured; the Flat Top district is the principal coke-making region.

Petroleum ranks second to coal among the state's mineral resources. In 1771 Thomas Jefferson described a "burning spring" in the Kanawha Valley, and when wells were drilled for salt brine near Charleston petroleum and natural gas were found here before there was any drilling for oil in Pennsylvania. Immediately before the Civil War, petroleum was discovered in shallow wells near Parkersburg, and there was a great rush of prospectors and speculators to the Little Kanawha Valley. But the Civil War interrupted development. After the war, wells were drilled at Burning Springs, Oil Rock, California House, Volcano, Sandhill and Horseneck, and in the years 1865–1876 3,000,000 bbls. of oil, valued at $20,000,000, were taken out of these districts. A successful well in Marion county, near Mannington, far from the region of the earlier wells, was drilled in 1889, and the output of the state increased from 119,448 bbls. in 1888 to 544,113 in 1889, and to 2,406,218 in 1891; in 1893 it was first more than 8,000,000 bbls.; and in 1900 it was 16,195,675. After 1900 it gradually decreased—although new pools in Wetzel county were found in 1902—and in 1908 it was 9,523,176 bbls. (valued at $16,911,865).

Natural gas, like petroleum, was first heard of in West Virginia in connexion with a burning spring on the Kanawha, and there were gas springs on the Big Sandy and the Little Kanawha. In 1841 natural gas was found with salt brine in a well on the Kanawha, and was used as a fuel to evaporate the salt water. The production was not large until after 1895; it was valued at $1,334,023 in 1898, at $3,954,472 in 1901, at $10,075,804 in 1905, at $16,670,962 in 1907, and at $14,837,130 in 1908, when (as since 1904, when it first was greater than that of Indiana) it was second only in value to that of Pennsylvania. The principal field is in Wetzel county, but there are important supplies in Lewis, Harrison, Marion, Monongahela.



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Lincoln and Wayne counties. Much of the natural gas is piped out of the state into Ohio (even into the northern parts), Kentucky, Pennsylvania and Maryland; within the state gas has been utilized as a fuel in carbon black and glass factories.

Brine wells have been mentioned above; the salt industry is still carried on in Mason county, and in 1908 145,157 bbls. were produced with a value of $10,481; and there is a small output of bromine. Iron ore is found in the state in the coal hills (especially Laurel Hills and Beaver Lick Mountain), but the deposits have not been worked on a large scale. Pig iron is manufactured cheaply because of the low price of fuel; in 1907 the value of pig iron manufactured in the state was $6,454,000. There are deposits of excellent clay, especially for pottery, and in 1907 ($2,159,132) and 1908 ($2,083,821) the state ranked after Ohio and New Jersey in the value of pottery. The total value of all clay products in West Virginia was $3,261,736 in 1908. An excellent glass sand is procured from crushed sandstone near Berkeley Springs, Morgan county. Grindstones have been quarried in Wood and Jackson counties. There are black slate deposits near Martinsburg. There are mineral springs, mostly medicinal waters, in Greenbrier, Summers, Webster, Ohio and Preston counties. Among the more noted medicinal springs are: classed as calcareous and earthy, Sweet Springs, 74° F., in Monroe county, diuretic and diaphoretic; and Berkeley Springs, 74° F., in Morgan county, reputed restorative in neuralgic cases, and as containing sulphur; Salt Sulphur Springs, in Monroe county, of value in scrofula and skin diseases.

Manufactures.—Manufacturing is largely localized in the north-western part of the state along the Ohio river. The value of the factory product in 1905 was $99,040,676. The principal manufacture is iron and steel: in 1905 the product of steel works and rolling mills was $13,454,802. The iron mills are almost all in the vicinity of Wheeling. The first rolling mill west of the Alleghanies was probably one near Morgantown. Next in importance among the state's manufactures are lumber and timber, and flour and grist mills. The tanning, currying and finishing of leather, an industry largely dependent on the plentiful supply of oak and hemlock bark for tanning, is centralized in the northern and eastern parts of the state, near the forests. The glass industry began in Wheeling in 1821, and there a process was discovered by which in 1864 for soda ash bicarbonate of lime was substituted, and a lime glass was made which was as fine as lead glass; other factors contributing to the localization of the manufacture of glass here are the fine glass sand obtained in the state and the plentiful supply of natural gas for fuel.

Transportation and Commerce.—Railway development in West Virginia has been due largely to the exploitation of the coal and lumber resources of the state. The Baltimore & Ohio railway leads in trackage: it enters the state with several lines at its northern end; its main line crosses this portion of the state from east to west, striking the Ohio at Parkersburg, and one of its lines (Ohio River railway) extends nearly the length of the state from Wheeling in the north through Parkersburg to Kenova in the south. This road serves as a carrier for the northern coal producing districts. The Chesapeake & Ohio traverses the southern part of the state, from White Sulphur Springs in the east, through Charleston to the Ohio, serving the New and Kanawha rivers coal district as a freight carrier; the Norfolk & Western runs just within the south-western boundary along the valley of the Big Sandy, carrying coal both east and west from the Pocahontas coal-field; and the new Virginian railway entering at the south-east taps the coal-producing region (the Kanawha and Pocahontas districts) at Deepwater, serving in addition to the Norfolk & Western as a carrier of coal to Norfolk on the Virginia coast. The railway mileage of the state grew with great rapidity in the decade 1880–1890; it was 691 m. in 1880, 1,433·30 in 1890, 2,473·34 in 1900 and 3,215·32 in January 1909. Natural facilities for transportation, afforded by the Ohio river and its branches, the Monongahela, at the northern end of the state, and the Little Kanawha and the Great Kanawha, are of special value for the shipment of lumber and coal. The Monongahela has been improved by locks and dams to Fairmont. It is the carrier of a heavy tonnage of coal to Pittsburg, Pennsylvania. The Little Kanawha, which has also been improved, serves chiefly for the transportation of logs which are floated down to the Ohio.

Population.—The population of West Virginia at the various censuses since its organization as a state has been as follows: 1870, 442,014; 1880, 618,457; 1890, 762,794; 1900, 958,800; 1910, 1,221,119. In 1890–1900 and 1900–1910 the increase in population was more than one fourth. Of the total population in 1900, 97·7% was native-born, 892,854 were native whites, 43,499 were negroes, 56 were Chinese and 12 were Indians. Of the inhabitants born in the United States 61,508 were natives of Virginia, 40,301 of Ohio, 28,927 of Pennsylvania and 10,867 of Kentucky; and of the foreign-born there were 6537 Germans, 3342 Irish, 2921 Italians and 2622 English. Of the total population 71,388 were of foreign parentage—*i.e.* either one or both parents were foreign-born, and 18,232 were of German and 10,534 of Irish parentage, on both the father's and the mother's side.

In 1906 there were in the state 301,565 members of religious denominations, of whom 86·2% were Protestants. The Methodist bodies with 115,825 communicants (38·4% of the total communicants or members) were the strongest. There were 67,044 Baptists (2226 United Baptists, 2019 Primitive Baptists and 1513 Free Baptists); 40,011 Roman Catholics; 19,993 United Brethren, all of the "New Constitution"; 19,668 Presbyterians; 13,323 Disciples of Christ; 6506 Lutherans, and 5230 Protestant Episcopalians. The principal cities of the state are Wheeling, Huntington, Parkersburg, Charleston (the capital), Martinsburg, Fairmont and Grafton.

Administration.—The first constitution of 1863 was superseded by the present instrument which was adopted August 1872 and was amended in 1880, 1883 and 1902. The constitution may be amended by either of two methods. A majority of the members elected to each house may submit the question of calling a convention to the people; and if a majority of the votes cast approve, an election for members of a convention shall be held, and all acts of the convention must be submitted to the people for ratification or rejection. On the other hand, a two-thirds majority of each house of the legislature may submit an amendment or amendments to popular vote at the next general election, when the approval of a majority of the qualified voters is necessary for ratification. All male citizens above twenty-one years of age have the right of suffrage, subject to a residence of one year in the state and sixty days in the county in which they offer to vote. Paupers, insane, and those convicted of treason, felony or bribery in an election are barred, "while the disability continues," and no person in the military, naval or marine service of the United States is deemed a resident of the state by reason of being stationed therein. An official blanket ballot containing the names of the candidates arranged in columns according to party is provided at public expense.

Executive.—The executive department consists of the governor, secretary of state, superintendent of free schools, auditor, treasurer and attorney-general, all elected by the people at the time of the presidential election and serving for four years from the fourth of March following. The governor must have been a citizen for five years preceding this election, must have attained the age of thirty and is ineligible for re-election during the four years succeeding the expiration of his term. In case of the death, resignation or other disability of the governor, the president of the Senate acts as governor, and in case of his incapability the Speaker of the House of Delegates; and these two failing, the legislature on joint ballot elects an acting governor. A new election must be called to fill the vacancy unless the unexpired term is less than one year. The governor appoints, subject to the consent of a majority of the members elected to the Senate, all officers whose appointment or election is not otherwise provided for. In case of a vacancy in the court of appeals or in the circuit court the governor appoints until the next general election, or if the unexpired term is less than two years, until the end of the term. The governor sends a message at the beginning of each session of the legislature, and may convene the houses in extraordinary session when he deems it necessary. He may veto a bill, or in case of an appropriation bill, the separate items, but this veto may be overridden by a simple majority of the total membership of each house. Any bill not returned with objections within five days after presentation becomes a law. An appropriation bill cannot be vetoed after the legislature adjourns.

Legislative.—The legislature, consisting of the Senate and the House of Delegates, meets at the capital on the first Wednesday in January of the odd years. The Senate is composed (1910) of thirty members, chosen from fifteen districts for a term of four years, but one half the membership retires biennially. A senator must be twenty-five years of age, and must have been a citizen of the state for five years and a resident of the district for one year preceding his election. The Senate elects a president, confirms or rejects the nominations of the governor, and acts as a court of impeachment for the trial of public officers, besides sharing in legislative functions. The House of Delegates is composed (1910) of eighty-six members, of whom each county chooses at least one. A delegate must be a citizen and have resided one year in the county from which he is chosen. No person holding a lucrative office under the state or the United States, no salaried officer of a railroad company, and no officer of any court of record is eligible for membership in either house. Besides its legislative functions the House prepares articles of impeachment and prosecutes the proceedings before the Senate. The length of the legislative session is forty-five days, but it may be extended by a vote of two-thirds of the members elected to each house. No act takes effect until ninety days after its passage unless two-thirds of the members of each house specifically order otherwise.

Judiciary.—The judicial power is vested in the Supreme Court of Appeals, the Circuit courts, such inferior courts as may be established, county courts, the powers and duties of which are, however, chiefly police and fiscal, and in justices of the peace. The Supreme Court of Appeals, consisting of five judges, elected for terms of twelve years, holds three terms annually, one at Wheeling, one at Charleston and one at Charles Town. It has original jurisdiction in cases of *habeas corpus*, *mandamus* and prohibition, and appellate jurisdiction in cases involving a greater amount than one hundred dollars; concerning title or boundary of lands, probate of wills; the appointment or qualification of personal representatives, guardians, curators, committees, &c.; concerning a mill, roadway, ferry or landing; the right of a corporation or county to levy tolls or taxes; in cases of *quo warranto*, *habeas corpus*, *mandamus*, *certiorari* and prohibition, and all others involving freedom or the constitutionality of a law; in criminal cases where there has been a conviction for felony or misdemeanour in a circuit, criminal or intermediate court; and in cases relating to the public revenues. The court designates one of its members as president. Nineteen judges elected for terms of eight years in eighteen circuits compose the circuit court, the judges of which have original jurisdiction of matters involving more than $50; of all cases of *habeas corpus*, *mandamus*, *quo warranto* and prohibition; of all cases in equity; and of all crimes and misdemeanours. The judges have appellate jurisdiction of cases civil and criminal coming up from the lower courts. In order to relieve the circuit judges the legislature has established by special acts inferior courts, generally with criminal jurisdiction only, in nine counties of the state. The judicial powers of the county court are confined to probate, the appointment of executors, administrators and other personal representatives, and the settlement of their accounts, matters relating to apprentices and to contested elections for county and district officers. (See below under *Local Government*.) One or two justices of the peace (depending on population) are elected from each magisterial district; there must be not less than three, nor more than ten, districts in each county.

Local Government.—As in Virginia, the county is the unit of government, though an unsuccessful attempt to introduce the township system was made in the first constitution. The county court, consisting of three commissioners elected for six years but with terms so arranged that one retires every two years, is the police and fiscal authority. Other officers are the clerk of the county court, elected for six years, the sheriff, who also acts as tax-collector and treasurer, the prosecuting attorney, one or two assessors, the surveyor of lands and the superintendent of free schools, all elected for the term of four years; the sheriff may not serve two consecutive full terms. In addition there are boards appointed or elected by various authorities and charged with specific duties. They include the local board of health and the board of jury commissioners. Each of the magisterial districts (of which, as has been said, there must be at least three and not more than ten in each county) elects one or two magistrates and constables, and a board of education of three members. The constitution provides that the legislature, on the request of any county, may establish a special form of county government, and several of the larger and more populous counties have special acts.

Miscellaneous Laws.—A woman's right to hold, manage and acquire property is not affected by marriage, except that unless she lives apart from her husband, she may not mortgage or convey real estate without his consent. A woman becomes of age at twenty-one. Rights of dower and courtesy both exist. When a husband dies intestate leaving a widow and issue, the widow is entitled to the life use of one-third of the real estate and to one-third of the personal estate absolutely. If there is no issue she takes the whole of the personal estate, while the real estate, subject to her dower, goes first to her husband's father and then to his mother, brothers and sisters. If the wife dies intestate the husband has a right to the use of her real estate for life, and to one-third of the personal estate if there is issue; otherwise to the whole. Neither can by will deprive the other of the right of dower or courtesy in the real estate and of the right to one-third of the personal estate. Children may be disinherited with or without cause. Any parent or infant children of deceased parents may set apart personal estate not exceeding $200 in value which shall be exempt from execution. A homestead not exceeding $1000 in value may be set apart, provided that it is recorded before the debt against which it was claimed was contracted. Marriages between whites and negroes, or where either party had a wife or husband living, or within the prohibited degrees of consanguinity, or where either was insane or physically incapable of marriage, or where the male was under eighteen or the female under sixteen may be annulled. No female or male under twelve may be employed in mines, and no child under twelve may be employed in a factory, and when school is in session none under fourteen.

[illegible]—The state charitable and penal institutions consist [illegible] Hospital for the Insane at Weston, the Second [illegible] Spencer, three miners' hospitals—one at [illegible] and one at Fairmont; the West Virginia Asylum for Incurables at Huntington, Schools for the Deaf and Blind at Romney, the West Virginia Penitentiary at Moundsville, the West Virginia Reform School at Grafton and the West Virginia Industrial Home for Girls near Salem. These are all under the supervision of a state board of control of three members, appointed by the governor, which was created in 1909, and also has control of the finances of the state educational system. There is also a state humane society, which was organized in 1899 for the protection of children and of the helpless aged, and for the prevention of cruelty to animals. The West Virginia Colored Orphans' Home near Huntington is not under state control, but has received appropriations from the legislature. In 1908 a law was enacted for establishing the West Virginia Children's Home to be under the control of the Humane Society.

Education.—Each magisterial district constitutes a school district and there are also a few independent school districts. For each school district there is a board of education consisting of a president and two commissioners, each elected for a term of four years, one commissioner every two years. This board is authorized to establish and alter sub-districts. A law enacted in 1908 requires that children between eight and fifteen years of age shall attend school twenty-four weeks each year, provided the public school in their district is in session that length of time. The county supervision of public schools is vested in a county superintendent, who is elected for a term of four years. The state supervision is vested in a state superintendent, who is elected for a term of four years. A state board of education, consisting of the state superintendent and five other persons appointed by him, constitutes a state board of examiners (for special primary, high school and professional certificates) and prescribes the course of study. There is also a state school book commission, consisting of the state superintendent and eight other members appointed by the governor. The state maintains six normal schools for whites (at Huntington, Fairmont, West Liberty, Glenville, Shepherdstown, Athens) and two for negroes (at Institute and at Bluefield). They are governed by a board of regents consisting of the state superintendent and six other members appointed by the governor. At the head of the educational system is the West Virginia University (1867) at Morgantown (*q.v.*). The principal institutions of higher learning not under state control are Bethany College (Christian, 1841), at Bethany; Morris Harvey College (Methodist Episcopal, Southern, 1888), at Barboursville; West Virginia Wesleyan College (Methodist Episcopal, 1890), at Buckhannon; and Davis and Elkins College (Presbyterian, 1904), at Elkins.

Finance.—The state revenue is derived mainly from a general property tax, licence taxes levied on various businesses and occupations, a collateral inheritance tax and a capitation tax. For the year ending on the 30th of September 1908 the receipts were $3,382,131·66 and the disbursements $3,482,317·03. West Virginia's share of the Virginia debt which existed when West Virginia was set off from Virginia has not yet been determined (see below, § HISTORY), but other than this the state has no debt, and the contraction of a state debt other than "to meet casual deficits in the revenue, to redeem a previous liability of the state, to suppress insurrection, repel invasion or defend the state in time of war" is forbidden by the constitution. The indebtedness of a county, municipality or school district is limited to 5% of the value of its taxable property.

History.—That part of Virginia beyond the Alleghany mountains was a favourite haunt of the Indians before the first coming of the whites, and there are many Indian mounds, indicative of an early and high cultural development, within the present limits of the state, and especially in the neighbourhood of Moundsville (*q.v.*). The western part of Virginia was not explored until long after considerable settlements had been made in the east. In 1671 General Abram Wood, at the direction of Governor William Berkeley (*c.* 1610–1677), sent a party which discovered Kanawha Falls, and in 1716, Governor Alexander Spottswood with about thirty horsemen made an excursion into what is now Pendleton county. John Van Metre, an Indian trader, penetrated into the northern portion in 1725, and Morgan ap Morgan, a Welshman, built a cabin in the present Berkeley county in 1727. The same year German settlers from Pennsylvania founded New Mecklenburg, the present Shepherdstown, on the Potomac, and others soon followed. Charles II. of England, in 1661, granted to a company of gentlemen the land between the Potomac and Rappahannock rivers, commonly known as the "Northern Neck." The grant finally came into the possession of Thomas, Lord Fairfax, and in 1746 a stone was erected at the source of the north branch of the Potomac to mark the western limit of the grant. A considerable part of this land was surveyed by George Washington between 1748 and 1751. The diary kept by the young surveyor indicates that there were already many squatters, largely of German origin, along the South Branch of the Potomac. Christopher Gist, a surveyor in the employ of the first Ohio Company (see OHIO COMPANY), which was composed chiefly of Virginians, in 1751–1752 explored the country along the Ohio river north of the mouth of the Kanawha, and the company sought to have a fourteenth colony established with the name "Vandalia." Many settlers crossed the mountains after 1750, though they were somewhat hindered by Indian depredations. Probably no Indians lived within the present limits of the state, but the region was a common hunting ground, crossed also by many war trails, and during the French and Indian war (1754–63) the scattered settlements were almost destroyed. In 1774 the governor of Virginia, Lord Dunmore, himself led a force over the mountains, and a body of militia under General Andrew Lewis dealt the Shawnee Indians under Cornstalk a crushing blow at Point Pleasant (*q.v.*) at the junction of the Kanawha and the Ohio rivers, but Indian attacks continued until after the War of Independence. During the war the settlers in Western Virginia were generally active Whigs and many served in the Continental army.

Social conditions in western Virginia were entirely unlike those existing in the eastern portion of the state. The population was not homogeneous, as a considerable part of the immigration came by way of Pennsylvania and included Germans, the Protestant Scotch-Irish and settlers from the states farther north. During the War of Independence the movement to create another state beyond the Alleghanies was revived, and a petition (1776) for the establishment of "Westsylvania" was presented to Congress, on the ground that the mountains made an almost impassable barrier on the east. The rugged nature of the country made slavery unprofitable, and time only increased the social, political and economic differences between the two sections of the state. The convention which met in 1829 to form a new constitution for Virginia, against the protest of the counties beyond the mountains, required a property qualification for suffrage, and gave the slave-holding counties the benefit of three-fifths of their slave population in apportioning the state's representation in the lower Federal house. As a result every county beyond the Alleghanies except one voted to reject the constitution, which was nevertheless carried by eastern votes. Though the Virginia constitution of 1850 provided for white manhood suffrage, yet the distribution of representation among the counties was such as to give control to the section east of the Blue Ridge Mountains. Another grievance of the West was the large expenditure for internal improvements at state expense in the East compared with the scanty proportion allotted to the West. For an account of the Virginia convention of 1861, which adopted the Ordinance of Secession, see VIRGINIA. Here it is sufficient to say that only nine of the forty-six delegates from the present state of West Virginia voted to secede. Almost immediately after the adoption of the ordinance a mass meeting at Clarksburg recommended that each county in north-western Virginia send delegates to a convention to meet in Wheeling on the 13th of May 1861. When this "First Wheeling Convention" met, four hundred and twenty-five delegates from twenty-five counties were present, but soon there was a division of sentiment. Some delegates favoured the immediate formation of a new state, but the more far-sighted members argued that as the ordinance had not yet been voted upon by the people, and Virginia was still in the Union, such action would be revolutionary, since the United States Constitution provides that no state may be divided without its consent. Therefore it was voted that in case the ordinance should be adopted (of which there was little doubt) another convention including the members-elect of the legislature should meet at Wheeling on the 11th of June. At the election (23rd May 1861) the ordinance was ratified by a large majority in the state as a whole, but in the western counties 40,000 votes out of 44,000 were cast against it. The "Second Wheeling Convention" met according to agreement (11th June), and declared that, since the Secession Convention had been called without the consent of the people, all its acts were void, and that all who adhered to it had vacated their offices. An act for the "reorganization" of the government was passed on the 19th of June. The next day Francis H. Pierpont was chosen governor of Virginia, other officers were elected and the convention adjourned. The legislature, composed of the members from the western counties who had been elected on the 23rd of May and some of the hold-over senators who had been elected in 1859, met at Wheeling on the 1st of July, filled the remainder of the state offices, organized a state government and elected two United States senators who were recognized at Washington. There were, therefore, two state governments in Virginia, one owning allegiance to the United States and one to the Confederacy. The Convention, which had taken a recess until the 6th of August, then reassembled and (August 20) adopted an ordinance providing for a popular vote on the formation of a new state, and for a convention to frame a constitution if the vote should be favourable. At the election (October 24, 1861) 18,489 votes were cast for the new state and only 781 against. The convention met on the 26th of November 1861, and finished its work on the 18th of February 1862, and the instrument was ratified by the people (18,162 for and 514 against) on the 11th of April 1862. Next the legislature of the "Reorganized" government on the 13th of May gave its consent to the formation of the new state. Application for admission to the Union was now made to Congress, and on the 31st of December 1862 an enabling act was approved by President Lincoln admitting the state on the condition that a provision for the gradual abolition of slavery be inserted in the Constitution. The Convention was reconvened on the 12th of February 1863, and the demand of Congress was met. The revised instrument was adopted by the people on the 26th of March 1863, and on the 20th of April 1863 President Lincoln issued a proclamation admitting the state at the end of sixty days (June 20, 1863). Meanwhile officers for the new state were chosen, and Governor Pierpont removed his capital to Alexandria where he asserted jurisdiction over the counties of Virginia within the Federal lines. The question of the constitutionality of the formation of the new state was brought before the Supreme Court of the United States in the following manner. Berkeley and Jefferson counties lying on the Potomac east of the mountains, in 1863, with the consent of the "Reorganized" government of Virginia voted in favour of annexation to West Virginia. Many voters absent in the Confederate army when the vote was taken refused to acknowledge the transfer on their return. The Virginia legislature repealed the act of cession and in 1866 brought suit against West Virginia asking the court to declare the counties a part of Virginia. Meanwhile Congress on the 10th of March 1866 passed a joint resolution recognizing the transfer. The Supreme Court in 1871 decided in favour of West Virginia, and there has been no further question. During the Civil War West Virginia suffered comparatively little. McClellan's forces gained possession of the greater part of the territory in the summer of 1861, and Union control was never seriously threatened, in spite of Lee's attempt in the same year. In 1863 General John D. Imboden, with 5000 Confederates, overran a considerable portion of the state. Bands of guerrillas burned and plundered in some sections, and were not entirely suppressed until after the war was ended. The state furnished about 36,000 soldiers to the Federal armies and somewhat less than 10,000 to the Confederate. The absence in the army of the Confederate sympathizers helps to explain the small vote against the formation of the new state. During the war and for years afterwards partisan feeling ran high. The property of Confederates might be confiscated, and in 1866 a constitutional amendment disfranchising all who had given aid and comfort to the Confederacy was adopted. The addition of the Fourteenth and Fifteenth Amendments to the U.S. Constitution caused a reaction, the Democratic party secured control in 1870, and in 1871 the constitutional amendment of 1866 was abrogated. The first steps toward this change had been taken, however, by the Republicans in 1870. In 1872 an entirely new constitution was adopted (August 22).

Though the first constitution provided for the assumption of a part of the Virginia debt, negotiations opened by Virginia in 1870 were fruitless, and in 1871 that state funded two-thirds of the debt and arbitrarily assigned the remainder to West Virginia.

The legislature of the latter state in 1873 adopted a report declaring that between 1822 and 1861, during which period the debt had been incurred, the western counties had paid an excess of taxes, more than equal to the amount which had been expended in the west for the purposes for which the debt had been incurred, and concluded with the statement: "West Virginia owes no debt, has no bonds for sale and asks no credit." In 1906 Virginia entered suit in the U.S. Supreme Court to compel West Virginia to assume a portion of the debt. West Virginia demurred, but was overruled, and on the 4th of May 1908 a master was appointed to take testimony. The state rejected decisively the overtures made by Virginia in 1866, looking towards a reunion of the commonwealths.

Governors of West Virginia.

Arthur I. Boreman	Republican	1863–1869
D. D. T. Farnsworth (acting)	„	1869
Wm. E. Stevenson	„	1869–1871
John J. Jacobs	Democrat	1871–1877
Henry M. Mathews	„	1877–1881
Jacob B. Jackson	„	1881–1885
E. Willis Wilson	„	1885–1890
A. Brooks Fleming[1]	„	1890–1893
Wm. A. MacCorkle	„	1893–1897
George W. Atkinson	Republican	1897–1901
Albert B. White	„	1901–1905
Wm. M. O. Dawson	„	1905–1909
Wm. E. Glasscock	„	1909–

Bibliography.—For general description see Henry Gannett, *Gazetteer of West Virginia* (Washington, 1904), being Bulletin 233 of the U.S. Geological Survey; the *Reports*, and the *Bulletins of the Geological Survey of West Virginia* (Morgantown, 1901 sqq.). Bulletin 1 is a *Bibliography of Works upon the Geology and Natural Resources of West Virginia*, by S. S. Brown; folios 26, 28, 32, 34, 44, 69, 72, 77 and 160 of the *Geologic Atlas* of the United States; M. F. Maury and W. M. Fontaine, *Resources of West Virginia* (Charleston, 1876); and George W. Summers, *The Mountain State* (ibid. 1893). For administration and history see the *Manual of West Virginia* (Charleston, 1907), issued by the Secretary of State; *West Virginia Public Documents* (ibid. 1902 sqq.); *The Code of West Virginia* (St Paul, 1906); A. R. Whitehill, *History of Education in West Virginia* (Washington, 1902), a Circular of Information of the U.S. Bureau of Education; a *History of Education in West Virginia* (Charleston, 1904), by the State Superintendent of Free Schools; V. A. Lewis, *History of West Virginia* (new ed., New York, 1904), and *History and Government of West Virginia* (Chicago, 1896); R. E. Fast and Hu Maxwell, *History and Government of West Virginia* (Morgantown, 1901; new edition, 1908); A. S. Withers, *Chronicles of Border Warfare* (1831, reprinted Cincinnati, 1905); J. P. Hale, *Trans-Alleghany Pioneers* (Cincinnati, 1887); W. P. Willey, *Formation of West Virginia* (Wheeling, 1901); and M. F. Callahan, *Evolution of the Constitution of West Virginia* (Morgantown, 1909).

WESTWARD HO, a small seaside village in the Barnstaple parliamentary division of Devonshire, England, on the east of Barnstaple Bay, 2½ m. N.W. of Bideford, on the Bideford, Appledore & Westward Ho railway. Of modern growth, it takes its name from a famous novel by Charles Kingsley. Many visitors are attracted in summer by its pure and bracing air, its quiet, and, above all, by its golf club, with links laid out on the sandhills known as Braunton Burrows. Westward Ho forms part of the urban district of Northam, which had a population in 1901 of 5355.

WETHERSFIELD, a township of Hartford county, Connecticut, U.S.A., on the Connecticut river, adjoining on the N. the city of Hartford, of which it is a residential suburb. Pop. (1890) 2271; (1900) 2637 (489 foreign-born); (1910) 3148. Area, about 12 sq. m. It is served by the New York, New Haven & Hartford railway and by electric lines to Hartford. Among its old buildings are the house in which in 1781 George Washington and Count Rochambeau met to plan the Yorktown campaign; the First Church of Christ (Congregational), erected in 1761 and remodelled in 1838 and 1882; and the old academy building, which was built in [illegible] is now used as a town hall, and houses a public library. [illegible] in girth. The Connecticut [illegible] in the township tobacco, veg[illegible] interests are of co[illegible]tures are small to[illegible] permanently [illegible] by legislature [illegible] inhabited township in the state; it was first settled in the winter of 1634–1635 by colonists from Watertown, Massachusetts, and received its present name in 1637. With Hartford and Windsor in 1639 it framed the Fundamental Orders of the Colony of Connecticut. Before 1660 its inhabitants aided in the founding of Stamford and Milford, Connecticut, and of Hadley, Massachusetts.

See H. R. Stiles, *History of Ancient Wethersfield* (New York, 1900).

WETSTEIN (also Wettstein), **JOHANN JAKOB** (1693–1754), New Testament critic, was born at Basel on the 5th of March 1693. Among his tutors in theology was Samuel Werenfels (1657–1740), an influential anticipator of modern scientific exegesis. While still a student he began to direct his attention to the special pursuit of his life—the text of the Greek New Testament. A relative, Johann Wetstein, who was the university librarian, gave him permission to examine and collate the principal MSS. of the New Testament in the library, and he copied the various readings which they contained into his copy of Gerard of Maestricht's edition of the Greek text. In 1713 in his public examination he defended a dissertation entitled *De variis Novi Testamenti lectionibus*, and sought to show that variety of readings did not detract from the authority of the Bible. Wetstein paid great attention also to Aramaic and Talmudic Hebrew. In the spring of 1714 he undertook a learned tour, which led him to Paris and England, the great object of his inquiry everywhere being manuscripts of the New Testament. In 1716 he made the acquaintance of Richard Bentley at Cambridge, who took great interest in his work. The great scholar induced him to return to Paris to collate carefully the *Codex Ephraemi*, Bentley having then in view a critical edition of the New Testament. In July 1717 Wetstein returned to take the office of a curate at large (*diaconus communis*) at Basel, a post which he held for three years, at the expiration of which he exchanged it to become his father's colleague and successor in the parish of St Leonard's. At the same time he pursued his favourite study, and gave private lectures on New Testament exegesis. It was then that he decided to prepare a critical edition of the Greek New Testament. He had in the meantime broken with Bentley, whose famous *Proposals* appeared in 1720. His earlier teachers, however, J. C. Iselin and J. L. Frey, who were engaged upon work similar to his own, became so unfriendly towards him that after a time he was forbidden any further use of the manuscripts in the library. Then a rumour got abroad that his projected text would take the Socinian side in the case of such passages as 1 Timothy iii. 16; and in other ways (*e.g.* by regarding Jesus's temptation as a subjective experience, by explaining some of the miracles in a natural way) he gave occasion for the suspicion of heresy. At length in 1729 the charge of projecting an edition of the Greek Testament savouring of Arian and Socinian views was formally laid against him. The end of the long and unedifying trial was his dismissal, on the 13th of May 1730, from his office of curate of St Leonard's. He then removed from Basel to Amsterdam, where a relative, Johann Heinrich Wetstein, had an important printing and publishing business, from whose office excellent editions of the classics were issued, and also Gerard of Maestricht's edition of the Greek Testament. Wetstein had begun to print in this office an edition of the Greek Testament, which was suddenly stopped for some unknown reason. As soon as he reached Amsterdam he published anonymously the *Prolegomena ad Novi Testamenti Graeci editionem*, which he had proposed should accompany his Greek Testament, and which was republished by him, with additions, as part of his great work, 1751. The next year (1731) the Remonstrants offered him the chair of philosophy in their college at Amsterdam, vacated by the illness of Jean le Clerc, on condition that he should clear himself of the suspicion of heresy. He thereupon returned to Basel, and procured a reversal (March 22, 1732) of the previous decision, and readmission to all his clerical offices. But, on his becoming a candidate for the Hebrew chair at Basel, his orthodox opponents procured his defeat and his retirement to Amsterdam. At length, after much painful contention, he was allowed to instruct the Remonstrant students in philosophy and Hebrew on certain somewhat humiliating conditions. For the rest of his life he continued professor in the Remonstrant college, declining in 1745 the Greek chair at Basel. In 1746 he once more visited England, and collated Syriac MSS. for his great work. At last this appeared in 1751–1752, in two folio volumes, under the title *Novum Testamentum Graecum editionis receptae cum lectionibus variantibus codicum MSS.*, &c. He did not venture to put new readings in the body of his page, but consigned those of them which he recommended to a place between the *textus receptus* and the full list of various readings. Beneath the latter he gave a commentary, consisting principally of a mass of valuable illustrations and parallels drawn from classical and rabbinical literature, which has formed a storehouse for all later commentators. In his *Prolegomena* he gave an admirable methodical account of the MSS., the versions and the readings of the fathers, as well as the troubled story of the difficulties with which he had had to contend in the prosecution of the work of his life. He was the first to designate uncial manuscripts by Roman capitals, and cursive manuscripts by Arabic figures. He did not long survive the completion of this work. He died at Amsterdam on the 23rd of March 1754.

Wetstein's New Testament has never been republished entire. The London printer, William Bowyer, published, in 1763, a text in which he introduced the readings recommended by Wetstein; J. G. Semler republished the *Prolegomena* and appendix (1764); A. Lotze commenced a new edition of the work, but the *Prolegomena* only appeared (Rotterdam, 1831), and this "castigated." It is generally allowed that Wetstein rendered invaluable service to textual criticism by his collection of various readings and his methodical account of the MSS. and other sources, and that his work was rendered less valuable through his prejudice against the Latin version and the principle of grouping MSS. in families which had been recommended by Richard Bentley and J. A. Bengel.

See Wetstein's account of his labours and trials in his *Nov. Test.* i.; articles in C. F. Illgen's *Ztschr. für histor Theol.* by C. R. Hagenbach (1839), by L. J. Van Rhyn in 1843 and again by Heinrich Böttger in 1870; S. P. Tregelles, *Account of the Printed Text of the New Testament*; F. H. A. Scrivener's *Introduction to the Criticism of the New Testament*; W. Gass, *Protestantische Dogmatik*, vol. iii.; the art. in Herzog's *Realencyklopädie* and in the *Allgemeine deutsche Biographie*.

WETTIN, the name of a family from which several of the royal houses of Europe have sprung, derived from a castle which stood near the small town of that name on the Saale. Attempts to trace the descent to the Saxon chief Widukind or Wittekind, who died about 807, or to Burchard, margrave of Thuringia (d. 908), have failed, and the earliest known ancestor is one Dietrich, who was count of Hassegau or Hosgau, a district on the left bank of the Saale. Dietrich was killed in 982 fighting the Hungarians, and his sons Dedo I. (d. 1009) and Frederick (d. 1017) received lands taken from the Wends, including the county or *Gau* of Wettin on the right bank of the Saale. Dedo's son Dietrich II. inherited these lands, distinguished himself in warfare against the Poles, and married Matilda, daughter of Ekkard I., margrave of Meissen. Their son Dedo II. obtained the Saxon east mark and lower Lusatia on the death of his uncle Ekkard II., margrave of Meissen, in 1046, but in 1069 he quarrelled with the emperor Henry IV. and was compelled to surrender his possessions. He died in 1075, and his lands were granted to his son Henry I., who in 1089 was invested with the mark of Meissen. In 1103 Henry was succeeded by his cousin Thimo (d. 1104), who built a castle at Wettin, and was called by this name. Henry II., son of Henry I., followed, but died childless in 1123; his cousin, Conrad I., son of Thimo, claimed Meissen, of which he secured possession in 1130, and in 1135 the emperor Lothair II. added lower Lusatia to his possessions. Abdicating in 1156, Conrad's lands were divided between his five sons, when the county of Wettin fell to his fourth son Henry, whose family died out in 1217. Wettin then passed to the descendants of Conrad's youngest son Frederick, and in 1288 the county, town and castle of Wettin were sold to the archbishop of Magdeburg. They were retained by the archbishop until the peace of Westphalia in 1648, when they passed to the elector of Brandenburg, and afterwards became incorporated in the kingdom of Prussia.

Conrad I. and his successors had added largely to their possessions, until under Henry I., the Illustrious, margrave of Meissen, the lands of the Wettins stretched from the Oder to the Werra, and from the Erzgebirge to the Harz mountains. The subsequent history of the family is merged in that of Meissen, Saxony and the four Saxon dukedoms. In June 1889 the 800th anniversary of the rule of the Wettins in Meissen and Saxony was celebrated with great splendour at Dresden.

See G. E. Hofmeister, *Das Haus Wettin* (Leipzig, 1889); C. W. Böttiger, *Geschichte des Kurstaates und Königreichs Sachsen* (Gotha, 1867–1873); O. Posse, *Die Markgrafen von Meissen und das Haus Wettin* (Leipzig, 1881), K. Wenck, *Die Wettiner im 14ten Jahrhundert* (Leipzig, 1877); Kämmel, *Festschrift zur 800 jährigen Jubelfeier des Hauses Wettin* (Leipzig, 1889), and H. B. Meyer, *Hof- und Zentralverwaltung der Wettiner* (Leipzig, 1902).

WETZLAR, a town of Germany, in the Prussian Rhine province, pleasantly situated at the confluence of the Dill and Lahn, 64 m. N.E. of Coblenz by the railway to Giessen. Pop. (1905) 12,276. The most conspicuous building is the cathedral, dating in part from the 11th, in part from the 14th-16th centuries. The municipal archives contain interesting documents of the whilom imperial chamber (see *infra*). The town preserves associations of Goethe, who wrote *Die Leiden des jungen Werthers* after living here in 1772 as a legal official, and of Charlotte Buff, the Lotte of *Werther*. Overlooking the town are the ruins of the medieval castle of Kalsmunt. There are iron mines and foundries and optical instrument factories. Wetzlar was originally a royal demesne, and in the 12th century became a free imperial town. It had grown in importance when, in 1693, the imperial chamber (*Reichskammergericht*) was removed hither from Spires. The town lost its independence in 1803, and passed to the prince-primate Dalberg. Three years later (1806), on the dissolution of the empire, the imperial chamber ceased to exist. The French were defeated here by the Austrians and Saxons under the archduke Charles, 15th June 1796.

WEXFORD, a county of Ireland in the province of Leinster, bounded N. by Wicklow, E. and S. by St George's Channel, and W. by Waterford, Kilkenny and Carlow. The area is 576,757 acres or about 902 sq. m. The coast-line does not present any striking features, and owing to the number of sandbanks navigation is dangerous near the shore. The only inlet of importance on the east coast and the only safe harbour is Wexford Harbour, which, owing to a bar, is not accessible to large vessels at ebb-tide. The artificial harbour of Rosslare, outside Wexford Harbour to the south, was therefore opened in 1906. On the south coast the great inlet of Waterford Harbour separates the county from Waterford and Kilkenny, and among several inlets Bannow Bay is the largest. Several islets adjoin the coast. South from Crossfarnogue Point are the Saltee Islands, and Coningmore and Coningbeg, beyond the latter of which is the Saltee lightship. South-east from Greenore Point is the Tuskar Rock.

The surface of the county is chiefly a series of verdant low hills, except towards the northern and western boundaries. An elevated ridge on the north-western boundary forms the termination of the granitic range in Wicklow, and in Croghan Kinshela, on the borders of Wicklow, rises to a height of 1985 ft. On the western border, another range, situated chiefly in Carlow, extends from the valley of the Slaney at Newtownbarry to the confluence of the Barrow with the Nore at New Ross, and reaches 2409 ft. in Blackstairs Mountain, and 2610 ft. in Mount Leinster on the border of Co. Carlow. In the southern district, a hilly region, reaching in Forth Mountain a height of 725 ft., forms with Wexford Harbour the northern boundaries of the baronies of Forth and Bargy, a peninsula of flat and fertile land. The river Slaney enters the county at its north-western extremity, and flows south-east to Wexford Harbour. Its chief tributary is the Bann, which flows south-westwards from the borders of Wicklow. The Barrow forms the western boundary of the county from the Blackstairs range of mountains till its confluence with the Suir at Waterford Harbour.

Geology.—The Leinster Chain, with its granite core and margin of mica-schist, bounds the county on the west. From this, Silurian ground stretches to the sea, like a platform with a hummocky surface, numerous intrusive and contemporaneous felsitic lavas, and some diorites occurring along the strike in continuation of the Waterford series. A granite outlier rises south-east of Enniscorthy, and granite, in part gneissic, forms Carnsore Pt. From near Courtown to Bannow Bay, greenish slates like the Oldhamian series of Wicklow form a broad band, with Old Red Sandstone and Carboniferous Limestone above them near Wexford. Silurian beds appear again towards Carnsore. The surface of the county is much modified by glacial drift, and by the presence of sands and gravels of pre-Glacial and possibly late Pliocene age. These interesting beds are used for liming the fields, under the name of "manure gravels," on account of the fossil shells that they contain.

Industries.—The soil for the most part is a cold stiff clay resting on clay-slate. The interior and western districts are much inferior to those round the coasts. In the south-eastern peninsula of Forth and Bargy the soil is a rich alluvial mould mixed with coralline sandstone and limestone. The peninsula of Hookhead, owing to the limestone formation, is specially fruitful. In the western districts of the county there are large tracts of turf and peat-moss. The acreage under pasture is a little over twice that of tillage, and figures show a fair maintenance of the principal crops, barley, of which the county produces more than any other Irish county, oats, potatoes and turnips. The numbers also of cattle, sheep, pigs and poultry are large and increasing, or well maintained. Except in the town of Wexford the manufactures and trade are of small importance. The town of Wexford is the headquarters of sea and salmon fishing districts, and there are a few fishing villages on the inlets of the south coast.

The main line of the Dublin & South-Eastern railway enters the county from N.E., and runs to Wexford by way of Enniscorthy, with a branch W. to New Ross, from Macmine Junction. Connecting with this line at Palace East, a branch of the Great Southern & Western joins the Kilkenny & Kildare line at Bagenalstown, county Carlow. This company also owns the lines from Rosslare harbour to Wexford and across the southern part of the county to Waterford. There is water communication for barges by the Slaney to Enniscorthy; by the Barrow for larger vessels to New Ross, and by this river and the Grand Canal for barges to Dublin.

Population and Administration.—The population decreases (112,063 in 1891; 104,104 in 1901), but this decrease and the emigration returns are less serious than the average of Irish counties. Of the total about 91% are Roman Catholics, and about 83% form the rural population. The principal towns are Wexford (pop. 11,168), New Ross (5847), Enniscorthy (5458) and Gorey (2178). Newtownbarry, finely situated on the Slaney below the outliers of Mount Leinster, is a lesser market town. To the Irish parliament, until the Union of 1800, the county returned two members, and the boroughs of Bannow, Clonmines, Enniscorthy, Fethard, Gorey, New Ross, Taghmon and Wexford two each. By the Redistribution Act of 1885 Wexford, which had returned two members since 1800, was divided into two parliamentary divisions, North and South, each returning one member, the borough of Wexford, which formerly returned one member, and the portion of the borough of New Ross within the county, being merged in the South Division. The county is divided into ten baronies. It is in the Protestant diocese of Dublin, and the Roman Catholic dioceses of Dublin, Ferns, and Kildare and Leighlin. Assizes are held at Wexford, and quarter sessions at Enniscorthy, Gorey, New Ross and Wexford.

History and Antiquities.—The northern portion of Wexford was included in *Hy Kinselagh*, the peculiar territory of the Macmorroughs, overlords of Leinster, who had their chief residence at Ferns. Dermod Macmorrough, having been deposed from the kingdom of Leinster, asked help of Henry II., king of England, who authorized him to raise forces in England for the assertion of his claim. He secured the aid of Strongbow by promising him the hand of Eva, and in addition obtained assistance from Robert Fitzstephen and Maurice Fitzgerald of Wales. On the 1st of May 1169 Fitzstephen landed at Bagenbon on the south side of Fethard, and after four days' siege captured the town of Wexford from its Danish inhabitants. After this Dermod granted the territory of Wexford to Fitzstephen and Fitzgerald and their heirs for ever. Macmorrough having died in 1172, Strongbow became lord of Leinster. At first Henry II. retained Wexford in his own possession; but in 1174 he committed it to Strongbow. The barony of Forth is almost entirely peopled by the descendants of those who accompanied these English expeditions. Wexford was one of the twelve counties into which the conquered territory in Ireland is generally stated to have been divided by King John, and formed part of the possessions of William Marshal, earl of Pembroke, who had married Strongbow's daughter. Through the female line it ultimately passed to John Talbot, earl of Shrewsbury, who in 1446 was made earl of Waterford and baron of Dungarvan. In 1474 George Talbot was seneschal of the liberty of Wexford. The district was actively concerned in the rebellion of 1641; and during the Cromwellian campaign the town of Wexford was carried by storm on the 9th of October 1649, and a week later the garrison at New Ross surrendered—a "seasonable mercy," according to Cromwell, as giving him an "opportunity towards Munster." Wexford was the chief seat of the rebellion of 1798, the leaders there being the priests.

Evidences of the Danish occupation are seen in the numerous raths, or encampments, especially at Dunbrody, Enniscorthy and New Ross. Among the monastic ruins special mention may be made of Dunbrody abbey, of great extent, founded about 1178 for Cistercian monks by Hervey de Montmorency, marshal of Henry II.; Tintern abbey, founded in 1200 by William Marshal, earl of Pembroke, and peopled by monks from Tintern abbey in Monmouthshire; the abbey of St Sepulchre, Wexford, founded shortly after the invasion by the Roches, lords of Fermoy; Ferns abbey, founded by Dermod Macmorrough (with other remains including the modernized cathedral of a former see, and ruins of a church); and the abbey of New Ross, founded by St Alban in the 6th century. There are a considerable number of old castles, including Ferns, dismantled by the parliamentary forces under Sir Charles Coote in 1641, and occupying the site of the old palace of the Macmorroughs; the massive pile of Enniscorthy, founded by Raymond le Gros; Carrick Castle, near Wexford, the first built by the English; and the fort of Duncannon.

WEXFORD, a seaport, market town and municipal borough, and the county town of Co. Wexford, Ireland, finely situated on the south side of the Slaney, where it discharges into Wexford Harbour, on the Dublin & South-Eastern railway, 92¾ m. S. of Dublin. Pop. (1901) 11,168. Wexford Harbour, formed by the estuary of the Slaney, is about 5 m. from N. to S. and about 4 from E. to W. There are quays extending nearly 900 yds., and the harbour affords good accommodation for shipping, but its advantages are in great part lost by a bar at its mouth preventing the entrance of vessels drawing more than 12 ft. An artificial harbour was therefore opened at Rosslare in 1906, outside the southern part of the promontory closing in the harbour, and this is connected with Wexford by a railway (8¾ m.) owned by the Great Southern & Western Company, and is served by the passenger steamers of the Great Western railway of England from Fishguard. The town of Wexford consists, for the most part, of extremely narrow streets, of picturesque appearance, but inconvenient to traffic. Some remains exist of the old walls and flanking towers. The Protestant church, near the ruins of the ancient abbey of St Sepulchre or Selsker, is said to occupy the spot where the treaty was signed between the Irish and the English invaders in 1169. The principal modern buildings are the town-hall, court-house, barracks, occupying the site of the ancient castle, St Peter's College for the education of Catholic clergy, with a striking chapel by A. W. Pugin, and a number of convents. At Carrick, 2 m. W., the Anglo-Normans erected their first castle, and opposite this, across the river, is a modern round tower commemorating the men of Wexford who died in the Crimean War. The principal exports are agricultural produce, live stock and whisky. Shipbuilding is carried on, and also tanning, malting, brewing, iron-founding, distilling and the manufacture of artificial manure, flour, agricultural implements, and rope and twine. Wexford is the headquarters of salmon and sea-fishery districts. Under the Local Government [illegible] it retains its mayor and corporation. [illegible]

Wexford was one of the [illegible] been taken by Fitzstephen [illegible] well besieged in [illegible] 1690. In [illegible] however [illegible]

By James I. it was in 1608 made a free borough corporate, by the title of "the town and free borough corporate of Wexford." It returned two members to parliament from 1374 till the Union, when they were reduced to one. In 1885 it was included in the south division of the county.

WEYBRIDGE, an urban district in the Chertsey parliamentary division of Surrey, England; 19 m. W.S.W from London by the London & South-Western railway. Pop. (1901) 5329. It lies in the flat valley of the river Wey, 1 m. above its junction with the Thames. The river is locked up to Godalming, and navigation is assisted by cuts. Weybridge has grown in modern times out of a village into a residential town. The church of St James is modern but contains numerous ancient memorials, and one by Sir F. Chantrey for the duchess of York (d. 1820), daughter of Frederick William II. of Prussia, to whose memory there is also a column on Weybridge Green. The summit of this column is that which formerly stood at Seven Dials, London. The Roman Catholic chapel of St Charles Borromeo was the burial-place of Louis Philippe, ex-king of the French (d. 1850), who resided at Claremont in the neighbouring parish of Esher, his queen and other members of his family, but their bodies were subsequently removed to Dreux in Normandy To the east of Weybridge lies Henry VIII.'s park of Oatlands (see WALTON-ON-THAMES). In 1907 the Brooklands racing track for motor-cars was opened near Weybridge. It has a circuit of 2 11/16 m. round the inner edge, and including the straight finishing track is 3¼ m. in total length, its maximum width is 100 ft., and at the curves it is banked up to a maximum height of 28 ft. 8 in.

WEYDEN, ROGIER VAN DER [originally ROGER DE LA PASTURE][1] (*c.* 1400–1464), Flemish painter, was born in Tournai, and there apprenticed in 1427 to Robert Campin He became a gild master in 1432 and in 1435 removed to Brussels, where he was shortly after appointed town painter His four historical works in the Hôtel de Ville have perished, but three tapestries in the Bern museum are traditionally based on their designs. In 1449 Rogier went to Italy, visiting Rome, Ferrara (where he painted two pictures for Lionel d'Este), Milan and probably Florence. On returning (1450) he executed for Pierre Bladelin the "Magi" triptych, now in the Berlin Gallery, and (1435) an altarpiece for the abbot of Cambrai, which has been identified with a triptych in the Prado Gallery representing the "Crucifixion," "Expulsion from Paradise" and "Last Judgment." Van der Weyden's style, which was in no way modified by his Italian journey, is somewhat dry and severe as compared with the painting of the Van Eycks, whose pupil Vasari erroneously supposed him to be; his colour is less rich than theirs, his brush-work more laboured, and he entirely lacks their sense of atmosphere. On the other hand, he cared more for dramatic expression, particularly of a tragic kind, and his pictures have a deeply religious intention. Comparatively few works are attributed with certainty to this painter, chief among such are two altarpieces at Berlin, besides that mentioned above, "The Joys and Sorrows of Mary," and "Life of St John the Baptist," a "Deposition" and "Crucifixion" in the Escorial, the Prado triptych, another ("Annunciation," "Adoration" and "Presentation") at Munich; a "Madonna" and a "St John the Baptist" at Frankfort. The "Seven Sacraments" altarpiece at Antwerp is almost certainly his, likewise the "Deposition" in the Uffizi, the triptych of the Beaune hospital, and the "Seven Sorrows" at Brussels. Two pictures of St Luke painting the Virgin, at Brussels and St Petersburg respectively, are attributed to him. None of these is signed or dated. Van der Weyden attracted many foreigners, notably Martin Schongauer, to his studio, and he became one of the main influences in the northern art of the [illegible] century. He died at Brussels in 1464. His descendant, [illegible] VAN DER WEYDEN the younger, is known to have [illegible] the Antwerp gild in 1528, but no work of his has yet [illegible] satisfactorily authenticated.

[illegible] Hasse, *Roger van der Weyden und Roger van Brügge* (Strass[illegible]

WEYLER Y NICOLAU, VALERIANO, Marquess of Tenerife (1839-   ), Spanish soldier, was born at Palma de Majorca. His family were originally Prussians, and served in the Spanish army for several generations. He entered at sixteen the military college of infantry at Toledo, and, when he attained the rank of lieutenant, passed into the staff college, from which he came out as the head of his class. Two years afterwards he became captain, and was sent to Cuba at his own request. He distinguished himself in the expedition to Santo Domingo in many fights, and especially in a daring reconnaissance with few men into the heart of the enemy's lines, for which he got the cross with laurels of San Fernando. From 1868 to 1872 he served also brilliantly against the Cuban rebels, and commanded a corps of volunteers specially raised for him in Havana. He returned to Spain in 1873 as brigadier-general, and took an active part against the Carlists in the eastern provinces of the Peninsula in 1875 and 1876, for which he was raised to the rank of general of division. Then he was elected senator and given the title of marquess of Tenerife. He held the post of captain-general in the Canary Isles from 1878 to 1883, and in the Balearic Isles afterwards. In 1888 he was sent out as captain-general to the Philippines, where he dealt very sternly with the native rebels of the Carolines, of Mindanao and other provinces. On his return to Spain in 1892 he was appointed to the command first of the 6th Army Corps in the Basque Provinces and Navarre, where he soon quelled agitations, and then as captain-general at Barcelona, where he remained until January 1896. In Catalonia, with a state of siege, he made himself the terror of the anarchists and socialists. After Marshal Campos had failed to pacify Cuba, the Conservative government of Canovas del Castillo sent out Weyler, and this selection met the approval of most Spaniards, who thought him the proper man to crush the rebellion. Weyler attempted to do this by a policy of inexorable repression, which raised a storm of indignation, and led to a demand from America for his recall. This recall was granted by the Liberal government of Sagasta, but Weyler afterwards asserted that, had he been left alone, he would have stamped out the rebellion in six months. After his return to Spain his reputation as a strong and ambitious soldier made him one of those who in case of any constitutional disturbance might be expected to play an important rôle, and his political position was nationally affected by this consideration, his appointment in 1900 as captain-general of Madrid resulted indeed in more than one ministerial crisis. He was minister of war for a short time at the end of 1901, and again in 1905. At the end of October 1909 he was appointed captain-general at Barcelona, where the disturbances connected with the execution of Francisco Ferrer were quelled by him without bloodshed.

WEYMAN, STANLEY JOHN (1855-   ), English novelist, was born at Ludlow, Shropshire, on the 7th of August 1855, the son of a solicitor. He was educated at Shrewsbury School, and at Christ Church, Oxford. He took his degree in modern history in 1877, and was called to the bar at the Inner Temple in 1881, joining the Oxford circuit. He had been practising as a barrister for eight years when he made his reputation as a novelist by a series of romances dealing with French history· *The House of the Wolf* (1889), *A Gentleman of France* (1893), *Under the Red Robe* (1894), *Memoirs of a Minister of France* (1895), &c. Among his later novels were. *Shrewsbury* (1897), *The Castle Inn* (1898), *Sophia* (1900), *Count Hannibal* (1901), *In King's Byways* (1902), *The Long Night* (1903), *The Abbess of Vlaye* (1904), *Starvecrow Farm* (1905), *Chippinge* (1906)

WEYMOUTH, a township of Norfolk county, Massachusetts, U.S.A., on Weymouth harbour, a part of Boston Bay, 9 m. S.E. of Boston, between Quincy and Braintree (to the W) and Hingham to the E. Pop. (1890) 10,866, (1900) 11,324 (1845 foreign-born); (1905, state census) 11,585, (1910) 12,895. Area, 19 sq. m. Weymouth is served by the New York, New Haven & Hartford railway, and is connected with Boston, Quincy, Braintree, Hingham, Nantasket and Rockland by electric lines. In the township there are several villages, including Weymouth, North Weymouth, East Weymouth and South

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[1] [illegible] been wrongly identified with a painter called [illegible]ggiero da Bruggia.

Weymouth, and the smaller villages of Weymouth Centre, Weymouth Heights, Lovell's Corner, Nash's Corner and Old Spain, and there are also four islands, Round, Grape, Slate and Sheep. The mainland itself is largely a peninsula lying between the Weymouth Fore river and the Weymouth Back river, to the west and east respectively. The surface of the country is rough: Great Hill (at one of the narrowest parts of the peninsula) is about 140 ft. above the rivers. In the township are the Fogg Library (1898, in South Weymouth) founded by a bequest of John S. Fogg; and the Tufts Library (1879, in Weymouth village), endowed by Quincy Tufts and his sister Susan Tufts. In 1905 the township's factory products were valued at $4,921,955, of which $2,588,213, or 52·6% of the total, was the value of boots and shoes. The township owns and operates its water works; the water supply is obtained from Weymouth Great Pond in the village of South Weymouth. Weymouth was first settled in 1623 by Robert Gorges. It was known first as the Plantation of Wessaguscus or Wessagusset, was incorporated as a township in 1635, and its boundaries have been practically unchanged since 1637, when Round and Grape islands were granted to Weymouth.

See C. F Adams, Jr., "Wessagusset and Weymouth" in No. 3 (1905) of the *Publications* of the Weymouth Historical Society (organized in 1879 and incorporated in 1886), and D. H. Hurd, *History of Norfolk County* (Boston, 1884).

WEYMOUTH and MELCOMBE REGIS, a seaport, watering-place, market town and municipal borough in the Southern parliamentary division of Dorsetshire, England, 142 m. S.W. by W. from London, on the London & South-Western and Great Western railways. Pop. (1891) 16,100; (1901) 19,843. It is formed of Weymouth, a fishing town and seaport on the south-west of the Wey, and Melcombe Regis on the north-east of the river, the two towns being contiguous. The situation on Weymouth Bay, which is enclosed to the south by the Isle of Portland, and north by the eastward trend of the coast, is picturesque. An esplanade about 1 m. in length fronts the sea. To the south of the esplanade is a pier of stone on wooden piles, and the Alexandra and other public gardens are attractive. The harbour lies between the pier on the north and the spur of land called the Nothe on the south, and is protected by a concrete wall extending 500 ft. northward from the Nothe. The principal buildings are the old town-hall, the market house, the guildhall, the Royal Dorset Yacht Clubhouse, the theatre, the Royal Victoria Jubilee Hall, the Weymouth and Dorset eye infirmary, the Weymouth royal hospital and dispensary and the barracks. Of the numerous churches none dates from before the 19th century. Opposite the Royal Terrace is an equestrian statue of George III., erected in 1809 in commemoration of his jubilee. A mile S.W. of Weymouth is Sandsfoot Castle, a fort erected by Henry VIII. for the protection of the shipping. The principal exports are Portland stone, bricks and tiles and provisions, and the imports are coal, timber, garden and dairy produce and wine. Ship and boat building, rope and sail making, and brewing are carried on. The Great Western railway company maintains a regular service of passenger steamers to Guernsey and Jersey The municipal borough is under a mayor, 8 aldermen and 24 councillors. Area, 1299 acres.

Although its convenient harbour was probably used before Saxon times, and bronze weapons and Roman interments have been found, there is no evidence that Weymouth (*Waimue, Waymuth*) was a place of early settlement. The first mention of "that place called Weymouth" occurs in a charter of King Æthelred (866–871), while it is again spoken of in a charter of King Æthelstan (895–940). Edward the Confessor gave the manor to the church of Winchester in 1042, and it remained with the prior and convent of St Swithin until the 13th century, when it passed by exchange to Gilbert de Clare, earl of Gloucester, though the vassals of the prior and convent remained exempt from dues and tronage in the port. Coming by marriage into the hands of the earls of March and Plantagenets, the manor was finally vested in the crown. The first charter was that granted by the prior and convent in 1252, by which Weymouth was made a free borough and port for all merchants, the burgesses holding their burgages by the same customs as those of Portsmouth and Southampton. The demand of six ships from the town by the king in 1324 shows its importance in the 14th century, but there is no mention of a mayor until 1467. It is probable that the town suffered considerably at the hands of the French at the beginning of the 15th century, though in 1404 the men of Weymouth were victorious over a party which landed in the Isle of Portland. Early in the 16th century the commercial rivalry between Weymouth and the neighbouring borough of Melcombe came to a height. Melcombe had received a charter from Edward I. in 1280 granting to its burgesses half the port and privileges similar to those enjoyed by the citizens of London, Edward II. in 1307–1308 granted that its men might elect for themselves two bailiffs. The date of the grant of the town at an annual fee-farm of 8 marks is uncertain, but in the reign of Henry VI. a commission was appointed to inspect the destruction wrought by the king's enemies on the town, with the result that the fee-farm was reduced to 20s. The continual disputes between the two boroughs led to the passing of an act of union in 1571, the new borough being incorporated under the title of the "Mayor, Bailiffs and Burgesses" by James I. in 1616; further charters were granted by Charles II. and George II. Melcombe Regis first returned two members to parliament in 1307, and Weymouth in 1319, four members being returned by the united boroughs until 1832, when the representation was reduced to two and ceased in 1885. The medieval fairs are no longer held. As early as 1293 trade was carried on with Bayonne, and six years later a receiver of customs on wool and wool-fells is mentioned at Weymouth, while wine was imported from Aquitaine. In 1586 sugar is mentioned as an import, and in 1646 deal boards were brought here from Hamburg. The town suffered severely during the Civil War, being garrisoned by the parliamentary troops in 1642, taken by the earl of Carnarvon in 1643, and surrendered in the following year. The town is described as "but little" in 1733, but a few years afterwards it gained a reputation as a watering-place, and the duke of Gloucester built a house here; George III. and the royal family in 1789 paid Weymouth the first of a series of visits which further ensured its popularity.

See H. J. Moule, *Descriptive Catalogue of the Charters, Minute Books, and other Documents of the Borough of Weymouth and Melcombe Regis, A.D. 1250 to 1860* (Weymouth, 1883); John Hutchins, *History and Antiquities of the County of Dorset* (3rd ed., Westminster, 1860).

WHALE, the English name applied to all the larger and some of the smaller representatives of the order Cetacea (*q.v.*). Although by their mode of life far removed from close observation, whales are in many respects the most interesting and wonderful of all creatures; and there is much in their structure and habits worthy of study. One of the first lessons a study of these animals affords is that, in the endeavour to discover what a creature really is, from what others it is descended, and to which it is related, the outward appearance affords little clue, and we must go deep below the surface to find the essential characteristics of its nature. There was once, and may be still, an idea that a whale is a fish. To realize the fallacy of this notion we have only to consider what a fish really is, what under all the diversities of form, size and colour there is common to all fishes, and we see that in everything which characterizes a true fish and separates if from other classes, as reptiles, birds and mammals, the whale resembles the last and differs from the fish. It is as essentially a mammal as a cow or a horse, and simply resembles a fish externally because it is adapted to [illegible] the same element, but it is no more on that [illegible] than is a bat (because adapted to pass a great [illegible] on the wing) nearly related to a bird. In [illegible] structure of a whale we see the result of [illegible] and reacting upon each other—on the [illegible] type, or rather to fundamental [illegible] and, on the other, adaptation [illegible] under which it lives, [illegible] fitted. The ext [illegible] swimming through the water; the tail, however, is not placed vertically as in fishes, but horizontally, a position which accords better with the constant necessity for rising to the surface for the purpose of breathing. The hairy covering characteristic of all mammals, which if present might interfere with rapidity of movement through the water, is reduced to the merest rudiments—a few short bristles about the chin or upper lip—which are often only present in young animals. The function of keeping the body warm is performed by a thick layer of non-conducting material, the "blubber," a dense kind of fat placed immediately beneath the skin. The fore-limbs, though functionally reduced to mere paddles, with no power of motion except at the shoulder-joint, have beneath their smooth and continuous external covering all the bones, joints and even most of the muscles, nerves and arteries of the human arm and hand; and rudiments even of hind-legs are found buried deep in the interior of the animal, serving no useful purpose, but pointing a lesson to those able to read it.

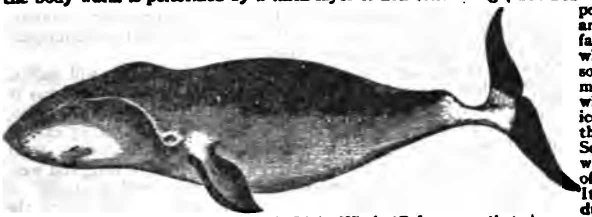

FIG. 1.—The Greenland or Arctic Right Whale (*Balaena mysticetus*).

In the present article attention is directed only to what may be regarded as the typical whales. Of these the Greenland or Arctic right whale (*Balaena mysticetus*) attains, when full grown, a length of from 45 to 50 ft. In this species (fig. 1) all the peculiarities which distinguish the head and mouth of the whales from those of other mammals have attained their greatest development. The head is of enormous size, exceeding one-third the whole length of the creature. The cavity of the mouth is actually larger than that of the body, thorax and abdomen together. The upper jaw is very narrow, but greatly arched from before backwards, to increase the height of the cavity and allow for the great length of the whalebone-blades; the enormous lateral halves of the lower jaw are widely separated posteriorly, and have a further outward sweep before they meet at the symphysis in front, giving the floor of the mouth the shape of an immense spoon. The whalebone-blades attain the number of 380 or more on each side, and those in the middle of the series have a length of 10 or sometimes 12 ft. They are black in colour, fine and highly elastic in texture, and fray out at the inner edge and ends into long, delicate, soft, almost silky, but tough hairs. The remarkable development of the mouth and of the structures in connexion with it, which distinguishes the right whale from all its allies, is entirely in relation to the nature of its food. By this apparatus the creature is enabled to avail itself of the minute but highly nutritious crustaceans and pteropods which swarm in immense shoals in the seas it frequents. The large mouth enables it to take in at one time a sufficient quantity of water filled with these small organisms, and the length and delicate structure of the whalebone provide an efficient strainer or hair-sieve by which the water can be drained off. If the whalebone were [illegible] aperture between the upper [illegible] shut, a space would be [illegible]ed, through which [illegible] would escape. But [illegible] elastic ends of the [illegible] is closed, the front [illegible] nel lying between [illegible] mouth is opened, [illegible] t like a bow unbent, [illegible] parated the strainer remains in perfect action, filling the whole of the interval. The mechanical perfection of the arrangement is completed by the great development of the lower lip, which rises stiffly above the jaw-bone and prevents the long, slender, flexible ends of the whalebone from being carried outwards by the rush of water from the mouth, when its cavity is being diminished by the closure of the jaws and raising of the tongue.

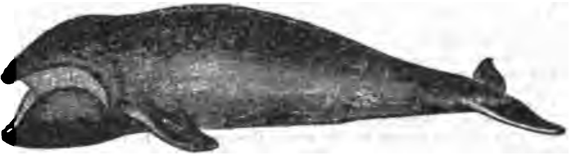

FIG. 2.—The Black Whale or Southern Right Whale (*B. australis*).

If, as appears highly probable, the "bowhead" of the Okhotsk Sea and Bering Strait belongs to this species, its range is circumpolar. Though found in the seas on both sides of Greenland, and passing freely from one to the other, it is never seen so far south as Cape Farewell; but on the Labrador coast, where a cold stream sets down from the north, its range is somewhat farther. In the Bering Sea, according to Scammon, "it is seldom seen south of the fifty-fifth parallel, which is about the farthest southern extent of the winter ice, while in the Sea of Okhotsk its southern limit is about the latitude of 54°." "Everything tends to prove," Scammon says, "that *Balaena mysticetus* is truly an 'ice whale,' for among the scattered floes, or about the borders of the ice-fields or barriers, is its home and feeding-ground. It is true that these animals are pursued in the open water, during the summer months, but in no instance have we learned of their being captured south of where winter ice-fields are occasionally met with." The occurrence of this species, therefore, on the British or any European coast is unlikely, as when alive and in health the southern limit of its range in the North Sea is from the east coast of Greenland at 64° N. lat. along the north of Iceland towards Spitsbergen, and a glance at a physical chart will show that there are no currents setting southwards which could bear a disabled animal or a floating carcase to the British shores. To this improbability may be added the fact that no authentic instance has been recorded of the capture or stranding of this species upon any European coast. Still, as two other Arctic cetaceans, the narwhal and the beluga, have in a few instances found their way to British shores, it would be rash to deny the possibility of the Greenland right whale doing the same.

The black whale or southern right whale (*B. australis*) resembles the preceding in the absence of a dorsal fin and of longitudinal furrows in the skin of the throat and chest, but differs in that it possesses a smaller head in proportion to its body, shorter whalebone, a different-shaped contour of the upper margin of the lower lip, and a greater number of vertebrae. This type inhabits the temperate seas of both southern and northern hemispheres and is divided into several species according to their geographical distribution: *B. biscayensis* of the North Atlantic, *B. japonica* of the North Pacific, *B. australis* of the South Atlantic, and *B. antipodarum* and *B. novae-zelandiae* of the South Pacific. But the differential characters by which they are separated are slight, and the number of specimens available for comparison is not sufficient to afford the necessary data to determine whether these characters can be regarded as specific or not.

The Biscay right whale was formerly abundant in the North Atlantic, but is now verging on extinction. This was the whale the pursuit of which gave occupation to a numerous population on the shores of the Basque provinces of France and Spain in the middle ages. From the 10th to the 16th centuries Bayonne, Biarritz, St Jean de Luz and San Sebastian, as well as numerous other towns on the north coast of Spain, were the centres of an active whale "fishery," which supplied Europe with oil and whalebone. In later times the whales were pursued as far as the coast of Newfoundland. They were, however, already getting scarce when the voyages undertaken towards the close of the 16th century for the discovery of the north-eastern route to China and India opened the seas round Spitzbergen; then for the first time the existence of the Greenland whale became known, and henceforth the energies of the European whale-fishers became concentrated upon that animal. Among instances of the occurrence of this whale in Europe in modern times may be mentioned three, namely, in the harbour of San Sebastian in January 1854, in the Gulf of Taranto, in the Mediterranean, in February 1877, and on the Spanish coast between Guetaria and Zarauz (Guipuzcoa) in February 1878. The skeletons of these three whales are preserved in the museums of Copenhagen, Naples and San Sebastian respectively. On the coast of the United States several specimens have been taken; and a cargo of whalebone belonging to this species was received at New Bedford in 1906. During the latter year six examples were killed by whalers from Bunevenader, in the island of Harris (see R. C. Haldane, *Ann. Scot. Nat. Hist.*, 1907, p. 13). In the North Pacific a similar if not identical whale is regularly hunted by the Japanese, who tow the carcases ashore for the purpose of flensing and extracting the whalebone. In the tropical seas, however, right whales are never or rarely seen; but the southern temperate ocean, especially in the neighbourhood of the Cape of Good Hope, Kerguelen's Island, Australia and New Zealand, is inhabited by "black whales," once abundant, but now nearly exterminated through the wanton destruction of the females as they visit the bays and inlets round the coast, their constant habit in the breeding time. The range of these whales southward has not been accurately determined; but no species corresponding with the Arctic right whale has been met with in the Antarctic seas.

See also HUMP-BACK WHALE, RORQUAL, SPERM-WHALE, BELUGA, &c. (W. H. F.; R. L.*)

WHALEBONE, the inaccurate name under which the baleen plates of the right whale are popularly known; the trade-name of whale-fin, which the substance receives in commerce, is equally misleading. Whalebone is formed in the palate on the roof of the mouth and is an exaggeration of the ridges, often horny in character, which are found on the roof of the mouth of all mammals. Three kinds are recognized by traders—the Greenland, yielded by the Greenland whale, *Balaena mysticetus*; the South Sea, the produce of the Antarctic black whale, *B. australis*; and the Pacific or American, which is obtained from *B. japonica*. Very many different names have been given to whales of the *B. australis* group, and it is possible that local races exist, whilst some writers are inclined to regard *B. japonica* as not specifically distinct from *B. australis*. Of these the Greenland whalebone is the most valuable. It formed the only staple known in earlier times, when the northern whale fishery was a great and productive industry. This whalebone usually comes into the market trimmed and clean, with the hairy fringe which edges the plates removed. To prepare whalebone for its economic applications, the blades or plates are boiled for about twelve hours, till the substance is quite soft, in which state it is cut either into narrow strips or into small bristle-like filaments, according to the use to which it is to be devoted.

Whalebone possesses a unique combination of properties which render it peculiarly and almost exclusively suitable for several purposes. It is light, flexible, tough and fibrous, and its fibres run parallel to each other without intertwisting. One of its earliest uses, referred to by William le Breton in the 13th century, was to form the plumes on helmets. It has been found practicable to employ flexible steel for several purposes to which whalebone was formerly applied, especially in the umbrella and corset industries, in which steel is now almost exclusively used. Whalebone, is, however, still in large demand among dressmakers and milliners; but it is principally used in the brush trade. In cases where bristles are too soft and weak, and where the available vegetable fibres possess insufficient elasticity and durability, whalebone offers the great advantage of being procurable in strips or filaments, long or short, thick or thin, according to requirement. Hence it is principally used for making brushes for mechanical purposes. The use of whalebone in brush-making was originally patented by Samuel Crackles in 1808, and various special machines have been adapted for cutting the material into filaments. When whalebone came into the English market in the 17th century it cost at first about £700 per ton. In the 18th century its price ranged from £350 to £500 per ton, but early in the 19th century it fell as low as £25. Later it varied from £200 to £250; but with the decrease in whaling the article has become very scarce, and upwards of £2000 per ton is now paid for Greenland whalebone.

WHALE-FISHERY, or WHALING, the pursuit and capture of the larger species of cetaceans (see CETACEA and WHALE). Man, in all probability, first became acquainted with the value of the products yielded by whales from stranded individuals; but at what time he first ventured to hunt and kill these monsters in the open ocean it is now impossible to ascertain. We know, however, from King Alfred's account of Ohthere's [illegible] the White Sea that the Norwegians were expert [illegible] least a thousand years ago; and we also know [illegible] 10th to the 16th centuries the Basques of [illegible] St Jean-de-Luz, San Sebastian and certain other French and Spanish ports were carrying on a lucrative trade in the products of a whale-fishery conducted by themselves, which supplied Europe with whalebone and oil. In the latter, and not improbably also in the former case, the species hunted was the Atlantic right-whale, or black whale (*Balaena biscayensis*), which the Basques seem to have well-nigh exterminated in their own waters; and it was not till a later epoch that the pursuit of its larger-headed cousin, the Greenland right-whale (*B. mysticetus*), was initiated. Hunting the sperm-whale, or cachalot, in the South Sea was a still later development, while rorqual-hunting is quite a modern industry.

Of whaling vessels of the old type, a brief notice will suffice. Those engaged in the British South Sea fishery, which was in its prime about the year 1790, were from 300 to 400 tons burden, and equipped for at least a three-years' voyage. They carried from 28 to 33 officers and men, and six whale-boats. Built sharp at both ends, these boats were about 27 ft. long, and were furnished, in addition to masts and sails, with a couple of 200-fathom whale-lines. When a whale was sighted from the "crow's-nest" at the masthead of the vessel, four boats, each carrying a crew of six men, were lowered and despatched in pursuit. The crew consisted of a boat-steerer in the bow, four rowers and a headsman in the stern. The boat-steerer carried the harpoons with which the whale was first attacked, and when the boat was once "fast" to a whale by means of the harpoon and line, the attack was carried on by the headsman, who was armed with long slender lances. When several whales were seen, two or more of the boats might make separate attacks; but in other instances they kept together, so that their united lines were available when the whale descended or "sounded." After the first blow of the harpoon, or at all events after the first effective lancing, the "sounding" was deep and prolonged; but loss of blood eventually caused the victim to keep near the surface, when, if all went well, it was finally despatched by lance-thrusts behind one of the flippers into the vital parts.

When a sperm-whale was killed, the carcase was made fast to the side of the vessel, and the process of flensing, or "cutting-in," commenced. On being made fast to the vessel, the whale was enveloped in a framework, and a strip of the blubber cut in a spiral direction. By raising this strip with the aid of proper apparatus, the whale could be turned round and round on its axis, and nearly the whole of the blubber removed in a continuous piece, to be cut, as required, into convenient lengths. Meanwhile the liquid spermaceti, or "head-matter," was ladled out in buckets from the great cavity in the skull and put in casks, where it solidified, to be carried to port and there refined. The blubber was, however, reduced to oil by "try-works" with which the vessel was provided, and stored in barrels. A large male sperm-whale will yield as much as eighty barrels, or about 3 tons of oil; while the yield of a small female does not exceed 1 or 2 tons. In the old days the cargo of a successful vessel might include the products of a hundred whales, yielding from 150 to 200 tons of boiled sperm-oil in addition to the spermaceti.

In the old days of the Greenland whale-fishery vessels of about 350 tons burden were deemed the most eligible, these being constructed in such a manner as to resist so far as possible the pressure of the ice. The crew was about fifty in number, and the vessel carried six or seven whale-boats of the same length as those used in the South Sea fishery. The vessels left Peterhead and Dundee (the ports for the Greenland fishery, as was London for the South Sea fishery) about the beginning of April, and, after touching at the Shetlands, reached the whaling-grounds before the [illegible] of that month. In approaching a whale, which [illegible] and the harpoo[illegible]

[illegible]

was retarded by one or more turns round the "bollard," a post fixed for this purpose in the boat; when this was done the friction was so great as to produce quantities of smoke, fire being prevented by sluicing the bollard with water. Even with the assistance offered by the bollard, the whale-line might be run out within ten minutes, when the lines of a second or even a third boat would be attached. In this manner some 600 or 700 fathoms of line would be taken out; the whale commonly remaining under water when first wounded for about 40 minutes, although a period of an hour is said to be not unfrequent. On rising after its second descent the whale was attacked with lances thrust deep into the body and aimed at the vital parts. The old-fashioned lance was a 6-ft. rod and ½-in. iron, flattened at one end into the form of a lance-head with cutting edges, and at the other expanding into a socket for the reception of a short wooden handle. Torrents of blood spouted from the blow-hole of the whale denoted the approaching end of the struggle. So soon as the whale was dead, no time was lost in piercing the tail or "flukes," and thus making the carcase fast to the boats by means of a cable, and then towing it in the direction of the ship. From fifteen minutes to as much as fifty hours might be occupied in a whale-hunt.

The following account of the operation of "flensing," or securing the blubber and whalebone of the Greenland whale, is taken from Sir William Jardine's *Naturalists' Library*:—

> "The huge carcase is somewhat extended by strong tackles placed at the snout and tail. A band of blubber, two or three feet in width, encircling the whale's body at what is the neck in other animals, is called the *kent*, because by means of it the whale is turned over or *kented*. To this band is fixed the lower extremity of a combination of powerful blocks, called the *kent-purchase*, by means of which the whole circumference of the animal is, section by section, brought to the surface. The harpooners, having spikes on their feet to prevent their falling from the carcase, then begin with a kind of spade, and with huge knives, to make long parallel cuts from end to end, which are divided by cross-cuts into pieces of about half a ton. These are conveyed on deck, and, after being reduced to smaller portions, are stowed in the hold. Finally, being by other operations still further divided, the blubber is put into casks, which is called 'making-off,' and packed down completely by a suitable instrument.
>
> "While this flensing is proceeding, and when it reaches the lips, which contain much oil, the baleen (whalebone) is exposed. This is detached by means of bone hand-spikes, bone knives and bone spades. The whole whalebone is hoisted on deck in one mass, when it is split by bone wedges into junks, containing five or ten blades each, and stowed away. When the whole whalebone and blubber are thus secured, the two jaw-bones, from the quantity of oil which they contain, are usually hoisted on deck, and then only the *kreng* remains—the huge carcase of flesh and bone, which is abandoned either to sink or to be devoured by the birds, sharks and bears, which duly attend on such occasions for their share of the prey."

The largest cargo ever secured by a Scotch whaler was that of the "Revolution" of Peterhead in 1814, which comprised the products of no less than forty-four whales. The oil, which amounted to 299 tons, realized £9568, while the price obtained for the whalebone, added to the government bounty then given to Greenland whalers, brought up the total sum to £11,000. Allowing a ton to each whale, the whalebone alone at present prices would have yielded about £110,000!

At a later period, say about 1880, the Greenland whaler had grown to a vessel of from 400 to 500 tons gross register, rigged either as a ship or a bark, and provided with auxiliary engines of about 75 horse-power. She would be manned by from fifty to sixty hands, and would carry eight boats of the type mentioned above. Below the hold-beams were fitted about fifty iron tanks capable of containing from 200 to 250 tons of oil. Such a vessel would cost about £17,500 to build, and her working expenses, exclusive of interest and insurance, would be about [illegible] a month. At the period mentioned each whale-boat was [illegible] harpoon-gun measuring 4 ft. 6 in. in length and [illegible] the barrel being 3 ft. long, with 1½-in. bore, [illegible] wooden stock, tapering behind into a pistol- [illegible] harpoon is used solely for first getting on to [illegible] harpoons being employed for getting a hold [illegible]

[illegible] to further improvements in the weapons and vessels employed, it will suffice to state that in the Greenland whale-fishery the whales are still killed from whale-boats. In the rorqual-fishery, as at Newfoundland, on the other hand, the actual attack is made from a steam-vessel of considerable size, as is described in the following quotation from a paper by Mr G. M. Allen in the *American Naturalist* for 1904, referring to the fishery at Rose-au-Rue, Placentia Bay, Newfoundland:—

> "The fishery itself," observes the author, "is carried on by means of small and staunchly built iron steamers of something over one hundred tons. A cannon-like gun is mounted on a pivot at the bow, and discharges a 5-ft. harpoon of over 100 ℔ weight, which at short range is nearly buried in the body of the whale. A hollow iron cap filled with blasting powder is screwed to the tip of the harpoon, forming its point. A timed fuse discharges the bomb inside the body of the whale. The harpoon carries a stout cable which is handled by a powerful 5-sheet winch on the steamer's deck."

Explosive harpoons of the type referred to were invented by Svend Foyn, a Norwegian, and used by him about the year 1865 or 1866 in the manner described above, as they still are in various Norwegian rorqual-fisheries.

In fisheries of this type the carcases of the whales are towed into harbour for flensing; and in place of the "kreng" being wasted, the flesh is worked up to form an excellent manure, while the bones are ground up and also used as fertilisers.

A somewhat similar mode of proceeding characterizes the sperm-whale fishery now carried on in the Azores, so far at least as the towing of the carcases to shore for the purpose of flensing is concerned. According to an account given by Professor E. L. Bouvier in the *Bulletin de l'Institut Océanographique* for 1907, American whalers have observation stations on most of the islands of the Azores group; Horta, in Fayal, being the favourite station. The carcases of the cachalots are towed for flensing into a small creek adjacent to the port, where, after the removal of the spermaceti and blubber, they are left to rot. Even the teeth have a commercial value, being either sold as curiosities in Horta, or utilized for ivory. Whenever practicable, the whales caught by the vessels belonging to the great sperm-whaling station at New Bedford are towed into the harbour for flensing.

Passing on to a review of some of the more important whale-fisheries of the world, the Atlantic fishery by the Basques in the 10th and six succeeding centuries claims first mention. Readers desirous of obtaining further insight into the little that is known about it are referred to an interesting paper by Sir Clements Markham published in the *Proceedings* of the Zoological Society of London for 1881. Although, as already mentioned, the black whale (*Balaena biscayensis*) was well-nigh exterminated in the north Atlantic by the Basques, and for many years afterwards was excessively rare, yet quite recently several examples have been taken by Scottish whalers off the Hebrides, while the whalebone of others has been received at New Bedford.

The discovery in 1596 by the Dutch navigator Barents of Spitzbergen, followed by the voyage of Hudson in the "Hopewell" in 1607, may be said to have inaugurated the second phase in the whaling industry; these adventurous voyages bringing to light for the first time the existence of the Greenland whale (*B. mysticetus*); a species of much greater value than any that had been previously hunted.

Here it may be well to refer to two common misconceptions regarding this whale. In the first place, it does not appear to be, as commonly supposed, a circumpolar species. There is, for instance, no evidence of its occurrence eastward of Spitzbergen along the Siberian coast between 10° and 170° E.; and it is not till the latter parallel is reached, at Cape Schelagskoi, that the domain of the so-called bowhead of the American whales is entered.

> "On the other side of Bering Strait," writes Mr T. Southwell in the *Annals of Scottish Natural History* for April 1904, "these whales do not appear to penetrate much farther east than Cape Bathurst, and it seems highly improbable that there is any intercommunication between those at that point and the whales in Baffin Bay. On the other hand, the whales on the east side of

Davis Strait do not descend so far south as Cape Farewell, nor are those in the Greenland Sea known to pass westward round that cape. It seems therefore that, although their range as a species is undoubtedly extensive longitudinally, the localities they inhabit are greatly restricted, each being inhabited by a local race differing from the other in some slight degree."

The second misconception is that the Greenland whale has gradually been driven northward by the whalers. A sufficient proof of the falsity of this idea is afforded by the fact that the minute organisms constituting the food of the species are restricted to the icy seas of the far north. The Greenland whale is, in fact, essentially an ice-whale.

To revert to the history of the fishery, no sooner was the accessibility of the Spitzbergen seas made known than vessels were fitted out for whaling there, at first by the British, and soon after by the Dutch. The seas absolutely swarmed with whales, which showed little fear of vessels and could thus be captured with ease. The first whaling expedition was despatched by the Muscovy Company, under the command of Jonas Poole; and the success of four voyages (1609–1612) soon attracted the attention of other nations. Some indication of the abundance of the whales may be gathered from the fact that in the year 1697 no less than 1959 of these monsters were killed off Spitzbergen by 188 vessels.

The fishery in Davis Strait was begun in 1719 by the Dutch, who at first killed large numbers of whales and were subsequently followed by the British. Although many whales have been seen in recent years, few are taken; and it is the opinion of many that in Greenland waters, at any rate, steam has been fatal to the industry.

The following summary of the rise and fall of the British Greenland whale-fishery is given by Mr Southwell in the article already cited:—

> "For the first quarter of the 19th century scarcely a seaport of any importance on the east coast of England was unrepresented in the Arctic seas: from Scotland, Berwick, Leith, Kirkcaldy, Dundee, Montrose, Aberdeen, Peterhead, Kirkwall, Greenock and for a time Banff and Bo'ness, all took part in the whale-fishery. Gradually, one by one, they fell off, till only Peterhead, which sent out her first whaler in 1788, and Dundee (which started in 1790) were left. In 1893 Peterhead, which in 1857 sent out 34 vessels, ceased to be represented in the industry, leaving Dundee in possession of the field. Dundee sent out its largest fleet in 1885,—16 vessels; in 1903 she was represented by 5 vessels only, one of which was wrecked."

According to Mr Southwell's account of the Arctic fishery (*Zoologist*, 1906), a Dundee vessel, the "Scotia," visited the east Greenland seas in the summer of 1906, where she took four small right-whales; this visit being the first made to those seas by a British vessel since 1899.

As already mentioned, the British whalers were accustomed to sail for the Arctic Ocean early in April; and if their destination was the east Greenland sea, off the west coast of Spitzbergen, they generally arrived on the grounds about a month later. The whales make their appearance amongst the ice near the sea edge about the 15th of May, but only remain until the opening of the barrier-ice permits them to resume their northward journey; for about the middle of June they suddenly disappear from these grounds, and are last seen going north-west, when the north Greenland whale-fishing is over for the season. If unsuccessful in obtaining a cargo at the northern grounds, the whale-ships were accustomed to proceed southwards as far as lat. 75°; where, if the sea were sufficiently open, they penetrated westwards until the coast of Greenland became visible. There they cruised amongst the ice until August, when the darkness of the nights put an end to the season's fishing. If the south-west fishery, in Davis Strait, were the first object of the voyage, the vessels arrived at the edge of the ice near Resolution Island in April. If unsuccessful here they proceeded direct to Disco Island, where they usually arrived early in May. The whales appear about the middle of May at South East Bay, where a great fishing was once carried on. The dangerous passage of Melville Bay was next performed; the whales entering the nor[illegible] in June, and pushing on towards the sou[illegible] "land-floe across," *i.e.* if the land-ice [illegible] tinuous across the entrance of Po[illegible] whales would be seen in considerable numbers and good cargoes might be obtained; but immediately the land-floe broke up they departed to the westward. When there was no land-floe across, the whales proceeded at once to the secluded waters of Eclipse Sound and Prince Regent Inlet for the summer months. At this season most of the vessels cruised in the sounds, but a few searched the middle ice, until the darkness of the August nights compelled them to seek anchorage in some of the harbours of the west side, to await the return of the whales south. This migration takes place on the formation of young ice in the sounds, usually in the latter part of September. Only the larger whales, most of which are males, come, however, close down along the land of the west side. These the ships sent their boats to intercept; this forming the inshore-fishing, or "rock-nosing," which continued till the formation of young ice drove the vessels out of harbour, usually early in October.

A few vessels, American as well as British, occasionally entered Hudson Bay and prosecuted the fishing in the neighbourhood of Southampton Island, even entering Fox Channel. There were whaling-stations in Cumberland Inlet, and a few vessels usually remained throughout the winter, ready to take advantage of the opening of the ice in the following spring. Here both young and old whales make their appearance in May; and the fishing continued till the whales migrated northwards in June.

Of the other nationalities which took part in the Spitzbergen-Greenland fisheries, it may be mentioned that the Dutch had fisheries both at Jan Mayen till 1640 and at Spitzbergen. In the Spitzbergen fishery 10,019 whales were taken by them in the ten years from 1679 to 1688. About 1680, when the fishing was probably most prosperous, they had 260 vessels and 14,000 seamen employed. The fishery continued to flourish on an extensive scale till 1770, when it began to decline, and it finally came to a close before the end of the century. At the same time the Germans prosecuted the fishing to a very considerable extent; 79 vessels from Hamburg and Bremen being employed in 1721, while during the fifty years from 1670 to 1719 an average of 45 vessels sailed yearly from Hamburg alone. German vessels continued to engage in the fishery until 1873. The Spaniards, although they at first supplied the harpooners to the crews of the English and Dutch vessels, never seem to have engaged largely in the northern fishery. The Danes, although likewise early appearing on the Spitzbergen fishing-grounds, never pursued the industry on a large scale until after the commencement of the Davis Strait fishing in 1721, in which year they had 90 vessels engaged; but by 1803 the number had fallen to 35.

The continually increasing rarity of the Greenland whale has caused an enormous appreciation in the value of whalebone of recent years, as compared to the prices obtaining the first half of the last century. For about twenty years preceding the year 1840 the average price of this commodity was about £163 per ton; while in the year 1835 whalebone of the Greenland whale sold at £250 per ton, and that of the south Atlantic black whale (*Balaena australis*) at £145 per ton. At the present date the price is about £2500 per ton, but a few years ago it touched £2800, although soon after it fell for a short time to £1400. The reason of the fall from £2800 to £2500 (at about which figure the price has stood for some time) is believed to be owing to the use of strips of horn for many purposes where whalebone was formerly employed. Owing to its much greater length, the whalebone of the Greenland whale is, as indicated above, far more valuable than that yielded by the northern and southern Atlantic black whales, of which comparatively little generally comes into the market. The best quality of whalebone is known in the trade as "size-bone," and consists of plates not less than 6 ft. in length.

In the twenty years preceding 1840 the average price of whale-oil from the northern fisheries was £30 per ton; the actual price in 1835 being £40 per ton. At the present day the price is only £23 per ton. It may be added that in 1835 South Sea oil sold at £43 and sperm-oil at £[illegible]

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disappear during summer, but return in the autumn, when the "fall-fishing" is carried on in the neighbourhood of Point Barrow; and between the seasons it was customary for the vessels to go south for sperm-whaling. The Bering Strait fishery was begun in 1848, and in the three following years 250 ships obtained cargoes. In 1871 no less than 34 vessels were abandoned in the ice off Cape Belcher, the crews making good their escape to other vessels; while again in 1876 a dozen vessels experienced a similar fate.

The sperm-whale fishery, of which the products are spermaceti, sperm-oil, ambergris (mostly found floating in masses in the sea) and teeth, appears to have been initiated by the Americans in 1690, who for a considerable period found sufficient occupation in the neighbourhood of their own coasts. The British are, however, stated to have opened up the great whaling-grounds of the Pacific and Indian Oceans, although they did not embark on sperm-whaling till 1775. Within less than twenty years from that date their trade had, however, attained its maximum; no less than 75 British vessels, all from the port of London, being engaged in this industry in the year 1791. After this there was a steady decline till 1830, when only 31 vessels were thus employed; and since 1853 sperm-whaling has ceased to be a British industry.

As regards the American fishery, the island of Nantucket embarked in this trade about the year 1712, and by 1774 there were 360 American ships engaged in sperm-whaling, while in 1846, when the fishery was about at its zenith, the number was 735, mostly from New Bedford. Between 1877 and 1886 the average number of vessels had sunk to 159. New Bedford, on the Atlantic, and San Francisco, on the Pacific side, are the two great whaling centres; and during the period last mentioned the average imports of whaling products into the United States totalled 5304 tons of sperm-oil, together with 4863 tons of whale-oil and 145 tons of whalebone.

During the first half of the last century the colony of New South Wales was busily engaged in this trade, and in 1835 exported 2989 tons of sperm-oil.

Since the year 1882, when no less than 203 head were taken by the Peterhead whaler "Eclipse," the Norwegians have carried on a fishery for the bottle-nosed whale (*Hyperoödon rostratus*), a species which although greatly inferior in point of size, yields an oil closely akin to sperm-oil, but possessed of even greater lubricating power. An average male bottle-nose will yield about 22 cwts. of oil, containing 5% of pure spermaceti. Bottle-nose fishing is chiefly carried on in the neighbourhood of Jan Mayen and Iceland during the months of May, June and July, the whales usually disappearing quite suddenly about the middle of the last-mentioned month. In 1903 about 1600 tons of this oil came on the market, which would imply the destruction of nearly 2000 whales.

The invention by Svend Foyn of the explosive harpoon, already referred to, inaugurated about the year 1866 the Norwegian fin-whale fishery, an industry which has since been taken up by other nationalities. The rorquals or fin-whales (*Balaenoptera*), which include the largest of all cetaceans, are built for speed, and are much fiercer animals than either the Greenland or the Atlantic right whale; their rush when wounded being of enormous velocity, while their vitality is such that attacking them in the old-fashioned way with the hand-harpoon is practically useless, and at the same time fraught with great danger to the pursuers. To a considerable extent the same may be affirmed of the humpbacked whale (*Megaptera*). Under these circumstances, previous to the invention of the bomb-harpoon, these whales were left entirely alone by the whalers.

[illegible] year 1885 the Norwegians had a fleet of over 30 vessels [illegible] this fishery off the coast of Finmark, the amount [illegible] comprised 1398 whales in 1885, and 954 in the [illegible]. Gradually the Norwegians have developed and [illegible] rorqual-fishery, and they now possess stations in [illegible] Faroes and Shetlands, and also at Buneveneader [illegible] in the Hebrides. In the Shetlands there are two [illegible] at the head of Ronas Voe on the north-west side of the mainland where operations are carried on from May and June till September, when the whales leave the shore. During the first season (1903) the Norröna Whaling Company's vessels killed 64 whales, while 62 were accounted for by the Shetland Whaling Company.

In 1898 a successful rorqual-fishery was established by the Newfoundland Steam Whaling Company at Rose-au-Rue, Placentia Bay, Newfoundland. Four species of rorquals as well as humpbacks are hunted; and during a portion of the season in 1903 the catch included 174 of the former and 14 of the latter.

In addition to the above-mentioned fisheries for the larger whales, there are considerable local captures of the smaller kinds, commonly known as grampuses or killers, porpoises, and dolphins. Of these, however, very brief mention must suffice. The most important captures are generally made in northern seas. The black pilot-whale, or grindhval (*Globicephalus melas*), is, for instance, not infrequently taken in large shoals by the Faroe islanders; these whales being driven by boats into the shallows, where they are sometimes slaughtered by hundreds. Much the same may be stated with regard to the grampus or killer (*Orca gladiator*), of which no less than 47 head were killed at once in January 1904 at Bildoströmmen, Norway. Of even more importance is the white-whale or *beluga* (*Delphinapterus leucas*), which is hunted for its blubber, hide and flesh; the average yield per head being about 100 gallons of oil. In 1871 the Tromsoe whalers captured no less than 2167 individuals; while in 1898 300 out of a school of some 900 were captured on a single occasion at Point Barrow, Alaska. These whales, which are worth about £3 a head, yield the leather known commercially as "porpoise-hide." The narwhal (*Monodon monoceros*), yielding both blubber and the valuable ivory tusks, is usually captured singly by the Greenlanders in their "kayaks." Local porpoise and dolphin fisheries are carried on by the fishermen in many parts of the world, the natives of the Travancore coast being noted for their success in this respect; while even the fresh-water susu or Ganges dolphin (*Platanista gangetica*) and the Rio de la Plata dolphin (*Pontoporia blainvillei*) are also caught in considerable numbers for the sake of their blubber.

LITERATURE.—The following books and papers may be consulted: T. Beale, *The Natural History of the Sperm-Whale* (London, 1837); W. S. Tower, *A History of the American Whale Fishery* (Philadelphia, 1907); J. R. Spears, *Story of New England Whaling* (New York, 1908); C. R. Markham, "On the Whale-Fishery of the Basque Provinces of Spain," *Proc. Zool. Soc. London* (1881), p. 969; T. Southwell, "Notes on the Seal and Whale Fishery," *Zoologist* (London, 1884–1907), and "On the Whale-Fishery from Scotland, with some account of the changes in that industry and of the species hunted," *Ann. Scot. Nat. Hist.* (1904), p. 77; G. M. Allen, "Some Observations on Rorquals off Southern Newfoundland," *American Naturalist*, xxxviii. 613 (1904); R. C. Haldane, "Whaling in Shetland, 1904," *Ann. Scott. Nat. Hist.* (1905), p. 65, and "Whaling in Scotland," *t.c.* (1907), p. 10; E. L. Bouvier, "Quelques impressions d'un naturaliste au cours d'une campagne scientifique de S.A.S. le Prince de Monaco, 1905," *Bulletin de l'Institut Océanographique* (Monaco, 1907), No. 93. (R. L.*)

WHALE-OIL, the oil obtained from the blubber of various species of the genus *Balaena*, as *B. mysticetus*, Greenland or "right" whale (northern whale-oil), *B. australis* (southern whale-oil), *Balaenoptera longimana*, *Balaenoptera borealis* (Finback oil, Finner whale-oil, Humpback oil). The "orca" or "killer" whale, and the "beluga" or white whale, also yield "whale-oils." "Train-oil" proper is the northern whale-oil, but this term has been applied to all blubber oils, and in Germany, to all marine animal oils—fish-oils, liver oils, and blubber oils. The most important whale-oil is sperm or spermaceti oil, yielded by the sperm-whales.

Whale-oil varies in colour from a bright honey yellow to a dark brown, according to the condition of the blubber from which it has been extracted. At best it has a rank fishy odour, and the darker the colour the more disagreeable the smell. With lowering of the temperature stearin, accompanied with a small proportion of spermaceti, separates from the oil, and a little under the freezing-point nearly the whole of these constituents may be crystallized out. When separated and pressed, this deposit is known as whale tallow, and the oil from which it is removed is distinguished as pressed whale-oil; this, owing to its limpidity, is sometimes passed as sperm-oil. Whale-oil is principally used in oiling wools for combing, in batching flax and other vegetable fibres, in currying and chamois leather-making, and as a lubricant for machinery. Sperm-oil is obtained from the cavity in the head of the sperm-whale, and from several smaller receptacles throughout the body of the animal. During the life of the whale the contents of these cavities are in a fluid condition, but no sooner is the "head matter" removed than the solid wax spermaceti separates in white crystalline flakes, leaving the oil a clear yellow fluid having a fishy odour. Refined sperm-oil is a most valuable lubricant for small and delicate machinery (see OILS).

WHALLEY, EDWARD (*c.* 1615–*c.* 1675), English regicide, the exact dates of whose birth and death are unknown, was the second son of Richard Whalley, who had been sheriff of Nottinghamshire in 1595, by his second wife Frances Cromwell, aunt of Oliver Cromwell. His great-grandfather was Richard Whalley (1499–1583), a prominent adherent of the protector Somerset and member of parliament. He is said to have started in the trade of a woollen-draper, but on the outbreak of the great rebellion he took up arms for the parliament, became major of Cromwell's regiment of horse, and greatly distinguished himself in the field. His conduct at Gainsborough fight in 1643 was especially praised by Cromwell; he fought at Marston Moor, commanded one of Cromwell's two regiments of cavalry at Naseby and at the capture of Bristol, was then sent into Oxfordshire, took Banbury, and was besieging Worcester when he was superseded, according to Richard Baxter, the chaplain of his regiment, on account of his religious orthodoxy. He, however, supported his regiment in their grievances against the parliament in 1647. When the king was seized by the army, he was entrusted to the keeping of Whalley and his regiment at Hampton Court. Whalley refused to remove Charles's chaplains at the bidding of the parliamentary commissioners, and treated his captive with due courtesy, receiving from Charles after his flight a friendly letter of thanks. In the second Civil War, Whalley again distinguished himself as a soldier, and when the king was brought to trial he was chosen to be one of the tribunal and signed his death-warrant. He took part in Cromwell's Scottish expedition, was wounded at Dunbar, and in the autumn of 1650 was active in dealing with the situation in north Britain. Next year he took part in Cromwell's pursuit of Charles II. and was in the fight at Worcester. He followed and supported his great kinsman in his political career, presented the army petition to parliament (August 1652), approved of the protectorate, and represented Nottinghamshire in the parliaments of 1654 and 1656, taking an active part in the prosecution of the Quaker James Naylor. He was one of the administrative major-generals, and was responsible for Lincoln, Nottingham, Derby, Warwick and Leicester. He supported the "Petition and Advice," except as regards the proposed assumption of the royal title by Cromwell, and became a member of the newly constituted House of Lords in December 1657. On the protector's death, at which he was present, he in vain gave his support to Richard; his regiment refused to obey his orders, and the Long Parliament dismissed him from his command as a representative of the army. In November 1659 he undertook an unsuccessful mission to Scotland to arrange terms with Monk. At the Restoration, Whalley, with his son-in-law, General William Goffe, escaped to America, and landed at Boston on the 27th of July 1660, living successively at New Haven and at Hadley, Massachusetts, every attempt on the part of the government at home to procure his arrest meeting with failure. He was alive, but failing in health, in 1674, and probably did not long survive. Whalley was twice married; first to Judith Duffell, by whom, besides other children, he had a son John and a daughter Frances (who married Major-General William Goffe, the regicide); and secondly to Mary Middleton, sister of Sir George Middleton, by whom he had two sons, Henry and Edward.

AUTHORITIES.—An account of Whalley's life is in Noble's *Lives of the Regicides*, and of his family in Noble's *Memoirs of the Protectoral House of Cromwell*, vol. ii.; see also Gardiner's and Clarendon's histories of the period, Peck's *Desiderata curiosa* (for Whalley's account of the king's flight); Ezra Stiles's *Hi*[illegible] *of the Judges of Charles I.* (1794, &c.). The arti[illegible] the *Dict. Nat. Biog.* is an admirable [illegible] in America is dealt with in nume[illegible] Massachusetts Historical Society, [illegible] published (1865) by the Prince Society; see also *Atlantic Monthly*, vi. 89-93; *Pennsylvania Mag.* i. 55-66, 230, 359; F. B. Dexter's Memoranda concerning Whalley and Goffe, *New Haven Col. Hist. Soc Papers*, ii. (1877); *Poem commemorative of Goffe, Whalley and Dixwell*, with abstract of their history, by Philagathos (Boston, 1793); Palfrey's *Hist. of New England*, ii. (1866); *Notes and Queries*, 5th series, viii. 359 (bibliography of American works on the regicides).

WHARF, a place for loading or unloading ships or vessels, particularly a platform of timber, stone or other material along the shore of a harbour or along the bank of a navigable river against which vessels may lie and discharge their cargo or be loaded. The O. Eng. word *hwerf* meant literally a turning or turning-place (*hweorfan*, to turn, cf. Goth. *hwairban*, Gr. *καρπός*, wrist), and was thus used particularly of a bank of earth, a dam which turns the flow of a stream, the cognate word in Dutch, *werf*, meant a wharf or a shipbuilder's yard, cf. Dan. *vaerft*, dockyard, and the current meaning of the word is probably borrowed from Dutch or Scandinavian languages.

In English law all water-borne goods must be landed at specified places, in particular hours and under supervision; wharves, which by the Merchant Shipping Act 1895, § 492, include quays, docks and other premises on which goods may be lawfully landed, are either "sufferance wharves," authorized by the commissioners of customs under bond, or "legal wharves" specially appointed by treasury warrant and exempt from bond. There are also wharves authorized by statute or by prescriptive right. The owner or occupier of a wharf is styled a "wharfinger," properly "wharfager," with an intrusive *n*, as in "messenger" and "passenger."

WHARNCLIFFE, JAMES ARCHIBALD STUART-WORTLEY-MACKENZIE, 1ST BARON (1776–1845), English statesman, was the son of Colonel Stuart, son of the 3rd earl of Bute and of his wife Mary Wortley-Montagu (Baroness Mountstuart in her own right), as whose heir Colonel Stuart added the name of Wortley, taking later also that of Mackenzie (which his son in later life discarded) as heir to his uncle J. S. Mackenzie of Rosehaugh. He entered the army, becoming colonel in 1797, but retired in 1801 and devoted himself to politics, sitting in parliament as a Tory for Bossiney in Cornwall till 1818, when he was returned for Yorkshire. His attitude on various questions became gradually more Liberal, and his support of Catholic emancipation lost him his seat in 1826. He was then raised to the peerage as Baron Wharncliffe of Wortley, a recognition both of his previous parliamentary activity and of his high position among the country gentlemen. At first opposing the Reform Bill, he gradually came to see the undesirability of a popular conflict, and he separated himself from the Tories and took an important part in modifying the attitude of the peers and helping to pass the bill, though his attempts at amendment only resulted in his pleasing neither party. He became lord privy seal in Peel's short ministry at the end of 1834, and again joined him in 1841 as lord president of the council. In 1837 he brought out an edition of the writings of his ancestress, Lady Mary Wortley-Montagu (new ed. 1893). On his death in 1845 he was succeeded as 2nd baron by his eldest son, John Stuart-Wortley (1801–1855), whose son Edward, 3rd baron (1827–1899), best known as chairman of the Manchester, Lincoln & Sheffield railway, converted under him into the Great Central, was created 1st earl of Wharncliffe and Viscount Carlton in 1876; his name was prominently identified with railway enterprise, and became attached to certain features of its nomenclature. He was succeeded as 2nd earl by his nephew Francis (b. 1856).

Among other members of the family, several of whom distinguished themselves in law, politics, art and the army, may be mentioned the 1st baron's third son, James Archibald Stuart-Wortley (1805–1881), recorder of London and solicitor-general; his son, C. B. Stuart Wortley, K.C. (b. 1851), became well known in [illegible] the home office (1885, and [illegible] mittees.

[illegible] of Wharton were an old [illegible] THOMAS WHARTON (1495– [illegible] vices in border warfare. [illegible] and 4th barons; and the [illegible] was the father of THOMAS [illegible] was created earl and in

1714 marquess of Wharton. The 1st marquess was one of the chief Whig politicians after the Revolution. He is famous in literary history as the author of the famous political ballad, *Lillibullero*, which "sang James II. out of three kingdoms." Wharton was lord-lieutenant of Ireland in Anne's reign, and incurred the wrath of Swift, who attacked him as Verres in the *Examiner* (No. 14), and drew a separate "character" of him, which is one of Swift's masterpieces. He was a man of great wit and versatile cleverness, and cynically ostentatious in his immorality, having the reputation of being the greatest rake and the truest Whig of his time. Addison dedicated to him the fifth volume of the *Spectator*, giving him a very different "character" from Swift's. His first wife, Anna Wharton (1632–1685), was an authoress, whose poems, including an *Elegy on Lord Rochester*, were celebrated by Waller and Dryden. His son, Philip Wharton (1698–1731), duke of Wharton, succeeded to his father's marquessate and fortune, and in 1718 was created a duke. But he quickly earned for himself, by his wild and profligate frolics and reckless playing at politics, Pope's satire of him as "the scorn and wonder of our days" (*Moral Essays*, i. 179). He spent his large estates in a few years, then went abroad and gave eccentric support to the Old Pretender. There is a lively picture of his appearance at Madrid in 1726 in a letter from the British consul, quoted in Stanhope's *History of England* (ii. 140). He was outlawed in 1729, and at his death the titles became extinct. In 1843 a claim was made before the House of Lords for a revival of the barony in favour of Mr Kemys-Tynte, a descendant of the 1st baron in the female line.

For the history of the family see E. R. Wharton's *Whartons of Wharton Hall* (1898).

WHARTON, FRANCIS (1820–1889), American legal writer and educationalist, was born in Philadelphia, Pennsylvania, on the 7th of March 1820. He graduated at Yale in 1839, was admitted to the bar in 1843, became prominent in Pennsylvania politics as a Democrat, and in Philadelphia edited the *North American and United States Gazette*. He was professor of English history and literature at Kenyon College, Gambier, Ohio, in 1856–1863. He took orders in the Protestant Episcopal church in 1862 and in 1863–1869 was rector of St Paul's Church, Brookline, Massachusetts. In 1871–1881 he taught ecclesiastical polity and canon law in the Protestant Episcopal Theological School at Cambridge, Massachusetts, and at this time he lectured on the conflict of laws at Boston University. For two years he travelled in Europe, and after two years in Philadelphia he went to Washington, D.C., where he was lecturer on criminal law (1885–1886) and then professor of criminal law (1886–1888) at Columbian (now George Washington) University; in 1885–1888 he was solicitor (or examiner of claims) of the Department of State, and from 1888 to his death on the 21st of February 1889 was employed on an edition (authorized by Congress) of the *Revolutionary Diplomatic Correspondence of the United States* (6 vols., 1889, ed. by J. B. Moore), which superseded Sparks's compilation. Wharton was a "broad churchman" and was deeply interested in the hymnology of his church. He received the degree of LL.D. from the university of Edinburgh in 1883, and was the foremost American authority on international law.

He published: *A Treatise on the Criminal Law of the United States* (1846; many times reprinted); *State Trials of the United States during the Administrations of Washington and Adams* (1849); *A Treatise on the Law of Homicide in the United States* (1855); with Moreton Stillé, *A Treatise on Medical Jurisprudence* (1855); *Modern Theism* (1859), in which he applied rules of legal evidence to modern sceptical theories; *A Treatise on the Conflict of Laws* (1872; 3rd ed. 1905); *A Treatise on the Law of Negligence* (1874); *A Commentary on the Law of Agency and Agents* (1876), *A Commentary on the Law* [illegible] *Civil Issues* (1877; 3rd ed. 1888); a companion work [illegible]*vidence*; *Commentary on the Law of Contracts* (1882); [illegible] *Law* (1884); and a *Digest of the International Law* [illegible]*tates* (3 vols. 1886).

[illegible] (Philadelphia, 1891) by his daughter, Mrs Viele, [illegible]ends; and J. B. Moore's "Brief Sketch of the Life [illegible]arton," prefaced to the first volume of the *Revolu*-[illegible] *Correspondence*.

[illegible]**ON, HENRY** (1664–1695), English writer, was [illegible]d from Thomas, 2nd Baron Wharton (1520–1572), being a son of the Rev. Edmund Wharton, vicar of Worstead, Norfolk. Born at Worstead on the 9th of November 1664, Wharton was educated by his father, and then at Gonville and Caius College, Cambridge. Both his industry and his talents were exceptional, and his university career was brilliant. In 1686 he entered the service of the ecclesiastical historian, the Rev. William Cave (1637–1713), whom he helped in his literary work; but considering that his assistance was not sufficiently appreciated he soon forsook this employment. In 1687 he was ordained deacon, and in 1688 he made the acquaintance of the archbishop of Canterbury, William Sancroft, under whose generous patronage some of his literary work was done. The archbishop, who had a very high opinion of Wharton's character and talents, made him one of his chaplains, and presented him to the Kentish living of Sundridge, and afterwards to that of Chartham in the same county. In 1689 he took the oath of allegiance to William and Mary, but he wrote a severe criticism of Bishop Burnet's *History of the Reformation*, and it was partly owing to the bishop's hostility that he did not obtain further preferment in the English church. He died on the 5th of March 1695, and was buried in Westminster Abbey.

Wharton's most valuable work is his *Anglia sacra*, a collection of the lives of English archbishops and bishops, which was published in two volumes in 1691. Some of these were written by Wharton himself; others were borrowed from early writers. His other writings include, in addition to his criticism of the *History of the Reformation*, *A treatise of the celibacy of the clergy* (1688); *The enthusiasm of the Church of Rome demonstrated in some observations upon the life of Ignatius Loyola* (1688); and *A defence of pluralities* (1692, new ed. 1703). In the Lambeth Library there are sixteen volumes of Wharton's manuscripts. Describing him as "this wonderful man," Stubbs says that Wharton did for the elucidation of English Church history "more than any one before or since." A life of Wharton is included in George D'Oyly's *Life of W. Sancroft* (1821).

WHATELY, RICHARD (1787–1863), English logician and theological writer, archbishop of Dublin, was born in London on the 1st of February 1787. He was educated at a private school near Bristol, and at Oriel College, Oxford. He obtained double second-class honours and the prize for the English essay; in 1811 he was elected fellow of Oriel, and in 1814 took orders. During his residence at Oxford he wrote his celebrated tract, *Historic Doubts relative to Napoleon Bonaparte*, a very clever *jeu d'esprit* directed against excessive scepticism as applied to the Gospel history. After his marriage in 1821 he settled in Oxford, and in 1822 was appointed Bampton lecturer. The lectures, *On the Use and Abuse of Party Spirit in Matters of Religion*, were published in the same year. In August 1823 he removed to Halesworth in Suffolk, but in 1825, having been appointed principal of St Alban Hall, he returned to Oxford. At St Alban Hall Whately found much to reform, and he left it a different place. In 1825 he published a series of *Essays on Some of the Peculiarities of the Christian Religion*, followed in 1828 by a second series *On some of the Difficulties in the Writings of St Paul*, and in 1830 by a third *On the Errors of Romanism traced to their Origin in Human Nature*. While he was at St Alban Hall (1826) the work appeared which is perhaps most closely associated with his name—his treatise on *Logic*, originally contributed to the *Encyclopaedia Metropolitana*, in which he raised the study of the subject to a new level. It gave a great impetus to the study of logic throughout Great Britain. A similar treatise on *Rhetoric*, also contributed to the *Encyclopaedia*, appeared in 1828. In 1829 Whately was elected to the professorship of political economy at Oxford in succession to Nassau William Senior. This was a subject admirably suited to his lucid, practical intellect; but his tenure of office was cut short by his appointment to the archbishopric of Dublin in 1831. He published only one course of *Introductory Lectures* (1831), but one of his first acts on going to Dublin was to endow a chair of political economy in Trinity College out of his private purse.

Whately's appointment by Lord Grey to the see of Dublin came as a great surprise to everybody, for though a decided Liberal Whately had from the beginning stood aloof from all political parties, and ecclesiastically his position was that of an Ishmaelite fighting for his own hand. The Evangelicals regarded him as a dangerous latitudinarian on the ground of his views on Catholic emancipation, the Sabbath question, the doctrine of election, and certain quasi-Sabellian opinions he was supposed to hold about the character and attributes of Christ, while his view of the church was diametrically opposed to that of the High Church party, and from the beginning he was the determined opponent of what was afterwards called the Tractarian movement. The appointment was challenged in the House of Lords, but without success. In Ireland it was immensely unpopular among the Protestants, both for the reasons just mentioned and as being the appointment of an Englishman and a Whig. Whately's blunt outspokenness and his "want of conciliating manners," which even his friends admit, prevented him from ever completely eradicating these prejudices, while at the same time he met with determined opposition from his own clergy. He ran counter to their most cherished prejudices from the first by connecting himself prominently with the attempt to establish a national and unsectarian system of education. He enforced strict discipline in his diocese, where it had been long unknown; and he published an unanswerable statement of his views on the Sabbath (*Thoughts on the Sabbath*, 1832). He took a small country place at Redesdale, 4 m. out of Dublin, where he could enjoy his favourite relaxation of gardening. Here his life was one of indefatigable industry. Questions of tithes, reform of the Irish church and of the Irish Poor Laws, and, in particular, the organization of national education occupied much of his time. But he found leisure for the discussion of other public questions, for example, the subject of transportation and the general question of secondary punishments. In 1837 he wrote his well-known handbook of *Christian Evidences*, which was translated during his lifetime into more than a dozen languages. At a later period he also wrote, in a similar form, *Easy Lessons on Reasoning*, on *Morals*, on *Mind* and on the *British Constitution*. Among his other works may be mentioned *Charges and Tracts* (1836), *Essays on Some of the Dangers to Christian Faith* (1839), *The Kingdom of Christ* (1841). He also edited Bacon's *Essays*, Paley's *Evidences* and Paley's *Moral Philosophy*. His cherished scheme of unsectarian religious instruction for Protestants and Catholics alike was carried out for a number of years with a measure of success, but in 1852 the scheme broke down owing to the opposition of the new Catholic archbishop of Dublin, and Whately felt himself constrained to withdraw from the Education Board. From the beginning Whately was a keen-sighted observer of the condition of Ireland question, and gave much offence by openly supporting the state endowment of the Catholic clergy as a measure of justice. During the terrible years of 1846 and 1847 the archbishop and his family were unwearied in their efforts to alleviate the miseries of the people. From 1856 onwards symptoms of decline began to manifest themselves in a paralytic affection of the left side. Still he continued the active discharge of his public duties till the summer of 1863, when he was prostrated by an ulcer in the leg, and after several months of acute suffering he died on the 8th of October 1863.

Whately was a great talker, much addicted in early life to argument, in which he used others as instruments on which to hammer out his own views, and as he advanced in life much given to didactic monologue. He had a keen wit, whose sharp edge often inflicted wounds never deliberately intended by the speaker, and a wholly uncontrollable love of punning. Whately often offended people by the extreme unconventionality of his manners. When at Oxford his white hat, rough white coat, and huge white dog earned for him the sobriquet of the White Bear, and he outraged the conventions of the place by exhibiting the exploits of his climbing dog in Christchurch Meadow. With a remarkably fair and lucid mind, his sympathies were [illegible] and by his blunt outspokenness on points of [illegible] alienated many. With no mystical [illegible] the Tractarian movement was [illegible] the object of his bitter di[illegible] the Low Church party se[illegible] with superstition. He took a practical, almost business-like view of Christianity, which seemed to High Churchmen and Evangelicals alike little better than Rationalism. In this they did Whately less than justice, for his religion was very real and genuine. But he may be said to have continued the typical Christianity of the 18th century—that of the theologians who went out to fight the Rationalists with their own weapons. It was to Whately essentially a belief in certain matters of fact, to be accepted or rejected after an examination of "evidences." Hence his endeavour always is to convince the logical faculty, and his Christianity inevitably appears as a thing of the intellect rather than of the heart. Whately's qualities are exhibited at their best in his *Logic*, which is, as it were, the quintessence of the views which he afterwards applied to different subjects. He wrote nothing better than the luminous Appendix to this work on *Ambiguous Terms*.

In 1864 his daughter published *Miscellaneous Remains* from his commonplace book and in 1866 his *Life and Correspondence* in two volumes. The *Anecdotal Memoirs of Archbishop Whately*, by W. J Fitzpatrick (1864), enliven the picture.

WHAT-NOT, a piece of furniture, derived from the French *étagère*, which was exceedingly popular in England in the first three-quarters of the 19th century. It usually consists of slender uprights or pillars, supporting a series of shelves for holding china, ornaments or trifles of any kind—hence the allusive name. In its English form, although a convenient drawing-room receptacle, it was rarely beautiful. The early mahogany examples are, however, sometimes graceful in their simplicity.

WHEAT (*Triticum*), the most important and the most generally diffused of cereal grasses. It is an annual plant, with hollow, erect, knotted stems, and produces, in addition to the direct developments from the seedling plant, secondary roots and secondary shoots (tillers) from the base. Its leaves have each a long sheath encircling the stem, and at the junction of the blade or "flag" with the sheath a small whitish outgrowth or "ligula." The inflorescence or ear consists of a central stalk bent zigzag, forming a series of notches (see fig. 1), and bearing a number of flattened spikelets, one of which grows out of each notch and has its inner or upper face pressed up against it. At the base of each spikelet are two empty boat-shaped glumes or "chaff-scales," one to the right, the other to the left, and then a series of flowers, 2 to 8 in number, closely crowded together; the uppermost are abortive or sterile,—indeed, in some varieties only one or two of the [illegible]. Each flower consists of an outer or lower glume, called the flowering glume, of the same shape as the empty glumes and terminat- [illegible] glumes, with infolded margins [illegible] several glumes are closely [illegible] conceal and protect the ovary,

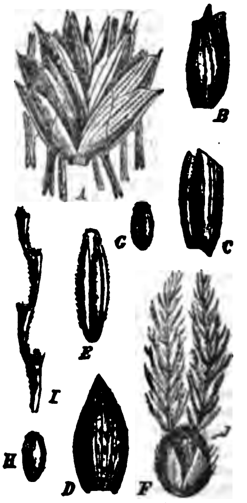

FIG. 1.—Spikelet and Flowers of Wheat.

A, Spikelet magnified.
B, Glumes, from side.
C, Glumes, from back.
D, Flowering glume or lower palea.
E, Palea.
F, Lodicules at base of *j*, the ovary, surmounted by styles.
[illegible] and H, Seed from front and back respectively.
[illegible] Rachis, or central stalk of ear, spikelets removed.

and they only separate for a short time when flowering takes place; after fertilization they close again. Within the pale are two minute, ovate, pointed, white membranous scales called "lodicules." These contain three stamens with thread-like filaments and oblong, two-lobed anthers. The stamens are placed round the base of the ovary, which is rounded or oblong, much smaller than the glumes, covered with down, and surmounted by two short styles, extending into feathery brush-like stigmas. The ripe fruit or grain, sometimes called the "berry," the matured state of the ovary and its contents, is oblong or ovoid, with a longitudinal furrow on one side. The ovary adheres firmly to the seed in the interior, so that on examining a longitudinal section of the grain by the microscope the outer layer is seen to consist of epidermal cells, of which the uppermost are prolonged into short hairs to cover the apex of the grain. Two or three layers of cells inside the epidermis constitute the tissue of the ovary, and overlie somewhat similar layers which form the coats of the seed. Within these is the albumen or endosperm, constituting the flowery part of the seed. The outermost layer of the endosperm consists of square cells larger and more regular in form than those on each side; these contain aleuron grains—small particles of gluten or nitrogenous matter. The remaining central mass of the seed is composed of numerous cells of irregular form and size containing many starch grains as well as gluten granules. The several layers of cells above referred to become more or less dry and inseparable one from another, forming the substance known as "bran." At the lower end of the albumen, and placed obliquely, is the minute embryo-plant, which derives its nourishment in the first instance from the albumen; this is destined to form the future plant.

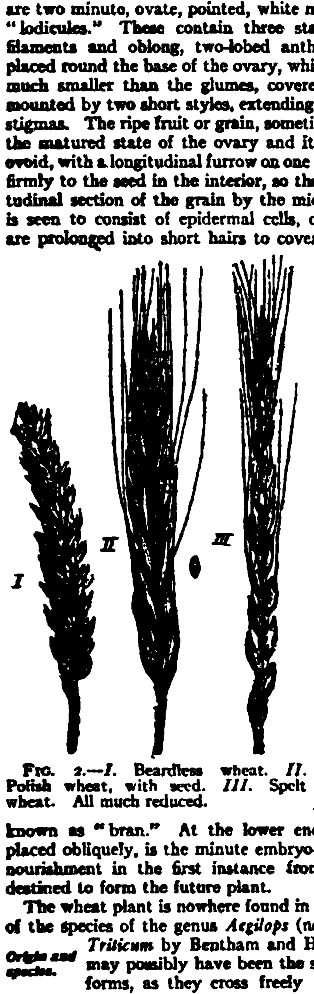

FIG. 2.—*I.* Beardless wheat. *II.* Polish wheat, with seed. *III.* Spelt wheat. All much reduced.

Origin and species.

The wheat plant is nowhere found in a wild condition. Some of the species of the genus *Aegilops* (now generally referred to *Triticum* by Bentham and Hooker and by Haeckel) may possibly have been the sources of our cultivated forms, as they cross freely with wheats. Haeckel considers that there are three species. (1) *Triticum monococcum*, which undoubtedly grows wild in Greece and Mesopotamia, is cultivated in Spain and elsewhere, and was also cultivated by the aboriginal Swiss lake-dwellers, as well as at Hissarlik, as is shown by the grain[1] found in those localities. (2) *T. sativum* is the ordinary cultivated wheat, of which Haeckel recognizes three principal races, *spelta*, *dicoccum* and *tenax*. Spelt wheats (see fig. 2) were cultivated by the aboriginal Swiss, by the ancient Egyptians, and throughout the Roman empire. The variety *dicoccum* was also cultivated in prehistoric times, and is still grown in Southern Europe as a summer wheat and [illegible] suitable for starch-making. The variety *tenax* includes four [illegible], *vulgare* (common wheat), *compactum*, *turgidum* and [illegible] below). (3) The third species, *T. polonicum*, or Polish [illegible], is a very distinct-looking form, with long leafy glumes; [illegible] is not known. As these varieties intercross with each other, the presumption is that they, like the species of *Aegilops*, which also intercross with wheat, may have all originated from one common stock.

Home and distribution.

Basing his conclusions upon philological data, such as the names of wheat in the oldest known languages, the writings of the most ancient historians, and the observations of botanical travellers, De Candolle infers that the original home of the wheat plant was in Mesopotamia, and that from there its cultivation extended in very early times to the Canaries on the west and to China on the east. In the western hemisphere wheat was not known till the 16th century. Humboldt mentions that it was accidentally introduced into Mexico with rice brought from Spain by a negro slave belonging to Cortes, and the same writer saw at Quito the earthen vase in which a Flemish monk had introduced from Ghent the first wheat grown in South America.

Principal varieties.

As might be anticipated from the cultivation of the plant from time immemorial and from its wide diffusion throughout the eastern hemisphere, the varieties of wheat—that is, of *T. sativum*—are very numerous and of every grade of intensity. Those cases in which the variation is most extreme some botanists would prefer to consider as forming distinct species; but others, as De Vilmorin, having regard to the general facts of the case and to the numerous intermediate gradations, look upon all the forms as derivatives from one. In illustration of this latter point it may be mentioned that not only do the several varieties run one into the other, but their chemical composition varies likewise according to climate and season. According to Professor Church,[1] even in the produce of a single ear there may be 3 to 4% more of albuminoid matters in some grains than in others; but on the average the proportion of gluten to starch is as 9·11 to 100. From the point of view of agriculture it is generally of no great moment what rank be assigned to the various forms. It is only important to take cognizance of them for purposes of cultivation under varying circumstances. Hence we only allude to some of the principal variations and to those characteristics which are found to be unstable. (1) Setting aside differences of constitution, such as hardihood, size, and the like, there is relatively little variation in the form of the organs of vegetation. This indicates that less attention has been paid to the straw than to the grain, for it is certain that, were it desirable, a great range of variation might be induced in the foliage and straw. As it is, some varieties are hardier and taller than others, and the straw more solid, varying in colour and having less liability to be "laid"; but in the matter of "tillering," or the production of side-shoots from the base of the stem, there is much difference. Spring wheats procured from northern latitudes mature more rapidly than those from temperate or hot climates, whilst the reverse is the case with autumn wheats from the same source. The difference is accounted for by the greater amount of light which the plants obtain in northern regions, and, especially, by its comparatively uninterrupted continuance during the growing period, when there are more working hours for the plants in the day than in more southern climes. Autumn wheats, on the other hand, are subjected to an enforced rest for a period of several months, and even when grown in milder climates remain quiescent for a longer period, and start into growth later in spring—much later than varieties of southern origin. These latter, accustomed to the mild winters of those latitudes, begin to grow early in spring, and are in consequence liable to injury from spring frosts. Wheats of dry countries and of those exposed to severe winds have, says De Vilmorin, narrow leaves, pliant straw, bearded ears, and velvety chaff—characteristics which enable them to resist wind and drought. Wheats of moist climates, on the other hand, have broader leaves, to admit of more rapid transpiration. No doubt careful microscopic scrutiny of the minute anatomy of the leaves of plants grown under various conditions would reveal further adaptations of structure to external conditions of climate. At any rate, it is certain that, as a general rule, the hard wheats are almost exclusively cultivated in hot, dry countries, the spelt wheats in mountainous districts and on poor soil, turgid (*durum* forms) and common wheats in plains or in valleys—the best races of wheat being found on rich alluvial plains and in fertile valleys. The wheat used in the neighbourhood of Florence for straw-plaiting is a variety with very slender stalks. The seed is sown very thickly at the beginning of winter and pulled, not cut, about the end of May, before the ear is ripe. In the United Kingdom ordinary wheat, such as old red Lammas and Chiddam white, is used for straw-plaiting, the straw being cut some time before the berry ripens. The propensity to "tiller" is of the greatest importance, as it multiplies the resources of the farmer. An instance of this is given in the *Philosophical Transactions* (1768), where it is stated that one seedling plant in the Cambridge botanic garden was divided into eighteen parts, each of which was replanted and subsequently again divided, till it produced sixty-seven plants in one season. In March and April of the following year these were again divided

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[illegible]-drawings made to scale by Mr Worthington Smith in the [illegible]dener's *Chronicle* (25th December 1886).

[1] *Food Grains of India*, p. 94.

and produced 500 plants, which in due time yielded 21,109 ears. (2) The variations in root-development have not been much attended to, although it would be well to study them in order to ascertain the degree of adaptability to various depths and conditions of soil. (3) A most important difference is observable in the liability to attacks of rust (*Puccinia*), some varieties being almost invariably free from it, while others are in particular localities so subject to it as to be not worth cultivating. (4) The ears vary, not only in size, but also in form, this latter characteristic being dependent on the degree of closeness with which the spikelets are set on. In such varieties as Talavera the spikelets are loose, while in the club and square-headed varieties they are closely packed. The form of the ear depends on the relative width of the anterior and posterior surfaces as compared with that of the lateral surfaces. In the square-headed varieties the lateral surfaces are nearly as wide as the median ones, owing to the form and arrangement of the spikelets. The number of abortive or sterile spikelets at the top of the ear also varies: in some cases nearly all the spikelets are fertile, while in others several of the uppermost ones are barren.

The classification of the different varieties of cultivated wheat has occupied the attention of many botanists and agriculturists.

Classification of cultivated wheats.

The classification adopted by Henry de Vilmorin in his *Les Blés meilleurs* (Paris, 1881) is based, in the first instance, on the nature of the ear: when mature its axis or stem remains unbroken, as in the true wheats, or it breaks into a number of joints, as in the spelt wheats. In the first class the ripe grain readily detaches itself from the chaff-scales, while in the spelts it is more or less adherent to them, or not readily separable from them. The true wheats are further subdivided into common wheats (*T. vulgare*), turgid wheats (*T. turgidum*), hard wheats (*T. durum*) and Polish wheats (*T. polonicum*). In the common wheats the chaff-scales are boat-shaped, ovoid, of the consistence of parchment, and shorter than the spikelet; the seed is usually floury, opaque, white, and easily broken. In the turgid wheats the glumes have long awns, and the seed is turgid and floury, as in the common wheats. In the hard wheats the outer glumes are keeled, sharply pointed, awned, and the seed is elongated and of hard glassy texture, somewhat translucent, and difficult to break owing to its toughness. These seeds are richer in nitrogen than the common and turgid wheats, so that an approximate notion of the richness in albuminoids may be gained by simply inspecting the cut surface of the seed. The Polish wheat, rarely if ever cultivated in the United Kingdom, has very large lanceolate glumes, longer than the spikelet, and elongated glassy seeds. Further subdivisions are made, according to the presence or absence of awns (bearded and beardless wheats), the colour of the ears (white, fawn-coloured or red), the texture of the ears (glabrous—*i.e.* smooth—or downy) and the colour of the seed or "berry." In the jointed or spelt wheats the distinctions lie in the presence of awns, the direction of the points of the glumes (straight, bent outwards, or turned inwards), the form of the ear as revealed on a cross-section, and the entire or cleft palea. As illustrating the fact of the occasional instability of these variations, Professor Church mentions that a single grain will be sometimes horny and partly opaque and floury, in which case its composition will correspond with its aspect. The division into spring wheat and winter wheat is an agricultural one solely. Any variety may be a spring or a winter wheat according to the time at which it is sown. In the summer wheats it may often be observed that the median florets do not fill out so fully as in the autumn wheats. Among the turgid wheats there is a frequent tendency in the spike to branch or become compound—a tendency which is manifested to a less degree in [illegible] The Egyptian, or so-called "mummy" wheat is of this [illegible] part of the spike branching out into several [illegible] tion of the seed-bearing branches [illegible] advantageous; but in practice the [illegible] be inferior, as if the force [illegible] maturation of the grain [illegible] in the produc[illegible]

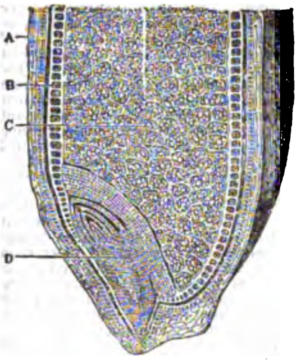

FIG. 3.—Longitudinal Section of a Grain of Wheat; highly magnified.
A, Epidermal cells.
B, Cells containing aleuron or gluten grains.
C, Cells of endosperm or albumen, filled with starch.
D, Embryo cut through the middle, root-end pointing downwards.

With regard to the chemical composition of the ripe grain, the Rothamsted experiments reveal a singular uniformity, even under very varied conditions of manuring, and even where much diversity was apparent in the constitution of the straw. A high or low percentage of nitrogen in the grain was also shown to depend more directly on the degree of ripening, as influenced by the character of the season, than on difference in manure; but it depends more upon the variety than upon soil or nutrition.

Adaptability to soil and locality.

Apart from the botanical interest of these diversities, as indications of the faculty of variation in plants, and possibly as clues to the genealogy and origin of the cultivated plant, their practical importance is very great. Some varieties are suited to hot, others to cold countries; some will flourish on one description of soil, others on another. Hence the paramount importance of ascertaining by experiment, not only what are the best varieties, but which are the best adapted for particular localities and particular climatic conditions. Porion and Dehérain have shown [1] the "infinite superiority" in yield over the ordinary wheats of a particular square-headed variety grown on rich soil in the north of France. A good selection of seed, according to the nature of the soil, demands, says De Vilmorin, intelligence and accurate knowledge on the part of the farmer. If a good variety be grown in poor soil, the result will be unprofitable, while, if bad wheat be grown on good soil, the result may be nil. In botanical collections there exist, it is stated, herbarium specimens or other evidences of plants grown in Norway as far north as lat. 65° (Schubeler), in Switzerland at an elevation of 1200 ft. above the valley of Zermatt (or 6500 ft. above the sea), near the straits of Magellan, as well as in Teneriffe, the Cape of Good Hope, Abyssinia, Rodriguez, the Philippine Islands and the Malay Archipelago. These widely separated localities show the great area over which the culture is possible, and illustrate the powers of adaptation of the plant. The requirements of the consumer have also to be considered: for some purposes the soft floury wheats, with their large relative proportion of starch, are the best, for others the harder wheats, with their larger quantity of gluten. With the modern processes of milling, the harder wheats are preferred, for they make the best flour for bakers' use; and in North America the spring wheats are, as a rule, harder than the winter wheats. The bearded varieties are supposed to be hardier; at any rate they defy the ravages of predatory birds more completely than the unarmed varieties, and they are preferable in countries liable to storms of wind, as less likely to have their seeds detached. The *durum* wheats are specially employed in Italy for the fabrication of macaroni. Polish wheat is used for similar purposes. Spelt wheats are grown in the colder mountainous districts of Europe; their flour is very fine, and is used especially for pastry-making; but, owing to the construction of the grain, it requires special machinery for grinding (see FLOUR).

Wheat begins to grow at a temperature of 5° C. (41° F.); and, when the aggregate temperature, as represented by the sum of the daily means, has mounted up to 185° F., the germ begins to escape from the husk, if the seed be not deeply buried; but if it is deeply buried, an amount of heat is required greater in proportion to the depth. If the seed lies at a depth lower than a foot from the surface, it rarely germinates. The seedling plant ceases to grow if the mean temperature of the day remains below 42° F. When the young plants have been influenced by an aggregate temperature amounting to 1896° F. from the period when sown, or 1715° from the period of germination, branching or "tillering" goes on freely, and the young ears are formed. Under the influence of a mean temperature of 55°, or a little above, the flowers are produced. A still higher daily mean is required for the full development and ripening of the grain. The figures here cited are given by Risler and are calculated for the climate of Paris; but, of course, the same principles apply in the case of other countries. The amount of light and of moisture has also to be taken into account. The fact that the wheat plant requires less water than other cereals, and therefore does not suffer so much from drought, is one of great importance to the cultivator, and furnishes one reason for the greater proportionate culture of wheat in the eastern than in the western counties of England.

The following figures, cited by De Vilmorin from Joulie, will give an idea of the nature and amount of the demands made upon the soil by a wheat crop: in order to yield a crop of 44½ bushels of wheat to the acre, the soil must supply to the crop during its growth in round numbers—202 lb of nitrogen, 81 lb of phosphoric acid, 55 lb of lime, 26 lb of magnesia, and 255 lb of potash.

Production of varieties.

The numerous varieties of wheat now in cultivation have been obtained either by selection or by cross-breeding. In any wheat-field there may be observed on close inspection plants differing in character from the majority. If seeds of these "sporting" plants be taken and grown in another season, they may (or may not) reproduce the particular variation. If they do, and the same process of selection be continued, the variation becomes in time "fixed," though it is always more or [illegible] to revert to its original condition. By continuously and [illegible] selecting the best grains from the best ears, Major [illegible] in introducing "pedigree wheats" of fine quality. [illegible] greater results may be expected from cross-breeding, or the fertilization of the flowers of one description of wheat by the pollen of another. This has been attempted by Shireff, Le Couteur, Maund and others in the past, and more recently by H. de Vilmorin and Messrs Carter. Under natural circumstances wheat is self-fertilized: that is to say, the pollen of any given flower impregnates the stigma and ovule of the same flower; the glumes and coverings of the flower being tightly pressed round the stamens and stigmas in such a way as to prevent the access of insects and to ensure the deposit of the pollen upon the stigmas of the same flower. This process of self-fertilization is the usual method, and no doubt keeps the variety true or unmixed; but the occasional presence of varieties in a wheat-field shows that cross-fertilization is sometimes secured. The stamens of the wheat plant may frequently be seen protruding beyond the glumes, and their position might lead to the inference that cross-fertilization was the rule; but on closer examination it will be found that the anthers are empty or nearly so, and that they are not protruded till after they have deposited the pollen upon the stigma. The separation of the glumes, which occurs at the time of fertilization, and which permits the egress of the useless stamens after that operation, occurs only under certain conditions of temperature, when the heat, in fact, is sufficient to cause the lodicules of the flower to become turgid and thus to press apart the glumes. A temperature of about 75° F. is found by Messrs Carter to be the most favourable. From what has been said it will be evident that the artificial fertilization of wheat is a very delicate operation. The glumes have to be separated and the anthers cut away before the pollen is fully formed, care being taken at the same time not to injure the stigma, and specially not to introduce, on the scissors or otherwise, any pollen except that of the variety desired. De Vilmorin's experiments have shown that all the varieties will intercross, and that even such a distinct form as the Polish is no exception. From this he concludes that all the forms have originated from one stock and are to be comprised within one species. In the progeny of these crossed wheats, especially in the second generation, much variation and difference of character is observable—a phenomenon commonly noticed in the descendants from crosses and hybrids, and styled by Naudin "irregular variation." Sometimes characteristics appear in the crossed wheats which are not found in the parent varieties, although they occur in other wheats. Thus, De Vilmorin records the presence of turgid wheats among seedlings raised from a common wheat fertilized with the pollen of a hard variety, and spelt wheats among the descendants of a common crossed with a turgid wheat.

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[1] *Ann. agronom.* (January 1888), p. 33.

The production of wheat, with the use of wheat bread, has increased enormously since the extension of railways has made possible the transportation of grain for great distances (see GRAIN TRADE) Of late years the increase of production has been most notable in southern Russia, Argentina, Australia, India and North America.

American Wheat-Farming.[1]—That wonderful agricultural region, extending from the international line on the north to the 37th parallel, and from the Atlantic Ocean to the 100th meridian, and comprising 26 states, produces 76% of the American wheat crop. This region, which contains only 30% of the land surface of the country, but embraces 60% of its total farm area and 70% of its improved farm acreage, is the greatest cereal-producing region of the world. Besides wheat, it produces 82% of the total corn crop, 91% of the total oat crop and 83% of the total hay crop of the United States. The methods pursued in the eastern portion of this region are similar to those used in other parts of the world; but in the north-western portion wheat-growing is carried on on a gigantic scale, and by methods almost unknown anywhere else. The best illustration of the great or "bonanza" wheat farms, as they are called, are found along the Red river (of the North), where it flows between the states of North Dakota and Minnesota.

The wheat grown in the United States is of two distinct kinds. One is the large-kernel winter wheat of the Eastern states; the other is the hard spring wheat. The "blue stem" or the "Scotch-Fife" are native varieties of the latter kind grown in Minnesota and the two Dakotas. For flour-making this wheat is considered the best in the world. During the season of 1899 the product of hard spring wheat amounted to nearly 250,000,000 bushels, or two-fifths of the entire wheat product of the United States. Of this, Minnesota and the two Dakotas alone produced 200,000,000 bushels. Minnesota is the greatest wheat-producing state in the Union. Her fields in 1899 covered 5,000,000 acres, and she produced nearly 80,000,000 bushels, which is twice the entire production of all Australia, and more than that of Great Britain and Ireland put together. In Minnesota and the Dakotas the farms are devoted almost exclusively to wheat-growing. Many of them contain from 3000 to 10,000 acres. The country is a very level one, making it possible to use all kinds of machinery with great success. As there are no mountains or swamps, there is here very little waste land, and every square foot of the vast wheat fields can be made productive.

Bonanza farms.

The first characteristic of a "bonanza" wheat farm is the machinery. The smallest agricultural implement used upon them is a plough, and the largest is the elevator. A hoe or a spade is almost unknown. Between these two there are machines of all sizes adapted to the needs of the particular work. Let us assume the conditions prevailing upon a bonanza farm of 5000 acres, and briefly describe the process of wheat production from the ploughing of the land to the delivery of the grain in the final market. These great wheat farms were established upon new lands sold directly to capitalists by the railroads. The lands became the property of the railroads largely through government grants, and they attracted capitalists, who bought them in large bodies and at low prices. The improvements made upon them consist of the cheap wooden dwellings for the managers, dormitories and dining-halls for the men, stables for the horses, and sheds and workshops for repairing machinery. Very little of the land is under fence. Since the desirable lands of the country have been occupied, the prices of these lands have advanced slowly, with the result that the big farms are being divided up into small holdings. After a generation or two, if land continues to rise in the market as it has recently, the bonanza farms will become a thing of the past. At present the best of these lands in the valley of the Red river (of the North) are worth from $25 to $30 an acre. The improvements upon them add about $5 an acre more. A farm is not considered a big one unless it contains from 2000 to 10,000 acres at least. There are, of course, many small farmers owning from two to five sections (640 acres in each section), but their methods are more like those of the small farmers in the eastern United States or on the continent of Europe. It is necessary to own a large body of land in order to be able to use the machinery and methods here described. It is hard to convey a just notion of the size of these farms. They stretch away as far as the eye can reach in every direction, making it difficult even for the visitor to conceive their size. The distances across wheat fields are so great that even horseback communication is too slow. The farms are separated into divisions, and lodging-houses and dining-halls and barns are scattered over them, so as to keep the workmen and teams near the scene of their labour. The men living at one end of the farm may not see those at the other for months at a time. Even then it is necessary to take the meals to the men in the fields rather than allow them to walk or ride to the dining-halls. It is not an unusual thing for a working crew to find themselves at the dinner hour 2 m. from their hall.

Ploughing.

First, after burning the old straw of the previous year—which is real labour in itself, so enormous is its bulk—comes the ploughing. This begins in October. The plough used has a 16-in. share, turns two furrows, and is drawn by five horses. Each plough covers about 250 acres in a season, travelling an average of 20 m. a day. The ploughing begins in October, and continues a month or six weeks, according to the season. The ploughs are driven in "gangs" under the eye of a superintendent, who rides with them. From eight to ten of these ploughs follow each other around the vast section. If one stands a few rods ahead of them they seem to be following one another in a line; but, if one stands to the right of the "gang," one sees that the line is broken, and that the second plough is a width farther in the field than the leader, and so on for the entire number. Experience shows that it costs about 70 cents an acre to plough the land in this way. About forty men are employed upon a farm of 5000 acres during the ploughing season. The men are paid by the month, and receive about $25, including their board. They breakfast at five o'clock, take an hour for their dinner at noon—usually in the field—and have their supper at seven. At the end of the ploughing season these particular men are usually discharged. Only eight or ten are kept on a farm of this size throughout the year. The other men go back to their homes or to the factories in the cities, where they await the harvesting and threshing season. The eight or ten who remain upon the farm are employed in doing odd jobs, such as overhauling machinery, or helping the carpenter and blacksmith, or looking after the horses. The wheat region is a country of heavy snows, and of severe, dry cold; but when March comes the snows begin to melt away, and by April the ploughed land is dry enough for the harrow. The harrowing is done with 25-ft. harrows, drawn by four horses, and operated by a single man. One man can harrow 60 to 73 acres a day.

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[1] For Canadian Wheat see CANADA § *Agriculture*.

Seeding.

The seeding follows immediately with four-horse press drills that cover 12 ft. The harrows and drills are worked in "gangs" as the ploughs were. Each drill will go from 20 to 25 m. a day. When the weather is good the seeding upon a 5000-acre farm will be done in twenty or twenty-five days. It is usual to seed a bushel and a peck of wheat to the acre. The wheat used for this purpose is carefully selected after the harvest of the previous year, and is thoroughly cleaned of foreign seeds. Through years of cultivation, varieties of wheat have been produced which are particularly well adapted to the soil and climate of this region. It has been found more profitable to use the native "blue stem" or "Scotch-Fife" wheat than the seed from any other country, or even from the neighbouring states. Counting the seed, wheat and the labour, it costs about $1 an acre to harrow the ground and plant the wheat.

Labour.

When the planting is done the extra labourers are discharged again, and the regular ones are put to work on the corn, oats and millet, which are grown to feed the horses. The men who do the most important work are all temporary labourers. They come from the cities of the east or the farms of the south. They begin with the early harvest in Oklahoma, and work northwards up the Missouri and the Red river until the season closes in Manitoba. They are not tramps, but steady, industrious men, with few bad habits and few ambitions. On well-managed farms drinking and gambling are strictly forbidden. The work is hard, and, as there are few amusements on the farm, the men spend their resting periods in sleep. Their dormitories are usually comfortably furnished, their dining-halls clean. The bonanza farmers find it good policy to feed their men well. Many a strike has occurred in the midst of the harvest because the quality or quantity of the food served was not what it ought to have been. The largest part of this food is brought from the eastern states. Some potatoes, turnips and beans are grown upon the farms; but the corned beef, bacon and groceries come from the cities. It is estimated that it costs 35 cents a day to feed each labourer. Farmers say that a good name in these respects enables them to get the choice of workmen, and that no money brings such sure returns as that expended in the bedrooms and upon the food.

The harvest.

The harvest labourers begin to arrive from the south about the middle of July, and by the end of this month the harvest is at its height. A farm of 5000 acres will use 75 or 100 extra men. With the men comes the new machinery in train loads. It is estimated that at least $5,000,000 worth of agricultural machines is annually sold in this region. The wheat farmers say that it does not pay to take undue care of old machinery, that more money is lost in repairing and tinkering an old machine than would pay for a new one. The result is that new machinery is bought in very large quantities, used until it is worn out or cannot be repaired without considerable work, and then left in the fields to rust. Heaps of cast-iron can be seen already upon many of the large farms. Of course a great many extra parts are bought to take the place of those which break most frequently, and some men are always kept at work repairing machines in the field. One of the big 10,000-acre farms will use up two car-loads of twine in a single harvest, enough to lay a line around the whole coast of England, Ireland and Scotland. The harvesters vary in size according to the character of the land. Upon the rougher ground and small farms the ordinary binders are used; upon the great plains, like those of California, a great harvester is used, which has a cutting line 52 ft. wide. These machines cut, thresh and stack the grain at the rate of 1600 sacks a day, and cover an area in that time of 100 acres. These machines can only be used where the wheat ripens thoroughly standing in the field. The harvest labourer earns $10 a week everywhere in America. The bonanza farmer expects one machine to cut at least 250 acres, and three men are required for each of them. The harvest lasts from ten days to three weeks, according to the weather. Including the labour and the wear and tear, it costs about 60 cents an acre to harvest wheat.

Threshing.

The wheat is not stacked as in the Eastern states and in England, but stands upright in shocks in the field. The grain cures very rapidly in the dry climate, so that by the time the wheat is all cut and shocked on one end of the division, it is ready for the thresher at the other. The shocks of wheat are hauled directly to the thresher and fed into the self-feeder. It usually takes a day and a quarter to thresh the wheat which it took a day to cut. The farmer estimates that a threshing-machine can thresh all the wheat ordinarily grown upon 2500 acres, so that a 5000-acre farmer would have at least two machines running at the same time. Time is a very important thing in threshing, since a rainfall might spoil enough grain in one night to buy several machines. The threshing season is thus a time of great pressure and of extensively active work. The wheat straw is worse than a waste product—it is a great nuisance upon the bonanza farm. A little of it is used for fuel for the engines and for bedding the stock; but the bulk of it is [illegible] the threshing machine by [illegible] until an opportunity [illegible] done [illegible] falls [illegible] it to the elevator. The elevator is placed at the railway station, and is usually owned by the bonanza farmer.

The returns.

From the time the sheaves of wheat are tumbled into the wagon until the flour reaches the hands of the cook, no hand touches the wheat that passes through the great Minneapolis mills. When the box-wagons reach the elevator the loosing of a bolt dumps the grain into the bin, where it remains until the pulling of a lever lets it into the cars. Every pound of it is weighed and accounted for, and entered upon the books, so as to show the exact product of each division of the farm. After the rush of the threshing is over the farmer studies these books carefully to see what his land is doing, and makes his plans for the next year, so as to rest or strengthen those divisions which are failing. It costs about $1.50 an acre to thresh the grain and put it into the elevator. This sum, added to the estimated cost of the other processes mentioned above, makes the total cost of growing an acre of grain about $3.80. This includes the cost of labour, seed and wear and tear of machinery, but does not include the interest on land or plant. The taxes on land will average 25 cents an acre. The farmers estimate that the other improvements, the waterworks, elevators, insurance, horse feed, &c., will make this up to $6 an acre. The best of these farms will yield 20 bushels to the acre. This makes the wheat cost 30 cents a bushel. During the last five years the average farm-selling price of wheat in the North-West has been 58 cents. An acre thus produces $11.60, making a gross profit of $5.60. Still to be provided for is the interest on the operating expenses for eighteen months, which will, at 8%, be 48 cents per acre. Interest on the capital in land, improvements and machinery, at $30 per acre, make $1.80 more, or a total interest charge of $2.28. When this is deducted from the gross profits of $5.60 prices found above, we have a net profit of $3.32 an acre, not an exorbitant one by any means. This is about 8% on the capital invested in the land, plant and operating expenses. But we have described the conditions on one of the best bonanza farms. The average yield per acre in this region is not over 18 bushels, and the average expenses would be higher than those given.

Marketing.

Every bonanza farmer's office is connected by wire with the markets at Minneapolis, Chicago and Buffalo. Quotations arrive hourly in the selling season, and the superintendent keeps in close touch with his agents in the wheat-pits of these and other cities. When the instrument tells him of a good price, his agent is instructed to sell immediately. The farmer on the upper waters of the Red river (of the North) is kept fully informed as to the drought in India, the hot winds in the Argentine and the floods of the Danube. Any occurrences in these distant parts of the world are known to him in a surprisingly short time. The world's great wheat fields almost lie within his sight, so well does he know the conditions that prevail in them. Ten days are allowed for delivery, so that he can usually ship the wheat after it is sold. In the early days of wheat-farming the bonanza farmer often speculated, but experience has taught him that he had better leave this to the men in the cities, and content himself with the profit from the business under his eye. The great elevator centres are in Duluth, St Paul, Minneapolis, Chicago and Buffalo. These elevators have a storage capacity of from 100,000 to 2,500,000 bushels. The new ones are built of steel, operated by steam or electricity, protected from fire by pneumatic water-pipes, and have complete machinery for drying and scouring the wheat whenever it is necessary. The elevators are provided with long spouts containing movable buckets, which can be lowered into the hold of a grain-laden vessel. The wheat is shovelled into the pathway of the huge steam shovels, which draw it up to the ends of these spouts, where the buckets seize it, and carry it upwards into the elevator, and distribute it among the various bins according to grade. A cargo of 200,000 bushels can thus be unloaded in two hours, while spouts on the other side of the elevator reload it into cars, five to ten at a time, filling a car in from five to ten minutes, or the largest canal boat in an hour. The entire work of unloading, storing and reloading adds only one cent to the price of a bushel of wheat.

Inspecting and grading.

The great wheat-growing states like Minnesota have established systems of inspecting and grading wheat under state supervision. In Minnesota the system is carried out by the Railroad and Warehouse Commission (1885), which fixes and defines the different grades of wheat and directs the work. At present there are 18 grades recognized in this state. The first is described as "No. 1, hard spring wheat, sound, bright and well cleaned, composed mainly of hard 'Scotch-Fife,' weighing not less than 58lb to the measured bushel." The second grade is known as "No. 1, northern spring wheat, sound, and well cleaned, composed of the hard and soft varieties of spring wheat." So the varieties run—"No. 2, northern"; "No. 3, northern," &c.—down to the 18th, which is "no grade." The official inspectors examine, grade and sample the wheat in the cars in which it is received at the great markets or elevators. The cars are sealed at the point of original shipment. The first thing, therefore, is to examine the seals to see that they are unbroken. The inspector then samples and examines the wheat, and enters the grade upon a blank opposite the number and letters of the car. His tag and sample go to the wheat exchange or chamber of commerce, where they are exposed in small tin pans, and form the basis of the trading. A few years ago the wheat received from the north-west was very clean indeed, but since the new land has all been cultivated the fields are growing more weedy, with the result that the wheat brought in is becoming mixed with oats and seeds of weeds, requiring more careful separating and inspection. After the inspector has finished his work the cars are resealed with the state seal, and await orders of the purchaser. The delay will not ordinarily be more than one day. The commission keeps complete records and samples of each car until the wheat has passed entirely out of the market. When disputes occur as to the grade they can thus be instantly settled. If the grade is changed after a second examination the state pays the expense of the inspection; if not, it is paid by the agent who raises the objection. Only about 5% of the samples are ever reinspected, and in less than 2% of these is the grade changed. The commission collects the small fee of 20 cents a car for its services as inspector, and later weighs all the wheat as it is distributed into the elevators. This small charge pays all the expenses.

Transportation.

The transportation of the wheat from the fields of the north-west to the seaport is a business of tremendous magnitude. Most of this wheat goes by way of the lakes through the Sault Sainte Marie canal to Buffalo, where it is shipped by rail or inland canal to New York, Philadelphia or Baltimore. Duluth, on Lake Superior, is, surprising to say, the second port in the United States in point of tonnage. The Sault Sainte Marie canal passes two and a half times as much tonnage during the eight months it is open as the Suez canal passes in the entire year. The cheapest transportation in the world is found upon these lakes, the rate being only three-fourths of a mill per ton of wheat per mile. The greater lake vessels, called "Whalebacks," carry cargoes up to 250,000 bushels, a bulk difficult to conceive. 700 bushels is a car-load. At that rate the cargo of 250,000 bushels will fill 360 American cars, or 9 trains of 40 cars each. At 20 bushels to the acre, this single cargo would represent the yield of two and a half farms of 5000 acres each, like that described above, with every acre in cultivation. The railways of the north-west have a monopoly of the business of hauling wheat, with the result that it costs 20 cents to ship a bushel of wheat from the Dakota field to Duluth, which is as much as it costs to forward it from Duluth to Liverpool. The bushel of wheat, or an equivalent amount of flour, can be shipped from Minneapolis or Duluth to almost any point in western Europe for from 20 to 25 cents.

Prospect of wheat production.

What are the prospects of wheat production in the United States? In his presidential address before the British Association for the Advancement of Science (1900), Sir William Crookes painted a rather dark picture of the future of the world's wheat production. Among other things he said, "It is almost certain that within a generation the ever-increasing population of the United States will consume all the wheat grown within its borders, and will be driven to import like ourselves." Americans think that this statement is altogether too pessimistic. Not sufficient account had been taken of the uncultivated land in farms, and of the possibilities of improving the yield, and still further cheapening the product. It is probable that the United States will by 1933 have a population of 133,000,000. This population would require a wheat crop of 700,000,000 bushels for its own use alone. Limiting attention to the great cereal-producing region described above, let us see what the prospects are for increasing the acreage and the yield. The fact that these States contain, according to the last census, over 100,000,000 acres of unimproved land, already enclosed in farms, suggests at once the great possibilities in wheat. But all this land is not immediately available for cultivation. The availableness of the unimproved land in these states is chiefly a question of population and physical features. In states like New York and Pennsylvania, which are much broken up by hills and mountains, and have already a large population, it is probable that the land available for wheat cultivation is now nearly all taken up, although they still have 30% of unimproved land in farms. In the great states of Michigan, Missouri, Wisconsin, Minnesota and the Dakotas there is still 40 to 50% of unimproved land in farms. There are few mountains and hills in these States, and there is still room in them for a large population. It is evident that in states like these wheat culture is destined to increase greatly. Twelve states, in this vast cereal-growing region—Ohio, Indiana, Illinois, Missouri, Kansas, Nebraska, Michigan, Iowa, Wisconsin, Minnesota, North and South Dakota—still have from 20 to 40% of unimproved land in farms. The total area of these states is nearly four times that of France. Their soil is primarily as fertile as hers. If we put the population of France at 40,000,000, the states in question could, at the same ratio, support a population of 140,000,000. France produced during the five years ending 1897 eight bushels of wheat per caput. At eight bushels per caput, the people in these twelve states alone could produce 1,120,000,000 bushels, or 420,000,000 bushels more than will be required by the population of 133,000,000 expected by 1933. This is a great manufacturing as well as a great agricultural region, and it is here, therefore, that a large part of this increase in population will be found.

It is evident that there is great room for improvement also in the matter of yield per acre. The average yield of wheat per acre has increased slowly in recent years. So long as there was so much virgin land to be brought under cultivation, it is surprising that it has increased at all, since the tendency everywhere is to "skin" the rich, new lands first. Mr B. W. Snow, formerly one of the statisticians of the United States Department of Agriculture, has shown (*The Forum*, vol. xxviii. p. 94) that the producing capacity of the wheat lands, under favourable weather, increased steadily during the period 1880–1899. He distinguishes between the actual yield and the producing capacity, and bases his comparison upon the latter. He takes the average for each year of five years between 1880 and 1899, and shows that the producing capacity per acre increased 0.5 bushel between the first and the second period, 1.3 bushels between the second and the third, and 1.4 bushels between the third and the fourth. In the period 1880–1884, inclusive, the maximum capacity was a little less than 14 bushels, while in the period 1895–1899 the maximum capacity exceeded slightly 17 bushels—an increase of 3.2 bushels per acre, or 23%, in less than twenty years. He says, "To account for this increase in the potential yield in our wheat-fields many factors must be taken into consideration. Among these may be mentioned improved methods of ploughing, tile drainage, use of the press drill, which results in greater immunity against winter killing, crop rotation, and, to a very small extent, fertilization. An important factor to be mentioned in this connexion is the change in the distribution of the acreage under wheat, consequent upon falling prices. A decline in the price of wheat rendered its production unprofitable where the rate of yield was small. Gradually these lands were passed over to crops better suited to them; while at the same time the wheat acreage was increased in districts having a better rate of yield." He predicts that "the increase in the acre yields in this country has only begun. All that has been accomplished during the period under review may be attributed to improvements in implements for preparing the soil and planting the seed. Wheat is grown year after year without rotation—except in a few cases—on a third or more of our wheat acreage; not one acre in fifty is directly fertilized for the crop, and only a minimum amount of attention is given to the betterment of seed stock. If, in the face of what cannot be considered less than careless and inefficient agricultural practice, we have increased the wheat capacity of our land by 3.2 bushels per acre in so short a time, what may we not expect in the way of large acre yields before we experience the hardships of a true wheat famine?"

Diseases.—Wheat, like other cereals, is liable to epidemic diseases caused by parasitic organisms which prey on the plant tissues. Of these the rust, smut and bunt fungi are by far the most common and the most destructive. Rust alone is said to cause an annual loss of wheat in India amounting to from 4,000,000 to 20,000,000 rupees. We have no similar calculation of loss for Great Britain, where wheat is not so much grown, but it is well known that there is a continual, serious depreciation of value in the crops due to parasitic fungi.

The rust fungus, *Puccinia graminis*, is a Uredine belonging to the heteroecious group, that is, one that passes from one host to another at different stages of its life-history. In spring, while the wheat plants are still green and immature, the rust makes its appearance as orange-red spots or streaks on the stalks and leaves. These coloured spots are due to the presence of a sorus or layer of countless numbers of minute brown spores, the *uredospores* of the summer fruiting form. The fine thread-like filaments composing the mycelium of the fungus are embedded in the tissue underneath and around the uredo-sorus, and draw from the host the nourishment required. The spores, when mature, are easily detached, and are carried by insects or by the wind to other wheat-plants. If infection takes place, other sori are formed in ten days or a fortnight under favourable conditions of moisture and warmth.

Towards the end of the summer the uredospores are replaced by the winter resting-spores, called *teleutospores*, which are larger, thicker-walled and darker in colour. These teleutospores remain inactive on the straw until spring, when they germinate in manure heaps or on moist ground and produce minute sporidia, which are conveyed by air currents to the alternate host, in this case a barberry. In due time the fungus, known as *Aecidium Berberidis*, appears on the barberry leaves in the form of small cluster-cups on *aecidia*, each of which is filled with chains of orange-coloured *aecidiospores*. Infection of the leaves of the young wheat plants follows on the scattering of the aecidiospores a sorus of the rusty uredospores is produced, and the life-cycle is complete.

Though this is the normal and complete development of *Puccinia graminis*, it is not invariably followed. In Australia, for instance, the berberry is an imported plant and of rare occurrence, yet rust is very abundant. Teleutospores of heteroecious rusts never reinfect the host on which they are produced, so that in many cases the uredospores probably survive the winter in Europe as well as in Australia and give rise to the rust of the following year. Wind dispersal of the spores would account for mysterious appearances of the disease, in some years almost every straw in a wheat-field being affected, while in other years scarcely one is attacked. Rust disease does not directly affect the grains, but both quantity and quality are impaired by the exhausted condition of the wheat plants. No cure is possible, but as winter wheat suffers less than spring wheat, early sowing is recommended. Fungus spores will not germinate without moisture, and attention to drainage helps to keep down this and other fungus pests. It has also been observed that too heavy nitrogenous manuring stimulates and prolongs the growing period of the wheat; flowering is retarded, and thus there is a greater opportunity for infection to take place. Wheat growing on an old manure heap is nearly always badly diseased. Much attention has been paid recently to the cultivation of varieties of wheat that are immune to rust attacks, and care should be taken to select strains that have been proved able to resist the disease.

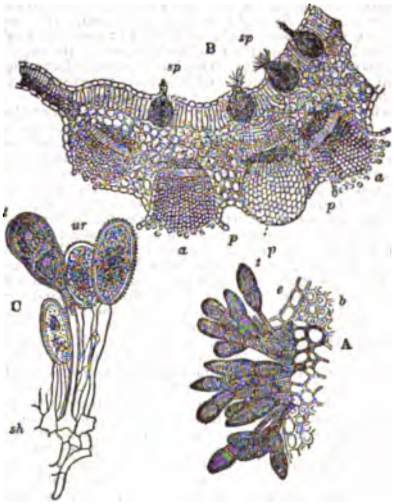
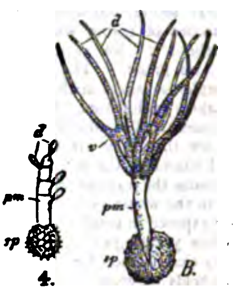


FIG. 4.—*Puccinia graminis.*

A, Mass of teleutospores (*t*) on a leaf of couch-grass.
e, Epidermis ruptured.
b, Sub-epidermal fibres. (After De Bary.)
B, Part of vertical section through leaf of *Berberis vulgaris*, with *a*, aecidium fruits, *p*, peridium, and *sp*, spermogonia. (After Sachs.)
C, Mass of uredospores (*ur*) with one teleutospore (*t*)
sh, Sub-hymenial hyphae. (After De Bary)

The other two parasites, smut and bunt, affect principally the grain. Smut of wheat, *Ustilago Tritici*, infects the host at the time of flowering. The fungus-spores, from some diseased plant, alight on the stigma of the flower, and germinate there along with the pollen-grains. The developing seed thus encloses fungal hyphae, which remain dormant within the seed and in spring develop symbiotically with the growth of the wheat pla[illegible] apparent injury until the time of fruiting is reach[illegible] kes complete possession [illegible] k-coloured spores.

other flowering wheat plants. It is impossible to detect the first infection or to cleanse the seed; the only remedy is to procure seed from a smut-free source, and to prevent further spread of the disease by gathering all smutted heads before the spores have matured or dispersed.



From Vine's *Students' Text-Book of Botany*, by permission of Swan, Sonnenschein & Co.

FIG. 5.—Germinating Resting-Gonidia: A of *Ustilago receptaculorum*; B of *Tilletia Caries*.
sp, The gonidium.
pm, The promycelium.
d, The sporidia: in B the sporidia have coalesced in pairs at *v*.

Tilletia Tritici, bunt or stinking smut of wheat, is so-called because the bunted grain has a disagreeable odour of stale herrings. Bread made from bunted flour is dark in colour, and both unpalatable and unwholesome. The spores of the fungus remain in the soil or in manure-heaps until spring, when they germinate and attack the first green leaves of the host plant. The after development is similar to that of smut, and the seed grain becomes a mere mass of fungus spores. Much can be done in this case to clean the seed before sowing by immersing it in hot water or in some solution that will kill the spores without injuring the grain.

Other parasitic fungi of less economic importance occasionally do considerable damage. *Erysiphe graminis*, a mildew of grasses, has caused great loss in various countries, *Dilophia graminis* sometimes causes deformities of the leaves and inflorescence; another somewhat similar fungus, *Ophiobolus graminis*, attacks the leaves and stalks near the ground, completely destroying the plants.

Helminthosporium gramineum, a disease of barley, has also been recorded as growing on wheat; it forms long narrow dark-brown streaks on the leaves, which wither and die. The lower leaves are usually the only ones attacked, and the yield of grain has not been seriously affected.

WHEATEAR, a bird's name, perhaps of doubtful meaning,[1] though J. Taylor, the "water poet" (d. 1654), in whose writings it seems first to occur, and F. Willughby, explain it (in the words of J. Ray, the latter's translator) as given "because [in] the time of wheat harvest they wax very fat." The wheatear, *Saxicola oenanthe*, is one of the earliest migrants of its kind to return to its home, often reaching England at the end of February and almost always by the middle of March. The cock bird, with his bluish grey back and light buff breast, set off by black ear-coverts, wings, and part of the tail, is rendered still more conspicuous by his white rump as he takes short flights in front of those who disturb him, while his sprightly actions and gay song harmonize so well with his delicately-tinted plumage as to render him a welcome object to all who delight in free and open country. When alarmed both sexes have a sharp monosyllabic note that sounds like *chat*, and this has not only entered into some of the local names of this species and of its allies, but has caused all to be frequently spoken of as "chats." The nest is constantly placed under ground, the bird takes advantage of the hole of some other animal, or the shelter of a clod in a fallow-field or a recess beneath a rock. A large amount of soft material is therein collected, and on them from 5 to 8 pale blue eggs are laid.

The wheatear has a very wide range throughout the Old World, extending in summer far within the Arctic Circle, from Norway to the Lena and Yana valleys, while it winters in Africa beyond the Equator and in India. But it also breeds regularly in Greenland and some parts of North America. Its reaching the former and the eastern coast of the latter, as well as the Bermudas, may possibly be explained by the drifting of individuals from Iceland; but far more interesting is the fact of its continued seasonal appearance in Alaska without ever showing itself in British Columbia or California, and without ever having been observed in Kamchatka, Japan or China, though it is a summer resident in the Tchuktchi peninsula. Hence it would seem as though its annual flights across Bering's Strait must be in connexion with a migratory movement that passes to the north and west of the Stanovoi range of mountains.

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[1] The vulgar supposition of its being an euphemism of an Anglo-Saxon name (cf. Bennett's ed. of White's *Nat. Hist. Selborne*, p. 69, note) must be rejected until evidence that such a name ever existed be adduced. It is true that "whittaile" (cf. Dutch *Witstaart* and French *Culblanc*) is given by Cotgrave in 1611; but the older names, according to Turner, in 1544, of "clotburd" (=clod-bird) and smatch (=chat) do not favour the usual derivation. "Fallow-chat" is another old name still locally in use, as is "coney-chuck."

Many species more or less allied to the wheatear have been described. Some eight are included in the European fauna; but the majority are inhabitants of Africa. Several of them are birds of the desert; and here it may be remarked that, while most of these exhibit the sand-coloured tints so commonly found in animals of like habitat, a few assume a black plumage, which, as explained by H. B. Tristram, is equally protective, since it assimilates them to the deep shadows cast by projecting stones and other inequalities of the surface.

Amongst genera closely allied to *Saxicola* are *Pratincola*, which comprises among others two well-known British birds, the stonechat and whinchat, *P. rubicola* and *P. rubetra*, the latter a summer-migrant, while the former is resident as a species, and the black head, ruddy breast, and white collar and wing-spot of the cock render him a conspicuous object on almost every furze-grown common or heath in the British Islands, as he sits on a projecting twig or flits from bush to bush. This bird has a wide range in Europe, and several other species, more or less resembling it, inhabit South Africa, Madagascar, Réunion and Asia, from some of the islands of the Indian Archipelago to Japan. The whinchat, on the other hand, much more affects enclosed lands, and with a wide range has no very near ally. The wheatear and its allies belong to the sub-family *Turdinae* of the thrushes (*q.v.*). (A. N.)

WHEATLEY, FRANCIS (1747–1801), English portrait and landscape painter, was born in 1747 at Wild Court, Covent Garden, London. He studied at Shipley's drawing-school and the Royal Academy, and won several prizes from the Society of Arts. He assisted in the decoration of Vauxhall, and aided Mortimer in painting a ceiling for Lord Melbourne at Brocket Hall (Hertfordshire). In youth his life was irregular and dissipated. He eloped to Ireland with the wife of Gresse, a brother artist, and established himself in Dublin as a portrait-painter, executing, among other works, an interior of the Irish House of Commons. His scene from the London Riots of 1780 was admirably engraved by Heath. He painted several subjects for Boydell's *Shakespeare Gallery*, designed illustrations to Bell's edition of the poets, and practised to some small extent as an etcher and mezzotint-engraver. It is, however, as a painter, in both oil and water-colour, of landscapes and rustic subjects that Wheatley is best remembered. He was elected an associate of the Royal Academy in 1790, and an academician in the following year. He died on the 28th of June 1801. His wife, afterwards Mrs Pope, was known as a painter of flowers and portraits.

WHEATON, HENRY (1785–1848), American lawyer and diplomatist, was born at Providence, Rhode Island, on the 27th of November 1785. He graduated at Brown University in 1802, was admitted to the bar in 1805, and, after two years' study abroad, practised law at Providence (1807–1812) and at New York City (1812–1827). He was a justice of the Marine Court of the city of New York from 1815 to 1819, and reporter of the United States Supreme Court from 1816 to 1827, aiding in 1825 in the revision of the laws of New York. His diplomatic career began in 1827, with an appointment to Denmark as chargé d'affaires, followed by that of minister to Prussia, 1837 to 1846. During this period he had published a *Digest of the Law of Maritime Captures* (1815); twelve volumes of *Supreme Court Reports*, and a *Digest*; a great number of historical articles, and some collected works; *Elements of International Law* (1836), his most important work, of which a 6th edition with memoir was prepared by W. B. Lawrence and an eighth by R. H. Dana (*q.v.*); *Histoire du Progrès du Droit des Gens en Europe*, written in 1838 for a prize offered by the French Academy of Moral and Political Science, and translated in 1845 by William B. Lawrence as *A History of the Law of Nations in Europe and America*; and the *Right of Visitation and Search* (1842). The *History* took rank at once as one of the leading works on the subject of which it treats. Wheaton's general theory is that international law consists of "those rules of conduct which reason deduces, as consonant to justice, from the nature of the society existing among independent nations, with such definitions and modifications as may be established by general consent." In 1846 Wheaton was requested to resign by the new president, Polk, who needed his place for another appointment. The request provoked general condemnation; but Wheaton resigned and returned to the United States. He was called at once to the Harvard Law School as lecturer on international law; but he died at Dorchester, Massachusetts, on the 11th of March 1848.

WHEATSTONE, SIR CHARLES (1802–1875), English physicist and the practical founder of modern telegraphy, was born at Gloucester in February 1802, his father being a music-seller in that city. In 1806 the family removed to London. Wheatstone's education was carried on in several private schools, at which he appears to have displayed no remarkable attainments, being mainly characterized by a morbid shyness and sensitiveness that prevented him from making friends. About 1816 he was sent to his uncle, a musical instrument maker in the Strand, to learn the trade; but with his father's countenance he spent more time in reading books of all kinds than at work. For some years he continued making experiments in acoustics, following out his own ideas and devising many beautiful and ingenious arrangements. Of these the "acoucryptophone" was one of the most elegant—a light box, shaped like an ancient lyre and suspended by a metallic wire from a piano in the room above. When the instrument was played, the vibrations were transmitted silently, and became audible in the lyre, which thus appeared to play of itself. On the death of his uncle in 1823 Wheatstone and his brother succeeded to the business; but he never seems to have taken a very active part in it, and he virtually retired after six years, devoting himself to experimental research, at first chiefly with regard to sound. Although he occasionally read a paper to scientific societies when a young man, he never could become a lecturer on account of his shyness. Hence many of his investigations were first described by Faraday in his Friday evening discourses at the Royal Institution. By 1834 his originality and resource in experiment were fully recognized, and he was appointed professor of experimental philosophy at King's College, London, in that year. This appointment was inaugurated by two events,—a course of eight lectures on sound, which proved no success and was not repeated, and the determination by means of a revolving mirror of the speed of electric discharge in conductors, a piece of work leading to enormously important results. The great velocity of electrical transmission suggested the possibility of utilizing it for sending messages; and, after many experiments and the practical advice and business-like co-operation of William Fothergill Cooke (1806–1879), a patent for an electric telegraph was taken out in their joint names in 1837. Wheatstone's early training in making musical instruments now bore rich fruit in the continuous designing of new instruments and pieces of mechanism. His life was uneventful except in so far as the variety of his work lent it colour. He became a fellow of the Royal Society in 1837; in 1847 he married; and in 1868, after the completion of his masterpiece, the automatic telegraph, he was knighted. While in Paris perfecting a receiving instrument for submarine cables, Sir Charles Wheatstone caught cold, and died on the 19th of October 1875.

Wheatstone's physical investigations are described in more than thirty-six papers in various scientific journals, the more important being in the *Philosophical Transactions*, the *Proceedings of the Royal Society*, the *Comptes rendus* and the British Association *Reports*. They naturally divide themselves into researches on sound, light and electricity, but extend into other branches of physics as well. But his best work by far was in the invention of complicated and delicate mechanism for various purposes, in the construction of which he employed a staff of workmen trained to the highest degree of excellence. For his insight into mechanism and his power over it he was unequalled, except perhaps by Charles Babbage. A cryptographic machine, which changed the cipher automatically and printed a message, entirely unintelligible until translated by a duplicate instrument, was one of the most perfect examples of this. Cryptography had a great fascination for Wheatstone; he studied it deeply at one time, and deciphered many of the MSS. in the British Museum which had defied all other interpreters. In acoustics his principal work was a research on the transmission of sound through solids, the explanation of Chladni's figures of vibrating solids, various investigations of the principles of acoustics and the mechanism of hearing, and the invention of new musical instruments, *e.g.* the concertina (*q.v.*).

The kaleidophone, intended to present visibly the movements of a sonorous body, consisted of a vibrating wire or rod carrying a silvered bead reflecting a point of light, the motions of which, by persistence of the successive images on the retina, were thus represented in curves of light. In light there are a series of papers on the eye, on the physiology of vision, on binocular vision, including the invention of one of the popular scientific instruments, the stereoscope (*q.v.*), and on colour. The polar clock, devised for use in place of a sun-dial, applies the fact that the plane of polarization of sky light is always 90° from the position of the sun; hence by measuring the azimuthal angle of the plane, even when the sun is below the horizon, correct apparent solar time may be obtained. In 1835, in a paper on "The Prismatic Decomposition of Electrical Light," he proved that sparks from different metals give distinctive spectra, which afforded a ready means of discriminating between them. But it is by his electrical work that Wheatstone is best remembered. He not only guided the growth of scientific telegraphy on land wires, but made the earliest experiments with submarine cables, foreseeing the practicability of this means of communication as early as 1840. He devised the "A, B, C" telegraph instrument, the automatic transmitter, by which messages may be sent at the rate of 500 words a minute, printing telegraph receivers of various forms, electrical chronoscopes, and many forms of electrical recording apparatus,—amongst others two sets of registering meteorological instruments, of which the earlier, described in 1842, was afterwards developed by Father A. Secchi and F. van Rysselberghe, but the later, put forward in 1867, included metallic thermometers and was less successful.

Wheatstone's *Scientific Papers* were collected and published by the Physical Society of London in 1879. Biographical notices of him will be found in his *Proc. Inst. C.E.*, xlvii. 283, and *Proc. Roy. Soc.*, xxiv. xvi. For his connexion with the growth of telegraphy, see *Nature*, xi. 510, and xii. 30 sq.

WHEATSTONE'S BRIDGE, an electrical instrument which consists of six conductors, joining four points, of such a character that when an electromotive force is applied in one branch the absence of a current in another branch (called the conjugate branch) establishes a relation between the resistance of the four others by which we can determine the value of the resistance in one of these, that of the others being assumed to be known. This arrangement was not invented by Sir Charles Wheatstone—although it bears his name and is commonly attributed to him, and was employed by him in some of his electrical researches—but by S. H. Christie, in 1833.[1]

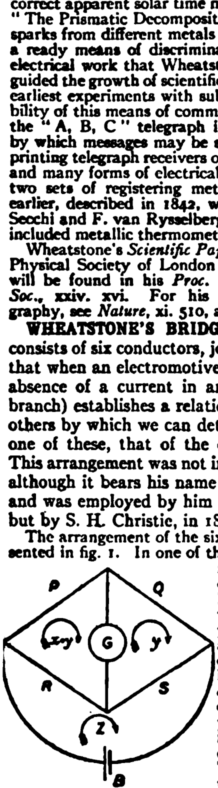

FIG. 1.

The arrangement of the six conductors is diagrammatically represented in fig. 1. In one of these branches is placed a battery B and in another a galvanometer G; the four other resistances are denoted by the letters P, Q, R, S. The circuits in which the battery and galvanometer are placed are called conjugate circuits, and the circuits P, Q, R, and S are called the *arms* of the bridge, the branches P and Q being called the *ratio arms* and S the *measuring arm*. The circuit in which the galvanometer is placed is the *bridge circuit*. Keys are inserted in the battery and galvanometer circuits to open or close them at pleasure. The resistance forming the four arms of the bridge can be so adjusted that if these resistances have values denoted by P, Q, R, and S, then when P : Q :: R : S, the current in the galvanometer circuit will be zero when an electromotive force is applied in the battery circuit.

To prove this statement, let the conductors P, Q, R, S., be arranged in a lozenge shape, as in fig. 1. Let E be the electromotive force in the battery circuit, and let $(x+y)$ be the current through the resistance P, y the current through the resistance Q and z that through B. Then by G. R. Kirchhoff's laws (see ELECTROKINETICS) we have the current equations,

$$\begin{aligned}(P+G+R)\,(x+y)-Gy-Rz&=O\\(Q+G+S)\,y-G\,(x+y)-Sz&=O\\(R+S+B)\,z-R\,(x+y)-Sy&=E\end{aligned}$$

Rearranging the terms and solving for x (the current through the galvanometer), we obtain

$$x=(PS-RQ)E/\Delta,$$

where Δ is a complex expression, involving the resistances P, Q, R, S, G, and B, which does not concern us. Hence when $x=o$, P : Q = R : S and the value of R can be determined in terms of P, Q and S.

In the practical instrument the three arms of the [illegible] and S are generally composed of coils of wire [illegible] whilst R is the resistance the value of which [illegible] This last resistance is connected to the other [illegible] of a galvanometer and a battery connected up as shown in the diagram. The operation of determining the value of the resistance R therefore consists in altering the ratio of the three resistances P, Q, and S, until the galvanometer indicates no current through it when the battery circuit is completed or closed by the key. In one form of Wheatstone's Bridge, known as the series pattern plug-resistance bridge, or Post Office pattern, the two ratio arms, P and Q, each consist of a series of coils of wire, viz. two 1-ohm coils, two 10-ohm coils, two 100-ohm coils and two 1000-ohm coils, which are joined up in series in the order, 1000, 100, 10, 1; 1, 10, 100, 1000, the junctions between each pair being connected to brass blocks, a series of which are mounted upon an ebonite slab that forms the lid of the box. The blocks are bored out with a hole partly in one block and partly in the other (see fig. 2) so that they can be connected by accurately fitting conical plugs. When the blocks are interconnected by the plugs all the coils are short-circuited; but if the plug or plugs are taken out, then a current flowing from one end of the series to the other is compelled to pass through the corresponding coils. In series with this set of coils is another set, S, which forms a measuring arm, the resistances of which are generally 1, 2, 3, 4, 10, 20, 30, 40, 100, 200, 300, 400, 1000, 2000, 3000, 4000 ohms. The junction between each pair of coils is connected as above described to a block, the blocks being interconnected by plugs all of which are made interchangeable.

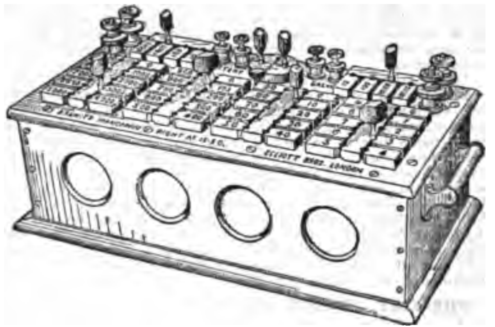

FIG. 2.—Standard Wheatstone's Bridge.

Another form of Wheatstone's Bridge, shown in fig. 2, is known as the *dial* pattern. Ten brass blocks are arranged parallel to or around another brass block, and by means of a plug which fits into holes bored partly out of the common block and partly out of the surrounding blocks, any one of the latter can be connected with the common one. A series of nine equal resistances, say 1-ohm coils, or nine 100-ohm coils, are joined in between these circumferential blocks (fig. 3). It will be seen that if a plug is placed so as to connect any outside block with the central block, the current can only pass from the [illegible] central block by passing through a certain [illegible] coils. Hence according to the [illegible] made anything [illegible] or four of the [illegible] brass blocks [illegible]d in the box [illegible] block of one [illegible] marked O. This [illegible], the ratio arms [illegible] described. A bridge [illegible] tion or removal of a

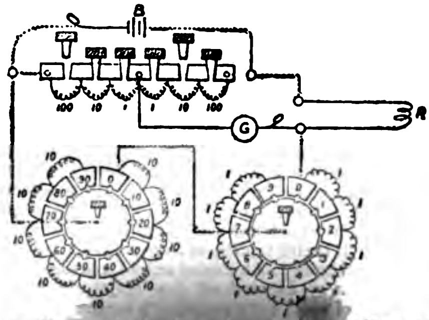

FIG. 3.—Diagram showing Connexions of a Dial and Plug pattern, Wheatstone's Bridge.

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[1] See Wheatstone's *Scientific* [illegible]

plug in the measuring arm does not tend to tighten or loosen all the rest of the plugs; moreover, there are fewer plugs to manipulate, and each plug is occupied. The resistance coils themselves are generally wound on brass or copper bobbins, with silk-covered manganin wire, which should first be aged by heating for about ten hours to a temperature of 140° C., to remove the slight tendency to change in resistivity which would otherwise present itself.

For the accurate comparison of resistance coils it is usual to make use of the Matthiessen and Hockin bridge, and to employ the method of differential comparison due to G. Carey Foster.[1] On a board is stretched a uniform metallic wire *a b*, generally of platinum silver. The ends of this wire are connected to copper blocks, which themselves are connected to a series of four resistance coils, A, B, and P, Q (fig. 4). A and B are the coils to be compared, P and Q are two other coils of convenient value. Over the stretched wire moves a contact maker S, which makes contact with it at any desired point, the position of which can be ascertained by means of an underlying scale. A battery C of two or three cells is connected to the extremities of the slide wire, and the sensitive galvanometer G is connected in between the contact-maker and the junction between the coils P and Q. The observer begins by moving the slider until the galvanometer shows no current. The position of the coils A and B is then interchanged, and a fresh balance in position on the bridge is obtained. It is then easily shown that the difference between the resistance of the coils A and B is equal to the resistance of the length of the slide wire intercepted between the two places at which the balance was found in the two observations.

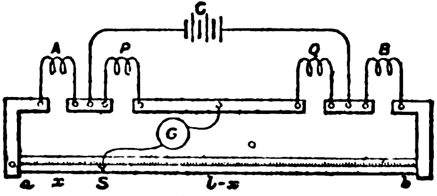

FIG. 4.

Let the balance be supposed to be attained, and let x be the position of the slider on the wire, so that x and $l-x$ are the two sections of the slide wire, then the relation between the resistance is

$$(A+x) / (B+l-x)=P/Q.$$

Next, let the position of A and B be interchanged, and the slide-wire reading be x'; then

$$(B+x') / (A+l-x')=P/Q.$$

Hence it follows that $A-B=x'-x$, or the difference of the resistances of the coils A and B is equal to the resistance of that length of the slide wire between the two points where balance is obtained.

Various plans have been suggested for effecting the rapid interchange of the two coils A and B; one of the most convenient was designed by J. A. Fleming in 1880, and has been since used by the British Association Committee on Electrical Units for making comparison between standard coils with great accuracy (see *Phil. Mag.*, 1880, and *Proc. Phys. Soc.*, 1879). In all very exact resistance [illegible]ents the chief difficulty, however, is not to determine the [illegible] of a coil, but to determine the temperature of the coil at [illegible]hen the resistance measurement is made. The difficulty is caused by the fact that the coil is heated by the current used to measure its resistance, which thus alters in value. In accurate comparisons, therefore, it is necessary that the coils to be compared should be immersed in melting ice, and that sufficient time should be allowed to elapse between the measurements for the heat generated in the coil to be removed.

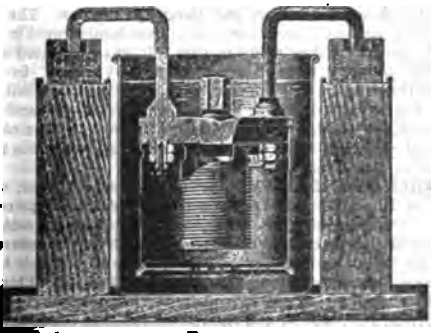

FIG. 5.

The standard resistance coil employed as a means of comparison by which to regulate and check other coils consists of a wire, generally of manganin or platinum silver, insulated with silk and wound on a brass cylinder (fig. 5). This is soldered to two thick terminal rods of copper, and the coil is enclosed in a water-tight brass cylinder so that it can be placed in water, or preferably in paraffin oil, and brought to any required temperature. In the form of standard coil recommended by the Berlin Reichsanstalt the coil is immersed in an insulating oil which is kept stirred by means of a small electric motor during the time of making the measurement. The temperature of the oil can best be ascertained by means of a platinum resistance thermometer.

For the measurement of low resistances a modification of the Wheatstone's bridge devised by Lord Kelvin is employed. The Kelvin bridge consists of nine conductors joining six points, and in one practical form is known as a Kelvin and Varley slide. Modifications of the ordinary Wheatstone's bridge for very accurate measurements have been devised by H. L. Callendar and by Callendar and E. H. Griffiths (see G. M. Clark, the *Electrician*, 38, p. 747). A useful bridge method for measurement of low resistances has been given by R. T. Housman (the *Electrician*, 40, p. 300, 1897). These and numerous modifications of the Wheatstone's bridge will be found described in J. A. Fleming's *Handbook for the Electrical Laboratory and Testing-Room*, vol. i. (1903).

REFERENCES:—F. E. Smith, "On Methods of High Precision for the Comparison of Resistances," Appendix to the Report of the British Association Committee on Electrical Standards, *British Association Report* (York, 1906), or the *Electrician*, 57, p. 976 (1906); C. V. Drysdale, "Resistance Coils and Comparisons," *British Association Report* (Leicester, 1907), or the *Electrician*, 57, p. 955 (1907), and 60, p. 20 (1907); J. A. Fleming, "A Form of Resistance Balance for Comparing Standard Coils," *Phil. Mag.* (February, 1880); "A Design for a Standard of Electrical Resistance," *Phil. Mag.* (January 1889); G. Aspinall Parr, *Electrical Measuring Instruments* (1903); W. H. Price, *The Practical Measurement of Resistance*; A. Gray, *Absolute Measurements in Electricity and Magnetism* (1900); Rollo Appleyard, "The Conductometer," *Proc. Phys. Soc. London*, 19, p. 29 (1903); also *Proc. Inst. Civ. Eng.* 154 (1903); and *Proc. Phys. Soc., London*, 17, p. 685 (1901). (J. A. F.)

WHEEL (O. Eng. *hwēol*, *hwēohl*, &c., cognate with Icel. *hjól*, Dan. *hiul*, *&c.*; the Indo-European root is seen in Sanskrit *chakrā*, Gr. *κύκλος*, circle, whence "cycle"), a circular frame or solid disk revolving on an axis, of which the function is to transmit or to modify motion. For the mechanical attributes and power of the wheel and for the modification of the lever, known as the "wheel and axis," and of the mechanical powers, see MECHANICS. The most familiar type of the wheel is of course that used in every type of vehicle, but it forms an essential part of nearly every kind of mechanism or machinery. Vehicular wheels in the earliest times were circular disks either cut out of solid pieces of wood, or formed of separate planks of wood fastened together and then cut into a circular shape. Such may be still seen in use among primitive peoples to-day, especially where the tracks, if any exist, are of the roughest description, and travelling is heavy. The ordinary wheel consists of the nave (O. Eng. *nafu*, cf. Ger. *Nabe*, allied with "navel"), the central portion or hub, through which the axle passes, the spokes, the radial bars inserted in the nave and reaching to the peripheral rim, the felloe or felly (O. Eng. *felge*, Ger. *Felge*, properly that which fitted together, Teut. *felhan*, to fit together). From the monuments we see that the ancient Egyptian and Assyrian chariots had usually six spokes; the Greek and Roman wheels from four to eight. (See further CARRIAGE and CHARIOT; also TIRE; and articles on BICYCLE; TRICYCLE; and MOTOR VEHICLES.)

WHEEL, BREAKING ON THE, a form of torture and execution formerly in use, especially in France and Germany. It is said to have been first used in the latter country, where the victim was placed on a cart-wheel and his limbs stretched out along the spokes. The wheel was made to slowly revolve, and the man's bones broken with blows of an iron bar. Sometimes it was mercifully ordered that the executioner should strike the criminal on chest and stomach, blows known as *coups de grâce*, which at once ended the torture, and in France he was usually strangled after the second or third blow. A wheel was not always used

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[1] [illegible] Modified Form of Wheatstone's Bridge, and Methods of [illegible] Small Resistances," by Professor G. Carey Foster. *Proc.* [illegible] *Eng.* (1872), 1.

In some countries it was upon a frame shaped like St Andrew's Cross that the sufferer was stretched. The punishment was abolished in France at the Revolution. It was employed in Germany as late as 1827. A murderer was broken on the *row* or wheel at Edinburgh in 1604, and two of the assassins of the regent Lennox thus suffered death.

WHEELER, JOSEPH (1836–1906), American soldier, was born at Augusta, Georgia, in 1836, and entered the United States cavalry from West Point in 1859. Within two years the Civil War broke out, and Wheeler, as a Southerner, resigned to enter the Confederate service. In a short time he became colonel of the 19th Alabama Infantry, with which he took part in the desultory operations of 1861 in Kentucky and Tennessee. He commanded a brigade at the battle of Shiloh, but soon afterwards he returned to the cavalry arm in which he won a reputation second only to Stuart's. After the action of Perryville he was promoted brigadier-general, and in January 1863 major-general. Thenceforward throughout the campaigns of Chickamauga, Chattanooga and Atlanta he commanded the cavalry of the Confederate army in the West, and when Hood embarked upon the Tennessee expedition, he left Wheeler's cavalry to harass Sherman's army during the "March to the Sea." In the closing operations of the war, having now the rank of lieutenant-general, he commanded the cavalry of Joseph Johnston's weak army in North Carolina, and was included in its surrender. After this he became a lawyer and a cotton planter and in 1882–83 and 1885–1900 was a representative in Congress. At the outbreak of the Spanish-American War in 1898, President M'Kinley, in pursuance of the policy of welding the North and the South, commissioned two ex-Confederate generals—Wheeler and Fitzhugh Lee—as major-generals of United States volunteers, and in this capacity Wheeler was placed in command of the cavalry division of Shafter's army in Cuba. He commanded in the actions of Guasimas and San Juan, was afterwards sent to the Philippines in command of a brigade, and in 1900 was commissioned a brigadier-general in the regular army. Shortly afterwards he retired. General Wheeler died on the 25th of January 1906.

WHEELER, WILLIAM ALMON (1819–1887), vice-president of the United States from 1877 to 1881, was born at Malone, New York, on the 30th of June 1819. He studied at the university of Vermont for two years (1833–1835), and in 1845 was admitted to the bar. First as a Whig, and then, after 1856, as a Republican, he was prominent for many years in state and national politics. He was a member of the state Assembly in 1849–1850, a member and president *pro tempore* of the state Senate in 1858–1859, and a member of the national House of Representatives in 1861–1863, and again from 1869 until 1877. He was the author of the so-called "Wheeler Compromise," by which the difficulties between contending political factions in Louisiana were adjusted in 1875. Nominated for vice-president by the Republicans in 1876 on the ticket with President Hayes, he was installed in office through the decision of the Electoral Commission, and at the end of his term he retired from public life. He died at Malone on the 4th of June 1887.

WHEELING, a city and the county-seat of Ohio county, West Virginia, U.S.A., on the east bank of the Ohio river, at the mouth of Wheeling Creek, 66 m. (by rail) S.W. of Pittsburg. Pop. (1890) 34,522; (1900) 38,878, of whom 1066 were negroes, and 5461 were foreign-born, including 3106 Germans and 876 Irish; (1910, census) 41,641. Area, 3·2 sq. m. Wheeling is served by the Baltimore & Ohio, the Pennsylvania and the Wheeling & Lake Erie railways, by the belt line of the Wheeling Terminal Company and by interurban electric lines. Wheeling is the largest city in West Virginia, and commercially the most important place on the Ohio river between Pittsburg and Cincinnati. It is built on a narrow strip of bottom land, between the river and steep hills, at an elevation of about 640 ft. above tidewater. Between the mainland and Wheeling (formerly Zane's) Island, which forms a part of the city, there are a suspension-bridge, which has a span of 1010 ft., and a steel bridge, and from the island across the back river channel there are two bridges to the Ohio shore, one from the middle of the island to Bridgeport on which the Old National Road crosses the river, and the other from the northern end of the island to Martin's Ferry, Ohio. A fifth bridge connects Wheeling with Bellaire, Ohio. Wheeling has a public library, containing 23,261 volumes in 1909. Near the city is the Mount de Chantal Academy (Roman Catholic) for girls, and in Wheeling is Linsly Institute, a secondary school for boys. The principal public buildings are the Custom-House and Post-Office, the City Hall, a High School, a Y.M.C.A. building and a Scottish Rite Cathedral. In the city are a City Hospital (private, 1890) and the Wheeling Hospital (under the Sisters of St Joseph, 1853). On the National Road there is a monument to Henry Clay; and in the City Hall Square is a Soldiers' Monument. By reason of its situation on the Ohio river Wheeling is an important shipping and distributing centre, and it has various important manufacturing interests. Its factory products were valued in 1905 at $23,297,475. The chief industry is the manufacture of iron and steel, which in 1905 gave employment to more than 34% of the city's wage-earners, and yielded more than 46% of the total value of its products. The manufacture of nails, begun here in 1849, was for many years of great importance. Other products in 1905 were slaughtering and meat products, $1,812,348; malt liquors, $1,541,185; tobacco and cigars (especially stogies), $1,161,594; foundry and machine-shop products, $709,376; lumber and planing mill products, $685,861; pickles, preserves and sauces, $676,437; glass, $508,145; and pottery. Glass was first manufactured here in 1821. Coal is found in abundance in the surrounding region, and also natural gas, which is much used as fuel in the manufacture of iron, steel and glass.

The first settlement here was made in 1770 by Colonel Ebenezer Zane (1747–1811), and his brothers, Jonathan (one of the founders of Zanesville, Ohio) and Silas, who in the autumn of that year made their way to this point from their home in Virginia, and took possession of claims at the mouth of Wheeling Creek. Other settlers came soon afterward, and in 1774 a strong stockade fort was erected within the present limits of Wheeling—at the top of Main Street hill. Until 1776 this fort was called Fort Fincastle in honour of Lord Dunmore, Viscount Fincastle, governor of Virginia from 1771 to 1776. After 1776 it was called Fort Henry, in honour of Patrick Henry. During this period the Indians were hostile, and the settlers were frequently forced to take refuge in the stockade. On the 1st of September 1777 the fort was attacked by a large force of Indians and 15 of the whites were killed; during this attack, when the ammunition of the defenders had failed, Elizabeth Zane (*c.* 1759–1847), a sister of Ebenezer, brought under fire a keg of powder from a house sixty yards from the fort. In September 1782 the fort was unsuccessfully besieged for two days by a force of about 40 British regular soldiers and about 250 Indians. The town was laid out by Colonel Zane in 1793, was incorporated in 1806, and was chartered as a city in 1836. It was designated as the capital of the "restored government of Virginia" in 1861, after the secession of Virginia at the beginning of the Civil War, and was the capital of West Virginia from 1863 to 1869, and again from 1875 until May 1885. The name "Wheeling" is a corruption of an Indian word, of uncertain meaning, sometimes translated as "the place of the head."

WHETHAMSTEDE, JOHN (d. 1465), English abbot, was a son of Hugh Bostock, and was born at Wheathampstead in Hertfordshire, owing his name, the Latin form of which is *Frumentarius*, to this circumstance. In early life he entered St Albans Abbey and in 1420 he was chosen abbot of this house. In 1423 he attended a council at Pavia, but in England his time was mainly occupied with lawsuits, several of which he carried on to defend the property and enforce the rights of the abbey. In 1440 he resigned his post, but in 1451, on the death of his successor, John Stoke, he became abbot for the second time. He died on the 20th of January 1465, and his [illegible] seen in the abbey church. [illegible] successful abbot. He greatly [illegible] Albans, which [illegible] to the [illegible]

College, Oxford, with which he was connected. He was a friend of Duke Humphrey of Gloucester, whom he helped to gather together his famous collection of books, and was himself a writer, his works including *Granarium de viris illustribus*; *Palearium poëtarum*; and *Super Valerium in Augustinum de Anchona*.

Whethamstede's *Chronicle*, or the *Registrum abbatiae Johannis Whethamstede*, is a register compiled soon after the abbot's death, which tells the events of his second abbacy. It has been edited by H. T. Riley, and is in vol. i. of the *Registra quorundam abbatum monasterii S. Albani* (London, 1872). The events of his first abbacy are narrated in the *Annales monasterii S. Albani* of John Amundesham, also edited by H. T. Riley (London, 1870–1871).

WHETSTONE, GEORGE (1544?–1587?), English dramatist and author, was the third son of Robert Whetstone (d. 1557). A member of a wealthy family that owned the manor of Walcot at Bernack, near Stamford, he appears to have inherited a small patrimony which he speedily dissipated, and he complains bitterly of the failure of a lawsuit to recover an inheritance of which he had been unjustly deprived. In 1572 he joined an English regiment on active service in the Low Countries, where he met George Gascoigne and Thomas Churchyard. Gascoigne was his guest near Stamford when he died in 1577, and Whetstone commemorated his friend in a long elegy. His first volume, the *Rocke of Regarde* (1576), consisted of tales in prose and verse adapted from the Italian, and in 1578 he published *The right excellent and famous Historye of Promos and Cassandra*, a play in two parts, drawn from the eighty-fifth novel of Giraldi Cinthio's *Hecatommithi*. To this he wrote an interesting preface addressed to William Fleetwood, recorder of London, with whom he claimed kinship, in which he criticizes the contemporary drama. In 1582 he published his *Heptameron of Civill Discourses*, a collection of tales which includes *The Rare Historie of Promos and Cassandra*. From this prose version apparently Shakespeare drew the plot of *Measure for Measure*, though he was doubtless familiar with the story in its earlier dramatic form. Whetstone accompanied Sir Humphrey Gilbert on his expedition in 1578–1579, and the next year found him in Italy. The Puritan spirit was now abroad in England, and Whetstone followed its dictates in his prose tract *A Mirour for Magestrates* (1584), which in a second edition was called *A Touchstone for the Time*. Whetstone did not abuse the stage as some Puritan writers did, but he objected to the performance of plays on Sundays. In 1585 he returned to the army in Holland, and he was present at the battle of Zutphen. His other works are a collection of military anecdotes entitled *The Honourable Reputation of a Souldier* (1585); a political tract, the *English Myrror* (1586), numerous elegies on distinguished persons, and *The Censure of a Loyall Subject* (1587). No information about Whetstone is available after the publication of this last book, and it is conjectured that he died shortly afterwards.

WHEWELL, WILLIAM (1794–1866), British philosopher and historian of science, was born on the 24th of May 1794 at Lancaster. His father, a carpenter, wished him to follow his trade, but his success in mathematics at Lancaster and Heversham grammar-schools enabled him to proceed with an exhibition to Trinity, Cambridge (1812). He was second wrangler in 1816, became fellow and tutor of his college, and, in 1841, succeeded Dr Wordsworth as master. He was professor of mineralogy from 1828 to 1832, and of moral philosophy (then called "moral theology and casuistical divinity") from 1838 to 1855. He [illegible] the 6th of March 1866 from the effects of a fall from [illegible]

[illegible]ominent not only in scientific research and [illegible] university and college administration. [illegible] *Treatise on Mechanics* (1819), [illegible]cock and Herschel in reforming the [illegible] teaching; to him in large [illegible] the moral and natural [illegible]bridge curriculum (1850). [illegible] years, he opposed reform: [illegible] in a controversy with "fellow-commoners," and the authority of heads of colleges in university affairs. He opposed the appointment of the University Commission (1850), and wrote two pamphlets (*Remarks*) against the reform of the university (1855). He advocated as the true reform, against the scheme of entrusting elections to the members of the senate, the use of college funds and the subvention of scientific and professorial work.

In 1826 and 1828, Whewell was engaged with Airy in conducting experiments in Dolcoath mine, Cornwall, in order to determine the density of the earth. Their united labours were unsuccessful, and Whewell did little more in the way of experimental science. He was the author, however, of an *Essay on Mineralogical Classification*, published in 1828, and contributed various memoirs on the tides to the *Philosophical Transactions* of the Royal Society between 1833 and 1850. But it is on his *History* and *Philosophy of the Sciences* that his claim to an enduring reputation mainly rests. The *History of the Inductive Sciences, from the Earliest to the Present Time* appeared originally in 1837. Whewell's wide, if superficial, acquaintance with various branches of science enabled him to write a comprehensive account of their development, which is still of the greatest value. In his own opinion, the *History* was to be regarded as an introduction to the *Philosophy of the Inductive Sciences* (1840). The latter treatise[1] analyses the method exemplified in the formation of ideas, in the new inductions of science, and in the applications and systematization of these inductions, all exhibited by the *History* in the process of development.

In the *Philosophy*, Whewell endeavours to follow Bacon's plan for discovery of an effectual art of discovery. He examines ideas ("explication of conceptions") and by the "colligation of facts endeavours to unite these ideas to the facts and so construct science. But no art of discovery, such as Bacon anticipated, follows, for "invention, sagacity, genius" are needed at each step. He analyses induction into three steps:—(1) the selection of the (fundamental) idea, such as space, number, cause or likeness; (2) the formation of the conception, or more special modification of those ideas, as a circle, a uniform force, &c.; and (3) the determination of magnitudes. Upon these follow special methods of induction applicable to quantity, viz., the method of curves, the method of means, the method of least squares and the method of residues, and special methods depending on resemblance (to which the transition is made through the law of continuity), viz. the method of gradation and the method of natural classification.

Here, as in his ethical doctrine (see Ethics), Whewell was moved by opposition to contemporary English empiricism. Following Kant, he asserted against J. S. Mill the a priori nature of necessary truth, and by his rules for the construction of conceptions he dispensed with the inductive methods of Mill.

Between 1835 and 1861 Whewell was the author of various works on the philosophy of morals and politics, the chief of which, *Elements of Morality, including Polity*, was published in 1845. The peculiarity of this work—written, of course, from what is known as the intuitional point of view—is its fivefold division of the springs of action and of their objects, of the primary and universal rights of man (personal security, property, contract, family rights and government), and of the cardinal virtues (benevolence, justice, truth, purity and order). Among Whewell's other works—too numerous to mention—reference must be made to writings popular in their day, such as the Bridgewater Treatise on *Astronomy* (1833), and the essay, *Of the Plurality of Worlds* (1854), in which he argued against the probability of planetary life, and also to the *Platonic Dialogues for English Readers* (1859–1861), to the *Lectures on the History of Moral Philosophy in England* (1852), to the essay, *Of a Liberal Education in General, with particular reference to the Leading Studies of the University of Cambridge* (1845), to the important edition and abridged translation of Grotius, *De jure belli et pacis* (1853), and to the edition of the *Mathematical Works* of Isaac Barrow (1860).

Full bibliographical details are given by Isaac Todhunter, *W. Whewell: an Account of his Writings* (2 vols., 1876). See also *Life of W. Whewell*, by Mrs Stair Douglas (1881).

WHICHCOTE (or Whitchcote), **BENJAMIN** (1609–1683), English divine and philosopher, was born at Whichcote Hall, Stoke, Shropshire, and educated at Emmanuel College, Cambridge, where he became fellow in 1633. He was ordained in 1636, and appointed shortly afterwards to be Sunday afternoon lecturer at Trinity Church, Cambridge. In 1643 he received the rectory of North Cadbury, Somerset, and in the following year he was appointed provost of King's College, Cambridge, in place of Samuel Collins who was ejected. On resigning North Cadbury in 1649 he became rector of Milton, Cambridgeshire. In 1650 he was vice-chancellor of Cambridge University. Cromwell in 1655 consulted him upon the question of extending tolerance to the Jews. His Puritan views lost him the provostship of King's College at the Restoration of 1660, but on complying with the Act of Uniformity he was appointed to the living of St Anne's, Blackfriars, London. In 1668 he became vicar of St Lawrence Jewry, London. He is regarded as the founder of the important school of Cambridge Platonists. His works, chiefly theological treatises and sermons, were all published posthumously. He died in May 1683.

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[1] Afterwards broken up into three parts published separately: (1) the *History of Scientific Ideas* (1858), substantially a reproduction of the first part of the *Philosophy*; (2) the *Novum organum renovatum*

See John Tulloch, *Rational Theology*, ii. 59-84 (1874); and *Masters in English Theology*, edited by A. Barry (1877).

WHICKHAM, an urban district in the Chester-le-Street parliamentary division of Durham, England, 4 m. S.W. of Newcastle-upon-Tyne, near the river Derwent. Pop. (1901) 12,852. There is a station (Swalwell) on a branch of the North-Eastern railway. The church of St Mary has Norman and Transitional portions, and in the neighbourhood is the mansion of Gibside, of the 17th century. The demesne borders the Derwent, and is of great beauty, part being laid out in formal gardens and straight avenues. It contains a lofty Doric column and a detached chapel and banqueting hall, and in the vicinity are picturesque fragments of the monastic chapel of Friarside, and of the manor house of Hollinside. Whickham is one of the centres of a coal-mining district, the mines employing the majority of the industrial population; but there are also iron, steel, and chemical works.

WHIG AND TORY, the names associated with two opposing political parties in England. The origin of "Whig" has been much controverted; it has been associated with the Scots for "whey," as implying a taunt against the "sour-milk" faces of the western Lowlanders; another theory is that it represented the initials of the Scots Covenanters' motto, "We hope in God"; another derives it from the Scots word "whiggam," used by peasants in driving their horses. It was, however, a form of the Scots Gaelic term used to describe cattle and horse thieves, and transferred to the adherents of the Presbyterian cause in Scotland. "Tory" is derived from the Irish *Tar a Ri*, "Come, oh king!" associated with the creed of the Irish native levies enlisted in the civil wars on behalf of the loyalist cause; the outlaws who fought for James in Ireland after the revolution were similarly nicknamed Rapparees or Tories.

Parliamentary parties, as such, came into existence in England as soon as parliament achieved or aimed at predominance in the state. In 1641, shortly after the meeting of the Long Parliament, they were divided on the question of church reform, passing, as soon as political questions were involved, into Cavaliers and Roundheads. After the expulsion of the Cavaliers in 1642 and 1643 the Houses were divided into a peace party and a war party, and these in 1643 took the shape of Presbyterians and Independents. After the Restoration there was a country party and a court party, and to these the names of Whig and Tory were applied in 1679, in the heat of the struggle which preceded the meeting of the first short parliament of Charles II. The words were nicknames given by the opponents of each party. To call a man a Whig was to compare him with the Presbyterian rebels of the west of Scotland. To call a man a Tory was to compare him with the Papist outlaws of Ireland. In fact, at this time the Whigs were maintainers of parliamentary power over the crown and of toleration for Dissenters, the Tories maintainers of the hereditary indefeasible rights of the wearer of the crown and of the refusal of toleration to Dissenters. The relation between the parties was further qualified by the fact that the heir to the crown was a Roman Catholic, whose claim to succeed was defended by the Tories and assailed by the Whigs.

The persistency of the names of the two parties is mainly owing to their essential unmeaningness. As new questions arose, the names of the old parties were retained, though the objects of contention were no longer the same. The Revolution of 1688-89 made it impossible for the Tories to retain their old attitude of attachment to the hereditary right of the occupant of the throne, with the exception of the extreme wing of the party, which remained Jacobite. They still, however, continued, though accepting the Toleration Act, to oppose the offering of further favours to Dissenters. In Anne's reign, after the war with France had gone on for some time, they supported a peace policy, whilst the Whigs advocated a continuance of the war. On the whole, during the last years of the 17th and the first years of the 18th century the Whigs may be regarded as the party of the great landowners, and of the merchants and tradesmen, the Tories as the party of the smaller landowners and the country clergy. The Whigs established, through their hold upon the boroughs under the influence of the great landowners, a firm government, which could keep in check, and at last practically set aside, the power of the crown. The Tories, distrusting the authority of the ministerial government, and fearing a new despotism based on parliamentary corruption, became, especially after Bolingbroke's return from exile, almost democratic in their views and in their demands for the purification of the existing system.

With the accession of George III. Toryism took a new form. The struggle about the Dissenters was now a thing of the past, and the king was accepted as a leader in carrying on the attack against the power of the great Whig families. The attack was the easier because the Whig families had split into factions. For some time the dividing line between Whigs and Tories was this: the Tories asserted that the king had a right to choose his ministers and control their policy, subject to the necessity of securing a majority of the House of Commons, whilst the Whigs thought that the choice should lie with leading members of parliament, and that the king should have no controlling power. The Whig view appears to resemble that subsequently adopted; but in the middle of the 18th century the corruption which prevailed rendered the analogy worthless, and the real conflict was between the corrupt influence of the crown and the influence of a clique of great landowners resting on their possession of electoral power through the rotten boroughs. In 1770 the king had his way and established Lord North at the treasury as his nominee. The Whigs, deprived of power, improved their position by the loss of one great instrument of corruption; but they were weakened by the establishment of two distinct currents of opinion in their own ranks. The main body under Rockingham was influenced by Burke to demand practical reforms, but set its face against any popular changes in the constitution. The Whigs who followed Chatham wished to place parliament on a more popular basis by the reform of the House of Commons. When in 1783 Chatham's son Pitt became prime minister, the Tory party took a new start. It retained the Tory principle of reliance on the crown, and joined to it Chatham's principle of reliance on the people as opposed to the great Whig families. It also supported Pitt in practical reforms.

All this was changed by the French Revolution. In opposition to the new democracy, the Tories coalesced with a section of the Whig families, the representatives of which entered the ministry in 1794. From this time till 1822, in spite of men like Pitt, and the personal influence of Tory leaders who supported moderate reform, Toryism came to be popularly identified with a desire to retain the existing state of things, however full of abuses it might be. When Canning and Peel entered the ministry in 1822, a gradual change took place, and a tendency to practical reform manifested itself. The refusal of Wellington to listen to any proposal for altering the constitution of the House of Commons threw power once more into the [illegible] Whigs in 1830. Shortly afterwards the name T[illegible] Conservative (*q.v.*), though it was th[illegible]
wished t[illegible]
wh[illegible]

reform. The name of Whig was replaced by that of Liberal, being frequently, however, assigned to the less progressive portion of the party, the "moderate Liberals," or even to half-and-half Conservatives, as a term more or less of reproach. It ceased to be a name accepted by any definite English political section.

WHIG PARTY, in America, a political party prominent from about 1824 to 1854.[1] The first national party system of the United States came to an end during the second war with Great Britain. The destruction of the Federalist party (*q.v.*) through a series of suicidal acts which began with the Alien and Sedition laws of 1798, and closed with the Hartford Convention of 1814–1815, left the Jeffersonian Republican (Democratic) party in undisputed control. When, after Waterloo, Napoleon ceased to disturb the relations of the new world with the old, the American people, freed for the first time from all trace of political dependence on Europe, were at liberty to shape their public policy in their own way. During the period of rapid internal development which followed after 1815, the all-inclusive Republican party began gradually to disintegrate and a new party system was evolved, each member of which was the representative of such groups of ideas and interests, class and local, as required the support of a separate party. This work of disintegration and rebuilding proceeded so slowly that for more than a decade after the Peace of Ghent each new party, disguised during the early stages of organization as the personal following of a particular leader or group of leaders, kept on calling itself Republican. Even during the sharply contested election of 1824 the rival partisans were known as Jackson, Crawford and Calhoun, or as Clay and Adams Republicans. (See Democratic Party.) It was not until late in the administration of John Quincy Adams, 1825 to 1829, that the supporters of the president and Henry Clay, the secretary of state, were first recognized as a distinct party and began to be called by the accurately descriptive term National Republicans. But after the party had become consolidated, in the passionate campaign of 1828, and later in opposing the measures of President Jackson, it adopted in 1834 the name Whig, which, through memorable associations both British and American, served as a protest against executive encroachments, and thus facilitated union with other parties and factions, such as the Anti-Masonic party (*q.v.*), that had been alienated by the high-handed measures of President Jackson. The new name announced not the birth but the maturity of the party, and the definite establishment of its principles and general lines of policy. The ends for which the Whigs laboured were: first, to maintain the integrity of the Union, second, to make the Union thoroughly national; third, to maintain the republican character of the Union; fourth, while utilizing to the full the inheritance from and through Europe, to develop a distinctly American type of civilization; fifth, to propagate abroad by peaceful means American ideas and institutions. Among the policies or means which the Whigs used in order to realize their principles were the broad construction of those provisions of the Federal Constitution which confer powers on the national government; protective tariffs; comprehensive schemes of internal improvements under the direction and at the cost of the national government; support of the Bank of the United States; resistance to many acts of President Jackson as encroachments by the executive on the legislative branch of the government and therefore hostile to republicanism; coalition with other parties in order to promote national as opposed to partisan ends; resort to compromise in [illegible] allay sectional irritation and compose sectional differ[illegible] cordial and yet prudent expression of sympathy [illegible] movement in other lands.

[illegible] of the Whig party, reckoned from the election [illegible] organization began, to the repeal of the Missouri [illegible] 1854, covers thirty years. In two respects, [illegible] radical democracy under Andrew [illegible] sectionalism over the slavery issue, [illegible]. In view of these events the most difficult task of the Whigs, clearly discerned and heartily accepted by them, under the patriotic and conservative leadership of Henry Clay and Daniel Webster, was to moderate and enlighten, rather than antagonize, the new democracy; and—what proved to be beyond their powers—to overcome the disrupting influence of the slavery issue.

The inaugural address and the messages to Congress of President J. Q. Adams set forth clearly the nationalizing, broad-construction programme of the new party. But his supporters in Congress, imperfectly organized and facing a powerful opposition, accomplished very little in the way of legislation. The election of 1828 gave to Andrew Jackson the presidency, and to the people, in a higher degree than ever before, the control of the government. The president's attack upon the Bank, the introduction of the modern "spoils system" into the Federal civil service, the unprecedented use of the veto power, Jackson's assumption of powers which his opponents deemed unconstitutional, and his personal hostility towards Clay, who had succeeded Adams in the leadership of the party, brought about, under Whig leadership, a coalition of opposition parties which influenced deeply and permanently the character, policy and fortunes of the Whig party. It became the champion of the Bank, of the right of Congress, and of the older and purer form of the civil service. Moreover, as a means of strengthening the bond with their new allies, the Whigs learned to practise a tolerance towards the opinions and even the principles of their associates which is exceptional in the history of American political parties. In strict accord with their own principles, however, the Whigs supported the president during the Nullification Controversy (see Nullification). The renown of Webster as the foremost expositor of the national theory of the Union rests largely on his speeches during this controversy, in particular on his celebrated reply to Senator R. Y. Hayne of South Carolina. Nevertheless, after vindicating the rights of the Union, most of the Whigs supported Clay in arranging the compromise tariff of 1832 which enabled the Nullifiers to retreat without acknowledging discomfiture. The majority of the Northern Whigs, with the entire Southern membership of the party, disapproved the propaganda of the Abolitionists on the ground of its tendency to endanger the Union, and many from a like motive voted for the "Gag Rules" of 1835–1844 (see Adams, J. Q.), which in spirit, if not in letter, violated the constitutional right of petition. In the election of 1832 Clay was the nominee of the party for the presidency, but in 1836 and 1840, purely on grounds of expediency, the Whig conventions nominated General W. H. Harrison. During the administration of Martin Van Buren the Whigs tried with success to make party capital out of the panic of 1837, which they ascribed to Jackson, and out of the long depression that followed, for which they held Van Buren responsible. The election of General Harrison in the "log cabin and hard cider" campaign of 1840 proved a fruitless victory: the early death of the president and the anti-Whig politics of his successor, John Tyler (*q.v.*), whom the Whigs had imprudently chosen as vice-president, shattered their legislative programme.

In 1844 Clay was again the Whig candidate, and the annexation of Texas, involving the risk of a war with Mexico, was the leading issue. The Whigs opposed annexation; and the prospect of success seemed bright, until Clay, in the effort to remove Southern misapprehensions, wrote that he "would be glad" at some future time to see Texas annexed if it could be done "without dishonour, without war, with the common consent of the Union, and upon just and fair terms." It is widely held that this letter turned against Clay the anti-slavery element and lost him the presidency. The triumph of Polk in 1844 was followed by the annexation of Texas and by war with Mexico. The Whigs opposed the war, but on patriotic grounds voted supplies for its prosecution. The acquisition of Texas, and the assured prospect of a great territorial enlargement, at the cost of Mexico, brought to the front the question of slavery in the new domain. The agitation that followed continued through the

"Compromise Measures of 1850" (*q.v.*). To its authors this compromise seemed essential to the preservation of the Union, but it led directly to the destruction of the Whig party. In the North, where the inhumane Fugitive Slave Law grew daily more odious, the adherence to the Compromise on which Clay and Webster insisted weakened the party fatally. The alternative, namely, a committal of the party to the repeal of the obnoxious law, would have driven the Southern Whigs into the camp of the Democrats, leaving the Northern Whigs a sectional party powerless to resist the disruption of the Union. The only weapons that the Whigs knew how to use in defence of the Fugitive Slave Law were appeals to patriotism and sectional bargaining, and these could be employed only so long as the party remained intact.

The National Whig Convention of 1852, the last that represented the party in its entirety, gave to the Northern Whigs the naming of the candidate—General Winfield Scott—who was defeated in the ensuing election, and to the Southern the framing of the platform with its "finality" plank, which, as revised by Webster, read as follows: "That the series of acts of the Thirty-second Congress, the act known as the Fugitive Slave Law included, are received and acquiesced in by the Whig party of the United States as a settlement in principle and substance of the dangerous and exciting questions which they embrace . . . and we will maintain this system as essential to the nationality of the Whig party and the integrity of the Union."

Two years later the Repeal of the Missouri Compromise by the Kansas-Nebraska Act demonstrated that "this system" could not be maintained, and that in committing the Whig party to the policy of its maintenance the Convention of 1852 had signed the death-warrant of the party.

Among the services of the Whigs the first in importance are these: During the thirty critical years in which under the leadership of Clay and Webster they maintained the national view of the nature of the Union, the Whigs contributed more than all their rivals to impress this view upon the hearts and minds of the people. During this same extended period as peacemakers between the sections they kept North and South together until the North had become strong enough to uphold by force the integrity of the Union. And lastly they bequeathed to the Republican party the principles on which, and the leader, Abraham Lincoln, through whom the endangered Union was finally saved.

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WHIP, in general, an instrument for striking, usually consisting of a handle of a flexible nature with a lash attached (see WHIP-
below). In English parliamentary usage, a "whip" is a
members) chosen by the leader or leaders of a
for the special duty of securing the attendance
embers of that party on all necessary occasions,
g abbreviated from the whipper-in of a hunt.
so given to the summons urging members of the
are, of course, always members of parliament, and for the party in power (*i.e.* the government) their services are very essential, seeing that the fate of an important measure, or even the existence of the government itself, may depend upon the result of a division in the House. Where the majority of the party in power is not large it is very necessary that there should always be at hand a sufficient number of its supporters to make up a majority, and without the assistance of the whips it would be impossible to secure this. The chief whip of the government holds the office of patronage secretary to the treasury, so called because when offices were freely distributed to secure the support of members, it was his chief duty to dispose of the patronage to the best advantage of his party. He is still the channel through which such patronage as is left to the prime minister is dispensed. He is assisted by three junior whips, who are officially appointed as junior lords of the treasury; their salaries are £1000 a year each, while the patronage secretary has a salary of £2000. The parties not in office have whips who are unpaid. Attendance of members is primarily secured by lithographed notices sent by the whips to their following, the urgency or importance of the notice being indicated by the number of lines underscoring the notice, a four-line whip usually signifying the extremest urgency. The whips also arrange for the "pairing" of such of the members of their party who desire to be absent with those members of the opposition party who also desire to be absent. The chief whips of either party arrange in consultation with each other the leading speakers in an important debate, and also its length, and give the list of speakers to the speaker or chairman, who usually falls in with the arrangement. They take no part in debate themselves, but are constantly present in the House during its sittings, keeping a finger, as it were, upon the pulse of the House, and constantly informing their leader as to the state of the House. When any division is regarded as a strictly party one, the whips act as tellers in the division.

An interesting account of the office of whip is given in A. L. Lowell's *Government of England* (1908), vol. i. c. xxv.

WHIPPING, or FLOGGING, a method of corporal punishment which in one form or another has been used in all ages and all lands (see BASTINADO, KNOUT, CAT-O'-NINE-TAILS). In ancient Rome a citizen could not be scourged, it being considered an infamous punishment. Slaves were beaten with rods. Similarly in early medieval England the whip could not be used on the freeman, but was reserved for the villein. The Anglo-Saxons whipped prisoners with a three-corded knotted lash. It was not uncommon for mistresses to whip or have their servants whipped to death. William of Malmesbury relates that as a child King Æthelred was flogged with candles by his mother, who had no handier weapon, until he was insensible with pain. During the Saxon period whipping was the ordinary punishment for offences, great or small. Payments for whipping figure largely in municipal and parish accounts from an early date. The abolition of the monasteries, where the poor had been sure of free meals, led during the 16th century to an increase of vagrancy, at which the Statute of Labourers (1350) and its provisions as to whipping had been early aimed. In the reign of Henry VIII. was passed (1530) the famous Whipping Act, directing vagrants to be carried to some market town or other place "and there tied to the end of a cart naked and beaten with whips throughout such market town till the body shall be bloody." In the 39th year of Elizabeth a new act was passed by which the offender was to be stripped to the waist, not quite naked. It was under this statute that whipping-posts were substituted for the cart. Many of these posts were combined with stocks, as that at Waltham Abbey, which bears date "1598." It is of oak, 5 ft. 9 in. high, with iron clasps for the hands when used for whipping, and for the feet when used as stocks. Fourpence was the old charge for whipping male and female rogues. At quarter-sessions in Devonshire at Easter 1598 it was ordered that the mothers of bastard children should be whipped; the reputed fathers suffering a like punishment. In the west of England in 1684, "certain Scotch pedlars and petty chapmen being in the habit of selling their goods to the greate damage and hindrance of shoppe-keepers," the court ordered them to be stripped naked and whipped. The flogging of women was common. Judge Jeffreys, in so sentencing a female prisoner, is reported to have exclaimed, "Hangman, I charge you to pay particular attention to this lady. Scourge her soundly, man: scourge her till her blood runs down! It is Christmas: a cold time for madam to strip. See that you warm her shoulders." Lunatics, too, were whipped, for in the Constable's Accounts of Great Staughton, Hunts, occurs the entry, "1690–1, Paid in charges taking up a distracted woman, watching her and whipping her next day—8/6d." A still more remarkable entry is "1710–1, Pd. Thomas Hawkins for whipping two people yt had smallpox—8d." In 1764 the *Public Ledger* states that a woman who is described as "an old offender" was taken from the Clerkenwell Bridewell to Enfield and there publicly whipped at the cart's tail by the common hangman for cutting wood in Enfield Chase. A statute of 1791 abolished the whipping of females.

WHISKER, a word chiefly used in the plural in the sense of the hair worn by a man on the cheeks as opposed to the beard on the chin and the moustache on the upper lip (see BEARD). It is also applied to the bristly feelers growing round the mouth of a cat or other animal. The word by derivation means that which "whisks" or "brushes."

WHISKY, or WHISKEY, a potable spirit distilled from cereal grains. The name is probably derived from the Celtic *uisge-beatha* (water of life), which was subsequently contracted to *usquebaugh*, and still later to whisky (cf. Skeat, *Etym. Dict. s.v.*). The liquor known as "usquebaugh" in the 17th and 18th centuries was not, however, of the same character as the whisky of modern times, but was a compound of plain spirit with saffron, nutmegs, sugar and other spices and flavouring matters. Whether the term whisky to denote a plain type of spirit was used concurrently with usquebaugh, or whether the latter name covered both varieties, is not clear. It is certain, however, that an alcoholic liquor, derived mainly from grain, has been prepared for very many centuries in both Ireland and Scotland (see SPIRITS). There are three main types of whisky, namely, Scotch, Irish and American.

Scotch whiskies may be broadly divided into two main groups, namely (*a*) pot-still or malt whiskies, and (*b*) patent-still or grain whiskies; the former are made practically without exception from malted barley only, the latter from a mixture of malted barley and other unmalted cereals, chiefly rye, oats and maize (see SPIRITS). (*a*) There are four main varieties of Scotch malt whiskies, namely, Highland Malts, Lowland Malts, Campbeltowns and Islays. The Highland Malts are produced (if we except a few distilleries on the islands in the west and north) in the district on the mainland lying north of an imaginary line drawn through Dundee on the east and Greenock on the west. The largest group of distilleries is in the famous Speyside or Glenlivet district. The Lowland Malts are made south of the imaginary line alluded to. The Campbeltowns are distilled in or near the town of that name at the southern end of the Kintyre peninsula. The Islays are produced in the island of that name. These different varieties of whisky, although made in much the same way, yet possess distinctive characteristics of flavour. The type of barley employed, the quantity of peat employed in curing the malt, the quality of the water, the manner of carrying out the various distillery processes—particularly that of distillation—the shape and size of the stills, &c., all these are factors which affect the flavour of the final product. The Islays, which, as a rule, are considered to be among the most valuable of Scotch whiskies, possess a very full and peaty flavour together with a strong ethereal bouquet. For this reason they are much used for blending with whiskies of a lighter type. The Highland Malts proper (Speyside type) are less peaty than the Islays, yet possess a full flavour, although many of them are inclined to be "elegant" rather than "big." The Lowland Malts, again, are, as a class, less peated than the Highland Malts, and indeed, nowadays, in view of the growing taste for a more neutral class of beverage, there are some Lowland Malt distilleries which dispense with the use of peat altogether. Many of the Lowland Malts possess considerable body and flavour, but, on the whole, they are lighter and not so fine as those of the Highland variety. Lowland distillers are now running their spirit at much the same strength as their Highland colleagues, whereas formerly it was the custom to work at a far higher strength. The result is that the difference between the two classes of spirit is not so marked as it was. The Campbeltowns, although in some respects similar to the Islays on the one hand, and the Highland Malts on the other, are somewhat rougher and less elegant than these. They usually possess a full peaty flavour. (*b*) Patent-still or grain whiskies are, as a class, lighter in flavour and "body" than the pot-still types. This is due to the fact that the rectification of these whiskies is carried a good deal further than is the case with the "malts." They are made from a mixture of malted and unmalted cereals, and, as no peat is employed in the curing of the malt, they lack the "smoky" flavour of the other varieties. Some controversy has arisen as to whether these patent-still spirits have a right to the name of "whisky" or "Scotch whisky," but although, no doubt, this controversy is largely due to conflicting trade interests, it has also, in the author's opinion, been caused by a very general popular misconception as to the true character of these whiskies. The idea that they are true "silent" or "neutral" spirits—*i.e.* alcohol and water pure and simple—is quite incorrect. They possess a distinct flavour, which varies at different distilleries, and analysis discloses the fact that they contain very appreciable quantities of the "secondary" products which distinguish potable spirits from plain alcohol. Indeed, as a result of an extensive investigation of the question

Composition of Scotch Whiskies.

Note.—The figures below are based on a large number of analyses of typical samples. Cf. Schidrowitz and Kaye, *Journal Soc. Chem. Ind.* (June 1905). Where two figures are given in the same column, they do not indicate extremes, but merely normal variation.

Description.	(Results expressed in grams per 100 litres of absolute alcohol.)						
	Alcohol.	Total Acid.	Non-volatile Acid.	Esters.	Higher Alcohols.	Aldehydes.	Furfurol.
Highland Malts—	Practically all Scotch whiskies are distilled at about 25 O.P. (about 72% of alcohol by volume). Prior to storage they are reduced to 11 O.P. with water. Mature whiskies contain 45 to 60% of alcohol according to age, humidity of store, &c. For retail sale, whiskies are reduced to a strength of roughly 17 to 24 U.P.						
New light type		15	Nil	50	140	10	2·5–3
New heavy type		20	Nil	75	200	20–40	3–5
Mature light type		20–80	5–35	50–100	150	15–50	2–3
Mature heavy type					220		2·5–4·5
Lowland Malts—							
New		15	Nil	25–50	110–180	15–50	2·5–4·5
Mature		20–60	5–20	50–75	120–200		2–3·5
Campbeltown—							
New		20–30	Nil	50–70	180–220	20–40	3–8
Mature		30–80	5–25	60–120	230–250	30–70	2·5–7
Islay[1]				..			..
Grain Whiskies—							
New		Trace to 5	Nil	20–40	50–60	2–10	Trace to 0·75
Mature		25–50	5–25	25–50	60–70	5–15	

[1] The Islays give similar figures to the Highland Malts except that the Higher Alcohols and Furfurol are slightly higher.

by the author, it has been shown that the relative proportion of "secondary" products in Highland Malt, Lowland Malt and "grain" whiskies respectively, is roughly as 3 : 2 : 1. The figures in the foregoing table illustrate, as far as we are at present able to determine them, the general composition of the various types of Scotch whiskies referred to.

The character of Scotch whisky is much influenced by the manner in which it is matured. Chief among the factors in this connexion is the nature of the cask employed. The main varieties are plain wood, sherry and refill casks. Technically the term "plain" wood is applied to a cask made from seasoned oak which has contained no other liquor than whisky. Similarly the term "sherry" wood is as a rule only applied to a cask the wood of which has become impregnated with sherry by contact with that wine, and which has not been used in any other manner. A sherry cask which has been filled with whisky, then emptied and "refilled" with whisky, is known as a "refill." Brandy and Madeira "wood" are also occasionally employed. The nature of the atmospheric conditions of the cellar is also of importance in determining character and quality (see SPIRITS).

Blending.—Scotch whiskies are, as a general rule, "blended" prior to sale to the public. By "blending" is understood the art of putting together different types and varieties of whisky to form a harmonious combination. The general run of "self" whiskies—*i.e.* whiskies from a single distillery—do not appear to be to the public taste, but by combining different kinds of whisky blenders have succeeded in producing an article the demand for which has increased enormously during the past quarter of a century, and which may now be regarded as a staple beverage in all English-speaking countries. The great expansion of the Scotch whisky trade of late years is undoubtedly due in the main to the introduction of blending on scientific lines. There are different types of blends. In some a Highland Malt, in others an Islay, in others again a "grain" flavour may predominate, but, generally speaking, the aim of the blender is to produce an article in which no single constituent "comes through"—*i.e.* is markedly apparent. The best blends are produced by blending a number of "vatted" whiskies. A "vat" is produced by blending a number of whiskies of the same style or type, for instance, ten or fifteen Highland Malts from different distilleries. The "vat" is allowed to mature before being blended with other types to form the final blend. The better-class blends contain, as a general rule, 50 to 60% of Highland and Lowland Malts, 10 to 20% of Islays, and about 20 to 40% of "grain" whisky.

A typical high-class blend would, on analysis, show figures much as follows: *Alcohol*, 45 to 48% by vol.; *total acid*, 30 to 50; *non-volatile acid*, 20 to 30; *esters*, 30 to 60; *higher alcohols*, 120 to 170; *aldehydes*, 15 to 25; *furfurol*, 2·5 to 3·5.

Irish Whisky.—Irish pot-still whisky is sharply differentiated from the Scotch variety in that (*a*) the raw materials employed are generally composed largely of unmalted grain, (*b*) the malt is not peat-cured, (*c*) the process of distillation is entirely different both as regards method and apparatus (see SPIRITS). The result is that whereas Scotch whisky possesses a characteristic dry, clean flavour, Irish whisky is round and sweet, with a full ethereal bouquet. The general run of Irish pot-still whiskies are made with 30 to 50% of malted barley, the balance being rye, oats, unmalted barley and wheat. A few distilleries employ malted barley only, but the product so obtained—owing to the different methods employed and the absence of peat curing—is quite different from Scotch malt whisky The Irish "grain" or "patent still" whiskies are made in a manner practically identical with that employed for Scotch "grain," but as a class they are somewhat lighter as regards flavour and body than the latter. Irish whiskies are not classified territorially, although occasionally the distinction of "Dublin" or "Country makes" is recognized in the trade. Broadly speaking, however, the differences between Irish whiskies are not due to class, but to individual variation.

American Whisky.—There are two main varieties of American whisky, namely, Rye whisky, the predominant raw material in the manufacture of which is rye, and Bourbon or corn whisky, made mainly from Indian corn (maize). Both varieties possess a much higher flavour and greater body than do the Scotch or Irish whiskies, due partly to the class of raw material employed, and partly to the method of distillation. Broadly speaking, the American self (so-called "straight") whiskies contain double the quantity of secondary or "by" products present in Scotch or Irish whiskies.

American whiskies are almost invariably stored in very heavily charred barrels, which, while it very appreciably affects the flavour, is necessary, inasmuch as it is doubtful whether it would be possible to mature these exceedingly heavy whiskies within a commercially reasonable time without the cleansing and purifying effect of the charcoal formed by the burning of the cask. Even with the aid of the charred cask, the average maturation time of the American pot-still whiskies is certainly two or three years longer than that of Scotch and Irish whiskies. (P. S.)

Composition of Irish Whiskies (Analyses by Schidrowitz and Kaye).

Description.	(Results expressed in grams per 100 litres of absolute alcohol.)						
	Alcohol per cent by vol.[1]	Total Acid.	Non-volatile Acid.	Esters.	Higher Alcohols.	Aldehydes.	Furfurol.
Dublin Whiskies—							
1.[2] Pot-still (new) . .	71·72	7	Trace	34	145	12	5·5
1a. Pot-still. From same distillery, 14 years old (plain wood) .	57·08	29	8	38	185	68	3·3
2. Pot-still (new) . .	74·11	6	Nil	28	233	8	4·1
2a. Pot-still. From same distillery, 14 years old	60·47	32	8	47	264	21	4·4
3. Pot-still, 14 years old	63·42	87	45	87	226	32	4·5
4. Patent-still (new) .	70·76	17	Trace	25	38	..	..

[1] Irish whisky is generally distilled at about 50 O.P. and reduced with water to 25 O.P. prior to storage.

[2] Nos. 1, 2, 3 and 4 represent different distilleries.

WHISKY INSURRECTION, THE, an uprising in Western Pennsylvania in 1794 against the Federal Government, occasioned by the attempted enforcement of the excise law (enacted by Congress March 1791) on domestic spirits. The common prejudice in America against excise in any form was felt with especial strength in Western Pennsylvania, Virginia and North Carolina, where many small whisky stills existed; and protests were made almost immediately by the Pennsylvanians. Albert Gallatin (*q.v.*) took a leading part in expressing their resentment in a constitutional manner, but under the agitator David Bradford the movement soon developed into excesses. The attempt to enforce the law led to stormy scenes and riotous violence, the Federal revenue officers in some cases being tarred and feathered; but in September 1794 President Washington, using the new powers bestowed by Congress in May 1792, despatched a considerable force of militia against the rebellious Pennsylvanians, who thereupon submitted without bloodshed, the influence of Gallatin being used to that end. Bradford fled to New Orleans; some of his more prominent supporters were tried for treason and convicted, but promptly pardoned. In American history this so-called "rebellion" is important chiefly on account of the emphasis it gave to the employment by the Federal Executive of the new powers bestowed by Congress for interfering to enforce Federal laws within the states. It is indeed inferred from one of Hamilton's own letters that his object in proposing this excise law was less to obtain revenue than to provoke just such a local resistance as would enable the central government to demonstrate its strength.

WHIST, a game at cards. The etymology of the name is disputed. Possibly it is of imitative origin, from "whist" (Hist! Hush! Silence!). "It is called Whist from the silence that must be observed in the play" (Cotton, *Compleat Gamester*). In the 16th century a card game called *triumph* or *trump* was commonly played in England. A game called *trionfi* is mentioned as early as 1526, and *triumphus Hispanicus* in 1541. *La triomphe* occurs in the list of games played by Gargantua (Rabelais, first half of 16th century). In Giovanni Florio's *Worlde of Wordes* (1598) *trionfo* is defined as "the play called trump or ruff." It is probable that the game referred to by the writers quoted is *la triomphe* of the early editions of the *Académie des jeux*. It is important to note that this game, called by Charles Cotton "French ruff," is similar to écarté. "English ruff-and-honours," also described by Cotton, is similar to whist. If we admit that ruff and trump are convertible terms, of which there is scarcely a doubt, the game of trump was the precursor of whist. A purely English origin may, therefore, be claimed for trump (not *la triomphe*). No record is known to exist of the invention of this game, nor of the mode of its growth into ruff-and-honours, and finally into whist. The earliest reference to trump in English is believed to occur in a sermon by Latimer, "On the Card," preached at Cambridge, in Advent, about the year 1529. He says, "The game that we play at shall be the triumph. . . . Now turn up your trump, . . . and cast your trump, your heart, on this card." In *Gammer Gurton's Needle* (1575) Dame Chat says, "We be fast set at trumpe." Eliot (*Fruits for the French*, 1593) calls trump "a verie common alehouse game." Richard Price or Rice (*Invective against Vices*, 1579) observes that "renouncing the trompe and comming in againe" (*i.e.* revoking intentionally) is a common sharper's trick. Cotton in his *Compleat Gamester* says, "He that can by craft overlook his adversary's game hath a great advantage." Thomas Dekker (*Belman of London*, 1608) speaks of the deceits practised at "tromp and such like games." Trump also occurs in *Antony and Cleopatra* (written about 1607), with other punning allusions to card-playing—

> "She, Eros, has
> Packed cards with Caesar, and false-played my glory
> Unto an enemy's triumph."—Act iv.

Ruff-and-honours, if not the same game as trump, was probably the same with the addition of a score for the four highest cards of the trump suit. A description of the game is first met with in *The Compleat Gamester* (1674) by Cotton. He states that ruff-and-honours (*alias* slamm) and whist are games very commonly known in England. It was played by four players, paired as partners, and it was compulsory to follow suit when able. The cards ranked as at whist, and honours were scored as now. Twelve cards were dealt to each player, four being left in the stock. The top card of the stock was turned up for trumps. The holder of the ace of trumps was allowed to *ruff*, *i.e.* to take in the stock and to put out four cards from his hand. The game was played nine up; and at the point of eight honours could be called, as at long whist. Cotton adds that at whist there was no stock. The deuces were put out and the bottom card was turned up for trumps.

It is believed that the earliest mention of whist is by Taylor, the Water Poet (*Motto*, 1621). He spells the word "whisk." The earliest known use of the present spelling is in *Hudibras, the Second Part* (spurious), 1663. The word is afterwards spelt indifferently whisk or whist for about half a century. Cotton (1674) spells it both ways. Richard Seymour (*Court Gamester*, 1734) has "whist, vulgarly called whisk." While whist was undergoing this change of name, there was associated with it the additional title of *swabbers* (probably allied to sweep, or sweepstakes). Fielding (*History of Mr Jonathan Wild*) says that whisk-and-swabbers was "the game then [1682] in chief vogue." Francis Grose (*Classical Dictionary of the Vulgar Tongue*, 1785) states that swabbers are "the ace of hearts, knave of clubs, ace and duce of trumps at whist." The true function of the swabbers is not positively known; it is probable that the holders of these cards were entitled to receive a certain stake from the other players. Swabbers dropped out of general use during the 18th century. The points of the game rose from nine to ten ("nine in all," Cotton, 1725; "ten in all," Seymour, 1734, "rectified according to the present standard of play"). Simultaneously with this alteration, or closely following it, the entire pack of fifty-two cards was used, the deuces being no longer discarded. This improvement introduces the odd trick, an element of great importance in modern whist. Early in the 18th century whist was not a fashionable game. The Hon. Daines Barrington (*Archaeologia*, vol. viii.) says it was the game of the servants' hall. Contemporary writers refer to it in a disparaging way, as being only fit for hunting men and country squires, and not for fine ladies or people of quality. According to Barrington, whist was first played on scientific principles by a party of gentlemen who frequented the Crown Coffee House in Bedford Row, London, about 1728. They laid down the following rules: "Lead from the strong suit; study your partner's hand; and attend to the score." Shortly afterwards the celebrated Edmond Hoyle (*q.v.*) published his *Short Treatise* (1742). It has been surmised by some that Hoyle belonged to the Crown Coffee House party. This, however, is only a conjecture. There is abundant evidence to show that, in the middle of the 18th century, whist was regularly played at the coffee houses of London and in fashionable society. From the time of Hoyle the game continued to increase in public estimation, until the introduction of bridge, which has to a large extent replaced it, but which has much in common with it.

It will be of interest to mark the successive stages through which whist passed from the time of Cotton. The only suggestions as to play in Cotton are that, "though you have but mean cards in your own hand, yet you may play them so suitable to those in your partner's hand that he may either trump them or play the best of that suit"; also that "you ought to have a special eye to what cards are play'd out, that you may know by that means either what to play if you lead or how to trump securely and advantagiously." It appears from this that the main ideas were to make trumps by ruffing, to make winning cards, and to watch the fall of the cards with these objects. In the rules laid down by the Crown Coffee House school a distinct advance is to be noticed. Their first rule, "Lead from the strong suit," shows a sound knowledge of the game. Their second rule, "Study your partner's hand," though sound, is rather vague. Their third rule, "Attend to the score," if amended into "Play to the score," is most valuable. From the Crown Coffee House school to Hoyle is rather a wide jump; but there is no intervening record. Hoyle in his *Short Treatise* endorses and illustrates the "Crown" rules. He also brought the doctrine of probabilities to bear on the game, and gave a number of cases which show a remarkable insight into the play.

About 1770 was published William Payne's *Maxims for Playing the Game of Whist*. The advance in this book is decided, as it inculcates the rules of leading invariably from five trumps and the return of the highest card from three held originally. Matthews's *Advice to the Young Whist-Player* (anon., 1804) repeats the "maxims of the old school," with "observations on those he thinks erroneous" and "with several new ones," but some of the maxims which he thinks erroneous are now generally allowed to be correct.

Soon after Matthews wrote the points of the game were cut down from ten (long whist) to five (short whist). Clay's account of this change is that, about the beginning of the 19th century, Lord Peterborough having lost a large sum of money, the players proposed to make the game five up, in order to give the loser a chance of recovering his loss. The new game, short whist, was found to be so lively that it soon became general, and eventually superseded the long game. "Coelebs" (*Laws and Practice of Whist*, 1851), who mainly repeats former writers, only calls for mention because he first printed in his second edition (1856) an explanation of the call for trumps. Calling for trumps was first recognized as part of the game by the players at Graham's Club about 1840. Long whist may be said to have died about 1835. The new game necessarily caused a change in the style of play, as recorded by James Clay in *The Laws of Short Whist, and a Treatise on the Game* (1864).

Whist then travelled, and about 1830 some of the best French whist-players, with Deschapelles at their head, modified and improved the old-fashioned system. They were but little influenced by the traditions of long whist, and were not content merely to imitate the English. The French game was the scorn and horror of the old school, who vehemently condemned its rash trump leads; those who adopted the practice of the new school were found to be winning players.

Dr William Pole (*Philosophy of Whist*, 1883) remarks that the long experience of adepts had led to the introduction of many improvements in detail since the time of Hoyle, but that nothing had been done to reduce the various rules of the game to a systematic form until between 1850 and 1860, when a knot of young men proceeded to a thorough investigation of whist, and in 1862 Henry Jones, one of the members of this "little whist school," brought out a work, under the pseudonym of "Cavendish," which "gave for the first time the rules which constitute the art of whist-playing according to the most modern form of the game." The little school was first brought prominently into notice by an article on whist in the *Quarterly Review* of January. Whist had previously been treated as though the "art" of the game depended on the practice of a number of arbitrary conventions. But it was now shown that all rules of whist-play depend upon and are referable to general principles. Hence, as soon as these general principles were stated, and the reasons for their adoption were argued, players began to discuss and to propose innovations on the previously established rules of play

A further development was the introduction of the system of discarding from the best protected suit instead of from the weakest, when the adversaries have the command in trumps. Soon after this (1872) followed the "echo" of the call for trumps, and contemporaneously with the echo the lead of the penultimate card from suits of five cards or more, not including the ace, a lead that was so vigorously opposed by some players that "the grand battle of the penultimate" ensued. The old players indeed regarded the new system with the same horror as they had formerly displayed with respect to the French school, stigmatizing it not only as an innovation, but as a private understanding, and even as cheating! Even Clay, the greatest player of his day, was at first an opponent of the penultimate lead, but after consideration adopted it. General Drayson (*Art of Practical Whist*, 1879) was the first to propose an analogous system, namely, that six cards in a suit, not including the ace, could be shown by leading the *antepenultimate* card, but his proposal, logical though it was, did not at first find favour Before this (1874–1875) leads from high cards having regard to the number held in the suit, had not escaped attention, several innovations being introduced, but it yet remained for some one to propound a constant method of treating *all* leads, and to classify isolated rules so as to render it possible to lay down general principles This was done in 1883–1884 by Nicholas Browse Trist of New Orleans, who introduced the system of "American Leads." American leads propose a systematic course of play when opening and continuing the lead from the strong suit. First, with regard to a low card led. When you open a strong suit with a low card, lead your fourth best When opening a four-card suit with a low card, the lowest, which is the fourth best, is the card selected. When opening a five-card suit with a low card, the penultimate card is selected. Instead of calling it the penultimate, call it the fourth best. So with a six-card suit, but, instead of antepenultimate, say fourth best And so on with suits of more than six cards disregard all the small cards and lead the fourth best Secondly, with regard to a high card led, followed by a low card When you open a strong suit with a high card and next lead a low card, lead your original fourth best The former rule was to proceed with the lowest. Thus, from ace, knave, nine, eight, seven, two, the leader was expected to open with the ace, and then to lead the two An American leader would lead ace, then eight. Thirdly, with regard to a high card led, followed by a high card. When you remain with two high indifferent cards, lead the higher if you opened a suit of four, the lower if you opened a suit of five or more A player who adopts this system notifies by it to his partner that, when he originally leads a low card, he holds exactly three cards higher than the one led; when he originally leads a high card, and next a low one, he still holds exactly two cards higher than the second card led; and when he originally leads a high card, and follows it with a high card, he indicates in many cases, to those who know the analysis of leads (as laid down in whist books), whether the strong suit consisted originally of four or of more than four cards. (See *Whist Developments*, by "Cavendish," 1885.)

These leads led to an overhauling of the play of the second and third hands, whist becoming apparently so complicated as to deter players of moderate ability from plunging into its intricacies This fact, combined with the introduction of the fascinating and simpler game of bridge, caused a distinct decadence in the popularity of whist during the last decade of the 19th century.

Whist (*i.e.* modern "short" whist) is played with a full pack of 52 cards. The ace is the highest, except in cutting, when it is the lowest. After the ace rank king, queen, &c, in order, down to the two. Four persons play, but with only three or two players the game can still be played with certain modifications (see *Dummy* below). The players each draw a card, the one who gets the lowest deals, and has choice of cards and seats The player who draws the next lowest is his partner; if two or more players draw cards of equal value, they cut again, the lowest pairing with the original lowest The cards are then cut and [illegible] by one from left to right. The last card is turned up [illegible] suit. In America the trump suit is sometimes [illegible] being replaced in the pack before shuffling (blind trump). A misdeal passes the deal, and at the end of each hand it passes in any case to the player on the left. At the end of the first trick the dealer takes the turned trump card into his hand If he fails to do so, the card may be called to any subsequent trick. The player on the dealer's left leads, and it is compulsory for the others to follow suit if possible, under penalty for "revoke" (by which the adversaries may either add three to their score, deduct three from the defaulting side, or take three tricks of theirs and add them to their own). A player who cannot follow suit may play any card he chooses to the trick unless he has exposed a card and the adversaries call it. The highest card, or trump (if one is played), wins the trick, the winner leading to the next trick. When all the cards have been played the tricks gained by each side are counted, each trick over six counting one. Six tricks are called "a book." Trump honours—ace, king, queen, knave—also count to the score, but a side which has a score of four at the beginning of a hand cannot score for honours. Tricks count before honours, thus if one side has a score of one and holds four honours, while the other has a score of four and makes the odd trick, the latter wins a double, the honours not counting, as the game has already been won by tricks. The scores for honours are as follows, but some players halve these scores, or, particularly in America, do not count honours at all This is a matter of arrangement. If one side holds all four honours, four points; if three, two points; if both sides hold two there is no score, honours being "divided," or "easy" A rubber consists of the best of three games, unless one side wins the first two games. A game consists of five points Thus if one side makes nine tricks and holds three honours it scores a game—three points by tricks (or "by cards") and two by honours—but if a revoke has been made, *i.e.* if a player, holding a card of the suit led, has played a card of another suit, the revoking side cannot score more than four, whatever its score in points may be The side that wins the rubber scores two points in addition to the game points, which are reckoned thus. three points for a "treble," a game in which the adversaries have no score; two points for a "double," *i.e.* when the adversaries have made one or two; one point for a "single," *i.e.* when they have made three or four Thus two trebles and the rubber (or "rub") count eight points, treble, single and the rub count six points. If the losers have won a game, its value is deducted. Sometimes, by arrangement, the rubber points are raised to four. At the end of a rubber, or, by arrangement, of two rubbers, the players cut again for partners. If others wish to join the table the original players cut, the highest going out It is not customary for more than two to join—technically, to "cut in", hence, if two players vacate at the end of the next rubber, they now take the place of the other original pair, who leave without cutting. When only one player "cuts in," the other three retire by rotation, decided by cutting, and come back in their turn. If more than four players wish to form a table, they cut first to see who shall stand out, the highest retiring; they then cut afresh for partners.

Dummy Whist is played by three players, two being partners and the other playing with dummy, whose cards, which must be dealt face downwards, are exposed on the table before the play begins Dummy has the first deal in every rubber His cards being exposed he is not considered able to revoke, if he does, there is no penalty, nor is his partner liable for any mistake of his own whereby he cannot profit, *e.g.* by exposing a card, but if he leads from the wrong hand, a suit can be called. At *Double Dummy* each player has a dummy partner, and there is no misdeal, as the deal is a disadvantage.

The leads and the play of the different hands have been so minutely systematized that some of the various text-books should be studied carefully by any one who wishes to become proficient, but some broad general rules may be useful to the beginner *The original leader* should lead from his strongest, which is almost always his *longest* suit, but if his longest suit contains only four cards and is also the trump suit, opinions differ, though most players would observe the general rule. The same rule applies to subsequent first leads of a suit, unless they have to be modified owing to information derived from cards already played. Thus a player who has to lead after, say, the third or fourth trick may have to sacrifice his lead of his strongest suit in response to a "call for trumps" by his partner. Such a lead is called a "forced" lead, and from three cards the highest should invariably be led, and, if the opportunity occurs, the second best at the second lead, but from four the lowest should be led. This lead of the highest from three applies to all forced leads, whether they are due to a "call," or to the fall of the cards already played. As a broad rule an ace is led always when five or more are held in the suit, but if you have the king also, lead it first; from a five suit without the ace lead the worst but one. With ace and two or three small ones, lead a small one; with ace and one small one, the ace. *The second hand* generally plays his worst card, but if an honour is led and he holds the ace, he should play the ace; also holding queen and king he should play the queen, or with knave, queen and king, the knave. If queen is led it is usually unwise to put on the king, but it is generally sound play to put the knave on the ten. With king and one other, or queen and one other, most players advocate the play of the small card; some would play the king under these conditions, but not the queen; many play the queen and not the king; but the state of the score may affect the play If it is important to get the lead, so as to lead trumps, the honour should be played, but as a rule the second hand reserves his strength. *The third hand* should win the trick if he can, unless he knows that his partner's card is a winning one; consequently he generally plays his highest card. *The fourth hand* should win the trick if he can, as a player is justified in passing a trick only if by so doing he is absolutely sure of winning two.

Returned Leads.—A partner's lead should be returned at once, unless one has a strong suit of one's own, in which event it is advisable to lead a card of it, to guide one's partner as to his future lead, but a lead of trumps must be returned as soon as possible. If a player holds three cards originally in his partner's suit he should invariably return the higher of the two left in his hand after the first round. Thus holding ace, three, two only, he should win with the ace and return the three; when the two falls afterwards, his partner will know that he holds no more. So, with ace, knave, ten only, win with the ace and return the knave, though from a scoring point of view the knave and ten are of equal value. With four originally, return the lowest, but a winning card should always be led or played in the second round, unless there is any special reason for retaining it. If your partner has called for trumps and you get the lead, with four trumps lead the smallest, with three lead the highest, and, if it wins, go in with the next highest. This law is universal in trumps (and also applies to forced leads from three-card suits) even if ace, king and another be held, from which the ordinary lead would be the king. If, however, one adversary has obviously played his last trump, a third round is not always advisable, as two trumps will fall from the leader and his partner, and only one from the adversaries. On the other hand it is generally good play to draw two opposing trumps for one, so that they may not make separately.

In the play of a hand never play an unnecessarily high card—unless you are "calling." Thus, holding ten and knave, play the ten; your partner will infer that you do *not* hold the nine, but *may* hold the knave, and even the queen as well, though all the cards are of equal value for making tricks. Similar inferences should be drawn from all cards played, and should be drawn at the moment. Never play false cards unless you see your partner is so weak that it can do no harm to deceive him; in such a case, with knave and ten, the knave may be played. It is a maxim that information given by play is more valuable to the partner than it is to the two adversaries.

Trumping or "Ruffing" and Discarding. The second player should not trump a doubtful card (*i.e.* a card that his partner might be able to beat), if he is strong in trumps; if weak, he should trump. A winning card from an adversary should be trumped in any case. With weak trumps, it is bad play to "force" one's partner, *i.e.* invite him to trump; but with strong trumps force him. If your partner refuse to trump an adverse winning card, lead a trump at the first opportunity. If you have a "cross-ruff" (*i.e.* if you and your partner can trump different suits), those suits should be led alternately, and not trumps. Force an adversary who is known to be strong in trumps. A weak suit in trumps (three only) should be led if the adversaries have a cross-ruff, or if the game is hopeless unless partner is strong, or if winning cards are held in all plain suits, which might be trumped.

It is usual to discard originally from the weakest suit, but if the adversaries are shown to have strength in trumps, from the strongest, *i.e.* the longest, so as to guard the weak suits. With absolute command of a suit, if you are compelled to discard from it, discard the winning card to inform your partner that you have command; *e.g.* with king, knave, ten—ace and queen being out—discard the king. *The "call" for trumps*, an artifice, which is also known as to "ask," to "signal," to "hang out blue-Peter" or to "peter," for trumps, consists in playing an unnecessarily high card, followed later by a lower one, *e.g.* by playing the three before the two, or the ten before the nine. As the "call" is an imperious command, equivalent to "sacrifice everything, partner, for the sake of leading trumps," it is only justified by great strength in the trump suit. *The echo:* To your partner's call you should "echo," if you hold four or more, by calling yourself, however low your trumps are. Similarly four trumps may be shown in partner's lead of trumps by playing a high card followed by a lower one.

General Maxims. Play to the score. If winning the odd trick saves or wins the game, do not try risky combinations for the sake of getting two or three tricks. Count your cards before playing. If your partner "renounces," *i.e.* discards or trumps, always ask him if he has a card of the suit led, to save the revoke. Announce the score when you mark it. Watch the fall of every card. Study the rules, especially those about penalties and consultation with partner. If the winning of one more trick wins or saves the game, and you hold the winning card, play it, unless it be the winning trump, which is good at any time. Retain the trump-card if you can play others of equal trick-making value; your partner then knows the position of one trump; *e.g.* with nine and ten in addition to the eight, the turn-up, play them before parting with the eight. Keep command of adversaries' suits as long as is judicious; get rid of the command of partner's strong suit. Do not finesse (*i.e.* play a lower card than your highest in the third hand) in partner's suit, unless he leads a high card in an obviously forced lead. Lead through a known strong suit on your left, and (especially) up to a known weak suit on your right. If you have to lead from a suit of two lead the highest. Leading from a "singleton" (your only card in one suit), in order to be able to trump— sometimes disparagingly called "Whitechapelling"—is not generally good play, and results badly unless the side is strong in trumps, but in some circumstances it is useful. Do not lead from a "tenace" (*i.e.* best and third best of a suit) if you have another equally good suit. Remember that whist is a game of combination, and that tricks made by your partner are just as valuable to you as tricks made by yourself. Sort your hand so as to keep the suits separate, red and black alternately, keeping the cards each in order of their value.

For Long Whist the play of the hands and the laws of the game are practically the same as at ordinary or "short" whist, but a more venturesome style of play may be adopted in view of the number of points required, *i.e.* a certain amount of risk may be taken when the odd trick is a certainty in the hope of getting two or three tricks instead. With the score at nine, honours cannot be secured, but at eight a player who holds *two* honours may ask his partner before playing if he too holds an honour, the formula being "Can you *one*, partner?" If the answer is "Yes," the honours are scored and the game ends. There is no "treble" at long whist. A double is scored when the losers are less than five, a single if they have made five or more. The game, however, is almost obsolete.

Progressive Whist.—This form of the game is social rather than scientific, but is a pleasant variety on the ordinary round game. The host provides prizes, as a rule—first, second and "booby" prizes for both ladies and gentlemen, the "booby" prizes going to the players who make the fewest points. Any number of tables may be formed. Partners are selected by lot, two ladies and two gentlemen never being partners. This can be done by means of two sets of tickets of different colours, numbered identically, No. 1 pairing with No. 1 and so on. After the first round there is no drawing for partners, as will be seen. The holders of all tickets numbered 1 and 2 form the first table, of 3 and 4 the second table. Only one pack of cards is needed at each table, but every player should be provided with a scoring card and pencil. The players at all the tables cut for deal, but no dealing is begun before a signal given by the master of the ceremonies. At each table one hand only is played. Honours are not counted. The score is marked by the number of tricks made, or the winner may mark all tricks above six. The winners remain at their original tables. The losers move on, from No. 1 table to No. 2, from No. 2 to No. 3 and from the last table to No. 1. Partners are formed afresh, the gentleman who has just won playing with the lady who has just lost, and *vice versa*. Play may last for one or more complete rounds, or for a given time, indicated by a signal, after which no fresh hand is begun. The scores are then added up and the prizes awarded. In playing the ordinary rules of whist are observed.

A printed existence was first given to the laws of whist by Hoyle in 1743. The fourteen laws then issued were subsequently increased to twenty-four. These laws were the authority until 1760, when the members of White's and Saunders's Chocolate Houses revised them. The revised laws (nearly all Hoyle) were accepted by whist players for over a century, notwithstanding that they were very incomplete. The laws of short whist, a more comprehensive code approved by the Portland and Arlington clubs, were brought out in 1864, and became the accepted standard, small modifications only having been introduced since. The latest edition of the rules should be consulted for what is not indicated in the text.

See *Principles of Whist, Stated and Explained*, by "Cavendish" (London, 1902), the most authoritative work.

WHISTLE, the shrill warbling sound made by forcing the breath through the lips, contracted to form a small orifice, or produced by means of an instrument of the whistle type; also, generally, any similar shrill, hissing or warbling sound, as of a bird's note, of wind through trees, ropes, &c. The O. Eng. *hwistlian*, to whistle, and *hwistlere*, whistler, piper, are closely allied to *hwisprian* or *hwæstrian*, to whisper, to speak softly or under one's breath; and both are imitative words, representing a shrill hissing sound, cf. Ger. *wispeln*, to whisper, Dan. *hvisle*, to whistle. The instrument known as a "whistle" takes many forms, from the straight flute and flageolet type made of wood or metal and pierced with holes, to the metal signalling pipe used for signalling on board ship or by policemen. Similarly the term is used of the instruments sounded by the escape of steam on a locomotive or other engine and on steamships, &c., as a means of giving signals.

WHISTLER, JAMES ABBOTT McNEILL (1834–1903), American artist, was born at Lowell, Massachusetts, on the 10th of July 1834. His father was Major G. W. Whistler, and his mother one of the Baltimore family of Winans. He was first heard of in Europe in 1857, when he had already been an art student, in Paris, in the studio of Gleyre. His first etchings, those known as "The French Set," were the means of bringing him under the notice of certain people interested in art, but the circulation of these first, like that of his later etchings, has always, of necessity, been more limited than their fame. The impressions from each plate are generally few. It was still in etching that Whistler continued his labours, and, coming to London in 1859, it appears, he almost at once addressed himself to the chronicle of the quaint riverside buildings and the craft of the great stream—the Thames "below Bridge." The "French Set" had included De Hooch-like or Nicholas Maes-like genre pieces, such as "La Vieille aux loques," the "Marchande de moutarde," and "The Kitchen," this last incomparably improved and perfected by the retouching that was accomplished a quarter of a century after the first performance. The Thames series of sixteen etchings, wrought chiefly in 1859, disclosed a new vision of the river, in which there was expressed, with perfect draughtsmanship, with a hitherto unparalleled command of vivacious line, the form of barge and clipper, of warehouse, wharf and waterside tavern. "The Pool," "Thames Police" and "Black Lion Wharf" are perhaps the finest of this series. Before it was begun, Whistler, ere he left Paris, had proceeded far with a plate, existing only in the state of trial proof, and, in that, of extreme rarity. It is called "Paris, Île de la Cité," and has distinct and curious manifestations of a style to be more generally adopted at a later period. For several years after the completion of the "Sixteen Etchings," Whistler etched comparatively little; but about 1870 we find him entering what has been described as his "Leyland period," on account of his connexion with the wealthy shipowner and art patron, Mr Frederick R. Leyland, of Prince's Gate, whose house became famous for Whistler's Peacock Room,[1] painted in 1877. In that period he worked greatly in dry-point. The "Model Resting," one of the most graceful of his figure pieces, and "Fanny Leyland"—an exquisite instance of girl portraiture—are notable performances of this time. To it also belong the largely conceived dry-points, so economical of means and endowed with so singular a unity of effect, the "London Bridge" and "Price's Candle-works." A little later came the splendid visions of the then disappearing wooden bridges of Battersea and Putney, and the plate "The Adam and Eve," which records the river-front of old Chelsea. This, however, is only seen in perfection in the most rare proofs taken before the publication by the firm of Hogarth. From these plates we pass almost imperceptibly to the period of the Venetian etchings, for in 1879, at the instance of the Fine Art Society, Whistler made a sojourn in Venice, and here he wrought, or, to speak accurately, commenced, not only the set of prints known as the "Venice Set," but also the "Twenty-six Etchings"—likewise chiefly, though not wholly, of Venice—issued later by the firm of Dowdeswell. One or two of the minor English subjects of the "Twenty-six Etchings"—those done after the artist's return from Venice—give indications of the phase reached more clearly in certain little prints executed a few years later, and, with perhaps one exception, never formally published. "Fruit Shop," "Old Clothes Shop," and "Fish Shop, busy Chelsea," belong to this time. Later, and bent upon doing justice to quite different themes, which demand different methods, the ever flexible artist again changes his way, and—not to speak of the dainty little records of the places about the Loire, which in method have affinity with the pieces last named—we have "Steps, Amsterdam," "Nocturne, Dance House," with its magical suggestion of movement and light, and the admirable landscape "Zaandam." With the mention of these things may fitly close a sketch of Whistler's periods in etching; but before proceeding to other branches of his work, the main characteristics of the whole series of etchings (of which, in Wedmore's *Whistler's Etchings*, nearly 300 examples are described) should be briefly indicated. These main characteristics are precision and vivacity; freedom, flexibility, infinite technical resource, at the service always of the most alert and comprehensive observation; an eye that no picturesqueness of light and shade, no interesting grouping of line, can ever escape—an eye, that is, that is emancipated from conventionality, and sees these things therefore with equal willingness in a cathedral and a mass of scaffolding, in a Chelsea shop and in a suave nude figure, in the façade of a Flemish palace and in a "great wheel" at West Kensington. Mr Whistler's pictures have as a chief source of their attractiveness those mental qualities of alertness and emancipation. Charm of colour and of handling enhance the hold which they obtain upon such people of taste as may be ready to receive them. There are but very few of them, however, at least very few oil pictures, when one considers the number of years since the artist began to labour; and one notable fact must be at once understood—the admitted masterpieces in painting belong almost entirely to the earlier time. "Sarasate" is an exception, and "Lady Archibald Campbell," and in its smaller, but still charming, way "The Little Rose of Lyme Regis"; but even these—save the "Little Rose"—are of 1885 or thereabouts. A few years earlier than they are the "Connie Gilchrist," the "Miss Alexander," and the "Rosa Corder," and the Thames "Nocturnes"; but we go farther back to reach the "Portrait of the Painter's Mother," which is now in the Luxembourg; the "Portrait of Carlyle," now at Glasgow; the "Cremorne Gardens," the "Nocturne, Valparaiso Harbour," the "Music Room," with little Miss Annie Haden standing by the piano while her mother plays, and the "White Girl," or "Little White Girl," in which Whistler shows the influence, but never the domination, of the Japanese. Of the slight but always exquisitely harmonious studies in water colour, undertaken by Whistler in his middle period, none call for special notice. To the middle time, too, belong, not perhaps all of his slight but delicately modelled pastels of the figure, but at least his more universally accepted pastels of Venetian scenes, in which he caught the sleepy beauty of the Venetian by-way. In pastel, as in painting, in water colour and in etching, Whistler has never been unmindful of the particular qualities of the medium in which he has worked, nor of the applicability of a given medium to a given subject. The result, accordingly, is not now a victory and now a failure, now a "hit" and now a "miss," but rather a succession of triumphs great and small. One other medium taken up by Whistler must now be mentioned. His lithographs—his drawings on the stone in many instances, and in others his drawings on that "lithographic paper" which with some people is the easy substitute for the stone to-day—are perhaps half as numerous as his etchings. Mr T. R. Way has catalogued about a hundred. Some of the lithographs are of figures slightly draped; two or three of the very finest are of Thames subjects—including a "nocturne" at Limehouse, of unimaginable and poetic mystery; others are bright and dainty indications of quaint prettiness in the old Faubourg St Germain, and of the sober lines of certain Georgian churches in Soho and Bloomsbury. An initiator in his own generation, and ever tastefully experimental, Whistler no doubt has found enjoyment in the variety of the mediums he has worked in, and in the variety of subjects he has brilliantly tackled. The absence of concentration in the Whistlerian temperament, the lack of great continuity of effort, may probably prove a drawback to his taking exactly the place as a painter of oil pictures, which, in other circumstances, his genius and his taste would most certainly have secured for him. In the future Whistler must be accounted, in oil painting, a master exquisite but rare. But the number and the range of his etched subjects and the extraordinary variety of perception and of skill which he has brought to bear upon the execution of his nearly three hundred coppers, ensure, and have indeed already compassed, the acceptance of him as a master among masters in that art of etching. Rembrandt's, Van Dyck's, Méryon's, Claude's, are, in fact, the only names which there is full warranty for pronouncing beside his own.

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[1] Whistler quarrelled with Leyland, and eventually painted his [illegible] portrait as [illegible]nd hoofs.

No account of Whistler's career would be complete without a reference to his supremely controversial personality. In 1878 he brought a libel action against Ruskin for his criticisms in *Fors Clavigera* (1877). Ruskin had denounced one of his nocturnes at the Grosvenor Gallery as "a pot of paint flung in the public face." After a long trial, Whistler was awarded a farthing damages. His examination caused much interest, especially in artistic circles, on account of his attitude in vindication of the purely artistic side of art; and it was in the course of it that he answered the question as to how long a certain "impression" had taken him to execute by saying, "All my life." His eccentricity of pose and dress, combined with his artistic arrogance, sharp tongue, and bitter humour, made him one of the most talked-about men in London, and his *mots* were quoted everywhere. He followed up his quarrel with Ruskin by publishing a satirical pamphlet, *Whistler* v. *Ruskin: Art* v. *Art Critics*. In 1885 he gave his *Ten o'Clock Lecture* in London, afterwards embodied in *The Gentle Art of Making Enemies* (1890). The substance of this flippantly written and amusing outburst was an insistence on the liberty of the artist to do what was right in his artistic eyes, and the inability of the public or the critics to have any ideas about art worth considering at all. In 1895 another quarrel, with Sir William Eden, whose wife's portrait Whistler had painted, but refused to hand over, came into the courts in Paris; and Whistler, though allowed to keep his picture, was condemned in damages. In later years he lived mainly in Paris, but he returned to live in London in 1902; and he died on the 17th of July 1903 at 74 Cheyne Walk, Chelsea. In 1888 he had married Mrs Goodwin, widow of E. W. Goodwin, the architect, and daughter of J. B. Philip, the sculptor; she died in 1896, leaving no children. In 1886 he became president of the Royal Society of British Artists (a title at which afterwards he scoffed); and he took a leading part later in founding the International Art Society, of which he was the first president. His "Nocturne in blue and silver" was presented to the National Gallery after his death by the National Art Collection Fund.

See also T. R. Way and G. R. Dennis, *The Art of J. McN. Whistler* (1901); F. Wedmore, *Mr Whistler's Etchings*; Théodore Duret, *Histoire de J. McN. Whistler et de son œuvre* (1904); Mortimer Menpes, *Whistler as I knew him*; W. G. Bowdoin, *Whistler, the Man and his Work* (1902); Catalogue of Memorial Exhibition (International Society, 1905); and E. R. and J. Pennell, *The Life of James McNeill Whistler* (1908). (F. WE.)

WHISTON, WILLIAM (1667–1752), English divine and mathematician, was born on the 9th of December 1667 at Norton in Leicestershire, of which village his father was rector. He was educated privately, partly on account of the delicacy of his health, and partly that he might act as amanuensis to his father, who had lost his sight. He afterwards entered at Clare College, Cambridge, where he applied himself to mathematical study, and obtained a fellowship in 1693. He next became chaplain to John Moore (1646–1714), the learned bishop of Norwich, from whom he received the living of Lowestoft in 1698. He had already given several proofs of his noble but over-scrupulous conscientiousness, and at the same time of a propensity to paradox. His *New Theory of the Earth* (1696), although destitute of sound scientific foundation, obtained the praise of both Newton and Locke, the latter of whom justly classed the author among those who, if not adding much to our knowledge, "at least bring some new things to our thoughts." In 1701 he resigned his living to become deputy at Cambridge to Sir Isaac Newton, whom two years later he succeeded as Lucasian professor of mathematics. In 1707 he was Boyle lecturer. For several years Whiston continued to write and preach both on mathematical and theological subjects with considerable success; but his study of the *Apostolical Constitutions* had convinced him that Arianism was the creed of the primitive church; and with him to form an opinion and to publish it were things almost simultaneous. His heterodoxy soon became notorious, and in 1710 he was deprived of his professorship and expelled from the university. The rest of his life was spent in incessant controversy—theological, mathematical, chronological and miscellaneous. He vindicated his estimate of the *Apostolical Constitutions* and the Arian views he had derived from them in his *Primitive Christianity Revived* (5 vols., 1711–1712). In 1713 he produced a reformed liturgy, and soon afterwards founded a society for promoting primitive Christianity, lecturing in support of his theories at London, Bath and Tunbridge Wells. One of the most valuable of his books, the *Life of Samuel Clarke*, appeared in 1730. While heretical on so many points, he was a firm believer in supernatural Christianity, and frequently took the field in defence of prophecy and miracle, including anointing the sick and touching for the king's evil. His dislike to rationalism in religion also made him one of the numerous opponents of Benjamin Hoadly's *Plain Account of the Nature and End of the Sacrament*. He proved to his own satisfaction that Canticles was apocryphal and that Baruch was not. He was ever pressing his views of ecclesiastical government and discipline, derived from the *Apostolical Constitutions*, on the ecclesiastical authorities, and marvelled that they could not see the matter in the same light as himself. He assailed the memory of Athanasius with a virulence at least equal to that with which orthodox divines had treated Arius. He attacked Sir Isaac Newton's chronological system with success; but he himself lost not only time but money in an endeavour to discover the longitude. Of all his singular opinions the best known is his advocacy of clerical monogamy, immortalized in the *Vicar of Wakefield*. Of all his labours the most useful is his translation of Josephus (1737), with valuable notes and dissertations, often reprinted. His last "famous discovery, or rather revival of Dr Giles Fletcher's," which he mentions in his autobiography with infinite complacency, was the identification of the Tatars with the lost tribes of Israel. In 1745 he published his *Primitive New Testament*. About the same time (1747) he finally left the Anglican communion for the Baptist, leaving the church literally as well as figuratively by quitting it as the clergyman began to read the Athanasian creed. He died in London, at the house of his son-in-law, on the 22nd of August 1752, leaving a memoir (3 vols., 1749–1750) which deserves more attention than it has received, both for its characteristic individuality and as a storehouse of curious anecdotes and illustrations of the religious and moral tendencies of the age. It does not, however, contain any account of the proceedings taken against him at Cambridge, these having been published separately at the time.

Whiston is a striking example of the association of an entirely paradoxical bent of mind with proficiency in the exact sciences. He also illustrates the possibility of arriving at rationalistic conclusions in theology without the slightest tincture of the rationalistic temper. He was not only paradoxical to the verge of craziness, but intolerant to the verge of bigotry. "I had a mind," he says, "to hear Dr (John) Gill preach. But, being informed that he had written a folio book on the Canticles, I declined to go to hear him." When not engaged in controversy he was not devoid of good sense. He often saw men and things very clearly, and some of his *bons mots* are admirable.

WHITAKER, JOSEPH (1820–1895), English publisher, was born in London on the 4th of May 1820, and apprenticed to a bookseller at the age of fourteen. After a long experience with various bookselling firms, he began business on his own account as a theological publisher. In January 1858 he started the *Bookseller*, and for 1869 published the first issue of *Whitaker's Almanack*, the annual work of reference, which also met with immediate success. In 1874 he published the first edition of the *Reference Catalogue of Current Literature*, of which several editions have since appeared. Whitaker died at Enfield on the 15th of May 1895. He had been the father of fifteen children.

WHITBREAD, SAMUEL (1758–1815), English politician, came of a Bedfordshire Nonconformist family; his father had made a considerable fortune as owner of the well-known brewery associated with his name. Educated at Eton and St John's College, Cambridge (after originally going to Christ Church, Oxford), he began by entering the brewing business; but after his marriage with the daughter of the 1st Earl Grey in 1789 he took to politics, and in 1790 was elected for Bedfordshire as a Whig, attaching himself to Fox. He became known as a social and financial reformer and a constant assailant in parliament of all sorts of abuses. It was on his motion in 1805 that Lord Melville was impeached for financial maladministration of the navy, and he conducted the case for the prosecution. His Poor Law bill in 1807, an elaborate Radical scheme, came to nothing. Whitbread continued to be a constant speaker in parliament, and the principal representative of Liberal criticism, a monument of opposition tactics. He opposed the regency, championed the princess of Wales, and led the peace party, and the caricaturists were busy with his personality. In 1809 he became chairman of the committee for rebuilding Drury Lane theatre, and for some time he was immersed in controversies connected with it, which eventually seem to have unstrung his mind, for he committed suicide on the 6th of July 1815. The Whitbread influence in Liberal politics continued to be very strong in Bedfordshire in later generations, his son William Henry (from 1818 to 1837) and grandson Samuel (from 1852 to 1895) representing Bedford for many years.

WHITBY, a seaport, watering-place and market town in the Whitby parliamentary division of the North Riding of Yorkshire, England, 245 m. N. from London, on the North-Eastern railway. Pop. of urban district (1901) 11,755. There are a terminal station in the town and a station at West Cliff on the Saltburn branch. Whitby is beautifully situated at the mouth and on both banks of the River Esk; the old town of narrow streets and picturesque houses standing on the steep slopes above the river, while the modern residential quarter is mainly on the summit of West Cliff. A long flight of steps leads up the eastern height to the abbey, the ruins of which gain a wonderful dignity from their commanding position. This was a foundation of Oswy, king of Northumbria, in 658, in fulfilment of a vow for a victory over Penda, king of Mercia. It embraced an establishment for monks and (until the Conquest) for nuns of the Benedictine order, and under Hilda, a grand-niece of Edwin, a former king of Northumbria, acquired high celebrity. The existing ruins comprise parts of the Early English choir, the north transept, also Early English but of later date, and the rich Decorated nave. The west side of the nave fell in 1763 and the tower in 1830. On the south side are foundations of cloisters and domestic buildings. Adjoining the abbey is Whitby Hall, built by Sir Francis Cholmley about 1580 from the materials of the monastic buildings, and enlarged and fortified by Sir Hugh Cholmley about 1635. A little below the abbey is the parish church of St Mary, originally Norman, and retaining traces of the first building; owing to a variety of alterations at different periods, and the erection of high wooden pews and galleries, its appearance is more remarkable than beautiful. A modern cross in the churchyard commemorates St Caedmon, the Northumbrian poet (*c.* 670), who was a monk at the abbey and there died. Other features of the town are the pleasant promenades and gardens on West Cliff, the antiquarian and geological museum, and an excellent golf course. The coast is cliff-bound and very beautiful both to the north and to the south, while inland the Esk traverses a lovely wooded vale, surrounded by open, high-lying moors. Whitby is a quiet resort, possessing none of the brilliance of Scarborough on the same coast. A large fishing industry is carried on from the harbour, which is formed by the mouth of the river and protected by two piers. The manufacture of ornaments from the jet found in the vicinity forms a considerable industry. The jet is a species of petrified wood found towards the bottom of the Upper Lias, and its use for the purpose of ornament dates from very early times. A former activity in shipbuilding is of interest through the recollection that here were constructed the ships for Captain Cook's voyages. Wooden ships and boats are still built, and [illegible] and sail-making are carried on.

Whitby (*Streanaeshalch* c. 657–857; *Prestebi* c. 857–1080; [illegible] c. 857 onwards) is first mentioned by Bede, who states that a religious house was established here about A.D. 657. In the 9th century it was destroyed by the Danes, but being refounded became the centre of a Danish colony, and until laid waste by the Conqueror was the most prosperous town in the district. Henry I. made a grant to the abbot and convent of Whitby of a burgage in the vill of Whitby, and Richard de Waterville, abbot 1175–1190, granted the town in free burgage to the burgesses. In 1200 King John, bribed by the burgesses, confirmed this charter, but in 1201, bribed by the successor of Richard de Waterville, quashed it as injurious to the dignity of the church of Whitby. A bitter struggle went on, however, till the 14th century, when a trial resulted in a judgment against the burgesses. In 1629 Whitby petitioned for incorporation on the ground that the town was in decay through want of good government and received letters patent giving them self-government. However, in 1674–1675 the crown, probably in gratitude for the part played by the Cholmleys in the Civil War, restored to the lords of the manor all the liberties ever enjoyed by the abbots of Whitby in Whitby and Whitby Strand. Whitby became a parliamentary borough under the Reform Act of 1832, returning one member until it was disfranchised under the Redistribution of Seats Act 1885. At the beginning of the 14th century Sir Alexander Percy claimed the hereditary right of buying and selling in Whitby without payment of toll. The market was held time out of mind on Sunday until the reign of Henry VI., who changed the day to Saturday, still the market day. A fortnightly cattle market was granted by Charles I. Henry I. granted to the abbot of Whitby a fair at the feast of St Hilda and the king's firm peace to all coming to the fair. A second fair was used later, but neither of them is any longer held. There was a port at Whitby in the 12th century and probably before, and though never important there have always since been traces of Whitby shipping and merchandise. In medieval times the salting and sale of herrings and the sale of cod, fish and other products of the North Sea fishery were the only industries. Whale-fishing began in 1753.

See J. C. Atkinson, *Memorials of Old Whitby* (London, 1894); Lionel Charlton, *History of Whitby* (York, 1779); George Young, *History of Whitby* (Whitby, 1817); *Victoria County History, Yorkshire, North Riding.*

WHITCHURCH, a market town in the Newport parliamentary division of Shropshire, England, 171 m. N.W. from London on a joint line of the London & North-Western and Great Western railways, and the terminus of the Cambrian railway. Pop. of urban district (1901) 5221. Malting and cheese-making are the principal industries. The church of St Alkmund, rebuilt in the 18th century, retains the fine tomb of John Talbot, first earl of Shrewsbury, who fell at the battle of Bordeaux (1453). The town hall and other public buildings are modern. The grammar school was founded in 1550, and here (*c.* 1791) Reginald Heber, Bishop of Calcutta, was educated. The parish of Whitchurch extends into Cheshire.

Whitchurch was at first known as *Westune* and belonged before the Conquest to King Harold, but was afterwards granted to Earl Roger, of whom William de Warenne was holding it at the time of the Domesday Survey. The name is said to have been altered to Whitchurch or Album Monasterium on account of a stone church built there soon after 1086. The manor appears to have been held by a younger branch of the Warenne family, from whom it passed by marriage to the families of Lestrange and Talbot. It was sold by the Talbots to Thomas Egerton, from whom it passed to the earls of Bridgwater and eventually to the present owner, Earl Brownlow. Whitchurch is mentioned as a borough in the 14th century, and was governed by a bailiff, but its privileges, which sprang up with the castle, appear to have disappeared after its decay. The town has never been represented in parliament nor noted for any trade except agriculture. In 1228 John Fitz-Alan received the right of changing the day of the market he held at Whitchurch from Thursday to Monday, and in 1362 a fair lasting three days from the feast of SS. Simon and Jude was granted to John Lestrange. Lord Brownlow granted the market rights to the local authority.

WHITE, ANDREW DICKSON (1832–), American educationist, was born in Homer, New York, on the 7th of November 1832. He graduated at Yale (A.B.) in 1853, studied at the Sorbonne in 1854, and at the University of Berlin in 1855–1856, meanwhile serving as attaché at the United States Legation at St Petersburg in 1854–1855. He was professor of history and English literature in 1857–1863, and lecturer on history in 1863–1867 at the University of Michigan. In 1864–1867 he was a member of the New York state Senate, and as chairman of the Committee on Education took an active part in formulating the educational features of the bill under which Cornell University (*q.v.*) was incorporated (1865). At Mr Cornell's suggestion Mr White drew up a plan of organization for the institution, and in 1867 became its first president, which post he held continuously until 1885, serving thereafter as a member of the board of trustees and of its executive committee. During his administration he greatly strengthened the curriculum of the university, to which he gave his architectural library, and, upon his retirement, his historical and general library of about 20,000 volumes (including bound collections of pamphlets) and about 3000 unbound pamphlets, which was installed in a special room in the main library building of the university. In recognition of this gift the departments of history and political science of the university have been named the President White School of History and Political Science. In 1870 President Grant appointed Benjamin F. Wade, Mr White and Samuel G. Howe a commission to visit Santo Domingo and report on the advisability of the president's project for annexing it to the United States, and in 1895 he was appointed by President Cleveland a member of the commission established to determine the boundary between Venezuela and British Guiana. Dr White was United States minister to Germany in 1879–1881, and to Russia in 1892–1894, and was United States ambassador to Germany in 1897–1903. In 1899 he was president of the American delegation at the Hague Peace Conference. He received the degree of LL.D. from the University of Michigan (1867), from Cornell (1886), from Yale (1887), from St Andrews, Scotland (1902), from Johns Hopkins, (1902), and from Dartmouth (1906); L.H.D. from Columbia (1887) and D.C.L. from Oxford (1902). He was also made an officer of the Legion of Honour, was awarded the royal gold medal of Prussia for arts and sciences in 1902, was president of the American Historical Association, of which he was a founder, in 1884, and was actively identified with various other learned bodies.

His publications include *The Greater States of Continental Europe* (1874); *A History of the Warfare of Science with Theology in Christendom* (2 vols., 1896), his most important work, his *Autobiography* (2 vols., New York, 1905) and *Seven Great Statesmen* (1910).

WHITE, SIR GEORGE STUART (1835–), British field marshal, the son of an Irish country gentleman, was born in County Antrim on the 6th of July 1835. He was educated at Sandhurst, and in 1853 joined the Inniskillings, with which regiment he served in India during the Mutiny in 1857. In the second Afghan War (1878–80) he was second in command of the Gordon Highlanders, whom he led in their charge at the battle of Charasiah. For conspicuous gallantry in this action, and again shortly afterwards at Kandahar, he received the Victoria Cross. In 1881 he assumed command of the Gordon Highlanders, and took part in the Nile Expedition of 1884–85. As brigadier in the Burmese War (1885–87) he rendered distinguished service, for which he was promoted major-general; and when Sir Frederick (afterwards Lord) Roberts returned to India from Burma in 1887, White was left in command of the force charged with the duty of suppressing the dacoits and pacifying the country. This he accomplished with a thoroughness which earned the thanks of the government of India. He was in command of the Zhob expedition in 1890, and in 1893 he succeeded Lord Roberts as commander-in-chief in India; and during his tenure of this office directed the conduct of the Chitral expedition in 1895 and the Tirah campaign in 1897. In the latter year he was made G.C.B. and in 1898 G.C.S.I. Returning to England in 1898 he became quartermaster-general to the forces; and on the outbreak of the Boer War in 1899 he was given command of the forces in Natal. He defeated the Boers at Elandslaagte on the 21st of October 1899 and at Reitfontein on the 24th; but the superior numbers of the Boers enabled them to invest Ladysmith, which Sir George White defended in a siege lasting 119 days, from the 2nd of November 1899 to the 1st of March 1900, in the course of which he refused to entertain Sir Redvers Buller's suggestion that he should arrange terms of capitulation with the enemy (see LADYSMITH, SIEGE and RELIEF OF). After the relief of Ladysmith, White, whose health had been impaired by the siege, returned to England, and was appointed governor of Gibraltar (1900–1904). King Edward VII., who visited the fortress in 1903, personally gave him the baton of a field marshal. In 1905 Sir George White was appointed governor of Chelsea Hospital, and in the same year was decorated with the Order of Merit.

See T. F. G. Coates, *Sir George White* (1900).

WHITE, GILBERT (1720–1793), English writer on natural history, was born on the 18th of July 1720 in the little Hampshire village of Selborne, which his writings have rendered so familiar to all lovers of either books or nature. He was educated at Basingstoke under Thomas Warton, father of the poet, and subsequently at Oriel College, Oxford, where in 1744 he was elected to a fellowship. Ordained in 1747, he became curate at Swarraton the same year and at Selborne in 1751. In 1752 he was nominated junior proctor at Oxford and became dean of his college. In 1753 he accepted the curacy of Durley, and in 1757 he was a candidate for the provostship of Oriel, but failed to secure election. Soon afterwards he received the college living of Moreton Pinkney, though he did not reside there, and in 1761 he became curate at Faringdon, near Selborne, a position which he held until in 1784 he again became curate in his native parish. He died in his home, The Wakes, Selborne, on the 26th of June 1793.

Gilbert White's daily life was practically unbroken by any great changes or incidents; for nearly half a century his pastoral duties, his watchful country walks, the assiduous care of his garden, and the scrupulous posting of his calendar of observations made up the essentials of a full and delightful life, but hardly of a biography. At most we can only fill up the portrait by reference to the tinge of simple old-fashioned scholarship, which on its historic side made him an eager searcher for antiquities and among old records, and on its poetic occasionally stirred him to an excursion as far as that gentlest slope of Parnassus inhabited by the descriptive muse. Hence we are thrown back upon that correspondence with brother naturalists which has raised his life and its influence so far beyond the commonplace. His strong naturalist tendencies are not, however, properly to be realized without a glance at the history of his younger brothers. The eldest, Thomas, retired from trade to devote himself to natural and physical science, and contributed many papers to the Royal Society, of which he was a fellow. The next, Benjamin, became the publisher of most of the leading works of natural history which appeared during his lifetime, including that of his brother. The third, John, became chaplain at Gibraltar, where he accumulated much material for a work on the natural history of the rock and its neighbourhood, and carried on a scientific correspondence, not only with his eldest brother, but with Linnaeus. The youngest, Henry, was vicar of Fyfield, near Andover. The sister's son, Samuel Barker, also became in time one of White's most valued correspondents. With other naturalists, too, he had intimate relations: with Thomas Pennant and Daines Barrington he was in constant correspondence, often too with the botanist John Lightfoot, and sometimes with Sir Joseph Banks and others, while Richard Chandler and other antiquaries kept alive his historic zeal. At first he was content to furnish information from which the works of Pennant and Barrington largely profited; but gradually the ambition of separate authorship developed from a suggestion thrown out by the latter of these writers in 1770. The next year White sketched to Pennant the project of "a natural history of my native parish, an *annus historico-naturalis*, comprising a journal for a whole year, and illustrated with large notes and observations. Such a beginning might induce more able naturalists to write the history of various districts and might in time occasion the production of a work so much to be wished for—a full and complete natural history of these kingdoms." Yet the famous *Natural History and Antiquities of Selborne* did not appear until 1789. It was well received from the beginning, and has been reprinted time after time.

To be a typical parish natural history so far as completeness or order is concerned, it has of course no pretensions; batches of letters, an essay on antiquities, a naturalist's calendar and miscellaneous jottings of all kinds are but the unsystematized material of the work proper, which was never written. Yet it is largely to this very piecemeal character that its popularity has been due. The style has the simple, yet fresh and graphic, directness of all good letter-writing, and there is no lack of passages of keen observation, and even shrewd interpretation. White not only notes the homes and ways, the times and seasons, of plants and animals—comparing, for instance, the different ways in which the squirrel, the field-mouse and the nuthatch eat their hazel-nuts—or watches the migrations of birds, which were then only beginning to be properly recorded or understood, but he knows more than any other observer until Charles Darwin about the habits and the usefulness of the earthworms, and is certain that plants distil dew and do not merely condense it. The book is also interesting as having appeared on the borderland between the medieval and the modern school of natural history, avoiding the uncritical blundering of the old Encyclopaedists, without entering on the technical and analytic character of the opening age of separate monographs. Moreover, as the first book which raised natural history into the region of literature, much as the *Compleat Angler* did for that gentle art, we must affiliate to it the more finished products of later writers like Thoreau or Richard Jefferies. Yet, while these are essential merits of the book, its endearing charm lies deeper, in the sweet and kindly personality of the author, who on his rambles gathers no spoil, but watches the birds and field-mice without disturbing them from their nests, and quietly plants an acorn where he thinks an oak is wanted, or sows beech-nuts in what is now a stately row. He overflows with anecdotes, seldom indeed gets beyond the anecdotal stage, yet from this all study of nature must begin; and he sees everywhere intelligence and beauty, love and sociality, where a later view of nature insists primarily on mere adaptation of interests or purely competitive struggles. The encyclopaedic interest in nature, although in White's day culminating in the monumental synthesis of Buffon, was also disappearing before the analytic specialism inaugurated by Linnaeus; yet the catholic interests of the simple naturalist of Selborne fully reappear a century later in the greater naturalist of Down, Charles Darwin.

The *Life and Letters of Gilbert White of Selborne*, by his great grandnephew, Rashleigh Holt-White, appeared in 1901.

WHITE, HENRY KIRKE (1785–1806), English poet, was born at Nottingham, the son of a butcher, on the 21st of March 1785. He was destined at first for his father's trade, but after a short apprenticeship to a stocking-weaver, was eventually articled to a lawyer. Meanwhile he studied hard, and his master offered to release him from his contract if he had sufficient means to go to college. He received encouragement from Capel Lofft, the friend of Robert Bloomfield, and published in 1803 *Clifton Grove, a Sketch in Verse, with other Poems*, dedicated to Georgiana, duchess of Devonshire. The book was violently attacked in the *Monthly Review* (February 1804), but White was in some degree compensated by a kind letter from Robert Southey. Through the efforts of his friends, he was entered as a sizar at St John's College, Cambridge, spending a year beforehand with a private tutor. Close application to study induced a serious illness, and fears were entertained for his sanity, but he went into residence at Cambridge, with a view to taking holy orders, in the autumn of 1805. The strain of continuous study proved fatal, and he died on the 19th of October 1806. He was buried in the church of All Saints, Cambridge. The genuine piety of his religious verses secured a place in popular hymnology for some of his hymns. Much of his fame was due to sympathy inspired by his early death, but it is noteworthy that Byron agreed with Southey in forming a high estimate of the young man's promise.

His *Remains*, with his letters and an account of his life, were edited (3 vols., 1807–1822) by Robert Southey. See prefatory notices by Sir Harris Nicolas to his *Poetical Works* (new ed., 1866) in the "Aldine Edition" of the British poets; by H. K. Swann in the volume of selections (1897) in the *Canterbury Poets*; and by John Drinkwater [illegible] in the "Muses' Library." See also J. T. Godfrey and [illegible] *The Homes and Haunts of Henry Kirke White* (1908).

WHITE, HUGH LAWSON (1773–1840), American statesman, was born in Iredell county, North Carolina, on the 30th of October 1773. In 1787 he crossed the mountains into East Tennessee (then a part of North Carolina) with his father James White (1737–1815), who was subsequently prominent in the early history of Tennessee. Hugh became in 1790 secretary to Governor William Blount, and in 1792–1793 served under John Sevier against the Creek and Cherokee Indians, and in the battle of Etowah (December 1793), according to the accepted tradition, killed with his own hand the Cherokee chief Kingfisher. He studied in Philadelphia and in 1796 he was admitted to the bar at Knoxville. He was a judge of the Superior Court of Tennessee in 1801–1807, a state senator in 1807–1809, and in 1809–1815 was judge of the newly organized Supreme Court of Errors and Appeals of the state. From 1812 to 1827 he was president of the State Bank of Tennessee at Knoxville, and managed it so well that for several years during this period it was the only western bank that in the trying period during and after the War of 1812 did not suspend specie payments. In 1821–1824 he was a member of the Spanish Claims Commission, and in 1825 succeeded Andrew Jackson in the United States Senate, serving until 1840 and being president *pro tem.* in 1832–1834. In the Senate he opposed internal improvements by the Federal government and the recharter of the United States Bank, favoured a protective tariff and Jackson's coercive policy in regard to nullification, and in general supported the measures of President Jackson, though his opposition to the latter's indiscriminate appointments caused a coolness between himself and Jackson, which was increased by White's refusal to vote to expunge the resolutions of a former Senate censuring the president. In 1830, as chairman of the Committee on Indian Affairs, he secured the passage of a bill looking to the removal of the Indians to lands west of the Mississippi. He was opposed to Van Buren, Jackson's candidate for the presidency in 1836, was himself nominated in several states as an independent candidate, and received the twenty-six electoral votes of Tennessee and Georgia, though President Jackson made strong efforts to defeat him in the former state. About 1838 he became a Whig in politics, and when the Democratic legislature of Tennessee instructed him to vote for Van Buren's sub-treasury scheme he objected and resigned (Jan. 1840). His strict principles and his conservatism won for him the sobriquet of "The Cato of the United States Senate." He died at Knoxville on the 10th of April 1840.

See Nancy N. Scott (ed.), *A Memoir of Hugh Lawson White* (Philadelphia, 1856).

WHITE, JOSEPH BLANCO (1775–1841), British theologian and poet, was born at Seville on the 11th of July 1775 He was educated for the Roman Catholic priesthood; but after his ordination (1800) religious doubts led him to escape from Spain to England (1810), where he ultimately entered the Anglican Church, having studied theology at Oxford and made the friendship of Arnold, Newman and Whately. He became tutor in the family of the last-named when he was made archbishop of Dublin (1831). While in this position he embraced Unitarian views; and he found an asylum amongst the Unitarians of Liverpool, where he died on the 20th of May 1841.

White edited *El Español*, a monthly Spanish magazine in London, from 1810 to 1814, and afterwards received a civil list pension of £250. His principal writings are *Doblado's Letters from Spain* (1822); *Evidence against Catholicism* (1825); *Second Travels of an Irish Gentleman in Search of a Religion* (2 vols., 1834); *Observations on Heresy and Orthodoxy* (1835). They all show literary ability, and were extensively read in their day. He also translated Paley's *Evidences* and the *Book of Common Prayer* into Spanish. He is best remembered, however, by his sonnet "Night and Death" ("Mysterious Night! when our first parent knew"), which was dedicated to S. T. Coleridge on its appearance in the *Bijou* for 1828 and has since found its way into several anthologies. Three versions are given in the *Academy* of the 12th of September 1891.

See *Life of the Rev. Joseph Blanco White, written by himself, with portions of his Correspondence*; edited by John Hamilton Thom (London, 3 vols., 1845).

WHITE, RICHARD GRANT (1822–1885), American Shakespearean scholar, philologist and essayist, was born in New York city, on the 23rd of May 1822. He graduated at the university of the City of New York in 1839, studied medicine and then law, and was admitted to the bar in 1845, but made no serious attempts to practise. He contributed (anonymously) musical criticisms to the New York *Courier and Enquirer*, of which he was co-editor in 1851–1858, and became a member of the staff of the New York *World*, when that paper was established in 1860. In 1861–1878 he was chief of the United States Revenue Marine Bureau, for the district of New York. When he was 21 years old he wrote his sonnet, "Washington: Pater Patriae," which, published anonymously, was frequently ascribed to Wordsworth, and by William Cullen Bryant was ascribed to Landor; White did not admit his authorship until 1852. In 1853 he contributed anonymously to *Putnam's Magazine* (October and November), an acute and destructive criticism of Collier's folio manuscript emendations of Shakespeare;[1] and in the following year this criticism was republished (with other matter) in his *Shakespeare's Scholar: being Historical and Critical Studies of his Text, Characters, and Commentators; with an Examination of Mr Collier's Folio of 1623*. During the Civil War he contributed to the *Spectator*, under the pseudonym, "A Yankee," a series of articles which greatly influenced English public opinion in favour of the North, while his clever and pungent satire, *The New Gospel of Peace; according to St Benjamin*, in four books (1863–1866)—also published anonymously—was an effective attack upon "copper-headism" and the advocates of "peace at any price." He died in New York on the 8th of April 1885.

In addition to those mentioned above, his Shakespearean publications include, *Essay on the Authorship of the Three Parts of King Henry VI.* (1859), *Memoirs of the Life of William Shakespeare; with an Essay towards the Expression of his Genius, and an account of the Rise and Progress of the English Drama to the Time of Shakespeare* (1865); an annotated edition of Shakespeare's works in 3 vols. (1883), and *Studies in Shakespeare* (1885), pleading for a rational treatment of the plays without over-annotation, textual or aesthetic. On linguistic subjects he wrote *Words and their Uses, Past and Present* (1870), and a sequel, *Every Day English* (1880), which without linguistic thoroughness, stimulated interest in the general subject of good use in language. His other publications include *National Hymns: How they are Written and How they are not Written* (1861), containing some of the best and worst of 1200 hymns submitted to a committee (of which White was a member) in a competition for a prize offered for a national hymn; *Poetry, Lyrical, Narrative and Satirical, of the Civil War* (1866); *The Fall of Man; or, The Loves of the Gorillas, By a Learned Gorilla* (1871); *Chronicles of Gotham. By U. Donough Outis* (1871); *The American View of the Copyright Question* (1880), *England Without and Within* (1881), and *The Fate of Mansfield Humphreys* (1884), a novel. For estimates of White's critical writing see the review of *Shakespeare's Scholar* in the *Eclectic Magazine*, vol. xxxiv. (1855); and the articles in the *Atlantic Monthly*, vol. xlix. (1882) by E. P. Whipple, and vol. lvii. (1886).

His son, STANFORD WHITE (1853–1906), the famous architect, studied under Henry H. Richardson, whom he assisted in the designing of Trinity Church, Boston, and became a member of the New York firm of McKim, Mead & White in 1881. He designed the Madison Square Garden, the Century and Metropolitan Clubs in New York City, the buildings of the New York University and the University of Virginia, and the pedestals for several of the statues by Augustus St Gaudens. He was murdered by Harry Thaw in 1906.

WHITE, ROBERT (1645–1704), English engraver and draughtsman, was born in London in 1645. He studied engraving under David Loggan, for whom he executed many architectural subjects; his early works also include landscapes and engraved title-pages for books. He acquired great skill in portraiture, his works of this class being commonly drawn with black-lead pencil upon vellum, and afterwards excellently engraved in line. Portraits executed in this manner he marked *ad vivum*, and they are prized by collectors for their artistic merit and their authenticity. Virtue catalogued 275 portrait engravings by White, including the likenesses of many of the most celebrated personages of his day; and nine portraits engraved in mezzotint are assigned to him by J. Chaloner Smith. White died at Bloomsbury, London, in 1704. His son, George White, who was born about 1671 and died about 1734, is also known as an engraver and portrait-painter.

WHITE, SIR THOMAS (1492–1567), founder of St John's College, Oxford, was a son of William White, a clothier, and was born at Reading. At an early age he became a merchant in London and was soon a member, and then master of the Merchant Taylors Company; growing wealthier he became an alderman and sheriff of the city of London. One of the promoters of the Muscovy Company, he was knighted in 1553, and in October of the same year he was chosen lord mayor. His term of office fell in a strenuous time. He had to defend the city against Sir Thomas Wyat and his followers, and he took part in the trial of the rebels, as just previously he had done in the case of Lady Jane Grey. In 1555 White received a licence to found a college at Oxford, which he endowed with lands in the neighbourhood of the city and which, dedicated to the Virgin Mary and St John Baptist, was opened in 1560. Soon after this event Sir Thomas began to lose money, and he was comparatively poor when he died at Oxford on the 12th of February 1567. His later years were mainly spent in Oxford, and he was buried in the chapel of St John's College. White had some share in founding the Merchant Taylors' School in London. He was twice married, but left no children. A portrait of him hangs in the hall of St John's College and one on glass, painted in the 16th century, is in the old library. Several early lives of him are among the college manuscripts. Sir Thomas must be distinguished from another Sir Thomas White of South Warnborough, Hampshire, some of whose property, by a curious coincidence, passed also into the possession of St John's College.

WHITE, THOMAS (*c.* 1550–1624), English divine, was born at Bristol about 1550, the son of a clothier. He graduated from Magdalen Hall (now Hertford College), Oxford, in 1570; took holy orders, and, coming to London, became rector of St Gregory by St Paul's and shortly after vicar of St Dunstan's in the West. Several of his sermons, attacking play-going and the vices of the metropolis, were printed. He was made a prebendary of St Paul's, treasurer of Salisbury, canon of Christ Church, Oxford, and canon of Windsor. In 1613 he built and endowed an almshouse, called the Temple Hospital, in Bristol. In 1621 he founded what is now known as White's chair of moral philosophy at Oxford, with a salary of £100 per annum for the reader, and several small exhibitions for scholars of Magdalen Hall. He died on the 1st of March 1624, bequeathing £3000 for the establishment of a college of "all the ministers, parsons, vicars, lecturers and curates in London and its suburbs" (afterwards Sion College (*q.v.*)), and an almshouse, now abolished, and leaving bequests for lectureships at St Paul's, St Dunstan's and at Newgate.

WHITE, THOMAS (1628–1698), bishop of Peterborough, was born at Aldington in Kent, and educated at St John's College, Cambridge. Having taken holy orders, he became vicar of Newark-on-Trent in 1660, vicar of Allhallows the Great, London, in 1666, and vicar of Bottesford, Leicestershire, in 1679. In 1683 he was appointed chaplain to the princess Anne, and in 1685 he was chosen bishop of Peterborough. In 1688 he joined the archbishop of Canterbury, William Sancroft, and five of his suffragan bishops in petitioning against the declaration of indulgence issued by James II., sharing the trial and the triumphant acquittal of his colleagues. In 1689 he refused to take the oath of allegiance to William and Mary and was deprived of his see, but he did not become very active among the nonjurors. White died on the 30th of May 1698.

The bishop must be distinguished not only from the founder of Sion College, but also from Thomas White (1593–1676), philosopher and controversialist. Educated at St Omer, Valladolid and Douai, the latter was ordained priest in 1617, and taught for some years in the college at Douai. Later he was president of the English college at Lisbon. He died in London on the 6th of July 1676. White was a voluminous writer; not only did he engage in controversy with Protestants, but he attacked the personal infallibility of the pope.

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[1] J. Paine Collier, *Notes and Emendations to the Text of Shakespeare's Plays from Early MS. Corrections in a Copy of the Folio, 1632* (London, 1853).

WHITE, SIR WILLIAM ARTHUR (1824–1891), British diplomatist, was born at Pulawy, in Poland, on the 13th of February 1824. He was descended on his father's side from an Irish Roman Catholic family. His mother's family, though not of Polish extraction, owned considerable estates in Poland, where White, though educated at King William's College, Isle of Man, and Trinity College, Cambridge, spent a great part of his early days, and thus gained an intimate knowledge of the Slavonic tongues. From 1843 to 1857 he lived in Poland as a country gentleman, but in the latter year he accepted a post in the British consulate at Warsaw, and had almost at once to perform the duties of acting consul-general. The insurrection of 1863 gave him an opportunity of showing his immense knowledge of Eastern politics and his combination of diplomatic tact with resolute determination. He was promoted in 1864 to the post of consul at Danzig. The Eastern Question was, however, the great passion of his life, and in 1875 he succeeded in getting transferred to Belgrade as consul-general for Servia. In 1879 he was made British Agent at Bucharest. In 1884 he was offered by Lord Granville the choice of the legation at Rio or Buenos Aires, and in 1885 Lord Salisbury, who was then at the Foreign Office, urged him to go to Peking, pointing out the increasing importance of that post. White's devoted friend, Sir Robert Morier, wrote in the same sense. But White, who was already acting as ambassador *ad interim* at Constantinople, decided to wait; and during this year he rendered one of his most conspicuous services. It was largely owing to his efforts that the war between Servia and Bulgaria was prevented from spreading into a universal conflagration, and that the union of Bulgaria and eastern Rumelia was accepted by the powers. In the following year he was rewarded with the embassy at Constantinople. He was the first Roman Catholic appointed to a British embassy since the Reformation. He pursued consistently the policy of counteracting Russian influence in the Balkans by erecting a barrier of independent states animated with a healthy spirit of national life, and by supporting Austrian interests in the East. To the furtherance of this policy he brought an unrivalled knowledge of all the under-currents of Oriental intrigue, which his mastery of languages enabled him to derive not only from the newspapers, of which he was an assiduous reader, but from the obscurest sources. His bluff and straightforward manner, and the knowledge that with him the deed was ready to follow the word, enabled him at once to inspire confidence and to overawe less masterful rivals. The official honours bestowed on him culminated in 1888 with the G.C.B. and a seat on the Privy Council. He was still ambassador at Constantinople when he was attacked by influenza during a visit to Berlin, where he died on the 28th of December 1891.

WHITE, SIR WILLIAM HENRY (1845–), English naval architect, was born at Devonport on the 2nd of February 1845, and at the age of fourteen became an apprentice in the dockyard there. In 1864 he took the first place in the scholarship competition at the Royal School of Naval Architecture, which had then just been established by the Admiralty at South Kensington, and in 1867 he gained his diploma as fellow of the school with first-class honours. At once joining the constructive staff of the Admiralty, he acted as confidential assistant to the chief constructor, Sir Edward Reed, until the latter's retirement in 1870. The loss of the "Captain" in that year was followed by an inquiry into designs for ships of war, and in connexion with this White, together with his old fellow-student, William John, worked out a long series of calculations as to the stability and strength of vessels, the results of which were published in an important paper read in 1871 before the Institution of Naval Architects. In 1872 White was appointed secretary to the Council of Construction at the Admiralty, in 1875 assistant constructor, and in 1881 chief constructor. In April 1883 he left the service of the Admiralty, at the invitation of Lord (then Sir W. [illegible] in order to undertake the difficult task of organizing a department for the construction of warships of the largest size at the Elswick works; but he only remained there for two and a half years, for in October 1885 he returned to the Admiralty in succession to Sir Nathaniel Barnaby as director of naval construction, retaining that post until the beginning of 1902, when ill-health obliged him to relinquish the arduous labours it entailed. During that period, which in Great Britain was one of unprecedented activity in naval shipbuilding as a result of the awakening of public opinion to the vital importance of sea-power, more than 200 vessels of various types were added to the British navy, at a total cost of something like 100 millions sterling, and for the design of all of these, as well as for the work of their construction, Sir William White was ultimately responsible. In addition, he did much to further the knowledge of scientific shipbuilding. He was professor of naval architecture at the Royal School from 1870 to 1873, and when in the latter year it was moved to Greenwich to be merged in the Royal Naval College, he reorganized the course of instruction and acted as professor for eight years more. The lectures he gave in that capacity were the foundation of his *Manual of Naval Architecture*, which has been translated into several foreign languages and is recognized as a standard text-book all over the world. Sir William White, who was chosen a fellow of the Royal Society in 1888, also read many professional papers before various learned and engineering societies. He was created K.C.B. in 1895.

WHITEAVES, JOSEPH FREDERICK (1835–), British palaeontologist, was born at Oxford, on the 26th of December 1835. He was educated at private schools, and afterwards worked under John Phillips at Oxford (1858–1861); he was led to study the Oolitic rocks, and added largely to our knowledge of the fossils of the Great Oolite series, Cornbrash and Corallian (*Rep. Brit. Assoc.* 1860, and *Ann., Nat. Hist.* 1861). In 1861 he visited Canada and made acquaintance with the geology of Quebec and Montreal, and in 1863 he was appointed curator of the museum and secretary of the Natural History Society of Montreal, posts which he occupied until 1875. He studied the land and freshwater mollusca of Lower Canada, and the marine invertebrata of the coasts; and also carried on researches among the older Silurian (or Ordovician) fossils of the neighbourhood of Montreal. In 1875 he joined the palaeontological branch of the Geological Survey of Canada at Montreal; in the following year he became palaeontologist, and in 1877 he was further appointed zoologist and assistant director of the survey. In 1881 the offices of the survey were removed to Ottawa. His publications on Canadian zoology and palaeontology are numerous and important. Dr Whiteaves was one of the original fellows of the Royal Society of Canada, and contributed to its Transactions, as well as to the *Canadian Naturalist* and other journals. He received the hon. degree of LL.D. in 1900 from McGill University, Montreal.

WHITEBAIT, the vernacular name of the small fish which appears in large shoals in the estuary of the Thames during the summer months, and is held in great esteem as a delicacy for the table. Formerly whitebait was supposed to be a distinct species of fish. T. Pennant and G. Shaw believed it to be some kind of Cyprinoid fish, similar to the bleak, whilst E. Donovan, in his *Natural History of British Fishes* (1802–1808), misled by specimens sent to him as whitebait, declared it to be the young of the shad. In 1820 W. Yarrell proved conclusively that Donovan's opinion was founded upon an error; unfortunately he contented himself with comparing whitebait with the shad only, and in the end adopted the opinion of the Thames fishermen, whose interest it was to represent it as a distinct adult form; thus the whitebait is introduced into Yarrell's *History of British Fishes* (1836) as *Clupea alba*. The French ichthyologist Valenciennes went a step farther, declaring it to be not only specifically but also generically distinct from all other Clupeoids. It is now known to consist of the young fry of herrings and sprats in varying proportions mixed with a few shrimps, gobies, sticklebacks, pope-fishes and young flounders: but these impurities are as far as possible picked out from the whitebait before it is marketed. The fishing is carried on from February to August, and samples taken in the successive months were found to contain the following percentages of herrings, the remainder being young sprats: 7, 5, 14, 30, 87, 75, 52. Hence it will be seen that sprats predominated in February, March, April and May, herrings in June and July. There is reason to believe that these young herrings are derived from a local "winter" race spawning about February and March, and having nothing to do with the great shoals of the more open sea spawning in the North Sea in November. The Thames being unequal to the supply of the large demand for this delicacy, large quantities of whitebait are now brought to London and other markets from many parts of the coast. In times past whitebait were considered to be peculiar to the estuary of the Thames; and, even after the specific identification of Thames whitebait with the young of the herring and sprat, it was still thought that there was a distinctive superiority in its condition and flavour. It is possible that the young fish find in the estuary of the Thames a larger amount of suitable food than on other parts of the coast, where the water may be of greater purity, but possesses less abundance of the minute animal life on which whitebait thrive. Indeed, Thames whitebait which have been compared with that from the mouth of the Exe, the Cornish coast, Menai Strait, and the Firth of Forth seemed to be better fed; but, of course, the specific characteristics of the herring and sprat—into which we need not enter here—were nowise modified.

The fry of fishes is used as an article of diet in almost every country: in Germany the young of various species of Cyprinoids, in Italy and Japan the young of nearly every fish capable of being readily captured in sufficient numbers, in the South Sea Islands the fry of *Teuthis*, in New Zealand young *Galaxias* are consumed at certain seasons in large quantities; and, like whitebait, these fry bear distinct names, different from those of the adult fish.

Whitebait are caught on the flood-tide from boats moored in from 3 to 5 fathoms of water. The net used is a bag some 20 ft. long, narrow and small-meshed towards the tail end, the mouth being kept open in the direction of the advancing tide by a framework 3 or 4 ft. square. It is placed alongside the boat and sunk to a depth of 4 ft. below the surface; from time to time the end of the bag is lifted into the boat, to empty it of its contents. The "schools" of whitebait advancing and retiring with the tide for days, and probably for weeks, have to run the gauntlet of a dozen of these nets, and therefore get very much thinned in number by the end of the season. When the view commenced to gain ground that whitebait were largely young herring, the question arose whether or not the immense destruction of the young brood caused by this mode of fishing injuriously affected the fishery of the mature herring. This perhaps it does; but, since it has been ascertained that the herring is much more restricted in its migrations than was formerly believed, and that the shoals are to a great extent local, the injury, such as it is, must be local and limited to the particular district in which the fishing for whitebait is methodically practised. Similar reasoning applies to sprats. (J. T. C.)

WHITEFIELD, GEORGE (1714–1770), English religious leader, was born on the 16th of December 1714 at the Bell Inn, Gloucester, of which his father was landlord. At about twelve years of age he was sent to the school of St Mary de Crypt, Gloucester, where he developed some skill in elocution and a taste for reading plays, a circumstance which probably had considerable influence on his subsequent career. At the age of fifteen he was taken from school to assist his mother in the public-house, and for a year and a half was a common drawer. He then again returned to school to prepare for the university, and in 1733 entered as a servitor at Pembroke College, Oxford, graduating in 1736. There he came under the influence of the Methodists (see Wesley), and entered so enthusiastically into their practices and habits that he was attacked by a severe illness, which compelled him to return to his native town. His enthusiastic piety attracted the notice of Martin Benson, bishop of Gloucester, who ordained him deacon on the 20th of June 1736. He then began an evangelizing tour in Bath, Bristol and other towns, his eloquence at once attracting immense multitudes.

In 1736 he was invited by Wesley to go out as missionary to Georgia, and went to London to wait on the trustees. Before setting sail he preached in some of the principal London churches, and in order to hear him, crowds assembled at the church doors long before daybreak. On the 28th of December 1737 he embarked for Georgia, which he reached on the 7th of May 1738. After three months' residence there he returned to England to receive priest's orders, and to raise contributions for the establishment of an orphanage. As the clergy did not welcome him to their pulpits, he began to preach in the open air. At Kingswood Hill, Bristol, his addresses to the colliers soon attracted crowds, and his voice was so clear and powerful that it could reach 20,000 folk. His fervour and dramatic action held them spell-bound, and his homely pathos soon broke down all barriers of resistance. "The first discovery of their being affected," he says, "was by seeing the white gutters made by their tears, which plentifully fell down their black cheeks." In 1738 an account of Whitefield's voyage from London to Georgia was published without his knowledge. In 1739 he published his *Journal* from his arrival in Savannah to his return to London, and also his *Journal* from his arrival in London to his departure thence on his way to Georgia. As his embarkation was further delayed for ten weeks he published *A Continuation of the Rev. Mr Whitefield's Journal during the Time he was delayed in England by the Embargo*. His unfavourable reception in England by the clergy led him to make reprisals. To Joseph Trapp's attack on the Methodists he published in 1739 *A Preservative against Unsettled Notions*, in which the clergy of the Church of England were denounced with some bitterness; he also published shortly afterwards *The Spirit and Doctrine and Lives of our Modern Clergy*, and a reply to a pastoral letter of the bishop of London in which he had been attacked. In the same year appeared *Sermons on Various Subjects* (2 vols.), the *Church Companion, or Sermons on Several Subjects*, and a recommendatory epistle to the *Life of Thomas Halyburton*. He again embarked for America in August 1739, and remained there two years, preaching in all the principal towns. He left his incumbency of Savannah to a lay delegate and the commissary's court at Charleston suspended him for ceremonial irregularities. While there he published *Three Letters from Mr Whitefield*, in which he referred to the "mystery of iniquity" in Tillotson, and asserted that that divine knew no more of Christ than Mahomet did.

During his absence from England Whitefield found that a divergence of doctrine from Calvinism had been introduced by Wesley; and notwithstanding Wesley's exhortations to brotherly kindness and forbearance he withdrew from the Wesleyan connexion. Thereupon his friends built for him near Wesley's church a wooden structure, which was named the Moorfields Tabernacle. A reconciliation between the two great evangelists was soon effected, but each thenceforth went his own way. In 1741, on the invitation of Ralph and Ebenezer Erskine, he paid a visit to Scotland, commencing his labours in the Secession meeting-house, Dunfermline. But, as he refused to limit his ministrations to one sect, the Seceders and he parted company, and without their countenance he made a tour through the principal towns of Scotland, the authorities of which in most instances presented him with the freedom of the burgh, in token of their estimate of the benefits to the community resulting from his preaching. From Scotland he went to Wales, where on the 14th of November he married a widow named James. The marriage was not a happy one. On his return to London in 1742 he preached to the crowds in Moorfields during the Whitsun holidays with such effect as to attract nearly all the people from the shows. After a second visit to Scotland, June–October 1742 (where at Cambuslang in particular he wielded a great spiritual influence), and a tour through England and Wales, 1742–1744, he embarked in August 1744 for America, where he remained till June 1748. On returning to London he found his congregation at the Tabernacle dispersed; and his circumstances were so depressed that he was obliged to sell his household furniture to pay his orphan-house debts. Relief soon came through his acquaintance with Selina, countess of Huntingdon (*q.v.*), who appointed him one of her chaplains.

The remainder of Whitefield's life was spent chiefly in evangelizing tours in Great Britain, Ireland and America. It has been stated that "in the compass of a single week, and that for years, he spoke in general forty hours, and in very many sixty, and that to thousands." In 1748 the synods of Glasgow, Perth and Lothian passed vain resolutions intended to exclude him from churches; in 1753 he compiled his hymn-book, and in 1756 opened the chapel which still bears his name in Tottenham Court Road. On his return from America to England for the last time the change in his appearance forcibly impressed Wesley, who wrote in his *Journal*: "He seemed to be an old man, being fairly worn out in his Master's service, though he had hardly seen fifty years." When health was failing him he placed himself on what he called "short allowance," preaching only once every week-day and thrice on Sunday. In 1769 he returned to America for the seventh and last time, and arranged for the conversion of his orphanage into Bethesda College, which was burned down in 1773. He was now affected by a severe asthmatic complaint; but to those who advised him to take some rest, he answered, "I had rather *wear* out than *rust* out." He died on the 30th of September 1770 at Newburyport, Massachusetts, where he had arrived on the previous evening with the intention of preaching next day. In accordance with his own desire he was buried before the pulpit in the Presbyterian church of the town where he died.

Whitefield's printed works convey a totally inadequate idea of his oratorical powers, and are all in fact below mediocrity. They appeared in a collected form in 1771–1772 in seven volumes, the last containing *Memoirs of his Life*, by Dr John Gillies. His *Letters* (1734–1770) were comprised in vols. i., ii. and iii. of his *Works* and were also published separately. His *Select Works*, with a memoir by J. Smith, appeared in 1850. See *Lives* by Robert Philip (1837), L. Tyerman (2 vols., 1876–1877), J. P. Gledstone (1871, new ed. 1900), and W. H. Lecky's *History of England*, vol. ii.

WHITEFISH, a collective name applied in different countries to very different kinds of freshwater fishes. The numerous European species of the Cyprinoid genus *Leuciscus* are frequently comprised under the name of "Whitefish," but the term is employed here for the various species of the Salmonoid genus *Coregonus*. The *Coregonus* group are somewhat herring-shaped, silvery salmonids with small, toothless or feebly toothed mouth, and rather large scales. They are distributed over Europe, Asia and North America, some species living in the sea, but most inhabiting clear lakes. The highly esteemed "lavaret" of Savoy, the "felchen," "kilch," "gangfisch," "palée," "gravenche," "féra" or Switzerland and southern Germany, the "sik" of Sweden, belong to this genus, which is represented in British and Irish waters by the houting (*C. oxyrhynchus*), occasionally found in the North Sea, the gwyniad or pawan (*C. clupeoides*) of Loch Lomond, Haweswater, Ullswater and Bala, the vendace (*C. vandesius*) of Lochmaben, and its newly described ally (*C. gracilior*) from Derwentwater and Bassenthwaite lakes in Cumberland. About eight species are distinguished from the northern parts of North America. The *Coregonus* are mostly of small size, few of them attaining a length of 18 in. Secondary nuptial sexual characters are by no means so well marked as in *Salmo*, but pearl-like excrescences may appear on the scales during the breeding season, and are more prominent in males than in females.

WHITEHALL, a village of Washington county, New York, U.S.A., in a township of the same name on the Poultney river and the Champlain Canal, at the head of Lake Champlain, and 78 m. by rail N. by E. of Albany. Pop. (1890) 4434; (1900) 4377, of whom 547 were foreign-born; (1905) 4148; (1910) 4917. Whitehall is served by the Delaware & Hudson railway, and is the N. terminus of the new barge-canal system of New York state. It is situated in a narrow valley between two hills called West Mountain and Skene's Mountain, and Wood Creek flows through the village and empties into the lake with a fall, from which valuable water-power is derived; there are various manufactures, and the village owns and operates the water works. In 1759, to strengthen the British hold on Canada, a large tract of land at the S. end of Lake Champlain was granted to Colonel Philip Skene (1725–1810), who fought at Ticonderoga in 1758 and in 1759, and who established here in 1761 a settlement of about thirty families which he called Skenesborough and which was patented in 1765. Skene was a Loyalist, and in May 1775 Skenesborough was seized by a party of American volunteers. In Burgoyne's expedition (1777) Skene and his son, Andrew Philip Skene (1753–1826), served as guides, and Skenesborough was recovered by the British after most of it had been burned by the Americans. At the close of the war Skene's estate was confiscated and in 1786 the place was named Whitehall. In the War of 1812 Whitehall was fortified and was a base of supplies for American operations against Canada. It was incorporated as a village in 1806.

WHITEHAVEN, a municipal and parliamentary borough, seaport and market town of Cumberland, England, 41 m. S.W. of Carlisle. Pop. (1901) 19,324. It lies mainly in a valley opening upon the Irish Sea, with high ground to north and south, and is served by the London & North-Western, the Cockermouth, Keswick & Penrith and the Furness railways. The harbour is protected by two main piers, of which the western is a fine structure by Sir John Rennie, and divided into four parts by others; it has a wet dock and extensive quayage. Regular passenger communications are maintained with the Isle of Man. The exports are principally coal, pig iron and ore, steel and stone. The port was made subordinate to that of Maryport in 1892. There are collieries near the town, the workings extending beneath the sea; there are also iron mines and works, engineering works, shipbuilding yards, breweries, tanneries, stone quarries, brick and earthenware works, and other industrial establishments in and near the town. The parliamentary borough returns one member. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area 1810 acres.

Whitehaven (*Witofthaven*) was an insignificant possession of the priory of St Bee which became crown property at the dissolution of the religious houses. It was acquired before 1644 by relatives of the earl of Lonsdale, who secured the prosperity of the town by working the coal-mines. From 1708 the harbour was governed by twenty-one trustees, whose power was extended and municipalized by frequent legislation, until, in 1885, they were incorporated. In 1894 this government by incorporated trustees gave place to that of a municipal corporation created by charter in that year. The harbour was entrusted to fifteen commissioners. Since the Reform Act of 1832 Whitehaven has returned one representative to parliament. A weekly market and yearly fairs were granted to Sir John Lowther in 1660; two fairs were held in 1888; and the market days are now Tuesday, Thursday and Saturday. Whitehaven coal was sent chiefly to Ireland in the 18th century. In the first half of the 19th century other exports were lime, freestone, and grain; West Indian, American and Baltic produce, Irish flax and Welsh pig iron were imported, and shipbuilding was a growing industry. Paul Jones, the notorious buccaneer, served his apprenticeship at the port, which in 1778 he successfully raided, burning three vessels.

WHITEHEAD, WILLIAM (1715–1785), English poet-laureate, son of a baker, was born at Cambridge, and baptized on the 12th of February 1715. His father had extravagant tastes, and spent large sums in ornamenting a piece of land near Grantchester, afterwards known as "Whitehead's Folly." William was his second son, and through the patronage of Henry Bromley, afterwards Lord Montfort, was admitted to Winchester College. In 1735 he entered Clare Hall, Cambridge, as a sizar, and became a fellow in 1742. At Cambridge Whitehead published an epistle "On the Danger of writing Verse"[1] and some other poems, notably an heroic epistle, *Ann Boleyn to Henry the Eighth* (1743), and a didactic *Essay on Ridicule* (1743). In 1745 he became tutor to Viscount Villiers, son of the earl of Jersey, and took up his residence in London. He produced two tragedies: *The Roman Father* (Drury Lane, 24th of February 1750), and *Creusa, Queen of Athens* (Drury Lane, 20th of April 1754). The plots are based respectively on the *Horace* of Corneille, and the *Ion* of Euripides. In June 1754 he went abroad with Lord Villiers,

[1] Printed in *A Collection of Poems by several Hands* (vol. ii., 1748).

and his companion Viscount Nuneham, son of Earl Harcourt, only returning to England in the autumn of 1756. In 1757 he was appointed poet-laureate in succession to Cibber, and proceeded to write annual effusions in the royal honour. That he was not altogether happy in his position, which was discredited by the fierce attacks made on his predecessor, Colley Cibber, appears from "A Pathetic Apology for all Laureates, past, present and to come." Charles Churchill attacked him in 1762, in the third book of *The Ghost*, as the heir of Dullness and Method. In the same year Whitehead produced his most successful work in the comedy of the *School for Lovers*, produced at Drury Lane on the 10th of February. This success encouraged David Garrick to make him his reader of plays. Whitehead's farce, *The Trip to Scotland*, was performed on the 6th of January 1770. He collected his *Plays and Poems* in 1774. He had for some time, after his return from the Continent, resided in the houses of his patrons, but from 1769 he lived in London, where he died on the 14th of April 1785. Beside the works already mentioned, Whitehead wrote a burlesque poem, *The Sweepers*; a number of verse *contes*, of which "Variety" and "The Goat's Beard" are good examples, and much occasional and official verse.

See memoirs by his friend William Mason, prefixed to a complete edition of his poems (York, 1788). His plays are printed in Bell's *British Theatre* (vols. 3, 7, 20) and other collections, and his poems appear in Chalmers's *Works of the English Poets* (vol. 17) and similar compilations.

WHITE HORSE, VALE OF, the name of the valley of the Ock, a stream which joins the Thames from the west at Abingdon in Berkshire, England. The vale is flat and well wooded, its green meadows and foliage contrasting richly with the bald summits of the White Horse Hills, which flank it on the south. On the north a lower ridge separates it from the upper Thames valley; but local usage sometimes extends the vale to cover all the ground between the Cotteswolds (on the north) and the White Horse Hills. According to the geographical definition, however, the vale is from 2 to 5 m. wide, and the distance by road from Abingdon to Shrivenham at its head is 18 m. Wantage is the only town in the heart of the vale, lying in a sheltered hollow at the foot of the hills, along which, moreover, villages are more numerous than elsewhere in the vale. Towards the west, above Uffington, the hills reach a culminating point of 856 ft. in White Horse Hill. In its northern flank, just below the summit, a gigantic figure of a horse is cut, the turf being removed to show the white chalky soil beneath. This figure gives name to the hill, the range and the vale. It is 374 ft. long and of the rudest outline, the neck, body and tail varying little in width. Its origin is unknown. Tradition asserted it to be the monument of a victory over the Danes by King Alfred, who was born at Wantage; but the site of the battle, that of Ashdown (871), has been variously located. Moreover, the figure, with others of a similar character elsewhere in England, is considered to be of a far higher antiquity, dating even from before the Roman occupation. Many ancient remains occur in the vicinity of the Horse. On the summit of the hill there is an extensive and well-preserved circular camp, apparently used by the Romans, but of earlier origin. It is named Uffington Castle from the village in the vale below. Within a short distance are Hardwell Castle, a square work, and, on the southern slope of the hills near Ashdown Park, a small camp traditionally called Alfred's. A smooth, steep gully on the north flank of White Horse Hill is called the Manger, and to the west of it rises a bald mound named Dragon's Hill, the traditional scene of St George's victory over the dragon, the blood of which made the ground bare of grass for ever. But the name, properly Pendragon, is a Celtic form signifying "chief of kings," and may point to an early place of burial. To the west of White Horse Hill lies a cromlech called Wayland Smith's Cave, said to be the home of a smith who was never seen, but shod the horses of travellers if they were left at the place with payment. The legend is elaborated, and the smith appears as a character, in Sir Walter Scott's novel *Kenilworth*. The White Horse itself has been carefully cleared of vegetation from time to time, and the process, known as the "Scouring of the White Horse," was formerly made the occasion of a festival. Sports of all kinds were held, and keen rivalry was maintained, not only between the inhabitants of the local villages, but between local champions and those from distant parts of England. The first of such festivals known took place in 1755, and they died out only subsequently to 1857. A grassy track represents the ancient road or Ridge Way along the crest of the hills continuing Icknield Street, from the Chiltern Hills to the north-east, across the Thames; and other earthworks in addition to those near the White Horse overlook the vale, such as Letcombe Castle above Wantage. At the foot of the hills not far east of the Horse is preserved the so-called Blowing Stone, a mass of sandstone pierced with holes in such a way that when blown like a trumpet a loud note is produced. It is believed that in the earliest times the stone served the purpose of a bugle. Several of the village churches in the vale are of interest, notably the fine Early English cruciform building at Uffington. The length of the vale is traversed by the main line of the Great Western railway, between Didcot and Swindon.

See Thomas Hughes, *The Scouring of the White Horse* (1859).

WHITEING, RICHARD (1840–), English author and journalist, was born in London on the 27th of July 1840, the son of a civil servant. He was a pupil of Benjamin Wyon, medallist and seal-engraver, and made his journalistic début by a series of papers in the *Evening Star* in 1866, printed separately in the next year as *Mr Sprouts, His Opinions*. He became leader-writer and correspondent on the *Morning Star*, and was subsequently on the staff of the *Manchester Guardian*, the New York *World*, and for many years the *Daily News*, resigning from the last-named paper in 1899. His novel *The Democracy* (3 vols., 1876) was published under the pseudonym of Whyte Thorne. His remarkable story *The Island* (1888) attracted little attention until, years afterwards, its successor, *No. 5 John Street* (1899), made him famous; the earlier novel was then republished. Later works were *The Yellow Van* (1903), *Ring in the New* (1906), *All Moonshine* (1907).

WHITELEY, WILLIAM (1831–1907), English "Universal Provider," was born at Agbrigg, near Wakefield, Yorkshire, on the 29th of September 1831, the son of a corn-factor. At the age of sixteen he was apprenticed to a firm of drapers at Wakefield. In 1851 he made his first visit to London to see the Great Exhibition, and was so impressed with the size and activity of the metropolis that he determined to settle there as soon as his apprenticeship was over. A year later he obtained a subordinate position in a draper's establishment in the city, and after studying the drapery trade in this and other London establishments for ten years, in 1863 himself opened a small shop for the sale of fancy drapery in Westbourne Grove, Bayswater. His capital amounted to about £700, which he had saved from his salaries and commissions, and he at first employed two young girls and an errand boy. Friends in the trade had assured him that Westbourne Grove was one of the two worst streets in London for his business, but Whiteley had noted the number and quality of the people who passed the premises every afternoon, and relied on his own judgment. Events justified his confidence, and within a year he was employing fifteen hands. He made a consistent practice of marking all goods in plain figures and of "dressing" his shop-window attractively, both unusual features in the retail trading of the time, and to this, coupled with the fact that he was satisfied with small profits, he largely attributed a success in which his own genius for organization and energy played a conspicuous part. In 1866 Whiteley added general drapery to his other business, opening by degrees shop after shop and department after department, till he was finally enabled to call himself the "Universal Provider," and boast that there was nothing which his stores could not supply. "Whiteley's was, in fact, the first great instance of a large general goods store in London, held under one-man's control. In 1899 the business, of which the profits then averaged over £100,000 per annum, was turned into a limited liability company, Whiteley retaining the bulk of the shares. On the 23rd of January 1907 he was shot dead, after an interview in his private office, by Horace George Rayner, who claimed (but, as was proved, wrongly) to be his illegitimate son and who had been refused pecuniary assistance. Rayner was found guilty of murder, and sentenced to be hanged; but the home secretary (Mr Herbert Gladstone), in response to an agitation for his reprieve, commuted the sentence to penal servitude for life.

WHITELOCKE, SIR JAMES (1570–1632), English judge, son of Richard Whitelocke, a London merchant, was born on the 28th of November 1570. Educated at Merchant Taylors' School, London, and at St John's College, Oxford, he became a fellow of his college and a barrister. He was then engaged in managing the estates belonging to St John's College, Eton College and Westminster College, before he became recorder of Woodstock and member of parliament for the borough in 1610. In 1620 Whitelocke was made chief justice of the court of session of the county palatine of Chester, and was knighted; in 1624 he was appointed justice of the court of king's bench. He died at Fawley Court, near Reading, an estate which he had bought in 1616, on the 22nd of June 1632. His wife, Elizabeth, was a daughter of Edward Bulstrode of Hedgerley Bulstrode, Buckinghamshire, and his son was Bulstrode Whitelocke.

Sir James was greatly interested in antiquarian studies, and was the author of several papers which are printed in T. Hearne's *Collection of Discourses* (1771); his journal, or *Liber famelicus*, was edited by John Bruce and published by the Camden Society in 1858.

Whitelocke's elder brother, EDMUND WHITELOCKE (1565–1608), was a soldier in France and later a courtier in England. He was imprisoned because he was suspected of being concerned in the Gunpowder Plot, and although he was most probably innocent, he remained for some time in the Tower of London.

The soldier JOHN WHITELOCKE (1757–1833) was doubtless a descendant of Sir James Whitelocke. He entered the army in 1778 and served in Jamaica and in San Domingo. In 1805 he was made a lieutenant-general and inspector-general of recruiting, and in 1807 he was appointed to command an expedition sent to recover Buenos Aires from the Spaniards. An attack on the city was stubbornly resisted, and then Whitelocke concluded an arrangement with the opposing general by which he abandoned the undertaking. This proceeding was regarded with great disfavour both by the soldiers and others in South America and in England, and its author was brought before a court-martial in 1808. On all the charges except one he was found guilty and he was dismissed from the service. He lived in retirement until his death on the 23rd of October 1833.

WHITELOCKE, BULSTRODE (1605–1675), English lawyer and parliamentarian, eldest son of Sir James Whitelocke, was baptized on the 19th of August 1605, and educated at Merchant Taylors' School and at St John's College, Oxford, where he matriculated on the 8th of December 1620. He left Oxford, without a degree, for the Middle Temple, and was called to the bar in 1626 and chosen treasurer in 1628. He was fond of field sports and of music, and in 1633 he had charge of the music in the great masque performed by the inns of court before the king and queen. Meanwhile he had been elected for Stafford in the parliament of 1626 and had been appointed recorder of Abingdon and Henley. In 1640 he was chosen member for Great Marlow in the Long Parliament. He took a prominent part in the proceedings against Strafford, was chairman of the committee of management, and had charge of articles XIX.-XXIV. of the impeachment. He drew up the bill for making parliaments indissoluble except by their own consent, and supported the Grand Remonstrance and the action taken in the Commons against the illegal canons; on the militia question, however, he advocated a joint control by king and parliament. On the outbreak of the Great Rebellion he took the side of the parliament, using his influence in the country as deputy-lieutenant to prevent the king's raising troops in Buckinghamshire and Oxfordshire. He was sent to the king at Oxford both in 1643 and 1644 to negotiate terms, and the secret communications with Charles on the latter occasion were the foundation of a charge of treason brought against Whitelocke and Denzil Holles (*q.v.*) later. He was again one of the commissioners at Uxbridge in 1645. Nevertheless he opposed the policy of Holles and the peace party and the proposed disbanding of the army in 1647, and though one of the lay members of the assembly of divines, repudiated the claims of divine authority put forward by the Presbyterians for their church, and approved of religious tolerance. He thus gravitated more towards Cromwell and the army party, but he took no part either in the disputes between the army and the parliament or in the trial of the king. On the establishment of the Commonwealth, though out of sympathy with the government, he was nominated to the council of state and a commissioner of the new Great Seal. He urged Cromwell after the battle of Worcester and again in 1652 to recall the royal family, while in 1653 he disapproved of the expulsion of the Long Parliament and was especially marked out for attack by Cromwell in his speech on that occasion. Later in the autumn, and perhaps in consequence, Whitelocke was despatched on a mission to Christina, queen of Sweden, to conclude a treaty of alliance and assure the freedom of the Sound. On his return he resumed his office as commissioner of the Great Seal, was appointed a commissioner of the treasury with a salary of £1000, and was returned to the parliament of 1654 for each of the four constituencies of Bedford, Exeter, Oxford and Buckinghamshire, electing to sit for the latter constituency.

Whitelocke was a learned and a sound lawyer. He had hitherto shown himself not unfavourable to reform, having supported the bill introducing the use of English into legal proceedings, having drafted a new treason law, and set on foot some alterations in chancery procedure. A tract advocating the registering of title-deeds is attributed to him. But he opposed the revolutionary innovations dictated by ignorant and popular prejudices. He defeated the strange bill which sought to exclude lawyers from parliament; and to the sweeping and ill-considered changes in the court of chancery proposed by Cromwell and the council he offered an unbending and honourable resistance, being dismissed in consequence, together with his colleague Widdrington, on the 6th of June 1655 from his commissionership of the Great Seal (see LENTHALL, WILLIAM). He still, however, remained on good terms with Cromwell, by whom he was respected; he took part in public business, acted as Cromwell's adviser on foreign affairs, negotiated the treaty with Sweden of 1656, and, elected again to the parliament of the same year as member for Buckinghamshire, was chairman of the committee which conferred with Cromwell on the subject of the Petition and Advice and urged the protector to assume the title of king. In December 1657 he became a member of the new House of Lords. On Richard Cromwell's accession he was reappointed a commissioner of the Great Seal, and had considerable influence during the former's short tenure of power. He returned to his place in the Long Parliament on its recall, was appointed a member of the council of state on the 14th of May 1659, and became president in August; and subsequently, on the fresh expulsion of the Long Parliament, he was included in the committee of safety which superseded the council. He again received the Great Seal into his keeping on the 1st of November. During the period which immediately preceded the Restoration he endeavoured to oppose Monk's schemes, and desired Fleetwood to forestall him and make terms with Charles, but in vain.

On the failure of his plans he retired to the country and awaited events. Whitelocke's career, however, had been marked by moderation and good sense throughout. The necessity of carrying on the government of the country somehow or other had been the chief motive of his adherence to Cromwell rather than any sympathy for a republic or a military dictatorship, and his advice to Cromwell to accept the title of king was doubtless tendered with the object of giving the administration greater stability and of protecting its adherents under the Statute of Henry VII. Nor had he shown himself unduly ambitious or self-seeking in the pursuit of office, and he had proved himself ready to sacrifice high place to the claims of professional honour and duty. These considerations were not without weight with his contemporaries at the Restoration. Accordingly Whitelocke was not excepted from the Act of Indemnity, and after the payment of various sums to the king and others he was allowed to retain the bulk of his property. He lived henceforth in seclusion at Chilton in Wiltshire, dying on the 28th of July 1675.

Whitelocke married (1) Rebecca, daughter of Thomas Bennet, (2) Frances, daughter of Lord Willoughby of Parham, and (3) Mary Carleton, widow of Rowland Wilson, and left children by each of his wives. He was the author of *Memorials of the English affairs from the beginning of the reign of Charles I. . . .*, published 1682 and reprinted, a work which has obtained greater authority than it deserves, being largely a compilation from various sources, composed after the events and abounding in errors. His work of greatest value, his *Annals*, still remains in MS. in Lord Bute's and Lord de la Warr's collections (*Hist. Brit. Comm. III. Rep.* pp. 202, 217; also Egerton MSS. Brit. Mus. 997, add. MSS. 4992, 4994); his *Journal of the Swedish Embassy . . .* was published 1772 and re-edited by Henry Reeve in 1885 (add. MSS. 4902, 4991 and 4995 and *Hist. MSS. Comm. III. Rep.* 190, 217); *Notes on the King's Writ for choosing Members of Parliament . . .* were published 1766 (see also add. MSS. 4993); *Memorials of English Affairs from the supposed expedition of Bruce to this Island to the end of the Reign of James I.*, were published 1709; *Essays Ecclesiastical and Civil* (1706); *Quench not the Spirit . . .* (1711); some theological treatises remain in MS., and several others are attributed to him.

See the article by C. H. Firth in the *Dict Nat. Biog.* with authorities there quoted; *Memoirs of B. Whitelocke* by R. H. Whitelocke (1860); H. Reeve's edition of the *Swedish Embassy*; Foss's *Judges of England*; *Eng. Hist. Rev.* xvi. 737; Wood's *Ath. Oxon.* iii. 1042.

WHITE MOUNTAINS, the portion of the Appalachian Mountain system which traverses New Hampshire, U.S.A., between the Androscoggin and Upper Ammonoosuc rivers on the north and the lake country on the south. They cover an area of about 1300 sq. m., are composed of somewhat homogeneous granite rocks, and represent the remnants of long-continued erosion of a region formerly greatly elevated. From a plateau which has been cut deep by rivers and streams they rise to rounded summits often noble in outline and of greater elevation than elsewhere in the Appalachian system, except in North Carolina, and culminate in Mount Washington, 6293 ft. above the sea. Thirteen other summits have an elevation exceeding 5000 ft. The scenery is so beautiful and varied that the region has long been popular as a summer resort. It is traversed by railways, one of which ascends Mount Washington, and contains numerous villages and fine hotels.

See the article NEW HAMPSHIRE; the *Guidebook* (Part i., Boston, 1907) published by the Appalachian Mountain Club; and *Appalachia* (ibid., 1876 seq.), a periodical published by the same club.

WHITE PLAINS, a village and the county-seat of Westchester county, New York, U.S.A., about 12 m. N. of New York City on the Bronx river, about midway between the Hudson river and Long Island Sound. Pop. (1890) 4508; (1900) 7899, of whom 1679 were foreign-born and 269 were negroes; (1910 census) 26,425. The village is served by the New York Central & Hudson River railway, and is connected by electric lines with New York City, and with Yonkers, Mount Vernon, New Rochelle, Tarrytown and Mamaroneck. White Plains is a beautiful residential suburb stretching over a considerable area of rolling tree-clad hills and picturesque stretches of meadow lands in the valley of the Bronx and Mamaroneck rivers. Near the village are Silver, Kensico and Rye lakes. Among the public buildings and the institutions here are a fine Public Library building, a town hall, an armoury, the Westchester county court house and county jail, several private schools, the White Plains Hospital, St Agnes Hospital, the Presbyterian Convalescents' Sanitarium, the New York Orthopaedic Hospital, Muldoon's Hygienic Institute and Bloomingdale Hospital for the Insane (1821). In White Plains are the grounds of the Century Country Club, the Knollwood Golf and Country Club and the Westchester County Fair Association. There are some prosperous farms and market gardens.

When the Dutch first settled Manhattan, the central portion of what is now Westchester county was the granary for part of the Mahican tribe; it was called Quarropas by the Indians. To the early traders here the region was known as "the White Plains" from the groves of white balsam which covered it. The first organized settlement (November 1683) was by a party of Connecticut Puritans, who had settled at Rye in what was then disputed territory between New York and Connecticut; they moved westward in a body and took up lands the title to which they bought from the Indians. The heirs of John Richbell claimed that White Plains was comprised in a tract extending N. from the Mamaroneck river granted to him by the Dutch and confirmed by the English, and the controversy between these heirs and the settlers from Rye was only settled in 1722 by the grant to Joseph Budd and sixteen other settlers of a royal patent under which the freeholders chose their local officers and managed their own affairs. In 1759 White Plains succeeded Westchester as the county-seat of Westchester county. In the early summer of 1776 the Third Provincial Congress, having adjourned from New York City, met here in the old court house on South Broadway—the site is now occupied by an armoury and is marked by a monument (1910). From the steps of this building the Declaration of Independence, brought from Philadelphia, was officially read for the first time in New York on the 11th of July 1776. Here Congress adopted formally the name "Convention of Representatives of the State of New York," and from this dates the existence of New York as a state. After the British under Lord Howe had effected a landing at Throg's Neck on Long Island Sound, Washington withdrew (October) all his forces from the North end of Manhattan Island except the garrison of Fort Washington, and (21st October) concentrated his army near White Plains. His right rested on the Bronx river here, and there was a small force in rude earthworks on Chatterton's Hill on the W. bank. This point Howe attacked (October 28th), his troops advancing in two columns 4000 strong, the British under General Alexander Leslie, the Hessians under Colonel Johann Gottlieb Rall. General Alexander McDougall, in command of the American right wing, reinforced the troops on the hill, making the number of the defenders about 1600. The attack was stubbornly resisted for some time, after which the Americans retreated in good order across the river. The British had sustained such a severe loss (about 250) that no attempt was made to follow the Americans, who carried their dead and wounded, some 125 in number, away with them. Washington's forces retired three days later to North Castle township, where they occupied a stronger position. The old Miller House, which still stands in North White Plains, was occupied at intervals by Washington as his headquarters before the battle and again in the summer of 1778. In 1779 a Continental force under Aaron Burr was stationed here for some months, and in 1781 (July) White Plains was occupied by parts of Lauzun's and Rochambeau's French force. In 1866 White Plains received a village charter, which it still retains in spite of its large population.

See F. Shonnard and W. W. Spooner, *History of Westchester County* (N.Y., 1900), and J. T. Scharf, *History of Westchester County* (2 vols., ibid., 1886).

WHITESIDE, JAMES (1804–1876), Irish judge, son of William Whiteside, a clergyman of the Church of Ireland, was born on the 12th of August 1804, and was educated at Trinity College, Dublin, being called to the Irish bar in 1830. He very rapidly acquired a large practice, and after taking silk in 1842 he gained a reputation for forensic oratory surpassing that of all his contemporaries, and rivalling that of his most famous predecessors of the 18th century. He defended Daniel O'Connell in the state trial of 1843, and William Smith O'Brien in 1848; and his greatest triumph was in the Yelverton case in 1861. He was elected member for Enniskillen in 1851, and in 1859 became member for Dublin University. In parliament he was no less successful as a speaker than at the bar, and in 1852 was appointed solicitor-general for Ireland in the first administration of the earl of Derby, becoming attorney-general in 1858, and again in 1866. In the same year he was appointed chief justice of the Queen's Bench; and he died on the 25th of November 1876. Whiteside was a man of handsome presence, attractive personality and cultivated tastes. In 1848, after a visit to Italy, he published *Italy in the Nineteenth Century*; and in 1870 he collected and republished some papers contributed many years before to periodicals, under the title *Early Sketches of Eminent Persons*. In 1833 Whiteside married Rosetta, daughter of

William Napier, and sister of Sir Joseph Napier (1804–1882), lord chancellor of Ireland.

See J. R. O'Flanagan, *The Irish Bar* (London, 1879).

WHITETHROAT, a name commonly given to two species of little birds, one of which, the *Motacilla sylvia* of Linnaeus and *Sylvia rufa* or *S. cinerea* of recent authors, is regarded as the type, not only of the genus *Sylvia*, but of the sub-family of thrushes known as *Sylviinae* (cf. Warbler). Very widely spread over Great Britain, in some places tolerably common, and by its gesticulations and song rather conspicuous, it is one of those birds which have gained a familiar nickname, and "peggy whitethroat" is the anthropomorphic appellation of schoolboys and milkmaids, though it shares "nettle-creeper" and other homely names with perhaps more than one congener, while to the writers and readers of books it is by way of distinction the greater whitethroat. The lesser whitethroat, *Sylvia curruca*, is both in habits and plumage a much less sightly bird: the predominant reddish brown of the upper surface, and especially the rufous edging of the wing-feathers, that are so distinctive of its larger congener, are wanting, and the whole plumage above is of a smoky-grey, while the bird in its movements is never obtrusive, and it rather shuns than courts observation. The nests of each of these species are very pretty works of art, firmly built of bents or other plant-stalks, and usually lined with horsehair; but the sides and bottom are often so finely woven as to be like open basket-work, and the eggs, splashed, spotted or streaked with olive-brown, are frequently visible from beneath through the interstices of the fabric. This style of nest-building seems to be common to all the species of the genus *Sylvia*, as now restricted, and in many districts has obtained for the builders the name of "hay-jack," quite without reference to the kind of bird which puts the nests together, and thus is also applied to the blackcap, *S. atricapilla*, and the garden-warbler—this last being merely a book-name—*S. salicaria* (*S. hortensis* of some writers). The former of these deserves mention as one of the sweetest songsters of Great Britain. The name blackcap is applicable only to the cock bird, who further differs from his brown-capped mate by the purity of his ashy-grey upper plumage; but, notwithstanding the marked sexual difference in appearance, he takes on himself a considerable share of the duties of incubation. All these four birds, as a rule, leave Great Britain at the end of summer to winter in the south. Two other species, one certainly belonging to the same genus, *S. orphea*, and the other, *S. nisoria*, a somewhat aberrant form, have occurred two or three times in Great Britain. The curious Dartford warbler of English writers, *Sylvia undata*, is on many accounts a very interesting bird, for it is one of the few of its family that winter in England—a fact the more remarkable when it is known to be migratory in most parts of the continent of Europe. Its distribution in England is very local, and chiefly confined to the southern counties. It is a pretty little dark-coloured bird, which here and there may be seen on furze-grown heaths from Kent to Cornwall. For a species with wings so feebly formed it has a wide range, inhabiting nearly all the countries of the Mediterranean seaboard, from Palestine to the Strait of Gibraltar, and thence along the west coast of Europe to the English Channel; but everywhere else it seems to be very local.

This may be the most convenient place for noticing the small group of warblers belonging to the well-marked genus *Hypolais*, which, though in general appearance and certain habits resembling the *Phylloscopi* (cf. [willow] Wren), would seem usually to have little to do with those birds, and to be rather allied to the *Sylviinae*. They have a remarkably loud song, and in consequence are highly valued on the continent of Europe, where two species at least spend the summer. One of them, *H. icterina*, has occurred more than once in the British Islands, and their absence as regular visitors is to be regretted. Among the minor characteristics of this little group is one afforded by their eggs, which are of a deeper or paler brownish pink, spotted with purplish black. Their nests are beautiful structures, combining warmth with lightness in a way that cannot be fully appreciated by any description. (A. N.)

WHITFIELD, JOHN CLARKE (1770–1836), English organist and composer, was born at Gloucester on the 13th of December 1770, and educated at Oxford under Dr Philip Hayes. In 1789 he was appointed organist of the parish church at Ludlow. Four years later he took the degree of Mus. Bac. at Cambridge, and in 1795 he was chosen organist of Armagh cathedral, whence he removed in the same year to Dublin, with the appointments of organist and master of the children at St Patrick's cathedral and Christchurch. Driven from Ireland by the rebellion of 1798, he accepted the post of organist at Trinity and St John's Colleges, Cambridge, and about the same time assumed the surname of Whitfield, in addition to that of Clarke, by which he had been previously known. He took the degree of Mus. Doc. at Cambridge in 1799, and in 1810 proceeded to the same grade at Oxford. In 1820 he was elected organist and master of the choristers at Hereford cathedral; and on the death of Dr Haig he was appointed professor of music at Cambridge. Three years afterwards he resigned these appointments in consequence of an attack of paralysis. He died at Hereford, on the 22nd of February 1836.

Whitfield's compositions were very numerous. Among the best of them are four volumes of anthems, published in 1805. He also composed a great number of songs, one of which—"Bird of the Wilderness," written to some well-known verses by James Hogg, the "Ettrick Shepherd"—attained a high degree of popularity. But the great work of his life was the publication, in a popular and eminently useful form, of the oratorios of Handel, which he was the first to present to the public with a complete pianoforte accompaniment.

WHITGIFT, JOHN (*c.* 1530–1604), English archbishop, was the eldest son of Henry Whitgift, merchant of Great Grimsby, Lincolnshire, where he was born, according to one account in 1533, but according to a calculation founded on a statement of his own in 1530. At an early age his education was entrusted to his uncle, Robert Whitgift, abbot of the neighbouring monastery of Wellow, by whose advice he was afterwards sent to St Anthony's school, London. In 1549 he matriculated at Queens' College, Cambridge, and in May 1550 he migrated to Pembroke Hall, where he had the martyr John Bradford for a tutor. In May 1555 he became a fellow of Peterhouse. Having taken orders in 1560, he became in the same year chaplain to Richard Cox, bishop of Ely, who collated him to the rectory of Teversham, Cambridgeshire. In 1563 he was appointed Lady Margaret professor of divinity at Cambridge, and his lectures gave such satisfaction to the authorities that on the 5th of July 1566 they considerably augmented his stipend. The following year he was appointed regius professor of divinity, and also became master first of Pembroke Hall and then of Trinity. He had a principal share in compiling the statutes of the university, which passed the great seal on the 25th of September 1570, and in November following he was chosen vice-chancellor. Macaulay's description of Whitgift as "a narrow, mean, tyrannical priest, who gained power by servility and adulation," is tinged with rhetorical exaggeration; but undoubtedly Whitgift's extreme High Church notions led him to treat the Puritans with exceptional intolerance. In a pulpit controversy with Thomas Cartwright, regarding the constitutions and customs of the Church of England, he showed himself Cartwright's inferior in oratorical effectiveness, but the balance was redressed by the exercise of arbitrary authority. Whitgift, with other heads of the university, deprived Cartwright in 1570 of his professorship, and in September 1571 exercised his prerogative as master of Trinity to deprive him of his fellowship. In June of the same year Whitgift was nominated dean of Lincoln. In the following year he published *An Answere to a Certain Libel intituled an Admonition to the Parliament*, which led to further controversy between the two divines. On the 24th of March 1577, Whitgift was appointed bishop of Worcester, and during the absence of Sir Henry Sidney in Ireland (1577) he acted as vice-president of Wales. In August 1583 he was appointed archbishop of Canterbury, and thus was largely instrumental in giving its special complexion to the church of the Reformation. Although he wrote a letter to Queen Elizabeth remonstrating against the alienation of church property, Whitgift always retained her special confidence. In his policy against the Puritans, and in his vigorous enforcement of the subscription test, he thoroughly carried out the queen's policy of religious uniformity. He drew up articles aimed at nonconforming ministers, and obtained increased powers for the Court of High Commission. In 1586 he became a privy councillor. His action gave rise to the Marprelate tracts, in which the bishops and clergy were bitterly attacked. Through Whitgift's vigilance the printers of the tracts were, however, discovered and punished; and in order more effectually to check the publication of such opinions he got a law passed in 1593 making Puritanism an offence against the statute law. In the controversy between Walter Travers and Richard Hooker he interposed by prohibiting the preaching of the former; and he moreover presented Hooker with the rectory of Boscombe in Wiltshire, in order to afford him more leisure to complete his *Ecclesiastical Polity*, a work which, however, cannot be said to represent either Whitgift's theological or his ecclesiastical standpoint. In 1595 he, in conjunction with the bishop of London and other prelates, drew up the Calvinistic instrument known as the Lambeth Articles, which were not accepted by the church. Whitgift attended Elizabeth on her deathbed, and crowned James I. He was present at the Hampton Court Conference in January 1604, and died at Lambeth on the 29th of the following February. . He was buried in the church of Croydon, and his monument there with his recumbent effigy was in great part destroyed in the fire by which the church was burnt down in 1867.

Whitgift is described by his biographer, Sir G. Paule, as of " middle stature, strong and well shaped, of a grave countenance and brown complexion, black hair and eyes, his beard neither long nor thick." He was noted for his hospitality, and was somewhat ostentatious in his habits, sometimes visiting Canterbury and other towns attended by a retinue of 800 horsemen. He left several unpublished works, which are included among the MSS. *Angliae*. Many of his letters, articles, injunctions, &c. are calendared in the published volumes of the " State Paper " series of the reign of Elizabeth. His *Collected Works*, edited for the Parker Society by John Ayre (3 vols., Cambridge, 1851–1853), include, besides the controversial tracts already alluded to, two sermons published during his lifetime, a selection from his letters to Cecil and others, and some portions of his unpublished MSS.

A *Life* of Whitgift by Sir G. Paule appeared in 1612, 2nd ed. 1649. It was embodied by John Strype in his *Life and Acts of Whitgift* (1718). There is also a life in C. Wordsworth's *Ecclesiastical Biography* (1810), W. F. Hook's *Archbishops of Canterbury* (1875), and vol. i. of Whitgift's *Collected Works*. See also C.H. Cooper's *Athenae Cantabrigienses*.

WHITHORN, a royal burgh of Wigtownshire, Scotland. Pop. (1901) 1118. It is situated near the southern extremity of the peninsula of Machers, 12½ m. S. of Wigtown by railway. The town consists of one long street running north and south, in which the town-hall is situated. It is famous for its associations with St Ninian or Ringan, the first Christian missionary to Scotland. He landed at the Isle of Whithorn, a small promontory about 3½ m. to the S.E. where he built (397) a church of stone and lime, which, out of contrast with the dark mud and wattle huts of the natives, was called Candida Casa, the White House (Anglo-Saxon, *Hwit ærn*, Whitherne or Whithorn). This he dedicated to his master St Martin of Tours. Ninian died probably in 432 and was buried in the church. A hundred years later the Magnum Monasterium, or monastery of Rosnat, was founded at Whithorn, and became a noted home of learning and, in the 8th century, the seat of the bishopric of Galloway. It was succeeded in the 12th century by St Ninian's Priory, built for Premonstratensian monks by Fergus " King " of Galloway, of which only the chancel (used as the parish church till 1822) with a richly decorated late Norman doorway, and fragments of the lady chapel, vaults, cellars, buttresses and tombs remain. The priory church was the cathedral church of the see till the Reformation, when it fell into gradual decay. In Roman times Whithorn belonged to the Novantae, and William Camden, the antiquary, identified it with the Leukopibia of Ptolemy. It was made a royal burgh by Robert Bruce.

WHITING, a city of Lake county, Indiana, U.S.A., on the S.W. shore of Lake Michigan, about 10 m. S.E. of Chicago. Pop. (1890) 1408; (1900) 3983 (1597 foreign-born); (1910) 6587. It is served by the Baltimore & Ohio, the Lake Shore & Michigan Southern, the Pennsylvania, the Chicago, Indiana & Southern and (for freight only) the Elgin, Joliet & Eastern, the Chicago Terminal Transfer, and the Indiana Harbour Belt railways; and is connected with Chicago and with the surrounding towns by an electric line. The city has a Carnegie library and a public park. Manual training, from the fourth to the twelfth grades, is a feature of the public school system. Whiting adjoins the cities of Hammond and East Chicago, and is practically a part of industrial Chicago, from which it is separated only by a state line. It is a shipping point; the Standard Oil Company has a large refinery here, and among its manufactures are asphaltum for street paving, linoleum and men's garments. Whiting was first settled about 1870, was incorporated as a town in 1895, and chartered as a city in 1903.

WHITING (*Gadus merlangus*), a fish of the family *Gadidae*, which is abundant on the shores of the German Ocean and all round the coasts of the British Islands; it is distinguished from the other species of the genus by having from 33 to 35 rays in the first anal fin, and by lacking the barbel on the chin. The snout is long, and the upper jaw longer than the lower. A black spot at the root of the pectoral fin is also very characteristic of this species, and but rarely absent. The whiting is one of the most valuable food fishes of northern Europe, and is caught throughout the year by hook and line and by the trawl. It is in better condition at the beginning of winter than after the spawning season, which falls in the months of February and March. Its usual size is from 1 to 1½ lb, but it may attain to twice that weight.

WHITLOW, a name applied loosely to any inflammation involving the pulp of the finger, attended by swelling and throbbing pain. In the simplest form, which is apt to occur in sickly children, the inflammation results in a whitish vesicle of the skin, containing watery or bloody fluid. In all such cases, where the deeper structures are not implicated, no radical local treatment is needed, although the illness is an indication for constitutional treatment. The inflammation is not usually spoken of as whitlow unless it involves the deeper structures of the last joint of the finger, in which case it is associated with intense pain. As the result of a scratch or prick of the finger septic germs enter the skin and give rise to an acute inflammation, with throbbing and bursting pain. If the germs do not spread from that spot, they set up an acute localized attack of erysipelas which may end in a superficial abscess. More often, however, they make their way to the periosteum of the last bone of the finger, and involve it in a devastating inflammation which may end in death (necrosis) of that bone. Sometimes the germs find their way into the tendon-sheath, and, spreading into the palm of the hand, cause a deep abscess with, perhaps, sloughing of the tendon, and leaving a permanently stiffened finger. In some cases amputation of the finger is eventually called for. Whitlow is especially apt to occur in people who are out of health, as in them the micro-organisms of the disease meet with less resistance. So soon, therefore, as the acute stage of the disease is over, tonic treatment, with quinine and iron, is needed. The local treatment of whitlow demands a free incision into the area in which the germs are undergoing cultivation, and the sooner that this is done the better. It is wrong to wait for an abscess to be formed. A prompt incision may actually prevent the formation of abscess, and the easing of the tension of the inflamed tissue by the incision gives immediate relief. Perhaps, even in the early stage of the disease, a bead or two of pus may find exit, but whether there is abscess or not, the depths of the wound should be swabbed out with some strong carbolic or mercuric lotion in order to destroy the germs. The hand should then be placed upon a splint with antiseptic fomentations around the finger. It should, moreover, be kept well raised, or worn in a sling. (E. O.*)

WHITMAN, MARCUS (1802–1847), American missionary and pioneer, was born at Rushville, New York, on the 4th of September 1802. He studied medicine at Pittsfield, Massachusetts, and practised in Canada and in Wheeler, Steuben county, New York. In 1834 he was accepted by the American Board of Commissioners for Foreign Missions for missionary work among the American Indians, and was assigned to the Oregon territory, then under the joint occupation of Great Britain and the United States. He set out early in 1835, but returned almost immediately was first awakened in 1848, and he at once devoted himself with enthusiasm to this at that time little-explored field of philological labour. After a brief course at Yale with Professor Edward Elbridge Salisbury (1814–1901), then the only trained Orientalist in the United States, Whitney went to Germany (1850) and studied for three years at Berlin, under Weber, Bopp and Lepsius, and at Tübingen (two summer semesters) under Roth, returning to the United States in 1853. In the following year he was appointed professor of Sanskrit in Yale, and in 1869 also of comparative philology. He also gave instruction in French and German in the college until 1867, and in the Sheffield scientific school until 1886. An urgent call to a professorship at Harvard was declined in 1869. The importance of his contributions to science was early and widely recognized. He was elected to membership in numerous learned societies in all parts of the world, and received many honorary degrees, the most notable testimonial to his fame being his election on the 31st of May 1881, as foreign knight of the Prussian order *pour le mérite* for science and arts to fill the vacancy caused by the death of Carlyle. In 1870 he received from the Berlin Academy of Sciences the first Bopp prize for the most important contribution to Sanskrit philology during the preceding three years—his edition of the *Tāittirīya-Prātiçākhya* (*Journal of the American Oriental Society*, vol. ix.). He died at New Haven, Connecticut, on the 7th of June 1894.

As a philologist Whitney is noted especially for his work in Sanskrit, which placed him among the first scholars of his time. He edited (1855–1856), with Professor Roth, the *Atharva-Veda-Sanhitā*; published (1862) with a translation and notes the *Atharva-Veda-Prātiçākhya*; made important contributions to the great Petersburg lexicon; issued an index verborum to the published text of the *Atharva-Veda* (*Journal of the American Oriental Society*, 1881); made a translation of the *Atharva-Veda*, books i.-xix., with a critical commentary, which he did not live to publish (edited by Lanman, 1905); and published a large number of special articles upon various points of Sanskrit philology. His most notable achievement in this field, however, is his *Sanskrit Grammar* (1879), a work which, as Professor Delbrück has said, not only is "the best text-book of Sanskrit which we possess," but also places its author, as a scientific grammarian, on the same level with such writers as Madvig and Krüger. To the general public Whitney is best known through his popular works on the science of language and his labours as a lexicographer. The former are, perhaps, the most widely read of all English books on the subject, and have merited their popularity through the soundness of the views which they present and the lucidity of their style.[1] His most important service to lexicography was his guidance, as editor-in-chief, of the work on *The Century Dictionary* (1889–1891). Apart from the permanent value of his contributions to philology, Whitney is notable for the great and stimulating influence which he exerted throughout his life upon the development of American scholarship.

The chronological bibliography of Whitney's writings appended to vol. xix. (first half) of the *Journal of the American Oriental Society*, issued in May 1897, contains 360 numbers. Of these the most important, in addition to those mentioned above, are: *Translation of the Sūryasiddhānta, a Text-book of Hindu Astronomy* (*Jour. Am. Oriental Soc.*, vol. vi., 1860); *Language and the Study of Language* (1867); *A Compendious German Grammar* (1869); *Oriental and Linguistic Studies* (1873; second series, 1874); *The Life and Growth of Language* (1875); *Essentials of English Grammar* (1877); *A Compendious German and English Dictionary* (1877); *A Practical French Grammar* (1886); *Max Müller and the Science of Language* (1892). (B. E. S.)

WHITSTABLE, a watering-place in the St Augustine's parliamentary division of Kent, England, on the north coast at the east end of the Swale, 6 m. N.N.W. of Canterbury, on the South Eastern & Chatham railway. Pop. of urban district (1901), 7086. The branch railway connecting Whitstable with Canterbury was one of the earliest in England, opened in 1830. The church of All Saints (Decorated and Perpendicular) possesses some old brasses; it was restored in 1875. Whitstable has been famous for its oyster beds from time immemorial. The fisheries were held by the Incorporated Company of Dredgers (incorporated by Act of Parliament in 1793), the affairs being administered by a foreman, deputy foreman and jury of twelve; but in 1896 an Act of Parliament transferred the management of the fishery to a company. The less extensive Seasalter and Ham oyster fishery adjoins. There is also a considerable coasting trade in coal in conjunction with the South-Eastern & Chatham railway company, who are the owners of the harbour, which accommodates vessels of about 400 tons alongside the quay. The urban district consists of parts of the old parishes of Whitstable and Seasalter. In modern times the manor was held by Wynne Ellis (1790–1875), who left a valuable collection of paintings to the nation.

Tankerton, adjoining Whitstable to the N.E., is a newly established seaside resort.

WHITSUNDAY, or Pentecost (Lat. *Pentecoste*, Gr. πεντηκοστή sc. ἡμέρα, Fr. *Pentecôte*, Ger. *Pfingsten*, fr. O. H. Ger. *fimfchustin*), one of the principal feasts of the Christian Church, celebrated on the fiftieth (πεντηκοστή) day after Easter to commemorate the descent of the Holy Spirit on the disciples. The day became one of the three baptismal seasons, and the name Whitsunday is now generally attributed to the white garments formerly worn by the candidates for baptism on this feast, as in the case of the *Dominica in albis*. The festival is the third in importance of the great feasts of the Church and the last of the annual cycle commemorating the Lord. It is connected with the Jewish Pentecost (*q.v.*), not only in the historical date of its origin (see Acts vii.), but in idea; the Jewish festival is one of thanks for the first-fruits of the earth, the Christian for the first-fruits of the Spirit. In the early Church the name of Pentecost was given to the whole fifty days between Easter and Whitsunday, which were celebrated as a period of rejoicing (Tertullian, *De idolatr.* c. 12, *De bapt.* 19, *De cor. milit.* 3, *Apost. Canons*, c. 37, *Canons of Antioch*, 30). In the narrower sense, as the designation of the fiftieth day of this period, the word Pentecost occurs for the first time in a canon of the council of Elvira (305), which denounces as an heretical abuse the tendency to celebrate the 40th day (Ascension) instead of the 50th, and adds: "juxta auctoritatem scripturarum cuncti diem Pentecostis celebremus." There is plentiful evidence that the festival was regarded very early as one of the great feasts; Gregory Nazianzen (*Orat.* xliv. *De Pentec.*) calls it the "day of the Spirit" (ἡμέρα τοῦ Πνεύματος), and in 385 the *Peregrinatio Silviae* (see Duchesne, *Origines*, App.) describes its elaborate celebration at Jerusalem. The code of Theodosius (xv. 5, *De spectaculis*) forbade theatrical performances and the games of the circus during the feast. The custom of hallowing the days immediately surrounding the festival is comparatively late. Thus, among others, the synod of Mainz in 813 ordered the celebration of an octave similar to that at Easter. The custom of celebrating the vigil by fasting had already been introduced. The duration of the festival was, however, ultimately fixed at three days. In the Church of England this is still the rule (there are special collects, gospels and epistles for Monday and Tuesday in Whitsun week); in the Lutheran churches two days only are observed.

In the middle ages the Whitsun services were marked by many curious customs. Among these described by Durandus (*Rationale div. off.* vi. 107) are the letting down of a dove from the roof into the church, the dropping of balls of fire, rose-leaves and the like. Whitsun is one of the Scottish quarter-days, and though the Church festival is movable, the legal date was fixed for the 15th of May by an act of 1693. Whitmonday, which, with the Sunday itself, was the occasion for the greatest of all the medieval church ales, was made an English Bank Holiday by an act passed on the 25th of May 1871.

See Duchesne, *Origines du culte Chrétien* (1889); W. Smith and Cheetham, *Dic. of Christian Antiquities* (1874–1880); Herzog-Hauck,

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[1] They are particularly important in that they counteracted the popular and interestingly written books of Max Müller: for instance, Müller, like Renan and Wilhelm von Humboldt, regarded language as an innate faculty and Whitney considered it the product of experience and outward circumstance. See Whitney's article *Philology* in the present edition of the *Encyclopaedia Britannica*.

Realencyklopädie (1904), xv. 254, s.v. "Pfingsten." For the many superstitions and observances of the day see P. H. Ditchfield, *Old English Customs* (1897); Brand, *Antiquities of Great Britain* (Hazlitt's edit., 1905); B. Picart, *Cérémonies et coutumes religieuses de tous les peuples* (1723).

WHITTIER, JOHN GREENLEAF (1807–1892), America's "Quaker poet" of freedom, faith and the sentiment of the common people, was born in a Merrimack Valley farmhouse, Haverhill, Massachusetts, on the 17th of December 1807. The dwelling was built in the 17th century by his ancestor, the sturdy immigrant, Thomas Whittier, notable through his efforts to secure toleration for the disciples of George Fox in New England. Thomas's son Joseph joined the Society of Friends and bore his share of obloquy. Successive generations obeyed the monitions of the Inner Light. The poet was born in the faith, and adhered to its liberalized tenets, its garb and speech, throughout his lifetime. His father, John, was a farmer of limited means but independent spirit. His mother, Abigail Hussey, whom the poet strongly resembled, was of good stock. The Rev. Stephen Bachiler, an Oxford man and a Churchman, who became a Nonconformist and emigrated to Boston in 1632, was one of her forebears and also an ancestor of Daniel Webster. The poet and the statesman showed their kinship by the "dark, deep-set and lustrous eyes" that impressed one who met either of these uncommon men. The former's name of Greenleaf is thought to be derived from the French Feuillevert, and to be of Huguenot origin; and there was Huguenot blood as well in Thomas Whittier, the settler. The poet thus fairly inherited his conscience, religious exaltation and spirit of protest. All the Whittiers were men of stature and bodily strength, John Greenleaf being almost the first exception, a lad of delicate mould, scarcely adapted for the labour required of a Yankee farmer and his household. He bore a fair proportion of it, but throughout his life was frequently brought to a halt by pain and physical debility. In youth he was described as "a handsome young man, tall, slight, and very erect, bashful, but never awkward." His shyness was extreme, though covered by a grave and quiet exterior, which could not hide his love of fun and sense of the ludicrous. In age he retained most of these characteristics, refined by a serene expression of peace after contest. His eyes never lost their glow, and were said by a woman to be those of one "who had kept innocency all his days."

Whittier's early education was restricted to what he could gain from the primitive "district school" of the neighbourhood. His call as a poet came when a teacher lent to him the poems of Burns. He was then about fifteen, and his taste for writing, bred thus far upon the quaint *Journals of Friends*, the Bible and *The Pilgrim's Progress*, was at once stimulated. There was little art or inspiration in his boyish verse, but in his nineteenth year an older sister thought a specimen of it good enough for submission to the *Free Press*, a weekly paper which William Lloyd Garrison, the future emancipationist, had started in the town of Newburyport. This initiated Whittier's literary career. The poem was printed with a eulogy, and the editor sought out his young contributor: their alliance began, and continued until the triumph of the anti-slavery cause thirty-seven years later. Garrison overcame the elder Whittier's desire for the full services of his son, and gained permission for the latter to attend the Haverhill academy. To meet expenses the youth worked in various ways, even making slippers by hand in after-hours; but when he came of age his text-book days were ended. Meanwhile he had written creditable student verse, and contributed both prose and rhyme to newspapers, thus gaining friends and obtaining a decided if provincial reputation. He soon essayed journalism, first spending a year and a half in the service of a publisher of two Boston newspapers, the *Manufacturer*, an organ of the Clay protectionists, and the *Philanthropist*, devoted to humane reform. Whittier edited the former, having a bent for politics, but wrote for the latter also. His father's last illness recalled him to the homestead, where both farm and family became his pious charge. Money had to be earned, and he now secured an editorial post at Hartford, Connecticut, which he sustained until forced by ill-health, early in his twenty-fifth year, to re-seek the Haverhill farm. There he remained from 1832 to 1836, when the property was sold, and the Whittiers removed to Amesbury in order to be near their meeting-house and to enable the poet to be in touch with affairs. The new home became, as it proved, that of his whole after-life; a dwelling then bought and in time remodelled was the poet's residence for fifty-six years, and from it, after his death on the 7th of September 1892, his remains were borne to the Amesbury graveyard.

While in Hartford Whittier issued in prose and verse his first book, *Legends of New England* (1831), and edited the writings of the poet John Gardiner C. Brainard. Thenceforward he was constantly printing verse, but of the hundred or more pieces composed before his settlement at Amesbury less than fifty are retained in his final collection. Of these none has more significance than the poem to Garrison, which appeared in 1831, and was read (December 1833) at the Philadelphia Convention that formed the Anti-Slavery Society. To that convention, with one-third of its membership composed of Friends, Whittier was a delegate, and was appointed one of the committee that drafted the famous Declaration of Sentiments. Although a Quaker, he had a polemical spirit; men seeing Whittier only in his saintly age knew little of the fire wherewith, setting aside ambition and even love, he maintained his warfare against the "national crime," employing action, argument and lyric scorn. A future was open for him among the Protectionists, who formed the Whig party, and doubtless soon would have carried him to the United States Congress. As it was, he got no farther than the legislature of his own state (1835–1836), elected by his neighbours in an anti-slavery town. But if Garrison, Phillips and Sumner and Mrs Stowe were to be the rhapsodists of the long emancipation struggle, Whittier was its foreordained poet-seer. In 1833 he had issued at his own cost a pamphlet, "Justice and Expediency," that provoked vehement discussion North and South. Later he shared with the agitators their experience of lawlessness, mob-violence and political odium. His sister Elizabeth, who became his life companion, and whose verse is preserved with his own, was president of the Woman's Anti-Slavery Society in Amesbury. It is to be noted that the first collection of Whittier's lyrics was the *Poems written during the Progress of the Abolition Question in the United States*, issued by a friend in 1837. But *Mogg Megone* (1836) was his first book, a crude attempt to apply the manner of Scott's romantic cantos to a native theme. Among his other lyrical volumes, of dates earlier than the Civil War, were *Lays of my Home* (1843), *Voices of Freedom* (1846), *Songs of Labor* (1850), *The Chapel of the Hermits* (1853), *The Panorama* (1856), *Home Ballads* (1860). The titles of *In War Time* (1863) and *National Lyrics* (1865) rightly designate the patriotic rather than Tyrtaean contents of these books. The poet was closely affiliated with the *Atlantic Monthly* from the foundation of that classic magazine in 1857. His repute became national with the welcome awarded to *Snow-Bound* in 1866, and brought a corresponding material reward. Of his later books of verse may be mentioned *The Tent on the Beach* (1867), *The Pennsylvania Pilgrim* (1872), *The Vision of Echard* (1878), *The King's Missive* (1881), *At Sundown*, his last poems (1890). As early as 1849 an illustrated collection of his poems appeared, and his *Poetical Works* was issued in London in 1850. During the ensuing forty years no less than ten successive collections of his poems appeared. Meanwhile he did much editing and compiling, and produced, among other works in prose, *The Stranger in Lowell* (1845), *Supernaturalism in New England* (1847), *Leaves from Margaret Smith's Journal* (1849), a pleasing treatment in old-style English of an early Colonial theme. When he died, in 1892, in New Hampshire, among the hills he loved and sang so well, he had been an active writer for over sixty years, leaving more than that number of publications that bore his name as author or editor. His body was brought to Amesbury for interment; the funeral services were held in the open air, and conducted after the simple rites of the Friends, in the presence of a large concourse, certain of whom "spake as they were moved" in tribute to the bard. The Amesbury house has been acquired by the "Whittier Home Association," so that the building and grounds are guarded as he left them, and form a shrine to which there is a constant pilgrimage. The Haverhill homestead, memorized in *Snow-Bound*, is also held by trustees "to preserve the natural features of the landscape," and to keep the buildings and furniture somewhat as they were in their minstrel's boyhood.

It would be unjust to consider Whittier's genius from an academic point of view. British lovers of poetry—except John Bright and others of like faith or spirit—have been slow to comprehend his distinctive rank. As a poet he was essentially a balladist, with the faults of his qualities; and his ballads, in their freedom, naiveté, even in their undue length, are among the few modern examples of unsophisticated verse. He returned again and again to their production, seldom labouring on sonnets and lyrics of the Victorian mould. His ear for melody was inferior to his sense of time, but that his over-facility and structural defects were due less to lack of taste than to early habit, Georgian models, disassociation from the schools, is indicated by his work as a writer of prose. In *Margaret Smith's Journal* an artistic, though suppositive, Colonial style is well maintained. Whittier became very sensible of his shortcomings; and when at leisure to devote himself to his art he greatly bettered it, giving much of his later verse all the polish that it required. In extended composition, as when he followed Longfellow's *Tales of a Wayside Inn* with his own *Tent on the Beach*, he often failed to rival his graceful brother poet. In American balladry he was pre-eminent; such pieces as "The Swan Song of Parson Avery," "Marguerite," "Barclay of Ury," "Skipper Ireson's Ride," "In the 'Old South,'" hold their place in literature. It is necessary above all to consider the relation of a people's years of growth and ferment to the song which represents them; for in the strains of Whittier, more than in those of any other 19th-century lyrist, the saying of Fletcher of Saltoun as to the ballads and laws of a nation finds a historic illustration. He was the national bard of justice, humanity and reform, whose voice went up as a trumpet until the victory was won. Its lapses resembled those of Mrs Browning, who was of his own breed in her fervour and exaltation. To the last it was uncertain whether a poem by Whittier would "turn out a sang," or "perhaps turn out a sermon"; if the latter, it had deep sincerity and was as close to his soul as the other. He began as a liberator, but various causes employed his pen; his heart was with the peoplé, and he was understanded of them; he loved a worker, and the *Songs of Labor* convey the zest of the artisan and pioneer. From 1832 to 1863 no occasion escaped him for inspiring the assailants of slavery, or chanting paeans of their martyrdom or triumph. No crusade ever had a truer laureate than the author of "The Virginia Slave Mother," "The Pastoral Letter"—one of his stinging ballads against a time-serving Church—"A Sabbath Scene," and "The Slaves of Martinique." "Randolph of Roanoke" is one of the most pathetic and most elevated of memorial tributes. "Ichabod" and "The Lost Occasion," both evoked by the attitude of Webster, are Roman in their condemnation and "wild with all regret."

The green rusticity of Whittier's farm and village life imparted a bucolic charm to such lyrics as "In School Days," "The Barefoot Boy," "Telling the Bees," "Maud Muller," and "My Schoolmate." His idyllic masterpiece is the sustained transcript of winter scenery and home-life, *Snow-Bound*, which has had no equal except Longfellow's "Evangeline" in American favour, but, in fact, nothing of its class since "The Cottar's Saturday Night" can justly be compared with it. Along with the Quaker poet's homing sense and passion for liberty of body and soul, religion and patriotism are the dominant notes of his song. His conception of a citizen's prerogative and duty, as set forth in "The Eve of Election," certainly is not that of one whose legend is "our country, right or wrong." Faith, hope and boundless charity pervade the "Questions of Life," "Invocation, and "The Two Angels," and are exquisitely blended in "The Eternal Goodness," perhaps the most enduring of his lyrical poems. "We can do without a Church," he wrote in a letter; "we cannot do without God, and of Him we are sure." The inward voice was his inspiration, and of all American poets he was the one whose song was most like a prayer. A knightly celibate, his stainless life, his ardour, caused him to be termed a Yankee Galahad; a pure and simple heart was laid bare to those who loved him in "My Psalm," "My Triumph" and "An Autograph." The spiritual habit abated no whit of his inborn sagacity, and it is said that in his later years political leaders found no shrewder sage with whom to take counsel. When the question of primacy among American poets was canvassed by a group of the public men of Lincoln's time, the vote was for Whittier; he was at least one whom they understood, and who expressed their feeling and convictions. Parkman called him "the poet of New England," but as the North and West then were charged with the spirit of the New England states, the two verdicts were much the same. The fact remains that no other poet has sounded more native notes, or covered so much of the American legendary, and that Whittier's name, among the patriotic, clean and true, was one with which to conjure. He was revered by the people cleaving to their altars and their fires, and his birthdays were calendared as festivals, on which greetings were sent to him by young and old.

In his age the poet revised his works, classifying them for a definitive edition, in seven volumes, published at Boston, 1888. Their metrical portion, annotated by Horace E. Scudder, can be found in the one-volume "Cambridge Edition," (Boston, 1894). Whittier's *Life and Letters*, prepared by his kinsman and literary executor, Samuel T. Pickard, also appeared in 1894.

See also G. R. Carpenter, *John Greenleaf Whittier* (Boston, 1903) in the "American Men of Letters" series; a life (1907) by Bliss Perry; and B. Wendell, *Stelligeri* (New York, 1893, pp. 149-201). (E.C.S.)

WHITTINGHAM, CHARLES (1767–1840), English printer, was born on the 16th of June 1767, at Caludon or Calledon, Warwickshire, the son of a farmer, and was apprenticed to a Coventry printer and bookseller. In 1789 he set up a small printing press in a garret off Fleet Street, London, with a loan obtained from the typefounding firm of William Caslon, and by 1797 his business had so increased that he was enabled to move into larger premises. An edition of Gray's *Poems*, printed by him in 1799, secured him the patronage of all the leading publishers. Whittingham inaugurated the idea of printing cheap, handy editions of standard authors, and, on the bookselling trade threatening not to sell his productions, took a room at a coffee house and sold them by auction himself. In 1809 he started a paper-pulp factory at Chiswick, near London, and in 1811 founded the Chiswick Press. From 1810 to 1815 he devoted his chief attention to illustrated books, and is credited with having been the first to use proper overlays in printing woodcuts, as he was the first to print a fine, or "Indian Paper" edition. He was one of the first to use a steam-engine in a pulp mill, but his presses he preferred to have worked by hand. He died at Chiswick on the 5th of January 1840.

His nephew, CHARLES WHITTINGHAM (1795–1876), who from 1824 to 1828 had been in partnership with his uncle, in 1838 assumed control of the business. He already had printing works at Took's Court, Chancery Lane, London, and had printed various notable books, specially devoting himself to the introduction of ornamental initial letters, and the artistic arrangement of the printed page. The imprint of the Chiswick press was now placed on the productions of the Took's Court as well as of the Chiswick works, and in 1852 the whole business was removed to London. Under the management of the younger Whittingham the Chiswick Press achieved a considerable reputation. He died on the 21st of April 1876.

WHITTINGHAM, WILLIAM (*c.* 1524–1579), English scholar, who belonged to a Lancashire family, was born at Chester. Educated at Brasenose College, Oxford, he became a fellow of All Souls' College and a senior student of Christ Church, and later he visited several universities in France and Germany. A strong Protestant, he returned to England in 1553, but soon found it expedient to travel again to France. In 1554 he was a leading member of the band of English Protestant exiles who were assembled at Frankfort-on-the-Main, and in the controversies which took place between them concerning the form of service to be adopted, Whittingham strongly supported the Calvinistic views propounded by John Knox. These opinions, however, did not prevail, and soon the Scottish reformer and his follower were found at Geneva; in 1559 Whittingham succeeded Knox as minister of the English congregation in that city, and here he did his most noteworthy work, that of making an English translation of the Bible. He was probably responsible for the English translation of the New Testament which appeared in 1557, and he had certainly a large share in the translation of both the Old and the New Testaments which is called the *Genevan* or *Breeches* Bible. This was printed at Geneva in 1560 and enjoyed a remarkable popularity (see BIBLE, ENGLISH). He also made a metrical translation of some of the Psalms. Having returned to England in 1560, Whittingham went to France in the train of Francis Russell, 2nd earl of Bedford, and a little later he acted as minister of the English garrison at Havre, being in this place during its siege by the French in 1562. In the following year he was made dean of Durham. He attended well to the duties of his office, but his liking for puritan customs made certain prelates and others look upon him with suspicion, and in 1576 or 1577 a commission was appointed to inquire into his conduct. This had no result, and another commission was appointed in 1578, one charge against Whittingham being that he had not been duly ordained. The case was still under consideration when the dean died on the 10th of June 1579.

WHITTINGTON, RICHARD (d. 1423), mayor of London, described himself as son of William and Joan (Dugdale, *Monasticon Anglicanum*, vi. 740). This enables him to be identified as the third son of Sir William Whittington of Pauntley in Gloucestershire, a knight of good family, who married after 1355 Joan, daughter of William Mansel, and widow of Thomas Berkeley of Cubberley. Consequently Richard was a very young man when he is mentioned in 1379 as subscribing five marks to a city loan. He was a mercer by trade, and clearly entered on his commercial career under favourable circumstances. He married Alice, daughter of Sir Ivo Fitzwaryn, a Dorset knight of considerable property. Whittington sat in the common council as a representative of Coleman Street Ward, was elected alderman of Broad Street in March 1393, and served as sheriff in 1393–1394. When Adam Bamme, the mayor, died in June 1397, Whittington was appointed by the king to succeed him, and in October was elected mayor for the ensuing year. He had acquired great wealth and much commercial importance, and was mayor of the staple at London and Calais. He made frequent large loans both to Henry IV. and Henry V., and according to the legend, when he gave a banquet to the latter king and his queen in 1421, completed the entertainment by burning bonds for £60,000, which he had taken up and discharged. Henry V. employed him to superintend the expenditure of money on completing Westminster Abbey. But except as a London commercial magnate Whittington took no great part in public affairs. He was mayor for a third term in 1406–1407, and for a fourth in 1419–1420. He died in March 1423. His wife had predeceased him leaving no children, and Whittington bequeathed the whole of his vast fortune to charitable and public purposes. In his lifetime he had joined in procuring Leadenhall for the city, and had borne nearly all the cost of building the Greyfriars Library. In his last year as mayor he had been shocked by the foul state of Newgate prison, and one of the first works undertaken by his executors was its rebuilding. His executors, chief of whom was John Carpenter, the famous town clerk, also contributed to the cost of glazing and paving the new Guildhall, and paid half the expense of building the library there; they repaired St Bartholomew's hospital, and provided bosses for water at Billingsgate and Cripplegate. But the chief of Whittington's foundations was his college at St Michael, Paternoster church, and the adjoining hospital. The college was dissolved at the Reformation, but the hospital or almshouses are still maintained by the Mercers' Company at Highgate. Whittington was buried at St Michael's church. Stow relates that his tomb was spoiled during the reign of Edward VI., but that under Mary the parishioners were compelled to restore it (*Survey*, i. 243). Whittington had a house near St Michael's church; it is doubtful whether he had any connexion with the so-called Whittington Palace in Hart Street, Mark Lane. There is no proof that he was ever knighted; Stow does not call him Sir Richard. Much of Whittington's fame was probably due to the magnificence of his charities. But a writer of the next generation bears witness to his commercial success in *A Libell of English Policy* by styling him "the sunne of marchaundy, that lodestarre and chief-chosen flower."

> "Pen and paper may not me suffice
> Him to describe, so high he was of price."

The Richard Whittington of history is thus very different from the Dick Whittington of popular legend, which makes him a poor orphan employed as a scullion by the rich merchant, Sir Hugh Fitzwarren, who ventures the cat, his only possession, on one of his master's ships. Distressed by ill-treatment he runs away, but turns back when he hears from Holloway the prophetic peal of Bow bells. He returns to find that his venture has brought him a fortune, marries his master's daughter, and succeeds to his treasure [illegible]
whose love for exposing [illegible]
him to notice [illegible]
The first reference to the [illegible]
of a play, now lost, *The* [illegible]
his lowe byrth, his great fortune [illegible]
makes one of the characters [illegible]
nobody, allude to the legend [illegible]
"they did more wrong to the [illegible]
Whittington," probably [illegible]
mentioned by Beaumont and [illegible]
of the Burning Pestle. The [illegible]
When a little later Robert [illegible]
supposed portrait of Whittington [illegible]
he had in deference to the public [illegible]
copies in the first state are very rare [illegible]
to explain the story as possibly referring [illegible]
which were employed in the North Sea [illegible]
achat (purchase). But Thomas Keightley [illegible]
Persian, Danish and Italian folk-lore at least [illegible]
the 13th century. The assertion that a carved [illegible]
existed on Newgate gaol before the great fire [illegible]
assumption.

Bibliography.—The most important early [illegible] ton are contained in Dr R. R. Sharpe's *Calendar of* [illegible] H. T. Riley's *Memorials of London*; and *Political* [illegible] (Rolls series). For his charities see Stow's *Survey of* [illegible] C. L. Kingsford, 1908). For documents relating [illegible] College see Dugdale, *Monasticon Anglicanum*, vi. 740, and the [illegible] *of Patent Rolls, Henry VI.*, ii. 214-217. Samuel Lysons [illegible] facts, but accepted the legend in *The Model Merchant of the Middle Ages* (1860). The *Life* by W. Besant and J. Rice does not [illegible] on Lysons. Some useful references will be found in J. H. W[illegible] *History of England under Henry IV.* For an examination of the legend see T. Keightley's *Tales and Popular Fictions*, pp. 241-[illegible] (1834), and H. B Wheatley's preface to his edition of *The History of Sir Richard Whittington* (first published in 1656). (C. L. K.)

WHITTINGTON, an urban district in the north-eastern parliamentary division of Derbyshire, England, 10 m. S. by E. of Sheffield and 2 m. N. of Chesterfield, on the Midland railway. Pop. (1901) 9416. The parish church of St Bartholomew was restored after its destruction by fire, excepting the tower and spire, in 1805. Samuel Pegge, the antiquary (1704–1796), was vicar of Whittington and Heath for many years, and was buried here. Stone bottles and coarse earthenware are manufactured in the town, where there are also large ironworks, collieries and brickworks. A small stone cottage, known as Revolution House, was the meeting-place of John Darcy, the 1st earl of Danby, and the 4th earl of Devonshire, who there concerted the plans by which, in 1688, the Whig party brought about the fall of James II. and the succession of William III. It was then a hostelry, known as the "Cock and Pynot"; pynot being the local name for a magpie.

WHITTLESEA (or Whittlesey), **WILLIAM** (d. 1374), archbishop of Canterbury, was probably born in the Cambridgeshire village of Whittlesey. He was educated at Oxford, and owing principally to the fact that he was a nephew of Simon Islip, archbishop of Canterbury, he received numerous ecclesiastical preferments; he held prebends at Lichfield, Chichester and Lincoln, and livings at Ivychurch, Croydon and Cliffe. Later he was appointed vicar-general, and then dean of the court of arches by Islip. In 1360 he became bishop of Rochester, and two years later bishop of Worcester. In 1368 Whittlesea was elected archbishop of Canterbury in succession to Simon Langham, but his term of office was very uneventful, a circumstance due partly, but not wholly, to his feeble health. He died at Lambeth on the 5th or 6th of June 1374.

WHITTLESEY, a market town in the Wisbech parliamentary division of Cambridgeshire, England, 5½ m. E. of Peterborough, between that city and March, on the Great Eastern railway. Pop. of urban district (1901) 3909. It lies on a gentle eminence in the flat fen country, and the fine Perpendicular tower and spire of the church of St Mary are a landmark from far. A little to the north is the great artificial cut carrying the water [illegible] river Nene; and the neighbourhood is intersected with many other navigable "drains." To the south-west is the tract known as Whittlesey Mere, 6 m. distant from the town, in Huntingdonshire. It was a lake until modern times, when it was included in a scheme of drainage. The so-called Whittlesey Wash, in the neighbourhood of the town, is among several tracts in the fens which are perennially flooded. St Mary's church is principally Perpendicular, but has Norman and Decorated portions; the church of St Andrew is also Decorated and Perpendicular. The town has manufactures of bricks and tiles, and a considerable agricultural trade.

WHITWORTH, SIR JOSEPH, Bart. (1803–1887), English engineer, was born at Stockport, near Manchester, on the 21st of December 1803. On leaving school at the age of fourteen, he was placed with an uncle who was a cotton-spinner, with the view of becoming a partner in the business; but his mechanical tastes were not satisfied with this occupation, and in about four years he gave it up. He then spent some time with various machine manufacturers in the neighbourhood of Manchester, and in 1825 moved to London, where he gained more experience in machine shops, including those of Henry Maudslay. In 1833 he returned to Manchester and started in business as a tool-maker. In 1840 he attended the meeting of the British Association at Glasgow, and read a paper on the preparation and value of true planes, describing the method which he had successfully used for making them when at Maudslay's, and which depended on the principle that if any two of three surfaces exactly fit each other, all three must be true planes. The accuracy of workmanship thus indicated was far ahead of what was contemplated at the time as possible in mechanical engineering, but Whitworth not only proved that it could be attained in practice, but also showed how it could be measured. He found that if two true planes were arranged parallel to each other, an exceedingly small motion towards or from each other was sufficient to determine whether an object placed between them was held firmly or allowed to drop, and by mounting one of the planes on a screwed shaft provided with a comparatively large wheel bearing a scale on its periphery, he was able to obtain a very exact measurement of the amount, however minute, by which the distance between the planes was altered, by observing through what angular distance the wheel had been turned. In 1841, in a paper read before the Institution of Civil Engineers, he urged the necessity for the adoption of a uniform system of screw threads in place of the various heterogeneous pitches then employed. His system of standard gauges was also widely adopted. The principles of exact measurement and workmanship which he advocated were strictly observed in his own manufactory, with the result that in the Exhibition of 1851 he had a show of machine tools which were far ahead of those of any competitor. It was doubtless this superiority in machine construction that caused the government three years later to request him to design, and estimate for making, the machinery for producing rifled muskets at the new factory at Enfield. He did not see his way to agree to the proposition in this form, but it was ultimately settled that he should undertake the machinery for the barrels only. Finding that there was no established practice to guide him, he began a series of experiments to determine the best principles for the manufacture of rifle barrels and projectiles. He ultimately arrived at a weapon in which the necessary rotation of the projectile was obtained, not by means of grooving, but by making the barrel polygonal in form, with gently rounded angles, the bullets also being polygonal and thus travelling on broad bearing-surfaces along the rotating polygon. The projectile he favoured was 3 to 3½ calibres in length, and the bore he fixed on was 0·45 in., which was at first looked upon as too small. It is reported that at the trial in 1857 weapons made according to these principles excelled the Enfield weapons in accuracy of fire, penetration and range to a degree "which hardly leaves room for comparison." He also constructed heavy guns on the same lines; these were tried in competition with Armstrong's ordnance in 1864 and 1865, and in their inventor's opinion gave the better [illegible] they were not adopted by the government. In constructing them Whitworth experienced difficulty in getting large steel castings of suitable soundness and ductility, and thus was led about 1870 to devise his compressed steel process, in which the metal is subjected to high pressure while still in the fluid state, and is afterwards forged in hydraulic presses, not by hammers. In 1868 he founded the Whitworth scholarships, setting aside an annual sum of £3000 to be given for "intelligence and proficiency in the theory and practice of mechanics and its cognate sciences," and in the following year he was created a baronet. He died at Monte Carlo, whither he had gone for the sake of his health, on the 22nd of January 1887. In addition to handing over £100,000 to the Science and Art Department for the permanent endowment of the thirty Whitworth scholarships, his residuary legatees, in pursuance of what they knew to be his intentions, expended over half a million on charitable and educational objects, mainly in Manchester and the neighbourhood.

WHOOPING-COUGH, or HOOPING-COUGH (syn. *Pertussis*, Chin-cough), a specific infective disease of the respiratory mucous membrane, of microbic origin (see PARASITIC DISEASES), manifesting itself by frequently recurring paroxysms of convulsive coughing accompanied with peculiar sonorous inspirations (or whoops). Although specially a disease of childhood, whooping-cough is by no means limited to that period but may occur at any time of life. It is one of the most dangerous diseases of infancy, the yearly death-rate in England and Wales for each of the five years 1904–1908 being greater than that from scarlet fever and typhoid added together. The majority of these deaths were in infants under one year, 97% in children under 5 years (Tatham). It is more common in female than in male children. There is a distinct period of incubation variously estimated at from two to ten days. Three stages of the disease are recognized, viz. (1) the catarrhal stage, (2) the spasmodic or paroxysmal stage, (3) the stage of decline.

The *first stage* is characterized by the ordinary phenomena of a catarrh, with sneezing, watering of the eyes, irritation of the throat, feverishness and cough, but in general there is nothing in the symptoms to indicate that they are to develop into whooping-cough, but the presence of an ulcer on the fraenum linguae is said to be diagnostic. The catarrhal stage usually lasts from ten to fourteen days. The *second stage* is marked by the abatement of the catarrhal symptoms, but at the same time by increase in the cough, which now occurs in irregular paroxysms both by day and by night. Each paroxysm consists in a series of violent and rapid expiratory coughs, succeeded by a loud sonorous or crowing inspiration—the "whoop." During the coughing efforts the air is driven with great force out of the lungs, and as none can enter the chest the symptoms of impending asphyxia appear. The patient grows deep-red or livid in the face, the eyes appear as if they would burst from their sockets, and suffocation seems imminent till relief is brought by the "whoop"—the louder and more vigorous the better. Occasionally blood bursts from the nose, mouth and ears, or is extravasated into the conjunctiva of the eyes. A single fit rarely lasts beyond from half to three-quarters of a minute, but after the "whoop" another recurs, and of these a number may come and go for several minutes. The paroxysm ends by the coughing or vomiting up of a viscid tenacious secretion, and usually after this the patient seems comparatively well, or, it may be, somewhat wearied and fretful. The frequency of the paroxysms varies according to the severity of the case, being in some instances only to the extent of one or two in the whole day, while in others there may be several in the course of a single hour. Slight causes serve to bring on the fits of coughing, such as the acts of swallowing, talking, laughing, crying, &c., or they may occur without any apparent exciting cause. In general children come to recognize an impending attack by a feeling of tickling in the throat, and they cling with dread to their mothers or nurses, or take hold of some object near them for support during the paroxysm; but although exhausted by the severe fit of coughing they soon resume their play, apparently little the worse. The attacks are on the whole most severe at night. This stage of the disease usually continues for thirty to fifty days, but it may be shorter or longer. It is during this time that complications are apt to arise which may become a source of danger greater even than the malady itself. The chief of these are inflammatory affections of the bronchi and lungs and convulsions, any of which may prove fatal. When, however, the disease progresses favourably, the *third* or *terminal stage* is announced by the less frequent paroxysms of the cough, which generally loses in great measure its "whooping" character. The patient's condition altogether undergoes amendment, and the symptoms disappear in from one to three weeks. It is to be observed, however, that for a long period afterwards in any simple catarrh from which the patient suffers the cough often assumes a spasmodic character, which may suggest the erroneous notion that a relapse of the whooping-cough has occurred.

In severe cases it occasionally happens that the disease leaves behind it such structural changes in the lungs (emphysema, &c.), as entail permanent shortness of breathing or a liability to attacks of asthma. Further, whooping-cough is well known to be one of those diseases of early life which are apt to give rise to a weakened and vulnerable state of the general health, or to call into activity any inherited morbid tendency, such as that towards consumption.

As regards the treatment in mild cases, little is necessary beyond keeping the patient warm and carefully attending to the general health. The remedies applicable in the case of catarrh or the milder forms of bronchitis are of service here, while gentle counter-irritation to the chest by stimulating liniments may be employed all through the attack. In mild weather the patient may be in the open air. An abdominal binder should be worn night and day in order to prevent the occurrence of hernia. Systematic disinfection of the sputum by means of a solution of corrosive sublimate or by burning should be practised in order to check the spread of infection. In the more severe forms efforts have to be employed to modify the severity of the paroxysms. Numerous remedies are recommended, the chief of which are the bromides of ammonium or potassium, chloral, codeine, &c. These can only be safely administered under medical advice, and with due regard to the symptoms in individual cases. During convalescence, where the cough still continues to be troublesome, a change of air will often effect its removal.

WHYMPER, EDWARD (1840–), British artist, explorer and mountaineer, was born in London on the 27th of April 1840. The son of an artist, he was at an early age trained to the profession of a wood-engraver. In 1860 he was commissioned to make a series of sketches of Alpine scenery, and undertook an extensive journey in the Central and Western Alps. Among the objects of this tour was the illustration of an attempt, which proved unsuccessful, made by Professor Bonney's party, to ascend Mont Pelvoux, at that time believed to be the highest peak of the Dauphiné Alps. He successfully accomplished the ascent in 1861—the first of a series of expeditions that threw much light on the topography of a district at that time very imperfectly mapped. From the summit of Mont Pelvoux he discovered that it was overtopped by a neighbouring peak, subsequently named the Pointe des Écrins, which, before the annexation of Savoy added Mont Blanc to the possessions of France, was the highest point in the French Alps. Its ascent by Mr Whymper's party in 1864 was perhaps the most remarkable feat of mountaineering up to that date. The years 1861 to 1865 are filled with a number of new expeditions in the Mont Blanc group and the Pennine Alps, among them the ascent of the Aiguille Verte and the crossing of the Moming Pass. Professor Tyndall and Mr Whymper emulated each other in fruitless attempts to reach the summit of the Matterhorn by the south-western or Italian ridge. Mr Whymper, six times repulsed, determined to try the eastern face, convinced that its precipitous appearance when viewed from Zermatt was an optical illusion, and that the dip of the strata, which on the Italian side formed a continuous series of overhangs, should make the opposite side a natural staircase. His attempt by what is now the usual route was crowned with success (14th of July 1865); but on the descent four of the party slipped and were killed, and only the breaking of the rope saved Mr Whymper and the two remaining guides from the same fate. The account of his attempts on the Matterhorn occupies the greater part of his *Scrambles among the Alps* (1871), in which the illustrations are engraved by the author himself, and are very beautiful. His campaign of 1865 had been planned to exercise his judgment in the choice of routes as a preparation for an expedition to Greenland (1867). This resulted in an important collection of fossil plants, which were described by Professor Heer and deposited in the British Museum. Mr Whymper's report was published in the *Report* of the British Association for the year 1869. Though hampered by want of means and by the prevalence of an epidemic among the natives, he proved that the interior could be explored by the use of suitably constructed sledges, and thus contributed an important advance to Arctic exploration. Another expedition followed in 1872, and was devoted to a survey of the coast-line. He next organized an expedition to Ecuador, designed primarily to collect data for the study of mountain-sickness and of the effect of diminished pressure on the human frame. He took as his chief guide Jean-Antoine Carrel, whose subsequent death from exhaustion on the Matterhorn after bringing his employers into safety through a snowstorm forms one of the noblest pages in the history of mountaineering. During 1880 Mr Whymper on two occasions ascended Chimborazo, whose summit, 20,500 ft. above sea-level, had never before been reached; spent a night on the summit of Cotopaxi, and made first ascents of half-a-dozen other great peaks. In 1892 he published the results of his journey in a volume, entitled *Travels amongst the Great Andes of the Equator*. His observations on mountain-sickness led him to conclude that it was caused by "diminution in atmospheric pressure, which operates in at least two ways—namely, (*a*) by lessening the value of the air that can be inspired in any given time, and (*b*) by causing the air or gas within the body to expand, and to press upon the internal organs"; and that "the effects produced by (*b*) may be temporary and pass away when equilibrium has been restored between the internal and external pressure." The publication of his work was recognized on the part of the Royal Geographical Society by the award of the Patron's medal. His experiences in South America having convinced him of certain serious errors in the readings of aneroid barometers at high altitudes, he published a work, entitled *How to Use the Aneroid Barometer*, and succeeded in introducing important improvements in their construction. He afterwards published two guide-books to Zermatt and Chamonix. In 1901–1905 he undertook an expedition in the region of the Great Divide of the Canadian Rockies.

WHYTE, ALEXANDER (1837–), Scottish divine, was born at Kirriemuir in Forfarshire on the 13th of January 1837, and was educated at the university of Aberdeen and at New College, Edinburgh. He entered the ministry of the Free Church of Scotland and after serving as colleague in Free St John's, Glasgow (1866–1870), removed to Edinburgh as colleague and successor to Dr R. S. Candlish at Free St George's. In 1909 he succeeded Dr Marcus Dods as principal, and professor of New Testament literature, at New College, Edinburgh.

Among his publications are *Characters and Characteristics of William Law* (1893); *Bunyan Characters* (3 vols., 1894); *Samuel Rutherford* (1894); *An Appreciation of Jacob Behmen* (1895); *Lancelot Andrewes and his Private Devotions* (1895); *Bible Characters* (7 vols., 1897); *Santa Teresa* (1897); *Father John of Cronstadt* (1898); *An Appreciation of Browne's Religio Medici* (1898); *Cardinal Newman, An Appreciation* (1901).

WHYTE-MELVILLE, GEORGE JOHN (1821–1878), English novelist, son of John Whyte-Melville of Strathkinness, Fifeshire, and grandson on his mother's side of the 5th duke of Leeds, was born on the 19th of June 1821. Whyte-Melville received his education at Eton, entered the army in 1839, became captain in the Coldstream Guards in 1846 and retired in 1849. After translating Horace (1850) in fluent and graceful verse, he published his first novel, *Digby Grand*, in 1853. The unflagging verve and intimate technical knowledge with which he described sporting scenes and sporting characters at once drew attention to him as a novelist with a new vein. He was the laureate of fox-hunting;

all his most popular and distinctive heroes and heroines, Digby Grand, Tilbury Nogo, the Honourable Crasher, Mr Sawyer, Kate Coventry, Mrs Lascelles, are or would be mighty hunters. *Tilbury Nogo* was contributed to the *Sporting Magazine* in 1853 and published separately in 1854. He showed in the adventures of Mr Nogo—and it became more apparent in his later works—that he had a surer hand in humorous narrative than in pathetic description; his pathos is the pathos of the preacher. His next novel, *General Bounce*, appeared in *Fraser's Magazine* (1854). When the Crimean War broke out Whyte-Melville went out as a volunteer major of Turkish irregular cavalry; but this was the only break in his literary career from the time that he began to write novels till his death. By a strange accident, he lost his life in the hunting-field on the 5th of December 1878, the hero of many a stiff ride meeting his fate in galloping quietly over an ordinary ploughed field in the Vale of the White Horse.

Twenty-one novels appeared from his pen after his return from the Crimea:—*Kate Coventry* (1856); *The Interpreter* (1858); *Holmby House* (1860); *Good for Nothing* (1861); *Market Harborough* (1861); *The Queen's Maries* (1862); *The Gladiators* (1863); *Brookes of Bridlemere* (1864); *Cerise* (1866); *Bones and I* (1868); *The White Rose* (1868); *M or N* (1869); *Contraband* (1870); *Sarchedon* (1871); *Satanella* (1873); *Uncle John* (1874); *Sister Louise* (1875); *Katerfelto* (1875); *Rosine* (1875); *Roy's Wife* (1878); *Black but Comely* (1878). Several of these novels are historical, *The Gladiators* being perhaps the most famous of them. As an historical novelist Whyte-Melville is not equal to Harrison Ainsworth in painstaking accuracy and minuteness of detail; but he makes his characters live and move with great vividness. It is on his portraiture of contemporary sporting society that his reputation as a novelist must rest; and, though now and then a character reappears, such as the supercilious stud-groom, the dark and wary steeple-chaser, or the fascinating sporting widow, his variety in the invention of incidents is amazing. Whyte-Melville was not merely the annalist of sporting society for his generation, but may also be fairly described as the principal moralist of that society; he exerted a considerable and a wholesome influence on the manners and morals of the gilded youth of his time. His *Songs and Verses* (1869) and his metrical *Legend of the True Cross* (1873), though respectable in point of versification, are of no particular merit.

WICHITA, a tribe of North American Indians of Caddoan stock. They call themselves Kitikitish or Tawéhash. Their former range was between the Red and Washita rivers, Oklahoma, and they are now on a reservation there. They were kinsmen of the Pawnee, and the French called them *Pani Piqué* ("Tattooed Pawnee"). They were known to other Indians as the "Tattooed People" in allusion to the extensive tattooing customary among them. They numbered 3000 in or about 1800, but only about 300 now survive.

WICHITA, a city and the county-seat of Sedgwick county, Kansas, U.S.A., on the Arkansas river, at the mouth of the Little Arkansas, 208 m. (by rail) S.W. of Kansas City. Pop. (1880) 4911; (1890) 23,853; (1900) 24,671, of whom 1447 were foreign-born and 1389 were negroes; (1910 census), 52,450. Area, 18·75 sq. m. Wichita is served by the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Missouri Pacific, the St Louis & San Francisco, and the Kansas City, Mexico & Orient railways. The site of the city is level, about 1300 ft. above the sea. The principal public buildings are the Federal building, the city hall, the county court house, a Y.M.C.A. building, an auditorium and exposition hall and a Masonic Temple. In Wichita are Fairmount College (Congregational; co-educational; organized as a preparatory school in 1892 and as a college in 1895); Friends' University (Society of Friends; co-educational; 1898); and Mount Carmel Academy and the Pro-Cathedral School (both Roman Catholic). Among the city's parks (area in 1909, 325 acres) is one (Riverside) of 146 acres. The city is supplied with natural gas. Wichita is a transporta- [illegible] agricultural region surrounding it, and is [illegible] broom-corn. In 1905 it ranked third [illegible] in value of its factory product [illegible] industry is slaughtering and meat- [illegible] Mexico & Orient railway has car- [illegible] an Indian tribe, was settled [illegible] city in 1871. In 1909 the city [illegible] by commission under a [illegible] and four commissioners, heads of the executive, finance, streets and public improvements, parks, public buildings and health, and water and lights departments, all elected for two years and nominated by primary election or by petition signed by at least 25 voters.

WICK, a royal, municipal and police burgh, seaport and county town of Caithness, Scotland. Pop. (1901) 7911. It is situated at the head of Wick Bay, on the North Sea, 327 m. N. of Edinburgh, by the North British and Highland railways. It consists of the old burgh and Louisburgh, its continuation, on the north bank of the river Wick, and of Pulteneytown, the chief seat of commerce and trade, on the south side. Pulteneytown, laid out in 1805 by the British Fishery Society, is built on a regular plan; and Wick proper consists chiefly of the narrow and irregular High Street, with Bridge Street, more regularly built, which contains the town hall and the county buildings. In Pulteneytown there are an academy, a chamber of commerce, a naval reserve station and a fish exchange. Among other buildings are the free libraries, the Rhind Charitable Institution and the combination hospital. The port consists of two harbours of fair size, but the entrance is dangerous in stormy weather. The chief exports are fish, cattle and agricultural produce, and the imports include coal, wood and provisions. Steamers from Leith and Aberdeen run twice a week and there is also weekly communication with Stromness, Kirkwall and Lerwick. It is to its fisheries that the town owes its prosperity. For many years it was the chief seat of the herring fishing on the east coast, but its insufficient harbour accommodation has hampered its progress, and both Peterhead and Fraserburgh surpass it as fishing ports. Women undertake the cleaning and curing, and the work attracts them from all parts. So expert are they that on the occasion of a heavy catch they are sent as far even as Yarmouth to direct and assist the local hands. Shipbuilding has now been discontinued, but boat-building and net-making are extensively carried on. There are also cooperage, the manufacture of fish-guano and fish products, flour mills, steam saw mills, a ropery and a woollen manufactory, a brewery and a distillery. The town, with Cromarty, Dingwall, Dornoch, Kirkwall and Tain, forms the Wick group of parliamentary burghs. Wick (Vik or "bay") is mentioned as early as 1140. It was constituted a royal burgh by James VI. in 1589, its superior being then George Sinclair, 5th earl of Caithness. By a parliamentary bounty in 1768 some impetus was given to the herring-fishery, but its real importance dates from the construction of a harbour in 1808.

WICKLOW, a county of Ireland in the province of Leinster, bounded E. by St George's Channel, N. by the county of Dublin, S. by Wexford and W. by Carlow and detached portions of Kildare. The area is 500,216 acres or about 782 sq. m. Wicklow is among the most famous counties of Ireland for beauty of scenery, both coastal and more especially inland. The coast is precipitous and picturesque, but very dangerous of approach owing to sandbanks. There are no inlets that can be properly termed bays. The harbour at Wicklow has a considerable trade; but that of Arklow is suitable only for small vessels. To the north of the town of Wicklow there is a remarkable shingle beach, partly piled up by the waves and currents. The central portion of the county is occupied by a mountain range, forming one of the four principal mountain groups of Ireland. The direction of the range is from N.E. to S.W., and the highest elevations are generally attained along the central line. The range consists of long sweeping moorlands, rising occasionally by precipitous escarpments into culminating points, the highest summits being Kippure (2473 ft.), Duff Hill (2364), Table Mountain (2416) and Lugnaquilla (3039), the last acquired by the War Office as a manœuvring ground. The range rises from the north by a succession of ridges intersected by deep glens, and subsides towards the borders of Wexford and Carlow. To the north its foothills enter county Dublin, and add attraction to the southern residential outskirts of the capital.

In the valleys there are many instances of old river terraces, the more remarkable being those at the lower end of Glenmalure and the lower end of Glendalough. It is in its deep glens that much of the peculiar charm of Wicklow scenery is to be found, the frequently rugged natural features contrasting finely with the rich and luxuriant foliage of the extensive woods which line their banks. Among the more famous of these glens are Glendalough, Dargle, Glencree, Glen of the Downs, Devil's Glen, Glenmalure and the beautiful vale of Avoca or Ovoca. The principal rivers are the Liffey, on the north-western border; the Vartry, which passes through Devil's Glen to the sea north of Wicklow Head; the Avonmore and the Avonbeg, which unite at the "meeting of the waters" to form the Avoca, which is afterwards joined by the Aughrim and falls into the sea at Arklow; and the Slaney, in the west of the county, passing southwards into Carlow. There are a number of small but finely situated lakes in the valleys, the principal being Loughs Dan, Bray and Tay or Luggelaw, and the loughs of Glendalough. The trout-fishing is generally fair. Owing to its proximity to Dublin and its accessibility from England, the portions of the county possessing scenic interest have been opened up to great advantage. Bray in the north is one of the most popular seaside resorts in the country, and Greystones, 5 m. S., is a smaller one. Of the small towns and villages inland which are much frequented for the beauty of the country in which they lie, are Enniskerry, west of Bray, and near the pass of the Scalp; Laragh, near Glendalough, from which a great military road runs S.W. across the hills below Lugnaquilla; and, on the railway south of Wicklow, Rathdrum, a beautifully situated village, Woodenbridge in the Vale of Avoca and Aughrim. Near the village of Shillelagh lies the wood which is said to have given the name of *shillelagh* to the oaken or blackthorn staves used by Irishmen. Ashford and Roundwood on the Vastry river, Delgany near the Glen of the Downs, and Rathnew, a centre of coach routes, especially for the Devil's Glen, must also be mentioned. The beauty of the central district of the Wicklow mountains lies in its wild solitude in contradistinction to the more gentle scenery of the populated glens. In the extreme north-west of the county Blessington is a favourite resort from Dublin, served by a steam tramway, which continues up the valley of the Liffey to the waterfalls of Pollaphuca. The climate near the sea is remarkably mild, and permits the myrtle and arbutus to grow.

Geology.—Wicklow, as regards its geology, is mainly an extension of county Wexford, the Leinster chain bounding it on the west, and Silurian foothills sloping thence down to the sea. The highland of muscovite-granite, with a marginal zone of mica-schist, produced by contact-action on the Silurian shales, runs from Shillelagh to the sea north of Bray, its highest point being Lugnaquilla. The rounded heather-clad moors give way to more broken country on either side, where the streams cut deeply into the Silurian region. The water-supply of Dublin is obtained from an artificial lake on the first plateau of the foothills at Roundwood. From Wicklow town to near Bray, red and greenish slates and yellow-brown quartzites, probably Cambrian, form a hilly country, in which rise Carrick Mt., the Great Sugarloaf and Bray Head. *Oldhamia* occurs in this series. Volcanic and intrusive felsites and diorites abound in the Silurian beds of the south, running along the strike of the strata. A considerable amount of gold has been extracted from the valley-gravels north of Croghan Kinshela on the Wexford border. Tinstone has also been found in small quantities. Lead-ore is raised west of Laragh, and the mines in the Avoca valley have been worked for copper, lead and sulphur, the last-named being obtained from pyrite. Paving-setts are made from the diorite at Arklow, and granite is extensively quarried at Ballyknockan on the west side of the mountain-chain.

Industries.—The land in the lower grounds is fertile; and although the greater part of the higher districts is covered with heath and turf, it affords good pasturage for sheep. There is a considerable extent of natural timber as well as artificial plantations. The acreage under pasture is nearly three times that of tillage, and, whereas the principal crops of oats and potatoes decrease considerably, the numbers of sheep, cattle, pigs and poultry are well maintained. Except in the Avoca district, where the mining industry is of some importance, the occupations are chiefly agricultural. The port of Wicklow is the headquarters of a sea-fishery district.

The Dublin and South-Eastern railway skirts the coast by way of Bray and the town of Wicklow, touching it again at Arklow, with a branch line from Woodenbridge junction to Shillelagh. A branch of the Great Southern & Western line from Sallins skirts the west of the county by Baltinglass.

Population and Administration.—The population (64,492 in 1891, 60,824 in 1901) decreases to a less extent than the average of the Irish counties, and emigration is considerable. Of the total about 80% are Roman Catholics, and 18% Protestant Episcopalians; about 80% forms the rural population. Bray (pop. 7424), Wicklow (the county town, 3288) and Arklow (4944) are the principal towns, all on the coast; Wicklow is the only considerable port. Wicklow returned to the Irish parliament, until the Union in 1800, two county members and two each for the boroughs of Baltinglass, Bray, Tinahely and Arklow; it is now formed into two parliamentary divisions, an eastern and a western, each returning one member. The county is divided into eight baronies. It is mainly in the Protestant diocese of Dublin and in the Roman Catholic dioceses of Dublin, Kildare and Leighlin and Ferns. Assizes are held at Wicklow, and quarter-sessions at Bray, Baltinglass, Tinahely, Arklow and Wicklow.

History and Antiquities.—Wicklow was not made a county until 1606. It was the last Irish ground shired, for in this mountainous district the Irish were long able to preserve independence. Wicklow sided with the royal cause during the Cromwellian wars, but on Cromwell's advance submitted to him without striking a blow. During the rebellion of 1798 some of the insurgents took refuge within its mountain fastnesses, and an engagement took place near Aughrim between a band of them under Joseph Holt (1756–1826) and the British troops. A second skirmish was fought at Arklow between the rebels and General Needham, the former being defeated.

Of the ancient cromlechs there are three of some interest, one near Enniskerry, another on the summit of Lugnaquilla and a third, with a druidical circle, at Donaghmore. There are comparatively unimportant monastic remains at Rathdrum, Baltinglass and Wicklow. The ruins in the vale of Glendalough, known as the "seven churches," including a perfect round tower, are, perhaps excepting Clonmacnoise, the most remarkable ecclesiastical remains in Ireland. They owe their origin to St Kevin, who lived in the vale as a hermit, and is reputed to have died on the 3rd of June 618. Of the old fortalices or strongholds associated with the early wars, those of special interest are Black Castle, near Wicklow, originally founded by the Norman invaders, but taken by the Irish in 1301, and afterwards rebuilt by William Fitzwilliam; the scattered remains of Castle Kevin, the ancient stronghold of the O'Tooles, by whom it was probably originally built in the 12th century; and the ruins of the old castle of the Ormondes at Arklow, founded by Theobald FitzWalter (d. 1285), the scene of frequent conflicts up to the time of Cromwell, by whom it was demolished in 1649, and now containing within the interior of its ruined walls a constabulary barrack. The fine mansion of Powerscourt occupies the site of an old fortalice founded by De la Poer, one of the knights who landed with Strongbow; in the reign of Henry VIII. it was taken by the O'Tooles and O'Brynes.

WICKLOW, a seaport, market town, and the county town of county Wicklow, Ireland, picturesquely situated at the mouth of a lagoon which receives the river Vartry and other streams, 28½ m. S. of Dublin by the Dublin & South-Eastern railway. Pop. (1901) 3288. The harbour, which is governed by commissioners and can accommodate vessels of 1500 tons, has two piers, with quayage. There is a considerable import trade in coal, timber, iron and slate; and some exports of grain and metallic ore, but the latter suffers by competition with the imports to Britain of sulphur ore from Spain. The town has county buildings, a parish church embodying a good Norman door from a previous structure, some ruins of a Franciscan abbey of the 13th century, and remains of Black Castle, on a commanding situation above the sea, founded in Norman times and rebuilt by William Fitzwilliam after capture by the Irish in 1301. The name shows the town to have been a settlement of the Norsemen. The cliff scenery to the S. towards Wicklow Head is fine, and the town has some claims as a seaside resort. It is governed by an urban district council.

WICKRAM, JÖRG, or GEORG (d. *c.* 1560), German poet and novelist, was a native of Colmar in Alsace; the date of his birth is unknown. He passed the latter part of his life as town clerk of Burgheim on the Rhine, and died before 1562. Wickram was a many-sided writer. He founded a Meistersinger school in Colmar in 1549, and has left a number of *Meistersingerlieder.* He edited Albrecht von Halberstadt's Middle High German version of Ovid's *Metamorphoses* (1545), and in 1555 he published *Das Rollwagenbüchlein*, one of the best of the many German collections of tales and anecdotes which appeared in the 16th century. The title of the book implies its object, namely, to supply reading for the traveller in the "Rollwagen" or diligences. As a dramatist, Wickram wrote *Fastnachtsspiele* (*Das Narrengiessen*, 1537; *Der treue Eckart*, 1538) and two dramas on biblical subjects, *Der verlorene Sohn* (1540) and *Tobias* (1551). A moralizing poem, *Der irrereitende Pilger* (1556), is half-satiric, half-didactic. It is, however, as a novelist that Wickram has left the deepest mark on his time, his chief romances being *Ritter Galmy aus Schottland* (1539), *Gabriotto und Reinhard* (1554), *Der Knabenspiegel* (1554), *Von guten und bösen Nachbarn* (1556) and *Der Goldfaden* (1557). These may be regarded as the earliest attempts in German literature to create that modern type of middle-class fiction which ultimately took the place of the decadent medieval romance of chivalry.

Wickram's works have been edited by J. Bolte and W. Scheel for the Stuttgart *Litterarischer Verein* (vols., 222, 223, 229, 230, 1900–1903); *Der Ritter Galmy* was republished by F. de la Motte Fouqué in 1806; *Der Goldfaden* by K. Brentano in 1809; the *Rollwagenbüchlein* was edited by H. Kurz in 1865, and there is also a reprint of it in Reclam's *Universalbibliothek*. See A. Stöber, *J. Wickram* (1866); W. Scherer, *Die Anfänge des deutschen Prosaromans* (1877).

WIDDRINGTON, BARONS. In November 1643 Sir William Widdrington (1610–1651), of Widdrington, Northumberland, son and heir of Sir Henry Widdrington (d. 1623), was created Baron Widdrington, as a reward for his loyalty to Charles I. He had been member for Northumberland in both the Short and the Long Parliaments in 1640, but in August 1642 he was expelled because he had joined the royal standard. He fought for the king chiefly in Yorkshire and Lincolnshire during 1642 and 1643; he was governor of Lincoln in 1643, but in 1644, after helping to defend York, he left England. Although in 1648 he had been condemned to death by the House of Commons, he accompanied Charles II. to Scotland in 1650, and he was mortally wounded whilst fighting for him at Wigan, dying on the 3rd of September 1651. His great-grandson, William, the 4th baron (1678–1743), took part in the Jacobite rising of 1715, and with two of his brothers was taken prisoner after the fight at Preston. He was convicted of high treason, and his title and estates were forfeited, but he was not put to death, and he survived until the 19th of April 1743. When his son, Henry Francis Widdrington, who claimed the barony, died in September 1774, the family appears to have become extinct.

Other eminent members of this family were Sir Thomas Widdrington and his brother Ralph. Having married a daughter of Ferdinando Fairfax, afterwards 2nd Lord Fairfax, Thomas Widdrington was knighted at York in 1639, and in 1640 he became member of parliament for Berwick. He was already a barrister, and his legal knowledge was very useful during the Civil War. In 1651 he was chosen a member of the council of state, although he had declined to have any share in the trial of the king. Widdrington was elected Speaker in September 1656, and in June 1658 he was appointed chief baron of the exchequer. In 1659 and again in 1660 he was a member of the council of state, and on three occasions he was one of the commissioners of the great seal, but he lost some of his offices when Charles II. was restored. However, he remained in parliament until his death on the 13th of May 1664. He left four daughters, but no sons. Widdrington, who founded a school at Stamfordham, Northumberland, wrote *Analecta Eboracensia; some Remaynes of the city of York*. This was not published until 1877, when it was edited with introduction and notes by the Rev. Caesar Caine. His younger brother, Ralph Widdrington (d. 1688), was educated at Christ's College, Cambridge, where he made the acquaintance of Milton. In 1654 he was appointed regius professor of Greek at Cambridge, and in 1673 Lady Margaret professor of divinity.

The name of Roger Widdrington was taken by Thomas Preston (1563–1640), a Benedictine monk, who wrote several books of a controversial nature, and passed much of his time in prison, being still a captive when he died on the 3rd of April 1640. (See Rev. E. Taunton, *The English Black Monks of St Benedict*, 1897.)

In 1840 the writer, Samuel Edward Cook, took the name of Widdrington, his mother being the heiress of some of the estates of this family. Having served in the British navy he lived for some years in Spain, writing *Sketches in Spain* during the years 1829–1832 (London, 1834); and *Spain and the Spaniards in 1843* (London, 1844). He died at his residence, Newton Hall, Northumberland, on the 11th of January 1856 and was succeeded in the ownership of his estates by his nephew, Shalcross Fitzherbert Jacson, who took the name Widdrington. See Rev. John Hodgson, *History of Northumberland* (1820–1840).

WIDNES, a municipal borough in the Widnes parliamentary division of Lancashire, England, on the Mersey, 12 m. E.S.E. from Liverpool, served by the London & North-Western and Lancashire & Yorkshire railways and the Cheshire lines. Pop. (1901) 28,580. It is wholly of modern growth, for in 1851 the population was under 2000. There are capacious docks on the river, which is crossed by a wrought-iron bridge, 1000 ft. long, and 95 in height, completed in 1868, and having two lines of railway and a footpath. Widnes is one of the principal seats of the alkali and soap manufacture, and has also grease-works for locomotives and waggons, copper works, iron-foundries, oil and paint works and sail-cloth manufactories. The barony of Widnes in 1554–1555 was declared to be part of the duchy of Lancaster. The town was incorporated in 1892, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 3110 acres.

WIDOR, CHARLES MARIE (1845–), French composer and organist, was born at Lyons on the 22nd of February 1845. He studied first at Lyons, then at Brussels under Lemmens for the organ and Fétis for composition. In 1870 he became organist of the church of Saint Sulpice in Paris. He succeeded César Franck as professor of the organ at the Paris Conservatoire, where he was also appointed professor of composition, counterpoint and fugue in 1896. A very prolific composer, he displayed his creative ability in a variety of different styles. His works include an opera, *Maître Ambros* (Opéra Comique, 1896), *La Korrigane* (ballet, given at the Opéra, 1880), incidental music to *Conte d'avril* (1885), *Les Jacobites* (1885) and *Jeanne d'Arc* (a pantomime play, 1890), three symphonies, *The Walpurgis Night* and other works for orchestra, a quintet for strings and piano, trio for piano and strings, a mass, psalms and other sacred compositions, symphonies for organ, a large number of piano pieces and many songs.

WIDUKIND, Saxon historian, was the author of *Res gestae Saxonicae*. Nothing is known of his life except that he was a monk at the Benedictine abbey of Corvey, and that he died about 1004, although various other conjectures have been formed by students of his work. He is also supposed to have written lives of St Paul and St Thecla, but no traces of these now remain. It is uncertain whether he was a resident at the court of the emperor Otto the Great or not, and also whether he was on intimate terms with Otto's illegitimate son William, archbishop of Mainz. His *Res gestae Saxonicae*, dedicated to Matilda, abbess of Quedlinburg, who was a daughter of Otto the Great, is divided into three books, and the greater part of it was undoubtedly written during the lifetime of the emperor, probably about 968. Starting with certain surmises upon the origin of the Saxons, he deals with the war between Theuderich I., king of Austrasia, and the Thuringians, in which the Saxons played an important part. An allusion to the conversion of the race to Christianity under Charlemagne brings him to the early Saxon dukes and the reign of Henry the Fowler, whose campaigns are referred to in some detail. The second book opens with the election of Otto the Great as German king, treats of the risings against his authority, and concludes with the death of his wife Edith in 946. In the third book the historian deals with Otto's expedition into France, his troubles with his son Ludolf and his son-in-law, Conrad the Red, duke of Lorraine, and the various wars in Germany; but makes only casual reference to Otto's visits to Italy in 951 and 962. He gives a vivid account of the defeat of the Hungarians on the Lechfeld in August 955, and ends with the death of Otto in 973 and a eulogy on his life.

Widukind formed his style upon that of Sallust; he was familiar with the *De vitis Caesarum* of Suetonius, the *Vita Karoli magni* of Einhard, and probably with Livy and Bede. Many quotations from the Vulgate are found in his writings, and there are traces of a knowledge of Virgil, Ovid and other Roman poets. His sentences are occasionally abrupt and lacking in clearness, his Latin words are sometimes germanized (as when he writes *michi* for *mihi*) and grammatical errors are not always absent. The earlier part of his work is taken from tradition, but he wrote the contemporary part as one familiar with court life and the events of the day. He says very little about affairs outside Germany, and although laudatory of monastic life gives due prominence to secular affairs. He writes as a Saxon, proud of the history of his race and an admirer of Henry the Fowler and Otto the Great.

Three manuscripts exist of the *Res gestae*, one of which is in the British Museum, and the book was first published at Basel in 1532. The best edition is that edited by G. Waitz in the *Monumenta Germaniae historica. Scriptores*, Band iii. (Hanover and Berlin, 1826). A good edition published at Hanover and Leipzig in 1904 contains an introduction by K. A. Kehr.

See R. Köpke, *Widukind von Corvey* (Berlin, 1867); J. Raase, *Widukind von Korvei* (Rostock, 1880); and B. Simson, "Zur Kritik des Widukind" in the *Neues Archiv der Gesellschaft für ältere deutsche Geschichte*, Band xii. (Hanover, 1876). (A. W. H.*)

WIDUKIND, or WITTEKIND (d. *c.* 807), leader of the Saxons during the earlier part of their resistance to Charlemagne, belonged to a noble Westphalian family, and is first mentioned in 777 when his absence from an assembly of the Saxons held by the Frankish king of Paderborn was a matter for remark. It is inferred with considerable probability that he had taken a leading part in the attacks on two Frankish garrisons in 776, and possibly had shared in earlier fights against the Franks, and so feared to meet the king. In 778 he returned from exile in Denmark to lead a fresh rising, and in 782 the Saxons at his instigation drove out the Frankish priests, and plundered the border territories. It is uncertain whether Widukind shared in the Saxon victory at the Süntel mountains, or what part he took in the risings of 783 and 784. In 785 Charlemagne, leading an expedition towards the mouth of the Elbe, learned that Widukind was in the land of the Nordalbingians, on the right bank of the river. Negotiations were begun, and the Saxon chief, assured of his personal safety, appeared at the Frankish court at Attigny. There he was baptized, the king acting as his sponsor and loading him with gifts. The details of his later life are unknown. He probably returned to Saxony and occupied there an influential position, as in 922 the inheritance of the "old count or duke Widukind" is referred to. Many legends have gathered around his memory, and he was long regarded as a national hero by the Saxons. He is reported to have been duke of Engria, to have been a devoted Christian and a builder of churches, and to have fallen in battle in 807. Kingly and princely houses have sought to establish their descent from him, but except in the case of Matilda, wife of the German king, Henry I. the Fowler, without any success.

See W. Diekamp, *Widukind der Sachsenführer nach Geschichte und Sage* (Münster, 1877); J. Dettmer, *Der Sachsenführer Widukind nach Geschichte und Sage* (Würzburg, 1879).

WIEDEMANN, GUSTAV HEINRICH (1826–1899), German physicist, was born at Berlin on the 2nd of October 1826. After attending the Cologne gymnasium, he entered the university of Berlin in 1844, and took his doctor's degree there three years later. His thesis on that occasion was devoted to a question in organic chemistry, for he held the opinion that the study of chemistry is an indispensable preliminary to the pursuit of physics, which was his ultimate aim. In Berlin he made the acquaintance of H. von Helmholtz at the house of H. G. Magnus, and was one of the founders of the Berlin Physical Society. In 1854 he left Berlin to become professor of physics in Basel University, removing nine years afterwards to Brunswick Polytechnic, and in 1866 to Karlsruhe Polytechnic. In 1871 he accepted the chair of physical chemistry at Leipzig. The attention he had paid to chemistry in the earlier part of his career enabled him to hold his own in this position, but he found his work more congenial when in 1887 he was transferred to the professorship of physics. He died at Leipzig on the 24th of March 1899. His name is probably most widely known for his literary work. In 1877 he undertook the editorship of the *Annalen der Physik und Chemie* in succession to J. C. Poggendorff, thus starting the series of that scientific periodical which is familiarly cited as *Wied. Ann.* Another monumental work for which he was responsible was *Die Lehre von der Elektricität*, or, as it was called in the first instance, *Lehre von Galvanismus und Elektromagnetismus*, a book that is unsurpassed for accuracy and comprehensiveness. He produced the first edition in 1861, and a fourth, revised and enlarged, was only completed a short time before his death. But his original work was also important. His data for the thermal conductivity of various metals were for long the most trustworthy at the disposal of physicists, and his determination of the ohm in terms of the specific resistance of mercury showed remarkable skill in quantitative research. He carried out a number of magnetic investigations which resulted in the discovery of many interesting phenomena, some of which have been rediscovered by others; they related among other things to the effect of mechanical strain on the magnetic properties of the magnetic metals, to the relation between the chemical composition of compound bodies and their magnetic properties, and to a curious parallelism between the laws of torsion and of magnetism. He also investigated electrical endosmosis and the electrical resistance of electrolytes. His eldest son, Eilhard Ernst Gustav, born at Berlin on the 1st of August 1852, became professor of physics at Erlangen in 1886, and his younger son, Alfred, born at Berlin on the 18th of July 1856, was appointed to the extraordinary professorship of Egyptology at Bonn in 1892.

WIELAND, CHRISTOPH MARTIN (1733–1813), German poet and man of letters, was born at Oberholzheim, a village near Biberach in Württemberg, on the 5th of September 1733. His father, who was pastor in Oberholzheim, and subsequently in Biberach, took great pains with the child's education, and from the town school of Biberach he passed on, before he had reached his fourteenth year, to the gymnasium at Klosterberge, near Magdeburg. He was a precocious child, and when he left school in 1749 was widely read in the Latin classics and the leading contemporary French writers; amongst German poets his favourites were Brockes and Klopstock. While at home in the summer of 1750, he fell in love with a kinswoman, Sophie Gutermann, and this love affair seems to have acted as an incentive to poetic composition; under this inspiration he planned his first ambitious work, *Die Natur der Dinge* (1752), a didactic poem in six books. In 1750 he went to the university of Tübingen as a student of law, but his time was mainly taken up with literary studies. The poems he wrote at the university—*Hermann*, an epic (published by F. Muncker, 1886), *Zwölf moralische Briefe in Versen* (1752), *Anti-Ovid* (1752)—are pietistic in tone and dominated by the influence of Klopstock. They attracted the attention of the Swiss literary reformer, J. J. Bodmer, who invited Wieland to visit him in Zürich in the summer of 1752. After a few months, however, Bodmer felt himself as little in sympathy with Wieland as, two years earlier, he had felt himself with Klopstock, and the friends parted; but Wieland remained in Switzerland until 1760, residing, in the last year, at Bern where he obtained a position as private tutor. Here he stood in intimate relations with Rousseau's friend Julie de Bondeli. Meanwhile a change had come over Wieland's tastes; the writings of his early Swiss years—*Der geprüfte Abraham* (1753), *Sympathien* (1756), *Empfindungen eines Christen* (1757)—were still in the manner of his earlier writings, but with the tragedies, *Lady Johanna Gray* (1758), and *Clementina von Porretta* (1760)—the latter based on Richardson's *Sir Charles Grandison*—the epic fragment *Cyrus* (1759), and the "moral story in dialogues," *Araspes und Panthea* (1760), Wieland, as Lessing said, "forsook the ethereal spheres to wander again among the sons of men."

Wieland's conversion was completed at Biberach, whither he had returned in 1760, as director of the chancery. The dullness and monotony of his life here was relieved by the friendship of a Count Stadion, whose library in the castle of Warthausen, not far from Biberach, was well stocked with French and English literature. Here, too, Wieland met again his early love Sophie Gutermann, who had meanwhile become the wife of Hofrat La Roche, then manager of Count Stadion's estates. The former poet of an austere pietism now became the advocate of a light-hearted philosophy, from which frivolity and sensuality were not excluded. In *Don Sylvio von Rosalva* (1764), a romance in imitation of *Don Quixote*, he held up to ridicule his earlier faith and in the *Komische Erzählungen* (1765) he gave his extravagant imagination only too free a rein. More important is the novel *Geschichte des Agathon* (1766–1767), in which, under the guise of a Greek fiction, Wieland described his own spiritual and intellectual growth. This work, which Lessing recommended as "a novel of classic taste," marks an epoch in the development of the modern psychological novel. Of equal importance was Wieland's translation of twenty-two of Shakespeare's plays into prose (8 vols., 1762–1766); it was the first attempt to present the English poet to the German people in something approaching entirety. With the poems *Musarion oder die Philosophie der Grazien* (1768), *Idris* (1768), *Combabus* (1770), *Der neue Amadis* (1771), Wieland opened the series of light and graceful romances in verse which appealed so irresistibly to his contemporaries and acted as an antidote to the sentimental excesses of the subsequent *Sturm und Drang* movement. Wieland married in 1765, and between 1769 and 1772 was professor of philosophy at Erfurt. In the last-mentioned year he published *Der goldene Spiegel oder die Könige von Scheschian*, a pedagogic work in the form of oriental stories; this attracted the attention of duchess Anna Amalie of Saxe-Weimar and resulted in his appointment as tutor to her two sons, Karl August and Konstantin, at Weimar. With the exception of some years spent at Ossmannstedt, where in later life he bought an estate, Weimar remained Wieland's home until his death on the 20th of January 1813. Here, in 1773, he founded *Der teutsche Merkur*, which under his editorship (1773–1789) became the most influential literary review in Germany. Of the writings of his later years the most important are the admirable satire on German provinciality—the most attractive of all his prose writings—*Die Abderiten, eine sehr wahrscheinliche Geschichte* (1774), and the charming poetic romances, *Das Wintermärchen* (1776), *Das Sommermärchen* (1777), *Geron der Adelige* (1777), *Die Wünsche oder Pervonte* (1778), a series culminating with Wieland's poetic masterpiece, the romantic epic of *Oberon* (1780). Although belonging to a class of poetry in which modern readers take but little interest, *Oberon* has still, owing to the facile beauty of its stanzas, the power to charm. In Wieland's later novels, such as the *Geheime Geschichte des Philosophen Peregrinus Proteus* (1791) and *Aristipp und einige seiner Zeitgenossen* (1800–1802), a didactic and philosophic tendency obscures the small literary interest they possess. He also translated Horace's *Satires* (1786), Lucian's Works (1788–1789), Cicero's Letters (1808 ff.), and from 1796 to 1803 he edited the *Attisches Museum* which did valuable service in popularizing Greek studies.

Without creating a school in the strict sense of the term, Wieland influenced very considerably the German literature of his time. The verse-romance and the novel—more especially in Austria—benefited by his example, and even the Romanticists of a later date borrowed many a hint from him in their excursions into the literatures of the south of Europe. The qualities which distinguish his work, his fluent style and light touch, his careless frivolity rather than poetic depth, show him to have been in literary temperament more akin to Ariosto and Voltaire than to the more spiritual and serious leaders of German poetry; but these very qualities in Wieland's poetry introduced a balancing element into German classical literature and added materially to its fullness and completeness.

Editions of Wieland's *Sämtliche Werke* appeared in (1794–1802, 45 vols.), (1818–1828, 53 vols.), (1839–1840, 36 vols.), and (1853–1858, 36 vols.). The latest edition (40 vols.) was edited by H. Düntzer (1879–1882); a new critical edition is at present in preparation by the Prussian Academy. There are numerous editions of selected works, notably by H. Pröhle in Kürschner's *Deutsche Nationalliteratur* (vols. 51-56, 1883–1887); by F. Muncker (6 vols., 1889); by W. Bölsche (4 vols., 1902). Collections of Wieland's letters were edited by his son Ludwig (1815) and by H. Gessner (1815–1816); his Letters to Sophie Laroche by F. Horn (1820). See J. G. Gruber, *C. M. Wielands Leben* (4 vols., 1827–1828); H. Döring, *C. M. Wieland* (1853); J. W. Loebell, *C. M. Wieland* (1858); H. Pröhle, *Lessing, Wieland, Heinse* (1876); L. F. Ofterdinger, *Wielands Leben und Wirken in Schwaben und in der Schweiz* (1877); R. Keil, *Wieland und Reinhold* (1885); F. Thalmeyr, *Über Wielands Klassizität, Sprache und Stil* (1894); M. Doll, *Wieland und die Antike* (1896); C. A. Behmer, *Sterne und Wieland* (1899); W. Lenz, *Wielands Verhältnis zu Spenser, Pope und Swift* (1903); L. Hirzel, *Wielands Beziehungen zu den deutschen Romantikern* (1904). See also M. Koch's article in the *Allgemeine deutsche Biographie* (1897). (J. G. R.)

WIELICZKA, a mining town in Galicia, Austria, 220 m. by rail W. of Lemberg and 9 m. S.E. of Cracow. Pop. (1900) 6012. It is built on the slopes of a hill which half encircles the place, and over the celebrated salt-mines of the same name. These mines are the richest in Austria, and among the most remarkable in the world. They consist of seven different levels, one above the other, and have eleven shafts, two of which are in the town. The levels are connected by flights of steps, and are composed of a labyrinth of chambers and passages, whose length aggregates over 65 m. The length of the mines from E. to W. is 2⅜ m., the breadth from N. to S. is 1050 yds. and the depth reaches 980 ft. Many of the old chambers, some of which are of enormous size, are embellished with portals, candelabra, statues, &c., all hewn in rock-salt. There are also two large chapels, containing altars, ornaments, &c., in rock-salt, a room called the dancing saloon (*Tanzsaal*), where the objects of interest found in the mines are kept; the Kronleuchtersaal, and the chamber Michatovice are also worth mention. In the interior of the mines are sixteen ponds, of which the large lake of Przykos is 195 ft. long, 110 ft. broad, and 10-26 ft. deep. The mines employ over 1000 workers, and yield about 60,000 tons annually. The salt of Wieliczka is well known for its purity and solidity, but has generally a grey or blackish colour. The date of the discovery of the mines is unknown, but they were already worked in the 11th century. Since 1814 they have belonged entirely to the Austrian government. The mines suffered greatly from inundations in 1868 and 1879, and the soil on which the town is built shows signs of subsidence.

See E. Windakiewicz, *Das Steinsalzbergwerk in Wieliczka* (Freiberg, 1896).

WIELOPOLSKI, ALEKSANDER, Marquis of Gonzaga-Myszkowski (1803–1877), Polish statesman, was educated in Vienna, Warsaw, Paris and Göttingen. In 1830 he was elected a member of the Polish diet on the Conservative side. At the beginning of the Insurrection of 1831 he was sent to London to obtain the assistance, or at least the mediation, of England; but the only result of his mission was the publication of the pamphlet *Mémoire présenté à Lord Palmerston* (Warsaw, 1831). On the collapse of the insurrection he emigrated, and on his return to Poland devoted himself exclusively to literature and the cultivation of his estates. On the occasion of the Galician outbreak of 1845, when the Ruthenian peasantry massacred some hundreds of Polish landowners, an outbreak generally attributed to the machinations of the Austrian government, Wielopolski wrote his famous *Lettre d'un gentilhomme polonais au prince de Metternich* (Brussels, 1846), which caused a great sensation at the time, and in which he attempted to prove that the Austrian court was acting in collusion with the Russian in the affair. In 1861, when Alexander II. was benevolently disposed towards the Poles and made certain political and national concessions to them, Wielopolski was appointed president of the commissions of public worship and justice and subsequently president of the council of state. A visit to the Russian capital in November still further established his influence, and in 1862 he was appointed adjutant to the grand-duke Constantine. This office he held till the 12th of September 1863, when finding it impossible to resist the rising current of radicalism and revolution he resigned all his offices, and obtained at his own request unlimited leave of absence. He retired to Dresden, where he died on the 30th of December 1877.

See Henryk Lisicki, *Le Marquis Wielopolski, sa vie et son temps* (Vienna, 1880); Wlodzimieriz Spasowicz, *The Life and Policy of the Marquis Wielopolski* (Rus.) (St Petersburg, 1882). (R. N. B.)

WIENER-NEUSTADT, a town of Austria, in Lower Austria, 31 m. S. of Vienna by rail. Pop. (1900) 28,438. It is situated between the Fischa and the Leitha and is close to the Hungarian frontier. It was almost entirely rebuilt after a destructive fire in 1834, and ranks among the handsomest provincial towns in Austria. Its ancient gates, walls and towers have disappeared, but it still possesses a few medieval edifices, the most important of which is the old castle of the dukes of Babenberg, founded in the 12th century, and converted by Maria Theresa in 1752 into a military academy. The Gothic chapel contains the remains of the emperor Maximilian I., who was born here in 1459. The parish church, with its two lofty towers, is substantially a Romanesque building of the 13th century, but the choir and transepts are Gothic additions of a later date. The late Gothic church of the old Cistercian abbey contains a handsome monument in memory of Leonora of Portugal (d. 1467), consort of the emperor Frederick III., and possesses a rich library and an interesting museum. The town-house is also a noteworthy building and contains large and important archives. The chief industrial establishments are a large ammunition factory and an engine factory; but manufactures of cotton, silk, velvet, pottery and paper, sugar-refining and tanning are also extensively carried on. Trade is also brisk, and is facilitated by a canal connecting the town with Vienna, and used chiefly for the transport of coal and timber.

Neustadt was founded in 1192, and was a favourite residence of numerous Austrian sovereigns, acquiring the title of the "ever-faithful town" (*die allezeit getreue Stadt*) from its unfailing loyalty. In 1246 it was the scene of a victory of the Hungarians over the Austrians; and in 1486 it was taken by Matthias Corvinus, king of Hungary, who, however, restored it to Maximilian I. four years later. In 1529 and 1683 it was besieged by the Turks. It was at Neustadt that the emperor Rudolf II. granted to the Bohemian Protestants, in 1609, the "Majestätsbrief," or patent of equal rights, the revocation of which helped to precipitate the Thirty Years' War.

See Hinner, *Wandelbilder aus der Geschichte Wiener-Neustadts* (Wiener-Neustadt, 1892).

WIENIAWSKI, HENRI (1835–1880), Polish violinist and composer, was born at Lublin, in Poland, on the 10th of July 1835. He was a pupil of the Paris Conservatoire from 1843 to 1846, and again in 1849–1850. Meanwhile he had given concerts in his native country and in Russia, and in 1850 entered upon the career of a travelling virtuoso, together with his brother Joseph, a distinguished pianist. He was appointed solo violinist to the tsar in 1860, and taught in the Conservatoire of St Petersburg from 1862 to 1867. He went on tour again in 1872 with Rubinstein in America, and on his return in 1874 was appointed to succeed Vieuxtemps as professor in the Brussels Conservatoire; but, like his predecessor, he was compelled through ill-health to give up the post after three years, returning to a public career in spite of his illness, until his death, which occurred in a hospital in Moscow, on the 31st of March 1880. He was a wonderfully sympathetic solo player, and a good if not a great quartet player. His *Légende*, the fantasias on *Faust* and on Russian airs, his two concertos and some other pieces, have retained their high place in the violin repertory.

WIEPRECHT, WILHELM FRIEDRICH (1802–1872), German musical conductor, composer and inventor, was born on the 10th of August 1802, at Aschersleben, where his father was town musician. According to his autobiography, Wieprecht early learned from his father to play on nearly all wind instruments. It was in violin-playing, however, that his father particularly wished him to excel; and in 1819 he went to Dresden, where he studied composition and the violin to such good purpose that a year later he was given a position in the city orchestra of Leipzig, playing also in those of the opera and the famous Gewandhaus. At this time, besides playing the violin and clarinet in the orchestra, he also gave solo performances on the trombone. In 1824 he went to Berlin, where he became a member of the royal orchestra, and was in the same year appointed chamber musician to the king. His residence at Berlin gave Wieprecht ample opportunity for the exercise of his genius for military music, on which his fame mainly rests. Several of his marches were early adopted by the regimental bands, and a more ambitious military composition attracted the attention of Gasparo Spontini, at whose house he became an intimate guest. It was now that he began to study acoustics, in order to correct the deficiencies in military musical instruments. As the result, he improved the valves of the brass instruments, and succeeded, by constructing them on sounder acoustic principles, in greatly increasing the volume and purity of their tone. He also invented the bass tuba or bombardon in order to give greater richness and power to the bass parts. In recognition of these inventions he was, in 1835, honoured by the Royal Academy of Berlin. In 1838 he was appointed by the Prussian government director-general of all the guards' bands, and in recognition of the magnificent performance by massed bands on the occasion of the emperor Nicholas I.'s visit the same year, was awarded a special uniform. In 1843 he became director-general of the bands of the 10th Confederate army corps, and from this time exercised a profound influence on the development of military music throughout Germany, and beyond. He was the first to arrange the symphonies and overtures of the classical masters for military instruments, and to organize those outdoor performances of concert pieces by military bands which have done so much to popularize good music in Germany and elsewhere. The performance arranged by him of Beethoven's "Battle of Vittoria," in which the bugle calls were given by trumpeters stationed in various parts of the garden and the cannon shots were those of real guns, created immense sensation. Besides the great work he accomplished in Germany, Wieprecht, in 1847, reorganized the military music in Turkey and, in 1852, in Guatemala. He composed military songs as well as numerous marches, and contributed frequently on his favourite subject to the Berlin musical papers. He died on the 4th of August 1872. Wieprecht was a man of genial, kindly and generous nature, and was associated with many charitable foundations established for the benefit of poor musicians.

WIESBADEN, a town and watering-place of Germany, in the Prussian province of Hesse-Nassau. Pop. (1905) 100,953. It is delightfully situated in a basin under the well-wooded southwestern spurs of the Taunus range, 5 m. N. of Mainz, 3 m. from the right bank of the Rhine (at Biebrich), and 25 m. W. of Frankfort-on-Main by rail. The town is on the whole sumptuously built, with broad and regular streets. Villas and gardens engirdle it on the north and east sides and extend up the hills behind. Its prosperity is mainly due to its hot springs and mild climate, which have rendered it a favourite winter as well as summer resort. The general character of the place, with its numerous hotels, pensions, bathing establishments, villas and places of entertainment, is largely determined by the requirements of visitors, who in 1907 numbered 180,000. The principal buildings are the royal palace, built in 1837–1840 as a residence for the dukes of Nassau, and now a residence of the king of Prussia; the Court Theatre (erected 1892–1894); the new Kurhaus, a large and handsome establishment, with colonnades, adjoining a beautiful and shady park; the town-hall, in the German Renaissance style (1884–1888); the government offices and the museum, with a picture gallery, a collection of antiquities, and a library of 150,000 vols. Among the churches, which are all modern, are the Protestant *Marktkirche*, in the Gothic style with five towers, built 1853–1862; the *Bergkirche*; the Roman Catholic church of St Boniface; the Anglican church and the Russian church on the Neroberg. There are two synagogues. Wiesbaden contains numerous scientific and educational institutions, including a chemical laboratory, an agricultural college and two musical conservatoria.

The alkaline thermal springs contain ⅔% of common salt, and smaller quantities of other chlorides; and a great deal of their efficacy is due to their high temperature, which varies from 156° to 104° Fahr. The water is generally cooled to 93° F. for bathing. The principal spring is the *Kochbrunnen* (156° F.), the water of which is drunk by sufferers from chronic dyspepsia and obesity. There are twenty-eight other springs of nearly identical composition, many of which are used for bathing, and are efficacious in cases of rheumatism, gout, nervous and female disorders and skin diseases. The season lasts from April to October, but the springs are open the whole year through and are also largely attended in winter.

Two miles north-west of the town lies the Neroberg (800 ft.), whence a fine view of the surrounding country is obtained, and which is reached by a funicular railway from Beausite, and 6 m. to the west lies the Hohe Wurzel (2025 ft.) with an outlook tower.

Wiesbaden is one of the oldest watering-places in Germany, and may be regarded as the capital of the Taunus spas. The springs mentioned by Pliny (*Hist. nat.* xxi. 2) as *Fontes Mattiaci* were known to the Romans, who fortified the place *c.* 11 B.C. The massive wall in the centre of the town known as the *Heidenmauer* was probably part of the fortifications built under Diocletian. The name *Wisibada* ("meadow bath") appears in 830. Under the Carolingian monarchs it was the site of a palace, and Otto I. gave it civic rights. In the 11th century the town and district passed to the counts of Nassau, fell to the Walram line in 1255, and in 1355 Wiesbaden became with Idstein capital of the county Nassau-Idstein. It suffered much from the ravages of the Thirty Years' War and was destroyed in 1644. In 1744 it became the seat of government of the principality Nassau-Usingen, and was from 1815 to 1866 the capital of the duchy of Nassau, when it passed with that duchy to Prussia. Though the springs were never quite forgotten, they did not attain their greatest repute until the close of the 18th century. From 1771 to 1873 Wiesbaden was a notorious gambling resort; but in the latter year public gambling was suppressed by the Prussian government.

See Roth, *Geschichte und historische Topographie der Stadt Wiesbaden* (Wiesbaden, 1883); Pagenstecher, *Wiesbaden in medizinisch-topographischer Beziehung* (Wiesbaden, 1870); Kranz, *Wiesbaden und seine Thermen* (Leipzig, 1884); Pfeiffer, *Wiesbaden als Kurort* (5th ed., Wiesbaden, 1899); and Heyl, *Wiesbaden und seine Umgebungen* (27th ed., Wiesbaden, 1908).

WIG (short for "periwig," an alternative form of "peruke," Fr. *perruque*; cf. Span. *peluca*; conjecturally derived from Lat. *pilus*), an artificial head of hair, worn as a personal adornment, disguise or symbol of office. The custom of wearing wigs is of great antiquity. If, as seems probable, the curious head-covering of a prehistoric ivory carving of a female head found by M. Piette in the cave of Brassempouy in the Landes represents a wig (see Ray Lankester, *Science from an Easy Chair*, fig. 7) the fashion is certainly some 100,000 years old. In historic times, wigs were worn among the Egyptians as a royal and official head-dress, and specimens of these have been recovered from mummies. In Greece they were used by both men and women, the most common name being *πηνίκη* or *φενάκη*, sometimes *προκόμιον* or *κόμαι πρόσθετοι*. A reference in Xenophon (*Cyr.* i. 3. 2) to the false hair worn by Cyrus's grandfather "as is customary among the Medes," and also a story in Aristotle (*Oecon.* 4. 14), would suggest that wigs were introduced from Persia, and were in use in Asia Minor. Another origin is suggested by Athenaeus (xii. 523), who says that the Iapygian immigrants into Italy from Crete were the first to wear *προκόμια περιθετά*, and the elaborately frizzled hair worn by some of the figures in the frescoes found at Cnossus makes it probable that the wearing of artificial hair was known to the Cretans. Lucian, in the 2nd century, mentions wigs of both men and women as a matter of course (*Alex.* 59, *Dial. mer.* 11). The theatrical wig was also in use in Greece, the various comic and tragic masks having hair suited to the character represented. A. E. Haigh (*Attic Theatre*, pp. 221, 239) refers to the black hair and beard of the tyrant, the fair curls of the youthful hero, and the red hair characteristic of the dishonest slave of comedy. These conventions appear to have been handed on to the Roman theatre.

At Rome wigs came into use certainly in the early days of the empire. They were also known to the Carthaginians; Polybius (iii. 78) says that Hannibal used wigs as a means of disguise. The fashionable ladies of Rome were much addicted to false hair, and we learn from Ovid, *Amores*, i. 14. 45) and Martial (v. 68) that the golden hair imported from Germany was most favoured. Juvenal (vi. 120) shows us Messalina assuming a yellow wig for her visits to places of ill-fame, and the scholiast on the passage says that the yellow wig was characteristic of courtesans. The chief names for wigs were *galerus*, *galericulum*, *corymbium*, *capillamentum*, *caliendrum*, or even *comae emptae*, &c. *Galerus* meant in the first place a skull-cap, or coif, fastening under the chin, and made of hide or fur, worn by peasants, athletes and *flamines*. The first men's wigs then would have been tight fur caps simulating hair, which would naturally suggest wigs of false hair. Otho wore a wig (Suetonius, *Otho* § 12), which could not be distinguished from real hair, while Nero (Dio Cass. lxi. 9) wore a wig as a disguise, and Heliogabalus also wore one at times (*ibid.* lxxix. 13). Women continued to have wigs of different colours as part of their ordinary wardrobe, and Faustina, wife of Marcus Aurelius, is said to have had several hundred. An amusing development of this is occasionally found in portrait busts, *e.g.* that of Plautilla in the Louvre, in which the hair is made movable, so that by changing the wig of the statue from time to time it should never be out of fashion.

The Fathers of the Church violently attacked the custom of wearing wigs, Tertullian (*De cultu fem. C.* 7) being particularly eloquent against them, but that they did not succeed in stamping out the custom was proved by the finding of an auburn wig in the grave of a Christian woman in the cemetery of St Cyriacus. In 672 a synod of Constantinople forbade the wearing of artificial hair.

Artificial hair has presumably always been worn by women when the fashion required abundant locks. Thus, with the development of elaborate coiffures in the 16th century, the wearing of false hair became prevalent among ladies in Europe; Queen Elizabeth had eighty attires of false hair, and Mary queen of Scots was also in the habit of varying the attires of hair she wore. The periwig of the 16th century, however, merely simulated real hair, either as an adornment or to supply the defects of nature. It was not till the 17th century that the peruke was worn as a distinctive feature of costume. The fashion started in France. In 1620 the abbé La Rivière appeared at the court of Louis XIII. in a periwig made to simulate long fair hair, and four years later the king himself, prematurely bald, also adopted one and thus set the fashion. Louis XIV., who was proud of his abundant hair, did not wear a wig till after 1670. Meanwhile, his courtiers had continued to wear wigs in imitation of the royal hair, and from Versailles the fashion spread through Europe. In England it came in with the Restoration; for though the prince of Wales (Charles I.), while in Paris on his way to Spain, had "shadowed himself the most he could under a burly perruque, which none in former days but bald-headed people used," he had dropped the fashion on returning to England, and he and his Cavaliers were distinguished from the "Roundheads" only by wearing their own flowing locks. Under Charles II. the wearing of the peruke became general. Pepys records that he parted with his own hair and "paid £3 for a periwigg";[1] and on going to church in one he says "it did not prove so strange as I was afraid it would." It was under Queen Anne, however, that the wig attained its maximum development, covering the back and shoulders and floating down over the chest. So far, indeed, whatever the exaggeration of its proportions, the wig had been a "counterfeit hair" intended to produce the illusion of abundant natural locks. But, to quote the inimitable author of *Plocacosmos*, "as the perukes became more common, their shape and forms altered. Hence we hear of the clerical, the physical, and the huge tie peruke for the man of law, the brigadier or major for the army and navy; as also the tremendous fox ear, or cluster of temple curls, with a pig-tail behind. The merchant, the man of business and of letters, were distinguished by the grave full bottom, or more moderate tie, neatly curled; the tradesman by the long bob, or natty scratch; the country gentleman by the natural fly and hunting peruke. All conditions of men were distinguished by the cut of the wig, and none more so than the coachman, who wore his, as there does some to this day, in imitation of the curled hair of a water-dog."[2]

[1] This was cheap. The author of *Plocacosmos* says that "when they first were wore, the price was usually one hundred guineas"; and the article in Diderot's *Encyclopédie* says that it sometimes cost as much as 1000 *écus*.

[2] *Plocacosmos*, p. 203. The writer goes on to describe the fashions on the stage. "So late as King William's reign, in one of Rowe's pieces, *Lady Jane Grey*, the Lord Guildford Dudley is dressed in all the modern fashion of laced coat, cravat, high peruke, &c., while the heroine is simply drest, her hair parted in the middle, hanging carelessly on her shoulders.... Nearer our time, in the tragedy of *Cato*, Mr Booth is dressed *a-la-mode*, with the huge peruke.... Mr Quin

This differentiation of wigs according to class and profession explains why, when early in the reign of George III. the general fashion of wearing wigs began to wane and die out, the practice held its own among professional men. It was by slow degrees that doctors, soldiers and clergymen gave up the custom. In the Church it survived longest among the bishops, the wig ultimately becoming a sort of ensign of the episcopal dignity. Wigs were first discarded by the bishops, by permission of the king, at the coronation banquet of William IV., the weather being hot; and Greville comments on the odd appearance of the prelates with their cropped polls. At the coronation of Queen Victoria the archbishop of Canterbury, alone of the prelates, still wore a wig. Wigs are now worn as part of official costume only in the United Kingdom and its dependencies, their use being confined, except in the case of the speaker of the house of commons and the clerks of parliament, to the lord chancellor, the judges and members of the bar (see ROBES). Wigs of course continue to be worn by many to make up for natural deficiencies; and on the stage the wig is, as in all times, an indispensable adjunct. Many of the modern stage wigs are made of jute, a fibre which lends itself to marvellously perfect imitations of human hair.

See F. W. Fairholt, *Costume in England*, 2 vols., ed. Dillon (1885); C. F. Nicolai, *Über den Gebrauch der falschen Haare und Perrücken* (1801); the articles "Coma" and "Galerus" in Daremberg and Saglio's *Dictionnaire des antiquités*. There is an admirable article on wigs and wig-making in Diderot's *Encyclopédie* (1765), t. xii., *s.v.* "Perruque." James Stewart's *Plocacosmos, or the Whole Art of Hairdressing* (London, 1782) also contains rich material.

WIGAN, a market town, and municipal, county and parliamentary borough of Lancashire, England, 194 m. N.W. by N. from London by the London & North-Western railway, served also by the Lancashire & Yorkshire and the Great Central railways. Pop. (1891) 55,013, (1901) 60,764. It lies on the small river Douglas, which flows into the estuary of the Ribble. There is connexion by canal with Liverpool, Manchester, &c. The older portions of the town occupy the north bank of the river, the modern additions being chiefly on the south bank. The church of All Saints, late Perpendicular, consisting of chancel with aisles and two chapels, was restored in 1630 and in modern times. There are numerous modern churches and chapels. The principal public buildings are the Royal Albert Edward Infirmary and Dispensary, the public hall, the borough courts and offices, the arcade, the market hall, the free public library and the county courts and offices (1888). The educational institutions include the free grammar school (founded by James Leigh in 1619 and rebuilt in 1876), the Wigan and District Mining and Technical College (built by public subscription and opened in 1903) and the mechanics' institution, also the convent of Notre Dame (1854), with a college for pupil teachers and a high school for girls, and several Roman Catholic schools. A public park of 27 acres was opened in 1878. The town owes much of its prosperity to its coal mines, which employ a large proportion of the inhabitants and supply the factory furnaces. The chief manufacture is that of cotton fabrics; the town also possesses iron forges, iron and brass foundries, oil and grease works, railway waggon factories, and bolt, screw and nail works. The parliamentary borough, returning one member since 1885, is coextensive with the municipal borough, and falls mainly within the Ince division of the county. The county borough was created in 1888. The corporation consists of a mayor, 10 aldermen and 30 councillors. Area 5082 acres, including the former urban district of Pemberton (pop. 21,664 in 1901), which was included with Wigan in 1904.

Roman remains have been found, and it is probable that the town covers the site of a Roman post or fort, Coccium. Wigan, otherwise Wygan and Wigham, is not mentioned in Domesday Book, but three of the townships, Upholland, Dalton and Orrel are named. After the Conquest Wigan was part of the barony of Newton, and the church was endowed with a carucate of land, the origin of the manor. Some time before Henry III.'s reign the baron of Newton granted to the rector of Wigan the manorial privileges. In 1246 Henry III. granted a charter to the famous John Mansel, parson of the church, by which Wigan was constituted a free borough and the burgesses permitted to have a Gild Merchant. In 1249 John Mansel granted by charter to the burgesses that each should have five roods of land to his burgage as freehold on payment of 12d. each. Confirmations and extensions of Henry III.'s charter were granted by Edward II. (1314), Edward III. (1349), Richard II. (1378), Henry IV. (1400), Henry V. (1413), Charles II. (1663), James II. (1685) and William IV. (1832 and 1836). In 1258 Henry III. granted by charter to John Mansel a weekly market on Monday and two fairs, each of three days, beginning on the eve of Ascension Day and on the eve of All Saints' Day, October 28th. Edward II. granted a three days' fair from the eve of St Wilfrid instead of the All Saints' fair, but in 1329 Edward III. by charter altered the fair again to its original date. Charles II.'s charter granted, and James II.'s confirmed, a three days' fair beginning on the 16th of July. Pottery and bell-founding were formerly important trades here, and the manufacture of woollens, especially of blankets, was carried on in the 18th century. The cotton trade developed rapidly after the introduction of the cylindrical carding machine, which was set up here two years before Peel used it at Bolton. During the Civil War the town, from its vicinity to Lathom House and the influence of Lord Derby, adhered staunchly to the king. On the 1st of April 1643 the Parliamentarians under Sir John Seaton captured Wigan after severe fighting. In the following month Lord Derby regained it for the Royalists, but Colonel Ashton soon retook it and demolished the works. In 1651 Lord Derby landed from the Isle of Man and marched through Preston to Wigan on the way to join Charles II. At Wigan Lane on the 25th of August a fierce battle took place between the Royalist forces under Lord Derby and Sir Thomas Tyldesley and the Parliamentarians under Colonel Lilburne, in which the Royalists were defeated, Tyldesley was killed and Lord Derby wounded. During the rebellion of 1745 Prince Charles Edward spent one night (December 10th) here on his return march. In 1295 Wigan returned two members to parliament and again in 1307; the right then remained in abeyance till 1547, but from that time till 1885, except during the Commonwealth, the borough returned two members, and since 1885 one member. The church of All Saints is of Saxon origin, and was existing in Edward the Confessor's time. The list of rectors is complete from 1199.

WIGEON, or WIDGEON (Fr. *Vigeon*, from the Lat. *Vipio*),[1] also called locally "Whewer" and "Whew" (names imitative of the whistling call-note of the male), the *Anas penelope* of Linnaeus and *Mareca penelope* of modern ornithologists, one of the most abundant species of ducks throughout the greater part of Europe and northern Asia, reaching northern Africa and India in winter. A good many pairs breed in the north of Scotland; but the nurseries of the vast numbers which resort in autumn to the waters of temperate Europe are in Lapland or farther to the eastward. Comparatively few breed in Iceland.

Intermediate in size between the teal and the mallard, and less showy in plumage than either, the drake wigeon is a beautiful bird, with the greater part of his bill blue, his forehead cream-colour, his head and neck chestnut,[2] replaced by greyish-pink below and above by lavender-grey, which last, produced by the transverse undulations of fine black and white lines, extends over the back and upper surface of the wings, except some of the coverts, which are

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acted almost all his young characters, as Hamlet, Horatio, Pierre, &c. in a full-dress suit and large peruke. But Mr Garrick's genius . . . first attacked the mode of dress, and no part more than that of the head of hair. The consequence of this was, that a capital player's wardrobe" [came to include] "what they call natural heads of hair; there is the comedy head of hair and the tragedy ditto; the silver locks, and the common gray; the carotty poll, and the yellow caxon; the savage black, and the Italian brown and Shylock's and Falstaff's very different heads of hair; . . . with the Spanish fly, the foxes tail, &c. &c." He adds that the tendency is to replace those by "the hair, without powder, simply curled."

[1] So PIGEON (*q.v.*) from *Pipio*. Other French names, more or less local, are, according to Rolland, *Vignon*, *Vingeon*, *Wagne*, *Woinge*, *Wignet*, *Wuiot*, *Vioux* and *Digeon*. In some parts of England the small teasing flies, generally called midges, are known as "wigeons."

[2] Hence come the additional local names "bald-pate" and "red-head."

conspicuously white, and shows itself again on the flanks. The wings are further ornamented by a glossy green speculum between two black bars; the tail is pointed and dark; the rest of the lower parts is white. The female has the inconspicuous coloration characteristic of her sex among most of the duck tribe. In habits the wigeon differs not a little from most of the *Anatinae*. It greatly affects tidal waters during the season of its southern stay, and becomes the object of slaughter to hundreds of gunners on the coasts of Britain and Holland; but, when it resorts to inland localities, as it also does to some extent, it passes much of its time in grazing, especially by day, on the pastures which surround the lakes or moors that it selects.

The wigeon occurs occasionally on the eastern coast of North America, and not uncommonly, it would seem, on the Pribyloff Islands in the Pacific. But the New World has two allied species of its own. One of them, *M. americana* (a freshly killed example of which was once found in a London market), inhabiting the northern part of that continent, and in winter reaching Central America and the West Indian islands as far as Trinidad, wholly resembles its Old-World congener in habits and much in appearance. But in it the chestnut of the head is replaced by a close speckling of black and buff, the white wing-coverts are wanting, and nearly all the plumage is subdued in tone. The other species, *M. sibilatrix*, inhabits the southern portion of South America and its islands, from Chile on the west to the Falklands on the east, and is easily recognized by its nearly white head, nape glossy with purple and green, and other differences; while the plumage hardly differs sexually at all. (A. N.)

WIGGIN, KATE DOUGLAS (1857–), American novelist, daughter of Robert N. Smith, a lawyer, was born in Philadelphia, Pennsylvania, on the 28th of September 1857. She was educated at Abbott Academy, Andover, Massachusetts, and removed in 1876 to Los Angeles, California. She taught in Santa Barbara College (1877–1878), established in San Francisco the first free kindergartens for poor children on the western coast (1878), and, with the help of her sister, Miss Nora Archibald Smith, and of Mrs Sarah B. Cooper, organized the California Kindergarten Training School (1880). She married, in 1880, Samuel Bradley Wiggin of San Francisco, who died in 1889. In 1895 she married George Christopher Riggs, but continued to write under the name of Wiggin. Her interest in children's education was shown in numerous books, some written in collaboration with her sister, in both prose and verse. But her literary reputation rests rather on her works of prose fiction, which show a real gift for depicting character and an original vein of humour. The best known of these are: *The Birds' Christmas Carol* (1888); *Penelope's English Experiences* (1893); *Marm Lisa* (1896); *Penelope's Progress* (1898), being Penelope's experiences in Scotland; *Penelope's Irish Experiences* (1901); *The Diary of a Goose-Girl* (1902); and *Rebecca of Sunnybrook Farm* (1903).

WIGGLESWORTH, MICHAEL (1631–1705), American clergyman and poet, was born in England, probably in Yorkshire, on the 18th of October 1631. His father, Edward (d. 1653), persecuted for his Puritan faith, emigrated with his family to New England in 1638 and settled in New Haven. Michael studied for a time at a school kept by Ezekiel Cheever, and in 1651 graduated at Harvard, where he was a tutor (and a Fellow) in 1652–1654. Having fitted himself for the ministry, he preached at Charlestown in 1653–1654, and was pastor at Malden from 1656 until his death, though for twenty years or more bodily infirmities prevented his regular attendance upon his duties—Cotton Mather described him as "a little feeble shadow of a man." During this interval he studied medicine and began a successful practice. He was again a Fellow of Harvard in 1697–1705. He died at Malden on the 10th of June 1705. Wigglesworth is best known as the author of *The Day of Doom; or a Poetical Description of the Great and Last Judgment* (1662). At least two English and eight American editions have appeared, notable among them being that of 1867 (New York), edited by W. H. Burr and including other poems of Wigglesworth, a memoir and an autobiography. For a century this realistic and terrible expression of the prevailing Calvinistic theology was by far the most popular work written in America. His other poems include *God's Controversy with New England* (written in "in the time of the great drought," and first printed in the *Proceedings of the Massachusetts Historical Society* for 1781), and *Meat out of the Eater; or Meditations concerning the Necessity, End and Usefulness of Afflictions unto God's Children* (1669; revised in 1703).

His son, Samuel (1689–1768), also a clergyman, was the author of several prose works and of one poem of merit, "A Funeral Song" (1709). Another son, Edward (1693–1765), was the first Hollis professor of Divinity at Harvard (1722–1765), and the author of various theological works; and a grandson, Edward (1732–1794), was the second Hollis professor of Divinity (1765–1791), in which position he was succeeded by Michael Wigglesworth's great-grandson, Rev. David Tappan (1752–1803).

See J. W. Deane, *Memoir of Rev. Michael Wigglesworth* (Boston, 1871).

WIGHT, ISLE OF, an island off the south coast of England, forming part of Hampshire, separated from the mainland by the Solent and Spithead. It is of diamond shape, measuring 22½ m. from E. to W. and 13½ from N. to S. (extremes). The area is 147 sq. m. The south coast is for the most part cliff-bound and grand, and there is much quietly beautiful scenery both inland and along the northern shores. Although east winds are at times prevalent in winter and spring, and summer heats may be excessive, the climate, especially in certain favoured spots, is mild and healthy. As a result numerous watering-places have grown up on the coasts.

A range of high chalk downs crosses the island from east to west, terminating seaward in the Culver cliffs and the cliffs near Freshwater respectively. It is breached eastward by the Yar stream flowing N.E., in the centre by the Medina, the principal stream in the island, flowing N., and by another Yar, flowing N., in the extreme west. These downs reach a height over 700 ft. west of the Medina, but east of it do not greatly exceed 400 ft. The slope northward is gradual. The north-west and north-east coasts, overlooking the Solent and Spithead respectively, rise sharply, but hardly ever assume the cliff form; they are beautifully wooded, and broken by many picturesque estuaries, such as those of the western Yar and Newtown on the north-west, the Medina opening northward opposite Southampton Water, and Wootton Creek and the mouth of the eastern Yar on the north-east. The streams mentioned rise very near the south coast; the western Yar, indeed, so close to it that the high land west of the stream is nearly insulated. A second range of downs in the extreme south, between St Catherine's Point and Dunnose, reaches the greatest elevation in the island, exceeding 800 ft. in St Catherine's Hill. Below these heights on the seaward side occurs the remarkable tract known as the Undercliff, a kind of terrace formed by the collapse of rocks overlying soft strata (sand and clay) which have been undermined. The upper cliffs shelter this terrace from the north winds; the climate is remarkably mild, and many delicate plants flourish luxuriantly. This part of the island especially affords a winter resort for sufferers from pulmonary complaints. Along the south coast the action of small streams on the soft rocks has hollowed out steep gullies or ravines, known as chines. Many of these, though small, are of great beauty; the most famous are Shanklin and Blackgang chines. The western peninsula shows perhaps the finest development of sea-cliffs. Off the westernmost promontory rise three detached masses of chalk, about 100 ft. in height, known as the Needles, exposed to the full strength of the south-westerly gales driving up the Channel. During a storm in 1764 a fourth spire was undermined and fell.

Geology.—The geology of the island possesses many features of interest. Its form has been determined by the simple monoclinal fold which has thrown up the Chalk with a high northward dip, so that it now exists as a narrow ridge running from the Needles eastward to Culver Cliffs. Owing to a kink in the fold the ridge expands somewhat south of Carisbrooke. On the north side of the ridge the Chalk dips beneath the Tertiaries of the Hampshire Basin. Immediately north of the Chalk the Lower Eocene, Reading beds and London Clay form a narrow parallel strip, followed by a similar strip of Upper Eocene, Bracklesham and Bagshot beds. The remaining northern portion of the island is occupied by fluvio-marine Oligocene strata, including the Headon, Osborne, Bembridge and Hamstead beds. The various Tertiary formations are exhibited along the north coast, and may also be studied to great advantage in White Cliff and Alum Bays. In Alum Bay the vertical disposition of the strata is well shown, and the highly-coloured Bagshot sands and clays form a conspicuous feature. From the excellent coast sections many fossils may be obtained. South of the Chalk ridge that rock has been completely removed by denudation so as to expose the underlying Upper Greensand, which has slipped in many places over the underlying Gault (locally called "blue slipper"), forming picturesque landslips. The Lower Greensand formation may best be studied in the cliff section from Atherfield Point to Rocken End, and in the chines of Shanklin and Blackgang. Beneath the Greensand the Wealden is exposed in the section from Brook to Atherfield, and also, to a much less extent, in Sandown Bay. The Wealden strata have yielded abundant fossil remains of extinct reptiles (*Iguanodon*), especially in the neighbourhood of Brook and Cowleaze Chines; and at Brook Point an extensive fossil forest exists, being the remains of a great raft of timber floated down and deposited in estuarine mud at the mouth of a great river. At Brook also the characteristic Wealden mollusk, *Unio valdensis*, occurs abundantly.

Towns, &c.—Newport at the head of the Medina estuary is the chief town; Cowes at the mouth the chief port. The principal resorts of visitors are Cowes (the headquarters of the Royal Yacht Squadron); Ryde on the north-east coast; Sandown, Shanklin and Ventnor on the south-east; Freshwater Gate on the south-west, and Yarmouth on the Solent. Others are Totland Bay near the mouth of the Solent, Gurnard near Cowes, and Seaview and Bembridge south of Ryde. The principal lines of communication with the mainland are between Cowes and Southampton, Ryde and Portsmouth, and Yarmouth and Lymington. Newport is the chief railway centre, lines running N. to Cowes, W. to Yarmouth and Freshwater, S. to Ventnor, with a branch to Sandown, and E. to Ryde. A direct line connects Ryde, Sandown, Shanklin and Ventnor, and has a branch to St Helen's and Bembridge. There are few industries in the island. The land is chiefly agricultural, a large proportion being devoted to sheep-grazing. Fishing is carried on to a considerable extent on the south coast—lobsters, crabs and prawns being plentiful. Oyster cultivation has been attempted in the Medina, in Brading Harbour and in the Newtown river. At Cowes shipbuilding is carried on, and timber is grown for the British navy in a part of the ancient forest of Parkhurst, between the Medina and the Solent. The general trade of the island centres at Newport, but in the coast towns the chief occupation of the inhabitants consists in providing for visitors. The island shares in the defences of the Solent, Spithead and Portsmouth; there are batteries at Puckpool near Ryde, and on the eastern foreland, and along the west coast between the Needles and Yarmouth. Strong associations connect the Isle of Wight with the British royal family. Osborne House, near Cowes, was a residence and the scene of the death of Queen Victoria, and was presented to the nation by King Edward in 1902 (see COWES). Princess Beatrice succeeded her husband Prince Henry of Battenberg as honorary governor of the island in 1896. The island is divided into two liberties, East and West Medina, excluding the boroughs of Newport and Ryde; and it forms one petty and special sessional division of the county. The urban districts are Cowes, East Cowes, St Helen's, Sandown, Shanklin and Ventnor. Until 1885 there was one member of parliament for the island and one for the borough of Newport; now, however, there is only one member for the whole island. Episcopally the island has for many centuries belonged to the see of Winchester. Pop. (1891) 78,672; (1901) 82,418.

History.—Among the most interesting relics of the Roman occupation of the Isle of Wight following its conquest by Vespasian in A.D. 43 are the villas at Brading and Carisbrooke, the cemetery at Newport, and remains of foundations at Combly Farm, Gurnet, and between Brixton and Calbourne. Of the settlement of the island by the Jutes no authentic details are preserved, but in 661 it was annexed by Wulfhere to Wessex and subsequently bestowed on his vassal, the king of Sussex. In 998 it was the headquarters of the Danes, who levied their supplies from the opposite coasts of Hampshire and Sussex.

From the 14th to the 16th century the island was continuously under fear of invasion by the French, who in 1377 burnt Yarmouth and Francheville (the latter being subsequently rebuilt and known as Newtown), and so devastated Newport that it lay uninhabited for two years. In 1419, on a French force landing in the island and demanding tribute in the name of King Richard and Queen Isabella, the islanders replied that the king was dead and the queen sent home to her parents without any such condition of tribute, "but if the Frenchmen's minde were to fight, they willed them to come up, and no man should let them for the space of five hours, to refresh themselves, but when that time was expired they should have battayle given to them"; a proposition prudently declined by the Frenchmen, who returned to their ships and sailed home again. A more formidable raid was attempted in 1545 when a French fleet of 150 large ships, 25 galleys, and 50 smaller vessels drew up off Brading Harbour, and in spite of the brave defence of the islanders wrought much serious destruction. Wolverton near Brading having lain a ruined site ever since. As a result of this, the last French invasion, an organized system of defence was planned for the island, and forts were constructed at Cowes, Sandown, Freshwater and Yarmouth. During the Civil War of the 17th century the island was almost unanimous in support of the parliament, and Carisbrooke Castle was the prison of Charles I. from 1647 to 1648, and in 1650 of his two children, the princess Elizabeth and the duke of Gloucester, the former dying there from the effects of a chill after only a few weeks of captivity.

The lordship of the island was granted by William the Conqueror to William Fitz-Osbern, but escheated to the crown by the treason of Roger, son of William, and was bestowed by Henry I. on Baldwin de Redvers, whose descendant Isabella de Fortibus sold it to Edward I. in 1293 for 6000 marks. Henceforth the island was governed by wardens appointed by the crown, who in the reign of Henry VII. were styled captains, a title revived in 1889 in the person of Prince Henry of Battenberg. The ancient place of assembly for the freemen of the island was at Shide Bridge near Newport, and at Newport also was held the Knighten Court, in which cases of small debt and trespasses were judged by those who held a knight's fee or part of a knight's fee of Carisbrooke Castle. The feudal tenants held their lands for the service of escorting their lords into and out of the island, and of serving forty days at their own cost in defence of Carisbrooke Castle. In the Domesday Survey twenty-nine mills are mentioned, and salt-works at Boarhunt, Bowcombe, Watchingwell and Whitfield. The island quarries have been worked from remote times, that of Quarr supplying material for Winchester cathedral. Alum was collected at Parkhurst Forest in 1579. Alum and sand for glass-making were formerly obtained at Alum Bay. In 1295 the united boroughs of Yarmouth and Newport made an isolated return of two members to parliament. From 1584 the boroughs of Lymington, Newport, Newtown and Yarmouth returned two members each, until under the act of 1832 the two last were disfranchised. By the act of 1868 Lymington and Newport lost one member each, and by the act of 1885 were disfranchised.

Antiquities.—Early antiquities include British pit villages near Rowborough, Celtic tumuli on several of the chalk downs, and the so-called Long Stone at Mottiston, a lofty sandstone monolith. The Roman villa near Brading contains some beautiful and well-preserved examples of tesselated pavements. Carisbrooke Castle is a beautiful ruin built upon the site of an ancient British stronghold. There are slight remains of Quarr Abbey near Ryde, founded for Benedictines (afterwards Cistercians) by Baldwin de Redvers in the first half of the 12th century. The most noteworthy ancient churches are those of Bonchurch (Norman), Brading (transitional Norman and Early English), Shalfleet (Norman and Decorated), and Carisbrooke, of various styles.

See *Victoria County History, Hampshire*; Sir R. Worsley, *The History of the Isle of Wight* (London, 1781); Richard Warner, *The History of the Isle of Wight* (Southampton, 1795); B. B. Woodward, *History of Hampshire, including the Isle of Wight* (3 vols., London, 1861–1869); Percy Stone, *Architectural History of the Isle of Wight* (London, 1891).

WIGTOWN, a royal burgh and the county town of Wigtownshire, Scotland. Pop. (1901) 1329. It is situated on the western shore of Wigtown Bay—whence the name, from the Scandinavian *vik*, "bay"—7 m. S. by E. of Newton Stewart by railway. It is built on an eminence around a spacious central area laid out in walks. The town hall stands at a corner of this square, and at the opposite side are two crosses, one of 1738 and the other commemorating Waterloo. Some fishing is carried on. In the old churchyard were buried Margaret MacLachlan, a widow aged 63, and Margaret Wilson, a girl of 18, two covenanting martyrs who were tied to stakes in the sands of Wigtown Bay and drowned by the rising waters (1685), to whose memory, as well as that of three men who were hanged at the same time without trial, an obelisk surmounted by an urn was erected in 1858 on the top of Windy Hill, outside the town. Wigtown was made a royal burgh in 1469.

WIGTOWNSHIRE (sometimes called West Galloway), a south-western county of Scotland, bounded N. by Ayrshire, E. by Kirkcudbrightshire and Wigtown Bay, S. by the Irish Sea and W. and N. by the North Channel. Including the small island of St Helena, at the head of Luce Bay, it covers an area of 311,609 acres, or 487 sq. m. On the eastern boundary the estuary of the Cree expands into Wigtown Bay, between which and Luce Bay, farther west, extends the promontory of the Machers, terminating in Burrow Head. By the indentation of Luce Bay on the south and Loch Ryan on the north the hammer-headed peninsula of the Rinns is formed, of which the Mull of Galloway, the most southerly point of Scotland, is the southern, and Milleur Point the northern extremity. The more or less rugged coast has many small inlets, few of which, owing to hidden rocks, afford secure landing-places. Excepting Loch Ryan, a fine natural harbour of which Stranraer is the port, the harbours are not available for vessels of heavy burden, on account either of the great distance to which the sea retires, or of their exposure to frequent fierce gales. Much of the county has a wild, bleak appearance, the higher land being covered with heath and whins, while in the lower districts there are long stretches of bog and moss, and in the north centre, a few miles west of Newton Stewart, is a tract known as the Moors. Only towards the Ayrshire border do the hills reach a considerable altitude, Benbrake and Craigairie Fell being each 1000 ft. in height. The chief rivers are the Cree, forming the boundary with Kirkcudbrightshire and flowing past. Newton Stewart and Carty into Wigtown Bay; the Bladenoch, issuing from Loch Maberry and falling into Wigtown Bay at Wigtown after a course of 22 m., its principal affluents, all on the right, being Black Burn, the Tarff and the Malzie; and the Luce, formed by the junction at New Luce of Main Water and Cross Water of Luce, and emptying itself into Luce Bay. Most of the numerous lochs are small, several being situated in private parks, as at the earl of Stair's estate of Castle Kennedy. Among the larger lakes are Loch Maberry and Loch Dornal, both partly in Ayrshire, and Loch Ochiltree in the north of the shire, Loch Connell in the west, Loch Ronald in the centre and the group of Castle Loch and four others in the parish of Mochrum, towards the south, and Loch Dowalton, at the junction of Kirkinner, Sorbie and Glasserton parishes.

Geology.—A line drawn in a north-easterly direction from the coast about 3 m. below Portpatrick, passing slightly north of the head of Luce Bay by Newton Stewart to the Cairnsmore of Fleet, divides the county so that practically all the rocks on the northern side are of Ordovician age, while those on the south are Silurian. This line coincides with the general direction of the strike of the beds throughout the county. Most of the Ordovician rocks are black shales, in which graptolites may be found, along with greywackes and grits; they include the Glenkill and Hartfell groups of the Moffat district. These rocks may be seen exposed on the coast south of Portpatrick and in the valley of the Cree. The slate quarries of Cairn Ryan are of Llandeilo age. Nearly the whole of the Silurian region is occupied by dark grits, greywackes and shales of Llandovery age, though here and there a small exposure of the underlying black Moffat shales appears on the denuded crest of one of the innumerable folds into which all these rocks have been thrown. A series of shales, flags and greywackes of Wenlock age is found on the shore between Burrow Head and Whithorn. On the west side of Loch Ryan is a narrow belt of Permian breccia and thin sandstones about 9 m. long and 1 m. wide: this rests unconformably upon a similar belt of Carboniferous sandstones, about 8 m. long and ½ m. in width, which lies on the west side of the Permian. A small patch of granite stands out on the coast at Laggantulloch Head, north of the Mull of Galloway. There are also a few patches and dikes of diorite and quartz-felsite. Glacial moraines and drumlins are found over much of the older formations, and are well seen between Glenluce and Newton Stewart and south of Wigtown. The boulder-clay is used for brick-making near Stranraer. On the coasts of Luce Bay and Loch Ryan raised beaches are found at levels of 25 ft. and 50 ft. above the sea, and tracts of blown sand lie above the shore. There are several peat-covered areas in the county.

Climate and Agriculture.—The mean annual rainfall amounts to 36·3 in., varying from 49·19 in. at Kirkcowan, a few miles west of Newton Stewart, to 26·81 in. at the Mull of Galloway. The average temperature for the year is 48·3° F., for January 40° F. and for July 58·5° F. In spite of its humidity the climate is not unfavourable for the ripening of crops, and frosts as a rule are not of long duration. Much of the shire consists of stony moors, rendering the work of reclamation difficult and in some parts impossible. The gravelly soil along the coasts requires heavy manuring to make it fruitful, and in the higher arable quarters a rocky soil prevails, better adapted for grass and green crops than for grain. A large extent of the surface is black top reclaimed from the moors, and in some districts loam and clay are found. By dint of energy, however, and constant resort to scientific agriculture, the farmers have placed half of the shire under cultivation, and the standard of farming is as high as that of any county in Scotland. Oats is the leading crop, barley and wheat occupying only a small area. Turnips and swedes constitute the great bulk of the green crops, potatoes coming next. Large tracts are under clover and rotation grasses and in permanent pasture, in consequence of the increasing attention paid to dairy-farming, which is carried on in combination and on scientific principles. Several creameries have been established in the dairy country, cheese being a leading product. Though the size of the herds is surpassed in several other Scottish counties, the number of milch cattle is only exceeded in three (Ayr, Aberdeen and Lanark). Ayrshire is the favourite breed for dairy purposes, and black polled Galloways are found in the eastern districts. A cross of the two breeds is also maintained. The sheep are principally black-faced on the hill farms, and in other parts Leicester and other long-woolled breeds. The flocks are usually heavy, and great numbers of pigs are kept. The shire has acquired some reputation for its horses, chiefly Clydesdale. The holdings are fairly large, the average being considerably over 100 acres, one-third of them running from 100 acres to 300. Most of the park land is finely wooded, and there are a few nurseries, market gardens and orchards.

Other Industries.—There are small manufactures in several of the towns, as woollens at Kirkcowan; tweeds, leather and agricultural implements at Newton Stewart; dairy appliances, beer, flour and bricks at Stranraer; and whisky at Bladenoch. Sandstone and slates are quarried, and peat is cut in various places. Fisheries, on a minor scale, are conducted chiefly from Stranraer, certain villages on Loch Ryan and Luce Bay, and Wigtown, and the Cree, Bladenoch and Luce yield salmon. Shipping is mainly carried on from Stranraer, but also from Port William, Portpatrick, Wigtown and Garliestown.

The Glasgow & South-Western railway runs to Stranraer via Girvan, and the Portpatrick and Wigtownshire joint railway from Newton Stewart to Portpatrick via Stranraer, with a branch line at Newton Stewart to Wigtown and Whithorn. There are coach services from Stranraer to Ballantrae on the Ayrshire coast and to Drumore, 4 m. N. of the Mull, and regular communication by mail steamer between Stranraer and Larne in Co. Antrim, Ireland.

Population and Administration.—In 1891 the population amounted to 36,062; in 1901 to 32,685 or 67 persons to the sq. m., the decrease for the decade being the third highest in Scotland. In 1901 there were 88 persons speaking Gaelic and English. The principal towns are Stranraer (pop. 6036); Newton Stewart (2598), which, however, standing on both banks of the Cree, extends into Kirkcudbrightshire; Wigtown (1329); and Whithorn (1188). Formerly Wigtown, Stranraer and Whithorn formed with New Galloway, in Kirkcudbrightshire, a group of burghs returning one member, but in 1885 the first three were merged in the county, which returns one member to parliament. Wigtown, the county town, Stranraer and Whithorn are royal burghs. The shire forms part of the sheriffdom of Dumfries and Galloway, and a sheriff-substitute sits at Wigtown and Stranraer. The administrative county is divided into the Lower district, comprising the shire east of the parishes of New Luce and Old Luce, and the Upper district, comprising the shire west of and including these parishes. The county is under school-board jurisdiction, and there are high schools in Newton Stewart and Stranraer. The board-schools in Whithorn and Wigtown have secondary departments, and several of the schools in the shire earn grants for higher education. The county council expends the "residue" grant in providing bursaries for science pupils, and in subsidizing agricultural classes at Kilmarnock and Edinburgh University, and the cookery classes and science department of the high schools.

History and Antiquities.—Galloway, or the country west of the Nith, belonged to a people whom Ptolemy called Novantae and Agricola subdued in A.D. 79. They were Atecott Picts, and are conjectured to have replaced a small, dark-haired aboriginal race, akin probably to the Basques of the Iberian peninsula. They held this south-western corner of Scotland for centuries, protecting themselves from the northern and southern Picts by a rampart, called the Deil's Dyke, which has been traced in a north-easterly direction from Beoch on the eastern side of Loch Ryan to a spot on the Nith near the present Thornhill, a distance of 50 m. Evidences of the Pictish occupation are prevalent in the form of hill forts, cairns, standing stones, hut circles and crannogs or lake dwellings (several of which were exposed when Dowalton Loch near Sorbie and Barhapple Loch near Glenluce were drained), besides canoes and flint, stone and bronze implements. The Romans possessed a small camp at Rispain near Whithorn and a station at Rerigonium, which has been identified with Innermessan on the eastern shore of Loch Ryan; but so few remains exist that it has been concluded they effected no permanent settlement in West Galloway. Ninian, the first Christian missionary to Scotland, landed at Isle of Whithorn in 396 to convert the natives. His efforts were temporarily successful, but soon after his death (432) the people relapsed into paganism, excepting a faithful remnant who continued to carry on Christian work. A monastery was built at Whithorn, and, though the bishopric founded in the 8th century was shortly afterwards removed, it was established again in the 12th, when the priory erected by Fergus, "king" of Galloway, became the cathedral church of the see of Galloway and so remained till the Reformation. In the 6th century the people accepted the suzerainty of the Northumbrian kings who allowed them in return autonomy under their own Pictish chiefs. On the decay of the Saxon power more than two hundred years later this overlordship was abandoned, and the Atecotts formed an alliance with the Northmen then ravaging the Scottish coasts. Because of this relationship the other Picts styled the Atecotts, by way of reproach, Gallgaidhel, or stranger Gaels, whence is derived Galloway, the name of their territory. With the aid of the Norsemen and the men of Galloway Kenneth Macalpine defeated the northern Picts at Forteviot and was crowned king of Scotland at Scone in 844. Henceforward the general history of Wigtownshire is scarcely distinguishable from that of Kirkcudbrightshire. A few particular points, however, must be noted. Malcolm MacHeth, who had married a sister of Somerled, lord of the Isles, headed about 1150 a Celtic revolt against the intrusion of Anglo-Norman lords, but was routed at Causewayend near the estuary of the Cree. In 1190 Roland, lord of Galloway, built for Cistercians from Melrose the fine abbey of Glenluce, of which the only remains are the foundations of the nave, the gable of the south transept, the cloisters, quadrangle and the vaulted chapter-house. In the disordered state of the realm during David II.'s reign east Galloway had been surrendered to Edward III. (1333), but Wigtownshire, which had been constituted a shire in the previous century and afterwards called the Shire to distinguish it from the Stewartry of Kirkcudbright, remained Scottish territory. In 1342 Sir Malcolm Fleming, earl of Wigtown, was appointed sheriff with power to hold the county separate from the other half of Galloway, but falling into straitened circumstances he sold his earldom and estates in 1372 to Archibald the Grim, 3rd earl of Douglas, thus once more placing all Galloway under one lord. Under Douglas's lordship the laws of Galloway, which had obtained from Pictish times and included, among other features, trial by battle (unless an accused person chose expressly to forgo the native custom and ask for a jury), were modified, and in 1426 abolished, the province then coming under the general law. Soon after the fall of the Douglases (1455) the Kennedy family, long established in the Ayrshire district of Carrick, obtained a preponderating influence in Wigtownshire, and in 1509 David Kennedy was created earl of Cassillis. Gilbert, the 4th earl, so powerful that he was called the "king of Carrick," held the shire for Mary, queen of Scots, when she broke with the Lords of the Congregation, but could do little for her cause. He profited by the Reformation himself, however, to acquire by fraud and murder the estate of Glenluce Abbey (about 1570). In 1603 James VI. instituted a bishop in the see of Galloway—which had not been filled for twenty years—and otherwise strove to impose episcopacy upon the people, but the inhabitants stood firm for the Covenant. The acts against Nonconformity were stringently enforced and almost every incumbent in Galloway was deprived of his living. Field-preaching was a capital crime and attendance at conventicles treason. A reign of terror supervened, and numbers of persons emigrated to Ulster in order to escape persecution. John Graham of Claverhouse, Viscount Dundee, having replaced Sir Andrew Agnew, who had refused the Test, as sheriff (1682), goaded the people into rebellion, the drowning of Margaret MacLachlan and Margaret Wilson within flood-mark in Wigtown Bay (1685) being an instance of his ruthless methods. With the Revolution of 1688 Presbyterianism was restored, and John Gordon, recently consecrated bishop of Galloway, retired to France. The Jacobite risings of 1715 and 1745 excited only languid interest, but in 1747 heritable jurisdictions were abolished and Sir Andrew Agnew ceased to be hereditary sheriff, though he was the only official able to prove continuous tenure of the post since it was granted to his family in 1451. The first sheriff appointed under the new system was Alexander Boswell, Lord Auchinleck, father of James Boswell, the biographer of Dr Johnson. In 1760 an engagement took place in Luce Bay, when the young French seaman, François Thurot, with three warships, attempting a diversion in Jacobite interests, was defeated and killed with the loss of three hundred men and his vessels.

Among ancient castles in Wigtownshire may be mentioned the cliff towers, possibly of Norse origin, of Carghidown and Castle Feather near Burrow Head; the ruins of Baldoon, south of Wigtown, associated with events which suggested to Sir Walter Scott the romance of *The Bride of Lammermoor*; Corsewall near the northern extremity of the Rinns; the Norse stronghold of Cruggleton, south of Garliestown, which belonged in the 13th century to de Quincy, earl of Winchester, who had married a daughter of Alan, "king" of Galloway, and to Alexander Comyn, 2nd earl of Buchan (d. 1289), his son-in-law; Dunskey, south of Portpatrick, built in the 16th century, occupying the site of an older fortress; the fragments of Long Castle at Dowalton Loch, the ancient seat of the MacDonells; Myrton, the seat of the MacCullochs, in Mochrum parish; and the ruined tower of Sorbie, the ancient keep of the Hannays.

See Sir Herbert Maxwell, *History of Dumfries and Galloway* (Edinburgh, 1896); Sir Andrew Agnew, *The Agnews of Lochnaw* (Edinburgh, 1893); *The Galloway Herd-Book* (Dumfries, 1880); *Proceedings of the Soc. of Ant. of Scotland*, *passim*; Gordon Fraser, *Wigtown and Whithorn* (Wigtown, 1877).

WIGWAM, a term loosely adopted as a general name for the houses of North American Indians. It is, however, strictly applied to a particular dome-shaped or conical hut made of poles lashed together at the tops and covered with bark. The skin tents of many of the Plains Indians are called *tipis*. The word "wigwam" represents the Europeanized or Anglicized form of the Algonkian *wĕkou-om-ut*, *i.e.* "in his (their) house."

WIHTRED, king of Kent (d. 725), son of Ecgberht, nephew of Hlothhere and brother of Eadric, came to the Kentish throne in 690 after the period of anarchy which followed the death of the latter king. Bede states that Wihtred and Swefheard were both kings in Kent in 692, and this statement would appear to imply a period of East Saxon influence (see KENT), while there is also evidence of an attack by Wessex. Wihtred, however, seems to have become sole king in 694. At his death, which did not take place until 725, he left the kingdom to his sons Aethelberht, Eadberht and Alric. After the annal 694 in the Chronicle there is inserted a grant of privileges to the church, which purports to have been issued by Wihtred at a place called Baccancelde. This grant, however, cannot be accepted as genuine and has merely an illustrative value, but there is still extant a code of laws issued by him in a council held at a place called Berghamstyde (Barham?) during the fifth year of his reign (probably 695).

See Bede, *Hist. Eccl.*, ed. C. Plummer (Oxford, 1896); *Anglo-Saxon Chronicle*, ed. Earle and Plummer (Oxford, 1899).

WILBERFORCE, ROBERT ISAAC (1802–1857), English clergyman and writer, second son of William Wilberforce, was born on the 19th of December 1802. He was educated at Oriel College, Oxford, taking a double first in 1823. In 1826 he was chosen fellow of Oriel and was ordained, among his friends and colleagues being Newman, Pusey and Keble. For a few years he was one of the tutors at Oriel, but the provost, Edward Hawkins, disliked his religious views, and in 1831 he resigned and left Oxford. In 1832 he obtained the living of East Farleigh, Kent, which in 1840 he exchanged for that of Burton Agnes, near Hull. In 1841 he was appointed archdeacon of the East Riding. About this time Wilberforce became very intimate with Manning, and many letters on theological and ecclesiastical questions passed between them. In 1851 Manning joined the Church of Rome, and three years later Wilberforce took the same step. He was preparing for his ordination when he died at Albano on the 3rd of February 1857. He left two sons, the younger of whom, Edward Wilberforce (b. 1834), became one of the masters of the Supreme Court of Judicature. Edward's son, Lionel Robert Wilberforce (b. 1861), was in 1900 appointed professor of physics in the university of Liverpool.

R. I. Wilberforce assisted his brother Samuel to write the *Life* and to edit the *Correspondence* of his father. His other writings include: *Church Courts and Church Discipline* (1843); *Doctrine of the Holy Eucharist* (1853); *Doctrine of the Incarnation in Relation to Mankind and the Church* (1848 and later editions); *The Five Empires, a Sketch of Ancient History* (1840); *A Sketch of the History of Erastianism* (1851); *An Enquiry into the Principles of Church Authority* (1854); and a romance, *Rutilius and Lucius* (1842).

WILBERFORCE, SAMUEL (1805–1873), English bishop, third son of William Wilberforce, was born at Clapham Common, London, on the 7th of September 1805. In 1823 he entered Oriel College, Oxford. In the "United Debating Society," which afterwards developed into the "Union," he distinguished himself as a zealous advocate of liberalism. The set of friends with whom he chiefly associated at Oxford were sometimes named, on account of their exceptionally decorous conduct, the "Bethel Union"; but he was by no means averse to amusements, and specially delighted in hurdle jumping and hunting. He graduated in 1826, taking a first class in mathematics and a second in classics. After his marriage on the 11th of June 1828 to Emily Sargent, he was in December ordained and appointed curate-in-charge at Checkenden near Henley-on-Thames. In 1830 he was presented by Bishop Sumner of Winchester to the rectory of Brightstone in the Isle of Wight. In this comparatively retired sphere he soon found scope for that manifold activity which so prominently characterized his subsequent career. In 1831 he published a tract on tithes, "to correct the prejudices of the lower order of farmers," and in the following year a collection of hymns for use in his parish, which had a large general circulation; a small volume of stories entitled the *Note Book of a Country Clergyman*; and a sermon, *The Apostolical Ministry*. At the close of 1837 he published the *Letters and Journals* of Henry Martyn. Although a High Churchman Wilberforce held aloof from the Oxford movement, and in 1838 his divergence from the "Tract" writers became so marked that J. H. Newman declined further contributions from him to the *British Critic*, not deeming it advisable that they should longer "co-operate very closely." In 1838 Wilberforce published, with his elder brother Robert, the *Life* of his father, and two years later his father's *Correspondence*. In 1839 he also published *Eucharistica* (from the old English divines), to which he wrote an introduction, *Agathos and other Sunday Stories*, and a volume of [illegible], and in the following year *Rocky* [illegible] November 1839 he was installed [illegible] 1840 was collated canon of [illegible] cepted the rectory of Alverstoke. In 1841 he was chosen Bampton lecturer, and shortly afterwards made chaplain to Prince Albert, an appointment he owed to the impression produced by a speech at an anti-slavery meeting some months previously. In October 1843 he was appointed by the archbishop of York to be sub-almoner to the queen. In 1844 appeared his *History of the American Church*. In March of the following year he accepted the deanery of Westminster, and in October the bishopric of Oxford.

The bishop in 1847 became involved in the Hampden controversy, and signed the remonstrance of the thirteen bishops to Lord John Russell against Hampden's appointment to the bishopric of Hereford. He also endeavoured to obtain satisfactory assurances from Hampden; but, though unsuccessful in this, he withdrew from the suit against him. The publication of a papal bull in 1850 establishing a Roman hierarchy in England brought the High Church party, of whom Wilberforce was the most prominent member, into temporary disrepute. The secession to the Church of Rome of his brother-in-law, Archdeacon (afterwards Cardinal) Manning, and then of his brothers, as well as his only daughter and his son-in-law, Mr and Mrs J. H. Pye, brought him under further suspicion, and his revival of the powers of convocation lessened his influence at court; but his unfailing tact and wide sympathies, his marvellous energy in church organization, the magnetism of his personality, and his eloquence both on the platform and in the pulpit, gradually won for him recognition as without a rival on the episcopal bench. His diary reveals a tender and devout private life which has been overlooked by those who have only considered the versatile facility and persuasive expediency that marked the successful public career of the bishop, and earned him the sobriquet of "Soapy Sam." In the House of Lords he took a prominent part in the discussion of social and ecclesiastical questions. He has been styled the "bishop of society"; but society occupied only a fraction of his time. The great bent of his energies was ceaselessly directed to the better organization of his diocese and to the furtherance of schemes for increasing the influence and efficiency of the church. In 1854 he opened a theological college at Cuddesdon, which was afterwards the subject of some controversy on account of its alleged Romanist tendencies. His attitude towards *Essays and Reviews* in 1861, against which he wrote an article in the *Quarterly*, won him the special gratitude of the Low Church party, and latterly he enjoyed the full confidence and esteem of all except the extreme men of either side and party. On the publication of J. W. Colenso's *Commentary on the Romans* in 1861, Wilberforce endeavoured to induce the author to hold a private conference with him; but after the publication of the first two parts of the *Pentateuch Critically Examined* he drew up the address of the bishops which called on Colenso to resign his bishopric. In 1867 he framed the first *Report* of the Ritualistic Commission, in which coercive measures against ritualism were discountenanced by the use of the word "restrain" instead of "abolish" or "prohibit." He also endeavoured to take the sting out of some resolutions of the second Ritualistic Commission in 1868, and was one of the four who signed the *Report* with qualifications. Though strongly opposed to the disestablishment of the Irish Church, yet, when the constituencies decided for it, he advised that no opposition should be made to it by the House of Lords. After twenty-four years' labour in the diocese of Oxford, he was translated by Gladstone to the bishopric of Winchester. He was killed on the 19th of July 1873, by the shock of a fall from his horse near Dorking, Surrey.

Wilberforce left three sons. The eldest, Reginald Garton Wilberforce, being the author of *An Unrecorded Chapter of the Indian Mutiny* (1894). His two younger sons both attained distinction in the English church. Ernest Roland Wilberforce (1840–1908) was bishop of Newcastle-on-Tyne from 1882 to 1895, and bishop of Chichester from 1895 till his death. Albert Basil Orme Wilberforce (b. 1841) was appointed canon residentiary of Westminster in 1894, chaplain of the House of Commons in 1896 and archdeacon of Westminster in 1900; he has published several volumes of sermons.

Besides the works already mentioned, Wilberforce wrote *Heroes of Hebrew History* (1870), originally contributed to *Good Words*, and several volumes of sermons. See *Life of Samuel Wilberforce, with Selections from his Diary and Correspondence* (1879–1882), vol. i., ed. by Canon A. R. Ashwell, and vols. ii. and iii., ed. by his son R. G. Wilberforce, who also wrote a one-volume Life (1888). One of the volumes of the "English Leaders of Religion" is devoted to him, and he is included in Dean Burgon's *Lives of Twelve Good Men* (1888).

WILBERFORCE, WILLIAM (1759–1833), English philanthropist whose name is chiefly associated with the abolition of the slave trade, was descended from a Yorkshire family which possessed the manor of Wilberfoss in the East Riding from the time of Henry II. till the middle of the 18th century. He was the only son of Robert Wilberforce, member of a commercial house at Hull, by his wife Elizabeth, daughter of Thomas Bird of Barton, Oxon, and was born at Hull on the 24th of August 1759. It was from his mother that he inherited both his feeble frame and his many rich mental endowments. He was not a diligent scholar, but at the grammar school of Hull his skill in elocution attracted the attention of the master. Before he had completed his tenth year he lost his father and was transferred to the care of a paternal uncle at Wimbledon; but in his twelfth year he returned to Hull, and soon afterwards was placed under the care of the master of the endowed school of Pocklington. Here his love of social pleasures made him neglectful of his studies, but he entered St John's College, Cambridge, in October 1766. Left by the death of his grandfather and uncle the possessor of an independent fortune under his mother's sole guardianship, he was somewhat idle at the university, though he acquitted himself in the examinations with credit; but in his serious years he "could not look back without unfeigned remorse" on the opportunities he had then neglected. In 1780 he was elected to the House of Commons for his native town, his success being due to his personal popularity and his lavish expenditure. He soon found his way into the fast political society of London, and at the club at Goosetrees renewed an acquaintance begun at Cambridge with Pitt, which ripened into a friendship of the closest kind. In the autumn of 1783 he set out with Pitt on a tour in France; and after his return his eloquence proved of great assistance to Pitt in his struggle against the majority of the House of Commons. In 1784 Wilberforce was elected for both Hull and Yorkshire, and took his seat for the latter constituency.

A journey to Nice in the autumn of the same year with his friend Dr Isaac Milner (1750–1820), who had been a master at Hull grammar school when Wilberforce was there as a boy, and had since made a reputation as a mathematician, and afterwards became president of Queens' College, Cambridge, and dean of Carlisle, led to his conversion to Evangelical Christianity and the adoption of more serious views of life. The change had a marked effect on his public conduct. In the beginning of 1787 he busied himself with the establishment of a society for the reformation of manners. About the same time he made the acquaintance of Thomas Clarkson, and began the agitation against the slave trade. Pitt entered heartily into their plans, and recommended Wilberforce to undertake the guidance of the project as a subject suited to his character and talents. While Clarkson conducted the agitation throughout the country, Wilberforce took every opportunity in the House of Commons of exposing the evils and horrors of the trade. In 1788, however, a serious illness compelled him to retire for some months from public life, and the introduction of the subject in parliament therefore devolved on Pitt, whose representations were so far successful that an act was passed providing that the number of slaves carried in ships should be in proportion to the tonnage. On the 12th of May of the following year Wilberforce, in co-operation with Pitt, brought the subject of abolition again before the House of Commons; but the friends of the planters succeeded in getting the matter deferred. On the 27th of January following Wilberforce carried a motion for referring to a special committee the further examination of witnesses, but after full inquiry the motion for abolition in April 1791 was lost by 163 votes to 88. In the following April he carried a motion for gradual abolition by 238 to 85 votes; but in the House of Lords the discussion was finally postponed till the following session. Notwithstanding his unremitting labours in educating public opinion and annual motions in the House of Commons, it was not till 1807, the year following Pitt's death, that the first great step towards the abolition of slavery was accomplished. When the anti-slavery society was formed in 1823, Wilberforce and Clarkson became vice-presidents; but before their aim was accomplished Wilberforce had retired from public life, and the Emancipation Bill was not passed till August 1833, a month after his death.

In 1797 Wilberforce published *A Pratical View of the Prevailing Religious System of Professed Christians in the Higher and Middle Classes of this Country Contrasted with Real Christianity*, which within half a year went through five editions and was afterwards translated into French, Italian, Dutch and German. In the same year (May 1797) he married Barbara Ann Spooner and took a house at Clapham, where he became one of the leaders of what was known as the "Clapham Sect" of Evangelicals, including Henry Thornton, Charles Grant, E. J. Eliot, Zacchary Macaulay and James Stephen. It was in connexion with this group that he then occupied himself with a plan for a religious periodical which should admit "a moderate degree of political and common intelligence," the result being the appearance in January 1801 of the *Christian Observer*. He also interested himself in a variety of schemes for the advancement of the social and religious welfare of the community, including the establishment of the Association for the Better Observance of Sunday, the foundation, with Hannah More (*q.v.*), of schools at Cheddar, Somersetshire, a project for opening a school in every parish for the religious instruction of children, a plan for the education of the children of the lower classes, a bill for securing better salaries to curates, and a method for disseminating, by government help, Christianity in India. In parliament he was a supporter of parliamentary reform and of Roman Catholic emancipation. In 1812, on account of failing health, he exchanged the representation of Yorkshire for that of a constituency which would make less demands on his time, and was returned for Bramber, Sussex. In 1825 he retired from the House of Commons, and the following year settled at Highwood Hill, near Mill Hill, "just beyond the disk of the metropolis." He died at London on the 29th of July 1833, and was buried in Westminster Abbey close to Pitt, Fox and Canning. In Westminster Abbey a statue was erected to his memory, and in Yorkshire a county asylum for the blind was founded in his honour. A column was also erected to him by his townsmen of Hull. Wilberforce left four sons, two of whom, Samuel and Robert Isaac, are noticed separately. The youngest, Henry William Wilberforce (1807–1873), was educated at Oriel College, Oxford, and was president of the Oxford Union. He took orders in the English Church, but in 1850 became a Roman Catholic. He was an active journalist and edited the *Catholic Standard*.

The chief authorities of the career of William Wilberforce are his *Life* (5 vols., 1838) by his sons, Robert Isaac and Samuel, and his *Correspondence* (1840) also published by his sons A smaller edition of the *Life* was published by Samuel Wilberforce in 1868. See also *The private papers of William Wilberforce*, edited by A. M. Wilberforce (1897); Sir James Stephen, *Essays in Ecclesiastical Biography* (1849); J. C. Colquhoun, *Wilberforce, His Friends and Times* (1866); John Stoughton, *William Wilberforce* (1880); J. J. Gurney, *Familiar Sketch of Wilberforce* (1838); and J. S. Hartford, *Recollections of W. Wilberforce* (1864).

WILBRANDT, ADOLF (1837–   ), German novelist and dramatist, was born at Rostock on the 24th of August 1837, the son of a professor at that university. Having received his early education at the gymnasium of his native town, he entered the university and engaged in the study of law. This, however, he soon abandoned in favour of philology and history, and continued these studies in Berlin and Munich. After taking the degree of doctor of philosophy, he joined the staff of the *Süddeutsche Zeitung* in Munich. He travelled abroad for a time and in 1871 settled in Vienna, where, two years later, he married the actress, Auguste Baudius. In 1881 Wilbrandt was appointed director of the Hofburg theatre in succession to Franz Dingelstedt, an office he held until 1887. In this year he returned to his native town of Rostock, and remained actively engaged in literary production. Wilbrandt is distinguished both as a dramatist and novelist. His merits were acknowledged by the award of the Grillparzer prize on two occasions—in 1875 for the tragedy *Gracchus der Volkstribun*, and in 1890 for his dramatic poem *Der Meister von Palmyra*, while in 1878 he received the Schiller prize for his dramatic productions.

Among his plays may be mentioned the tragedies, *Arria and Messalina* (1874), *Nero* (1876); *Kriemhild* (1877); the comedies *Unerreichbar* (1870), *Die Maler* (1872), *Jugendliebe* (1873) and *Der Kampf ums Dasein* (1874); and the drama *Die Tochter des Herrn Fabricius* (1883). Among his novels the following deserve notice:—*Meister Amor* (1880); *Hermann Ifinger* (1892); *Der Dornenweg* (1894); *Die Osterinsel* (1895); *Die Rothenburger* (1895); and *Hildegard Mahlmann* (1897). He also published translations of Sophocles and Euripides (1866), *Gedichte* (1874, 1889 and 1907), and a volume of *Erinnerungen* (1905).

See V. Klemperer, *Adolf Wilbrandt. Eine Studie über seine Werke* (1907), and A. Stern, *Studien zur Literatur der Gegenwart* (3rd ed., 1905).

WILBYE, JOHN, English 16th-century madrigal composer, was born probably at Bury St Edmunds, but the details of his life are obscure. A set of madrigals by him appeared in 1598 and a second in 1608, the two sets containing sixty-four pieces; and from a few contributions known to have been made by him to other contemporary sets, we can infer that he was alive in 1614. He is the most famous of all the English madrigalists; his pieces have long been favourites and are included in modern collections.

WILD, JONATHAN (*c.* 1682–1725), English criminal, was born about 1682 at Wolverhampton, where his father was a wig-maker. After being apprenticed to a local buckle-maker, he went to London to learn his trade, and, getting into debt, was imprisoned for several years. The acquaintance of many criminals which he made in prison he turned to account after his release by setting up as a receiver of stolen goods. Wild shrewdly realized that it was safer, and in most cases more profitable, to dispose of such property by returning it to its legitimate owners than to sell it, with the attendant risks, in the open market, and he thus built up an immense business, posing as a recoverer of stolen goods, the thieves receiving a commission on the price paid for recovery. A special act of parliament was passed by which receivers of stolen property were made accessories to the theft, but Wild's professed "lost property office" had little difficulty in evading the new law, and became so prosperous that two branch offices were opened. From profiting by robberies in which he had no share, Wild naturally came to arrange robberies himself, and he devised and controlled a huge organization, which plundered London and its approaches wholesale. Such thieves as refused to work with him received short shrift. The notorious Jack Sheppard, wearied of Wild's exactions, at last refused to deal with him, whereupon Wild secured his arrest, and himself arrested Sheppard's confederate, "Blueskin." In return for Wild's services in tracking down such thieves as he did not himself control, the authorities for some time tolerated the offences of his numerous agents, each a specialist in a particular kind of robbery, and so themselves strengthened his position. If an arrest were made, Wild had a plentiful supply of false evidence at hand to establish his agents' *alibi*, and he did not hesitate to obtain the conviction, by similar means, of such thieves as refused to recognize his authority. Such stolen property as could not be returned to the owners with profit was taken abroad in a sloop purchased for this work. At last either the authorities became more strict or Wild less cautious. He was arrested, tried at the Old Bailey, and after being acquitted on a charge of stealing lace, found guilty of taking a reward for restoring it to the owner without informing the police. He was hanged at Tyburn on the 24th of May 1725.

WILDBAD, a watering-place of Germany, in the kingdom of Württemberg, picturesquely situated 1475 ft. above the sea, [illegible] pine-clad gorge of the Enz in the Black Forest, [illegible] Stuttgart and 14 E. of Baden-Baden by rail. Pop. (1905) 3734. It contains an Evangelical, a Roman Catholic and an English church, and has some small manufactures (cigars, paper and toys). Its thermal alkaline springs have a temperature of 90°-100° Fahr. and are used for bathing in cases of paralysis, rheumatism, gout, neuralgia and similar ailments. The fact that the springs rise within the baths, and are thus used at the fountain-head, is considered to contribute materially to their curative value. The water is used internally for affections of the stomach and digestive organs, and of the kidneys, bladder, &c. Wildbad possesses all the usual arrangements for the comfort and amusement of the visitors (over 15,000 annually), including large and well-appointed hotels, a Kurhaus, a Trink-Halle and promenades. The neighbourhood is picturesque, the most attractive spot being the Wildsee, of which legends are told.

See W. T. v. Renz, *Die Kur zu Wildbad* (with Guide, Wildbad, 1888), and Weizsäcker, *Wildbad* (2nd ed., 1905).

WILDE, OSCAR O'FLAHERTIE WILLS (1856–1900), English author, son of Sir William Wilde, a famous Irish surgeon, was born in Dublin on the 15th of October 1856; his mother, Jane Francisca Elgee, was well known in Dublin as a graceful writer of verse and prose, under the pen-name of "Speranza." Having distinguished himself in classics at Trinity College, Dublin, Oscar Wilde went to Magdalen College, Oxford, in 1874, and won the Newdigate prize in 1878 with his poem "Ravenna," besides taking a first-class in classical Moderations and in Literae Humaniores. But his career at Oxford, brilliant intellectually as he showed himself to be, was chiefly signalized by the part he played in what came to be known as the aesthetic movement. He adopted what to undergraduates appeared the effeminate pose of casting scorn on manly sports, wearing his hair long, decorating his rooms with peacock's feathers, lilies, sunflowers, blue china and other *objets d'art*, which he declared his desire to "live up to," affecting a lackadaisical manner, and professing intense emotions on the subject of "art for art's sake"—then a new-fangled doctrine which J. M. Whistler was bringing into prominence. Wilde made himself the apostle of this new cult. At Oxford his behaviour procured him a ducking in the Cherwell, and a wrecking of his rooms, but the cult spread among certain sections of society to such an extent that languishing attitudes, "too-too" costumes and "aestheticism" generally became a recognized pose. Its affectations were burlesqued in Gilbert and Sullivan's travesty *Patience* (1881), which practically killed by ridicule the absurdities to which it had grown. At the same time it cannot be denied that the "aesthetic" movement, in the aspect fundamentally represented by the school of William Morris and Rossetti, had a permanent influence on English decorative art. As the leading "aesthete," Oscar Wilde became one of the most prominent personalities of the day; apart from the ridicule he encountered, his affected paradoxes and his witty sayings were quoted on all sides, and in 1882 he went on a lecturing tour in the United States. In 1884 he married Constance Lloyd. He had already published in 1881 a selection of his poems, which, however, only attracted admiration in a limited circle. In 1888 appeared *The Happy Prince and Other Tales*, illustrated by Walter Crane and Jacomb Hood. This charming volume of fairy tales was followed up later by a second collection, *The House of Pomegranates* (1892), acknowledged by the author to be "intended neither for the British child nor the British public." In much of his writings, and in his general attitude, there was to most people an undertone of rather nasty suggestion which created prejudice against him, and his novel, *The Picture of Dorian Gray* (1891), with all its sparkle and cleverness, impressed them more from this point of view than from its purely literary brilliance. Wilde contributed some characteristic articles to the reviews, all coloured by his peculiar attitude towards art and life, and in 1891 republished three of them as a book called *Intentions*. His first real success with the larger public was as a dramatist with *Lady Windermere's Fan* at the St James's Theatre in 1892, followed by *A Woman of No Importance* (1893), *An Ideal Husband* (1895) and *The Importance of Being Earnest* (1895). The dramatic and literary ability shown in these plays, all of which were published later in book form, was as undoubted as their diction and ideas were characteristically paradoxical. In 1893 the licenser of plays refused a licence to Wilde's *Salome*, but it was produced in French in Paris by Sarah Bernhardt in 1894. His success as a dramatist had by this time gone some way to disabuse hostile critics of the suspicions as regards his personal character which had been excited by the apparent looseness of morals which since his Oxford days it had always pleased him to affect; but to the consternation of his friends, who had ceased to credit the existence of any real moral obliquity, in 1895 came fatal revelations as the result of his bringing a libel action against the marquis of Queensberry; and at the Old Bailey, in May, Wilde was sentenced to two years' imprisonment with hard labour for offences under the Criminal Law Amendment Act. It was a melancholy end to what might have been a singularly brilliant career. Even after leaving prison he was necessarily an outcast from decent circles, and he lived mainly on the Continent, under the name of "Sebastian Melmoth." He died in Paris on the 30th of November 1900. In 1898 he published his powerful *Ballad of Reading Gaol*. His *Collected Poems*, containing some beautiful verse, had been issued in 1892. While in prison he wrote an apology for his life which was placed in the hands of his executor and published in 1905. The manuscripts of *A Florentine Tragedy* and an essay on Shakespeare's sonnets were stolen from his house in 1895. In 1904 a five-act tragedy, *The Duchess of Padua*, written by Wilde about 1883 for Mary Anderson, but not acted by her, was published in a German translation (*Die Herzogin von Padua*, translated by Max Meyerfeld) in Berlin. It is still impossible to take a purely objective view of Oscar Wilde's work. The Old Bailey revelations removed all doubt as to the essential unhealthiness of his personal influence; but his literary genius was none the less remarkable, and his plays were perhaps the most original contributions to English dramatic writing during the period. (H. Ch.)

WILDENBRUCH, ERNST VON (1845–1909), German poet and dramatist, was born on the 3rd of February 1845 at Beyrout in Syria, the son of the Prussian consul-general. Having passed his early years at Athens and Constantinople, where his father was attached to the Prussian legation, he came in 1857 to Germany, received his early schooling at the Pädagogium at Halle and the Französische Gymnasium in Berlin, and, after passing through the Cadet school, became, in 1863, an officer in the Prussian army. He abandoned the military career two years later, but was recalled to the colours in 1866 for the war with Austria. He next studied law at the university of Berlin, and again served in the army during the Franco-Prussian War, 1870–71. In 1876 Wildenbruch was attached to the foreign office, which he finally quitted in 1900 with the title of counsellor of legation. He achieved his first literary successes with the epics *Vionville* (1874) and *Sedan* (1875). After publishing a volume of poems, *Lieder und Balladen* (Berl., 1877; 7th ed., 1900), he produced, in 1882, the tragedy, *Die Karolinger*. Among his chief dramas may be mentioned the tragedy *Harold* (1882); *Die Quitzows* (1888); *Der Generalfeldoberst* (1889); *Die Haubenlerche* (1891); *Heinrich und Heinrichs Geschlecht* (1895); *Die Tochter des Erasmus* (1900); and *König Laurin* (1902). Wildenbruch was twice (in 1884 and 1896) awarded the Schiller prize, and was, in 1892, created a doctor of philosophy *honoris causa* by the university of Jena. He also wrote several volumes of short stories (*Novellen*, 1883; *Neue Novellen*, 1885; *Tiefe Wasser*, 1897, &c.). He died on the 15th of January 1909.

Cf. B. Litzmann, *Das deutsche Drama in den Bewegungen der Gegenwart* (1894; 4th ed., 1897); H. Bulthaupt, *Dramaturgie des Schauspiels*, vol. iv. (1901).

WILDERNESS, a large forest in Spottsylvania county, Virginia, U.S.A., on the S. bank of the Rapidan, extending from Mine Run on the E. to Chancellorsville on the W. It is famous in military history for the battles of Chancellorsville (1863) and Wilderness (1864) during the American Civil War.

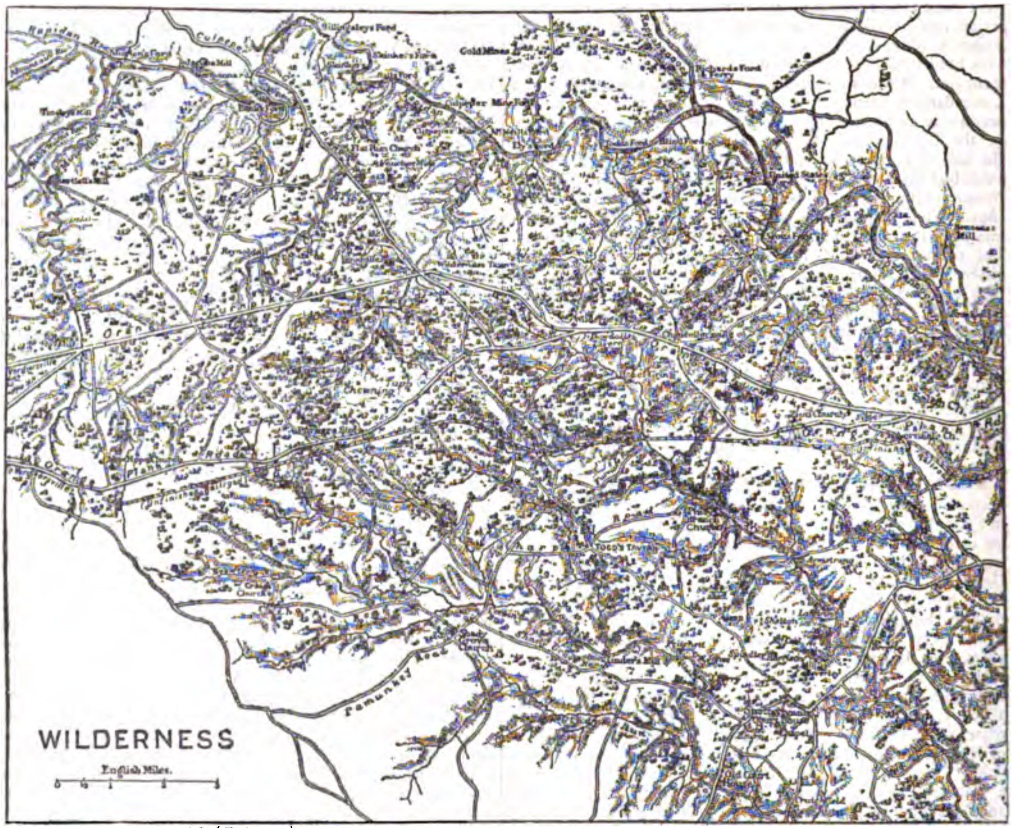
Chancellorsville.—In May 1863 a three days' battle was fought at Chancellorsville between the Army of the Potomac, under General J. Hooker, and General Lee's Army of Northern Virginia, which had stemmed the tide of invasion in the East by taking up a defensive position along the right or south bank of the Rappahannock. General Burnside had suffered a severe repulse in front of the Confederate position at Fredericksburg in December 1862, and his successor resolved to adopt the alternative plan of turning Lee's flank and so gaining the road to Richmond. General Lee had meanwhile weakened his forces by detaching Longstreet's two divisions and the cavalry brigades of Hampton, Robertson and Jones. Hooker had now at his disposal 12,000 cavalry, 400 guns and 120,000 infantry and artillery, organized in seven corps (I. Reynolds, II. Couch, III. Sickles, V. Meade, VI. Sedgwick, XI. Howard, XII. Slocum). General Lee counted only 45,000 men of all arms effective. Hooker detached 10,000 cavalry under Stoneman and Sedgwick's corps (30,000) to demonstrate on his flanks along the Rapidan and at Fredericksburg, while with the remainder he moved up the Rappahannock and crossed that river and afterwards the Rapidan and on the 30th of April fixed his headquarters at Chancellorsville, a farmhouse in the Wilderness. Lee's cavalry under Stuart had duly reported the Federal movements and Lee called up "Stonewall" Jackson's four divisions from below the Massaponax as soon as Sedgwick's corps crossed the river at Fredericksburg. At Chancellorsville Anderson's division was in position, and McLaws was sent to support him, while Jackson took three divisions to the same point, leaving Early's division to observe Sedgwick. Hooker had cleared and entrenched a position in the forest, inviting attack from the E. or S. General Lee, however, discovered a route by which the Federals might be attacked from the N. and W., and Jackson was instructed to execute the turning movement and fall upon them. As soon as a brigade of cavalry was placed at his disposal Jackson marched westward with his corps of 22,000 men and by a détour of 15 m. gained the Federal right flank, while Anderson and McLaws with 20 guns and 12,000 men demonstrated in front of Hooker's army and so kept 90,000 men idle behind their earthworks. One of Stuart's cavalry brigades neutralized Stoneman's 10,000 horsemen. Sedgwick was being contained by Early. Jackson's attack surprised the Federals, who fled in panic at nightfall, but Jackson was mortally wounded. Next day the attack was resumed under the direction of Stuart, who was reinforced by Anderson, while McLaws now threatened the left flank of the Federals and Fitz Lee's cavalry brigade operated against their line of retreat. Hooker finally gained the shelter of an inner line of works covering the ford by which he must retreat. Meanwhile, Early had checked Sedgwick, but when at last the Federal corps was about to overwhelm the Confederate division Lee came to succour it. Then Sedgwick was assailed by Early, McLaws and Anderson, and driven over the Rappahannock to join the remainder of Hooker's beaten army, which had recrossed the Rapidan on the 5th of May and marched back to Falmouth. Phisterer's *Record* states that the Federal loss was 16,000 and that of the Confederates 12,000 men.

See A. C. Hamlin, *Chancellorsville*; G. F. R. Henderson, *Stonewall Jackson*; A. Doubleday, *Chancellorsville and Gettysburg*, *Battles and Leaders of the Civil War* and *Official Records of the War of Secession*. (G. W. R.)

Grant's Campaign of the Wilderness and Cold Harbor.—On the evening of the 3rd of May 1864, after dark, the Army of the Potomac, commanded by Major-General G. G. Meade and consisting of the II., V. and VI., and Cavalry corps, left its winter quarters about Culpeper to manœuvre across the Rapidan with a view to fighting a battle at or near New Hope Church and Craig's Church. The army, and the IX. corps (Burnside), which was an independent command, were directed by Lieutenant-General Grant, the newly appointed commander of the armies of the United States, who accompanied Meade's headquarters. The opposing Army of Northern Virginia under General R. E. Lee lay in quarters around Orange Court House (A. P. Hill's corps), Verdiersville (Ewell's corps) and Gordonsville

(Longstreet's corps). The respective numbers were: Army of the Potomac, 98,000; IX. corps, 22,000; Army of Northern Virginia rather less than 70,000.

The crossing of the Rapidan was made at Germanna and Ely's Fords, out of reach of Lee's interference, and in a few hours the two leading corps had reached their halting-places—V., Wilderness Tavern; and II., Chancellorsville. The VI. followed the V. and halted south of Germanna Ford. Two of the three divisions of cavalry preceded the march, and scouted to the front and flanks. Controversy has arisen as to whether the early halt of the Union army in the midst of the Wilderness was not a serious error of judgment. The reason assigned was the necessity of protecting an enormous wagon train, carrying 15 days' supplies for the whole army, that was crossing after the II. corps at Ely's Ford. Burnside's corps was far to the rear when the advance began, but by making forced marches it was able to reach Germanna Ford during the 5th of May. On that day the manœuvre towards Craig's Church was resumed at 5 A.M., Wilson's cavalry division moving from Parker's Store southward, the V. corps (Warren) moving from Wilderness Tavern towards Parker's Store, followed by the VI. under Sedgwick, the II. from Chancellorsville by way of Todd's Tavern towards Shady Grove Church. Of the other cavalry divisions, Gregg's went towards Fredericksburg (near where the Confederate cavalry corps had been reported) and Torbert's (which had acted as rearguard and watched the upper Rapidan during the first day's march) was not yet across the river.



Redrawn from *The Wilderness and Cold Harbor*, by permission of Hugh Rees, Ltd.

Grant's intention of avoiding a battle until he was clear of the Wilderness was not achieved, for Confederate infantry appeared on the Orange Turnpike east of Mine Run, where on his own initiative Warren had posted a division of the V. corps overnight as flank-guard, and some cavalry, judiciously left behind by Wilson at Parker's Store, became engaged a little later with hostile forces on the Orange Plank Road. This led to the suspension of the whole manœuvre towards Lee's right rear. The first idea of the Union headquarters was that Lee was falling back to the North Anna, covered by a bold rearguard, which Grant and Meade arranged to cut off and destroy by a convergent attack of Warren and Sedgwick. But the appearance of infantry on the Plank Road as well as the Pike had shown that Lee intended to fight in the Wilderness, and Hancock (II. corps) was called in from Todd's Tavern, while one division (Getty's) of the VI. was hurried to the intersection of the Brock and Plank roads to hold that point until Hancock's arrival. Getty arrived just in time, for Confederate skirmishers were found dead and wounded only 30 yds. from the cross roads. The division then formed up to await Hancock's arrival up the Brock Road, practically unmolested, for Lee had only two of his corps on the ground (Hill on the Plank Road, Ewell on the Pike), and did not desire to force a decision until Longstreet's distant corps should arrive.

Meanwhile Warren had been slowly forming up his attacking line with great difficulty in the woods. Grant appears to have used bitter words to Meade on the subject of Warren's delays, and Meade passed these on to Warren, who in turn forced his subordinates into premature action. In the end, about noon, Griffin's division of Warren's corps attacked directly along the Pike and crushed the enemy's first line, but, unsupported by the VI. corps on the right and Wadsworth's division (V. corps) on the left, both of which units were still groping their way forward in the woods, was forced back with heavy losses. Wadsworth took a wrong direction in the woods and presented himself as an easy victim to Ewell's right, soon after Griffin's repulse. The VI. corps advanced later in the day on Warren's right, but was only partially engaged. The result of the attack on Ewell was thus completely unsatisfactory, and for the rest of the battle the V. and VI. corps were used principally as reservoirs to find supports for the offensive wing under Hancock, who arrived on the Plank Road about 2 P.M.

Hancock's divisions, as they came up, entrenched themselves along the Brock Road. In the afternoon he was ordered to attack whatever force of the enemy was on the Plank Road in front of him, but was unwilling to do so until he had his forces well in hand. Finally Getty was ordered to attack "whether Hancock was ready or not." This may have been an attempt to force Hancock's hand by an appeal to his soldierly honour, and as a fact he did not leave Getty unsupported. But the disjointed attacks of the II. corps on Hill's entrenchments, while forcing the Confederates to the verge of ruin, were not as successful as the preponderance of force on the Union side ought to have ensured. For four hours the two lines of battle were fighting 50 yds. apart, until at nightfall the contest was given up through mutual exhaustion.

The battle of the 6th was timed to begin at 5 A.M. and Grant's attack was wholly directed on Parker's Store, with the object of crushing Hill before Longstreet could assist him. If Longstreet, instead of helping Hill, were to attack the extreme Union left, so much the better; but the far more probable course for him to take was to support Hill on or north of the Plank Road, and Grant not only ordered Hancock with six of the eleven divisions of Meade's army to attack towards Parker's Store, but sent his own "mass of manœuvre" (the IX. corps) thither in such a way as to strike Hill's left. The cavalry was drawn back for the protection of the trains,[1] for "every musket" was required in the ranks of the infantry. Warren and Sedgwick were to hold Ewell occupied on the Pike by vigorous attacks. At 5 o'clock Hancock advanced, drove back and broke up Hill's divisions, and on his right Wadsworth attacked their left rear. But after an hour's wood fighting the Union attack came to a standstill, and at this moment, the critical moment for the action of the IX. corps, Burnside was still more than a mile away, having scarcely passed through Warren's lines into the woods. Then Longstreet's corps, pushing its way in two columns of fours through Hill's retreating groups, attacked Hancock with the greatest fury, and forced him back some hundreds of yards. But the woods broke the force of this attack too, and by 7.30 the battle had become a stationary fire-fight. After an interval in which both sides rallied their confused masses, Longstreet attacked again and gained more ground. Persistent rumours came into the Union headquarters of a Confederate advance against the Union left rear, and when Grant realized the situation he broke off one of Burnside's divisions from the IX. corps column and sent it to the cross roads as direct reserve to Hancock. At this moment the battle took a very unfavourable turn on the Plank Road. Longstreet had sent four brigades of infantry by a détour through the woods south of the Plank Road to attack Hancock's left. This was very effective, and the Union troops were hustled back to the cross-roads. But Longstreet, like Jackson a year before in these woods, was wounded by his own men at the critical moment and the battle again came to a standstill (2-2.30 P.M.).

Burnside's corps, arriving shortly before 10 A.M. near Chewning's house, the position whence it was to have attacked Hill's left in the early morning, was about to attack, in ignorance of Hancock's repulse, when fortunately an order reached it to suspend the advance and to make its way through the woods towards Hancock's right. This dangerous flank march, screened by the woods, was completed by 2 P.M., and General Burnside began an attack upon the left of Longstreet's command (R. H. Anderson's fresh division of Hill's corps). But Hancock being in no condition to support the IX. corps, the whole attack was, at 3 P.M., postponed by Grant's order until 6 P.M. Thus there was a long respite for both sides, varied only by a little skirmishing. But Lee was determined, as always, to have the last word, and about 4.15–4.30 a fierce assault was delivered amidst the burning woods upon Hancock's entrenchments along the Brock Road. For a moment, aided by the dense smoke, the Confederates seized and held the first line of works, but a counterstroke dislodged them. Burnside, though not expecting to have to attack before 6, put into the fight such of his troops as were ready, and at 5.30 or thereabouts the assaulting line receded into the woods. Grant cancelled his order to attack at 6, and at the decisive point the battle was at an end. But on the extreme right of the Union army a sudden attack was delivered at sunset upon the hitherto unmolested VI. corps, by Gordon, one of Ewell's brigadiers. This carried off two generals and several hundred prisoners, and a panic ensued which affected all the Union forces on the Pike, and was not quieted until after nightfall.

Lee, therefore, had the last word on both flanks, but in spite of this and of the very heavy losses,[2] Grant had already resolved to go on, instead of going back like his various predecessors. To him, indeed, the battle of the Wilderness was a victory, an indecisive victory indeed, but one that had given him a moral superiority which he did not intend to forfeit. His scheme, drafted early on the morning of the 7th, was for the army to march to Spottsylvania on the night of the 7th–8th, to assemble there on the 8th, and thence to undertake a fresh manœuvre against Lee's right rear on the 9th. This movement required the trains with the fighting line to be cleared away from the roads needed for the troops at once, and Lee promptly discovered that a movement was in progress. He mistook its object, however, and assuming that Grant was falling back on Fredericksburg, he prepared to shift his own forces to the south of that place so as to bar the Richmond road. This led to a race for Spottsylvania, which was decided more by accidents to either side than by the measures of the two commanding generals. On the Union side Warren was to move to the line Spottsylvania Court House–Todd's Tavern, followed by Hancock; Sedgwick was to take a roundabout route and to come in between the V. and II. corps; Burnside to follow Sedgwick. The cavalry was ordered to watch the approaches towards the right of the army. The movement began promptly after nightfall on the 7th. But ere long the head of Warren's column, passing in rear of Hancock's line of battle, was blocked by the headquarters escort of Grant and Meade. Next, the head of the V. corps was again checked at Todd's Tavern by two cavalry divisions which had been sent by Sheridan to regain the ground at Todd's Tavern,[3] given up on the 6th, and after fighting the action of Todd's Tavern had received no further orders from him. Meade, greatly irritated, ordered Gregg's division out towards Corbin's Bridge and Merritt's (Torbert's) to Spottsylvania. On the latter road the Union cavalry found themselves opposed by Fitz Lee's cavalry, and after some hours of disheartening work in the woods, Merritt asked Warren to send forward infantry to drive the enemy. This Warren did, although he was just preparing to rest and to feed his men after their exhausting night-march. Robinson's division at the head of the corps deployed and swiftly drove in Fitz Lee. A little beyond Alsop's, however, Robinson found his path barred by entrenched infantry. This was part of Anderson's (Longstreet's) corps. That officer had been ordered to draw out of his (Wilderness) works, and to bivouac, preparatory to marching at 3 A.M. to the Court House, but, finding no good resting-place, he had moved on at once. His route took him to the Catharpin Road (Hampton's cavalry protecting him towards Todd's Tavern), and thence over Corbin's Bridge to Block House Bridge. At or near Block House Bridge the corps halted to rest, but Stuart (who was with Fitz Lee) called upon Anderson for assistance and the march was resumed at full speed. Sheridan's new orders to Gregg and Merritt did not arrive until Meade had given these officers other instructions, but Wilson's cavalry division, which was out of the line of march of the infantry, acted in accordance with Sheridan's plan of occupying the bridges in front of the army's intended position at Spottsylvania Court House, and seized that place, inflicting a smart blow upon a brigade of Stuart's force that was met there.

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[1] Wilson's division, in its movement on Shady Grove Church on the 5th, had been cut off by the enemy's advance on the Plank Road and attacked by some Confederate cavalry. But it extricated itself and joined Gregg, who had been sent to assist him, at Todd's Tavern.

[2] The Union losses in the battle were 18,000, the Confederates at least 11,500.

[3] In consequence of a mistaken order that the trains which he was protecting were to move forward to Piney Branch Church.

The situation about 9 A.M. on the 8th was therefore curious. Warren, facing E., and opposed by part of Anderson's corps, was seeking to fight his way to Spottsylvania Court House by the Brock Road. Wilson, facing S., was holding the Court House and driving Fitz Lee's cavalry partly westward on to the backs of the infantry opposing Warren, partly towards Block House Bridge, whence the rest of Anderson's infantry was approaching. All the troops were weary and hungry, and Sheridan ordered Wilson to evacuate the Court House and to fall back over the Ny. Warren fruitlessly attacked the Confederate infantry at Spindler's, General Robinson being severely wounded, and his division disorganized. The other divisions came up by degrees, and another attack was made about 11. It was pressed close up to, and in some places over, the Confederate log-works, but it ended in failure like the first. A third attempt in the evening dwindled down to a reconnaissance in force. Anderson was no longer isolated. Early's division observed Hancock's corps at Todd's Tavern, but the rest of Ewell's and all Hill's corps went to Spottsylvania and prolonged Anderson's line northward towards the Ny. Thus the re-grouping of the Union army for manœuvre, and even the running fight or strategic pursuit imagined by Grant when he found Anderson at Spottsylvania, were given up, and on the 9th both armies rested. On this day General Sedgwick was killed by a long-range shot from a Confederate rifle. His place was taken by General H. G. Wright. On this day also a violent quarrel between Meade and Sheridan led to the departure of the cavalry corps on an independent mission. This was the so-called Richmond raid, in which Sheridan defeated Stuart at Yellow Tavern (where Stuart was killed) and captured the outworks of Richmond, but, having started with empty forage wagons,[1] had then to make his way down the Chickahominy to the nearest supply depots of the Army of the James, leaving the Confederate cavalry free to rally and to rejoin Lee.

Finding the enemy thus gathered in his front, Grant decided to fight again on the 10th. While Hancock opposed Early, and Warren and Wright Hill and Anderson, Burnside was ordered by Grant to work his way to the Fredericksburg-Spottsylvania road, thence to attack the enemy's right rear. The first stage of this movement of the IX. corps was to be made on the 9th, but not the attack itself, and Burnside was consequently ordered not to go beyond a place called " Gate " on the maps used by the Union staff. This, it turned out, was not the farm of a person called Gate, as headquarters supposed, but a mere gate into a field. Consequently it was missed, and the IX. corps went on to Gale's or Gayle's house, where the enemy's skirmishers were driven in.[2] The news of an enemy opposing Burnside at " Gate," which Grant still supposed to be the position of the IX. corps, at once radically altered the plan of battle. Lee was presumed to be moving north towards Fredericksburg, and Grant saw an opportunity of a great and decisive success. The IX. corps was ordered to hold its position at all costs, and the others were to follow up the enemy as he concentrated upon Burnside. Hancock was called in from Todd's Tavern, sent down to force the fords of the Po at and below Tinder's Mill, and directed upon Block House Bridge by an officer of Grant's own staff, while Warren and Wright were held ready. But once more a handful of cavalry in the woods delayed the effective deployment of the moving wing, and by the time that the II. corps was collected opposite Block House Bridge it was already night. Still there was, apparently, no diminution of force opposite Burnside, and Hancock was ordered to resume his advance at early dawn on the 10th.

Meade, however, had little or no cognizance of Grant's orders to the independent IX. corps, and his orders, conflicting with those emanating from the Lieutenant-General's staff, puzzled Hancock and crippled his advance. At 10 the whole scheme was given up, and the now widely deployed Union army closed on its centre as best it could for a direct attack on the Spottsylvania position. At 4, before the new concentration was complete, and while Hancock was still engaged in the difficult operation of drawing back over the Po in the face of the enemy, Warren attacked unsupported and was repulsed. In the woods on the left Wright was more successful, and at 6 P.M. a rush of twelve selected regiments under Colonel Emory Upton carried the right of Lee's log-works. But for want of support this attack too was fruitless, though Upton held the captured works for an hour and brought off 1000 prisoners. Burnside, receiving Grant's new orders to attack from Gayle's towards Spottsylvania, sent for further orders as to the method of attack, and his advance was thus made too late in the day to be of use. Lee had again averted disaster, this time by his magnificent handling of his only reserve, Hill's (now Early's) corps, which he used first against Hancock and then against Burnside with the greatest effect.

This was the fourth battle since the evening of the 4th of May. On the morning of the 11th Grant sent his famous message to Washington, " I purpose to fight it out on this line if it takes all summer." The 12th was to be the fifth and, Grant hoped, the decisive battle. A maze of useful and useless entrenchments had been constructed on both sides, especially on the Union side, from mere force of habit. Grant, seeing from the experience of the 10th that his corps commanders were manning these entrenchments so strongly that they had only feeble forces disposable for the attack, ordered all superfluous defences to be given up. Three corps were formed in a connected line (from right to left, V., VI., IX.) during the 11th, and that night the II. corps moved silently to a position between Wright and Burnside and formed up in the open field at Brown's in an attacking mass of Napoleonic density—three lines of divisions, in line and in battalion and brigade columns. Burnside was to attack from Gayle's (Beverly's on the map) towards McCool's. Warren and Wright were to have at least one division each clear of their entrenchments and ready to move.

Up to the 11th Lee's line had extended from the woods in front of Block House Bridge, through Perry's and Spindler's fields to McCool's house, and its right was refused and formed a loop round McCool's. All these works faced N.W. In addition, Burnside's advance had caused Early's corps to entrench Spottsylvania and the church to the south of it, facing E. Between these two sections were woods. The connexion made between them gave the loop around McCool's the appearance from which it derives its historic name of The Salient. Upon the northern face of this Salient Hancock's attack was delivered.

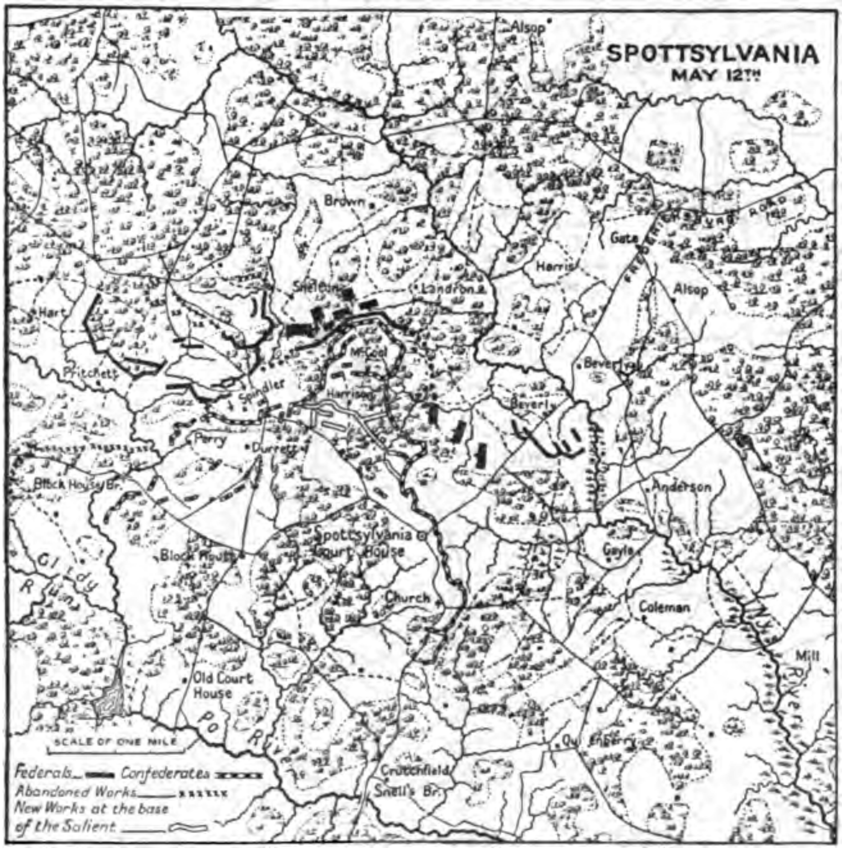
On the 11th the abandonment of Burnside's threatening advance on his rear and other indices had disquieted Lee as to his left or Block House flank, and he had drawn off practically all Ewell's artillery from the McCool works to aid in that quarter. The infantry that manned the Salient was what remained of Stonewall Jackson's " foot cavalry," veterans of Antietam, Fredericksburg and Chancellorsville. But at 4.35, in the mist, Hancock's mass swept over their works at the first rush and swarmed in the interior of the Salient, gathering thousands of

[1] Owing to the circumstances of his departure, the angry army staff [illegible] out at once with the forage that he had, and S[illegible] army reserve supplies were at hand, made no [illegible]

[2] [illegible]ion, for the historian at least, is that [illegible] this " Gayle " is called " Beverly " [illegible]

prisoners and seizing the field batteries that Lee had sent back just too late.

The thronging and excited Federals were completely disordered by success, and the counter-attack of one or two Confederate brigades in good order drove them back to the line of the captured works. Then, about 6, there began one of the most remarkable struggles in history. While Early, swiftly drawing back from Block House, checked Burnside's attack from the east, and Anderson, attacked again and again by parts of the V. corps,[1] was fully occupied in preserving his own front, Lee, with Ewell's corps and the few thousand men whom the other generals could spare, delivered all day a series of fierce counter-strokes against Hancock. Nearly all Wright's corps and even part of Warren's (in the end 45,000 men) were drawn into the fight at the Salient, for Grant and Meade well knew that Lee was struggling to gain time for the construction of a retrenchment across the base of it. If the counter-attacks failed to gain this respite, the Confederates would have to retreat as best they could, pressed in front and flank. But the initial superiority of the Federals was neutralized by their disorder, and, keeping the fight alive by successive brigade attacks, while the troops not actually employed were held out of danger till their time came, Lee succeeded so well that after twenty hours' bitter fighting the new line was ready and the Confederates gave up the barren prize to Hancock. Lee had lost 4000 prisoners as well as 4500 killed and wounded, as against 7000 in the Army of the Potomac and the IX. corps.



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There were other battles in front of Spottsylvania, but that of the 12th was the climax. From the 13th to the 20th the Federals gradually worked round from west to east, delivering a few partial attacks in the vain hope of discovering a weak point. Lee's position, now semicircular, enabled him to concentrate on interior lines on each occasion. In the end the Federals were entrenched facing E. between Beverly's house (Burnside's old "Gayle") and Quisenberry's, Lee facing W. from the new works south of Harrison's through the Court House to Snell's Bridge on the Po. In the fork of the Po and the Ny, with woods and marshes to obstruct every movement, Grant knew that nothing could be done, and he prepared to execute a new manœuvre. But here, as in the Wilderness, Lee managed to have the last word. While the Union army was resting in camp for the first time since leaving Culpeper, Ewell's corps suddenly attacked its baggage-train near Harris's house. The Confederates were driven off, but Grant had to defer his intended manœuvre for two days. When the armies left Spottsylvania, little more than a fortnight after breaking up from winter quarters, the casualties had reached the totals of 35,000 out of an original total of 120,000 for the Union army, 26,000 out of 70,000 for the Confederates.

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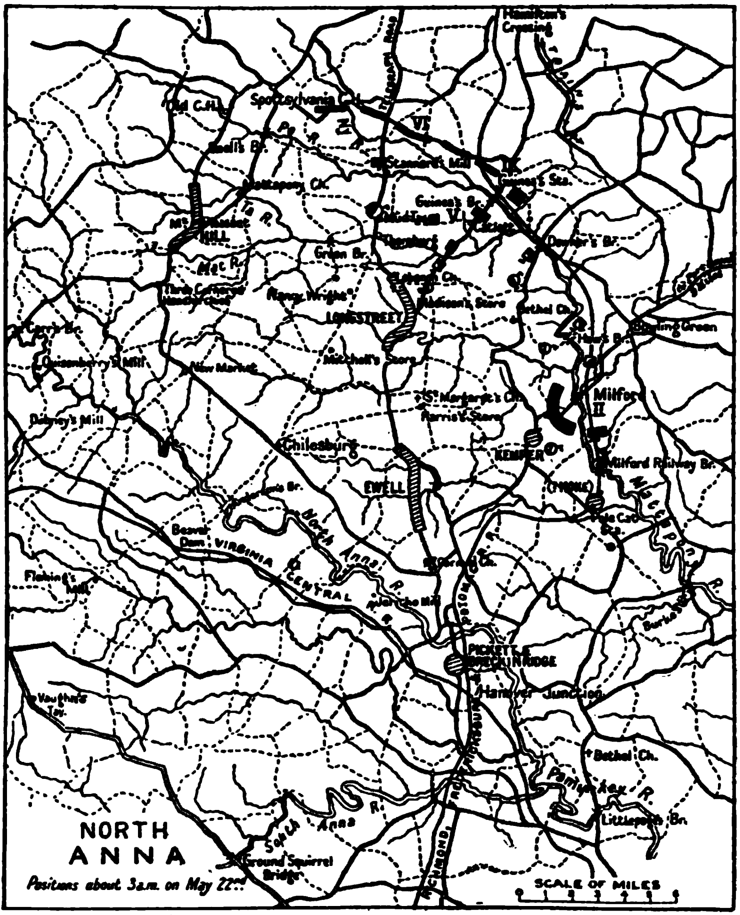
[1] The tension was so great that, after threatening to deprive Warren of his command, Meade sent General Humphreys, his chief of staff, to direct the V. corps' attack.

The next manœuvre attempted by Grant to bring Lee's army to action "outside works" was of an unusual character, though it had been foreshadowed in the improvised plan of crushing Lee against Burnside's corps on the 9th. Hancock was now (20th) ordered to move off under cover of night to Milford; thence he was to march south-west as far as possible along the Richmond and Fredericksburg railroad, and to attack whatever force of the enemy he met. It was hoped that this bold stroke by an isolated corps would draw Lee's army upon it, and the rest of the Army of the Potomac would, if this hope were realized, drive down upon Lee's rear while Hancock held him up in front. Supposing, however, that Lee did not take the bait, the manœuvre would resolve itself into a turning movement with the object of compelling Lee to come out of his Spottsylvania lines on pain of being surrounded.

The II. corps started on the night of the 20th-21st. The alarm was soon given. At Milford, where he forced the passage of the Mattapony, Hancock found himself in the presence of hostile infantry from Richmond and heard that more had arrived at Hanover Junction, both from Richmond and from the Shenandoah Valley. He therefore suspended his advance and entrenched. The main army began to move off, after giving Lee time to turn against Hancock, at 10 a.m. on the 21st, and marched to Catlett's, a place a few miles S.W. of Guinea's bridge, Warren leading, Burnside and Wright following. But no news came in from Hancock until late in the evening, and the development of the manœuvre was consequently delayed, so that on the night of the 21st-22nd Lee's army slipped across Warren's front *en route* for Hanover Junction. The other Confederate forces that had opposed Hancock likewise fell back. Grant's manœuvre had failed. Its principal aim was to induce Lee to attack the II. corps at Milford, its secondary and alternative purpose was, by dislodging Lee from Spottsylvania, to force on an encounter battle in open ground. But he was only offered the bait—not compelled to take it, as he would have been if Hancock with two corps had been placed directly athwart the road between Spottsylvania and Hanover Junction—and, having unimpaired freedom of action, he chose to retreat to the Junction. The four Union corps, therefore, could only pursue him to the North Anna, at which river they arrived on the morning of the 23rd, Warren on the right, Hancock on the left, Wright and Burnside being well to the rear in second line. The same afternoon Warren seized Jericho Ford, brought over the V. corps to the south side, and repulsed a very sharp counterstroke made by one of Lee's corps. Hancock at the same time stormed a Confederate redoubt which covered the Telegraph Road bridge over the river. Wright and Burnside closed up. It seemed as if a battle was at hand, but in the night reports came in that Lee had fallen back to the South Anna, and as these were more or less confirmed by the fact that Warren met with no further opposition, and by the enemy's retirement from the river bank on Hancock's front, the Union generals gave orders, about midday on the 24th, for what was practically a general pursuit. This led incidentally to an attempt to drive Lee's rearguard away from the point of passage, between Warren's and Hancock's, required for Burnside, and in the course of this it became apparent that Lee's army had not fallen back, but was posted in a semicircle to which the North Anna formed a tangent. On the morning of the 25th this position was reconnoitred, and found to be more formidable than that of Spottsylvania. Moreover, it divided the two halves of the Union army that had crossed above and below.

Grant gave up the game as drawn and planned a new move. This had as its objects, first, the seizure of a point of passage



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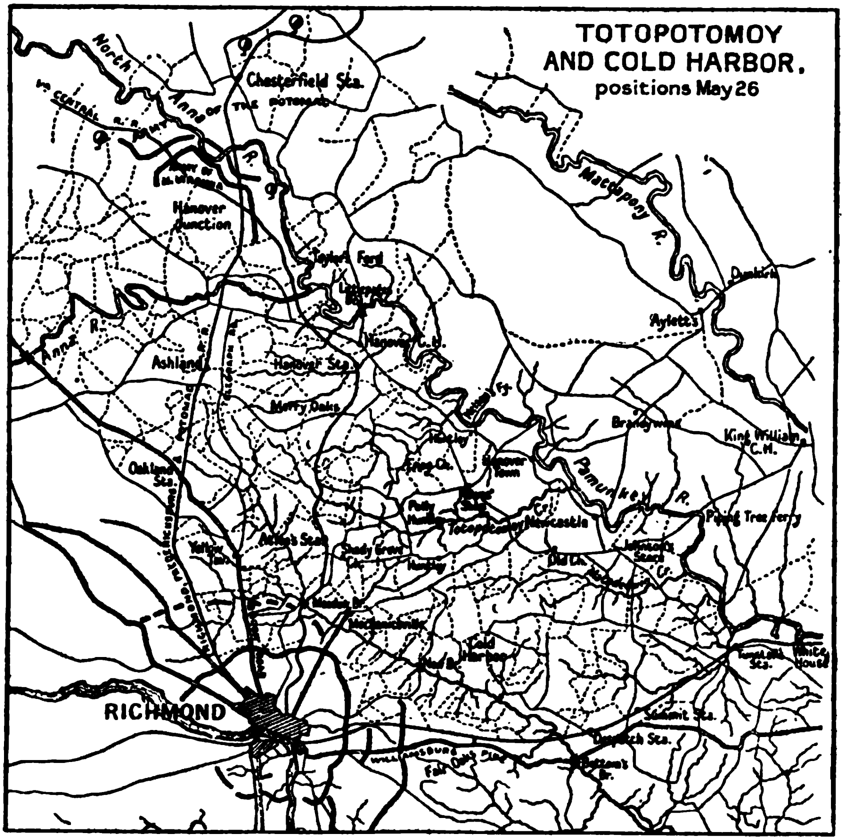
on the Pamunkey; secondly, the deployment of the Army of the Potomac and of a contingent expected from the Army of the James, and thirdly, the prevention of Lee's further retirement, which was not desired by the Union commanders, owing to the proximity of the Richmond defences and the consequent want of room to manœuvre. On the 27th Sheridan's cavalry and a light division of infantry passed the Pamunkey at Hanover Town, and the two divided wings of the Army of the Potomac were withdrawn over the North Anna without mishap—thanks to exactitude in arrangement and punctuality in execution. On the 28th the Army of the Potomac had arrived near Hanover Town, while at Hawes's Shop, on the road to Richmond, Sheridan had a severe engagement with the enemy's cavalry Lee was now approaching from Hanover Junction via Ashland, and the Army of the Potomac swung round somewhat to the right so as to face in the presumed direction of the impending attack. The Confederate general, however, instead of attacking, swerved south, and planted himself behind the Totopotomoy. Here he was discovered, entrenched as always, on the 29th, and skirmishing all along the line, varied at times by more severe fighting, occupied that day and the 30th. On the morning of the 31st the Union army was arranged from right to left in the order VI., II., IX. and V. corps, Sheridan having meantime drawn off to the left rear of the infantry.



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Now, for the last time in the campaign, the idea of a hammer and anvil battle was again taken up, the "anvil" being Smith's XVIII. corps, which had come up from the James river to White House on the 30th; but once more the lure failed because it was not made sufficiently tempting.

The last episode of the campaign centred on Cold Harbor, a village close to the Chickahominy, which Sheridan's cavalry seized, on its own initiative, on the 31st. Here, contrary to the expectation of the Union staff, a considerable force of Confederate infantry—new arrivals from the James—was met, and in the hope of bringing on a battle before either side had time to entrench, Grant and Meade ordered Sheridan to hold the village at all costs, and directed Wright's (VI.) corps from the extreme right wing, and Smith's (XVIII.) from Old Church, to march thither with all possible speed, Wright in the night of the 31st of May and Smith on the morning of the 1st of June. Lee had actually ordered his corps commanders to attack, but was too ill to enforce his wishes, and in the evening Wright and Smith themselves assaulted the Confederate front opposite Cold Harbor. The assault, though delivered by tired men, was successful. The enemy's first or skirmish line was everywhere stormed, and parts of the VI. corps even penetrated the main line. Nearly 800 prisoners were taken, and Grant at once prepared to renew the attack, as at Spottsylvania, with larger forces, bringing Hancock over from the right of the line on the night of the 1st, and ordering Hancock, Wright and Smith to assault on the next morning. But Lee had by now moved more forces down, and his line extended from the Totopotomoy to the Chickahominy. Hancock's corps, very greatly fatigued by its night march, did not form up until after midday, and meanwhile Smith, whose corps, originally but 10,000 strong, had been severely tried by its hard marching and fighting on the 1st, refused to consider the idea of renewing the attack. The passive resistance thus encountered dominated Grant's fighting instinct for a moment. But after reconsidering the problem he again ordered the attack to be made by Wright, Smith and Hancock at 5 p.m. A last modification was made when, during the afternoon, Lee's far distant left wing attacked Burnside and Warren. This, showing that Lee had still a considerable force to the northward, and being, not very inaccurately, read to mean that the 6 m. of Confederate entrenchments were equally —*i.e.* equally thinly—guarded at all points, led to the order being given to all five Union corps to attack at 4·30 a.m. on the 3rd of June.

The resolution to make this plain, unvarnished frontal assault on entrenchments has been as severely criticized as any action of any commander in the Civil War, and Grant himself subsequently expressed his regret at having formed it. But such criticisms derive all their force from the event, not from the conditions in which, beforehand, the resolution was made. The risks of failure were deliberately accepted, and the battle—if it can be called a battle—was fought as ordered. The assault was made at the time arranged and was repulsed at all points, with a loss to the assailants of about 8000 men: Thereafter the two armies lay for ten days less than a hundred yards apart. There was more or less severe fighting at times, and an almost ceaseless bickering of skirmishers. Owing to Grant's refusal to sue for permission to remove his dead and wounded in the terms demanded, Lee turned back the Federal ambulance parties, and many wounded were left to die between the lines. It was only on the 7th that Grant pocketed his feelings and the dead were buried.

This is one of the many incidents of Cold Harbor that must always rouse painful memories—though to blame Lee or Grant supposes that these great generals were infinitely more inhuman here than at any other occasion in their lives, and takes no account of the consequences of admitting a defeat at this critical moment, when the causes for which the Union army and people contended were about to be put to the hazard of a presidential election.

The Federal army lost, in this month of almost incessant campaigning, about 50,000 men, the Confederates about 32,000. Though the aggregate of the Union losses awed both contemporaries and historians of a later generation, proportionately the losses of the South were heavier (46% of the original strength as compared with 41% on the Union side), and whereas within a few weeks Grant was able to replace nearly every man he had lost by a new recruit, the Confederate government was almost at the end of its resources.

See A. A. Humphreys, *The Campaign of Virginia, 1864–65* (New York, 1882); Military History Society of Massachusetts, *The Wilderness Campaign*; *Official Records of the Rebellion*, serial numbers 67, 68 and 69; and C. F. Atkinson, *The Wilderness and Cold Harbor* (London, 1908). (C. F. A.)

WILDMAN, SIR JOHN (*c.* 1621–1693), English agitator, was educated at the university of Cambridge, and during the Civil War served for a short time under Sir Thomas Fairfax. He became prominent, however, not as a soldier but as an agitator, being in 1647 one of the leaders of that section of the army which objected to all compromise with the king. In a pamphlet, *Putney Projects*, he attacked Cromwell; he was responsible for *The Case of the Army stated*, and he put the views of his associ-a[illegible] of the army at a meeting in Putney church [illegible]thorities looked upon him with suspicion, [illegible] and John Lilburne were imprisoned, [illegible]on, being made "for his trial and [illegible]" However, he was released in the [illegible] time he was associated with the party known as the levellers, but he quickly severed his connexion with them and became an officer in the army. He was a large buyer of the land forfeited by the royalists, and in 1654 he was sent to the House of Commons as member for Scarborough. In the following year he was arrested for conspiring against Cromwell, and after his release four months later he resumed the career of plotting, intriguing alike with royalists and republicans for the overthrow of the existing régime. In 1659 he helped to seize Windsor castle for the Long Parliament, and then in November 1661 he was again a prisoner on some suspicion of participating in republican plots. For six years he was a captive, only regaining his freedom after the fall of Clarendon in October 1667.

In or before 1681 Wildman became prominent among those who were discontented with the rule of Charles II., being especially intimate with Algernon Sydney. He was undoubtedly concerned in the Rye House Plot, and under James II. he was active in the interests of the duke of Monmouth, but owing to some disagreements, or perhaps to his cowardice, he took no part in the rising of 1685. He found it advisable, however, to escape to Holland, and returned to England with the army of William of Orange in 1688. In 1689 he was a member of the convention parliament.

Wildman was postmaster-general from April 1689 to February 1691, when some ugly rumours about his conduct brought about his dismissal. Nevertheless, he was knighted by William III. in 1692, and he died on the 2nd of June 1693. Sir John, who was the author of many political pamphlets, left an only son, John, who died childless in 1710.

WILES, IRVING RAMSAY (1861–), American artist, was born at Utica, New York, on the 8th of April 1861. He studied under his father, the landscape painter, Lemuel Maynard Wiles (1826–1905), in the Art Students' League, New York, and under Carolus Duran, at Paris. His earlier work was as an illustrator for American magazines, and later he devoted himself with great success to portraiture. He became a full member of the National Academy of Design (1897) and a member of the American Water Color Society.

WILFRID (*c.* 634–709), English archbishop, was born of good parentage in Northumbria, *c.* 634. When serving in King Oswio's court, he attracted the notice of the queen, Eanfled, who, fostering his inclination for a religious life, placed him under the care of an old noble, Cudda, now a monk at Lindisfarne. Later on Eanfled enabled him to visit Rome in the company of Benedict Biscop. At Lyons Wilfrid's pleasing features and quick intelligence made Annemund, the archbishop, desire to adopt him and marry him to his niece. Resisting his offers, the youth went on to Rome, received the papal benediction, and then, in accordance with his promise, returned to Lyons, where he stayed for three years, till the murder of his patron, whose fate the executioners would not let him share. On his return home, Oswio's son Alchfrid gave him a monastery at Ripon, and, before long, Agilbert, bishop of the Gewissae, or West Saxons, ordained him priest

He was probably already regarded as the leading exponent of the Roman discipline in England when his speech at the council of Whitby determined the overthrow of the Celtic party (664). About a year later he was consecrated to the see of York, not, however, in England, where perhaps he could not find the fitting number of orthodox prelates, but at Compiègne, Agilbert being now bishop of Paris. On his return journey he narrowly escaped the pagan wreckers of Sussex, and only reached his own country to find Ceadda (St Chad) installed in his see.

The rest of his life is largely a record of wandering and misfortune. For three years (665–668) he ruled his monastery at Ripon in peace, though acting as bishop in Mercia and Kent during vacancies in sees there. On Archbishop Theodore's arrival (668) he was restored to his see, and spent in it nine years of ceaseless activity, especially in building churches, only to be driven out through the anger of King Ecgfrith's queen (677).

Theodore now divided Wilfrid's large diocese into three; and the aggrieved prelate went to lay his case before the bishop of Rome. On his way a west wind drove him to Friesland, where he evangelized the natives and prepared the way for Willibrord (*q.v.*). Late in life he ordained Suidbert bishop of the Frisians. A synod held at Rome under Agatho (680) ordained his restitution; but even this decision could not prevent his being cast into prison on his return home. When released he wandered first to Mercia, then to Wessex and finally to Sussex. Here he rescued the pagan folk from an impending famine, sent preachers to the Isle of Wight and founded a monastery at Selsey. After Ecgfrith's death (20th May 685) Wilfrid was restored to York (much circumscribed), and Ripon (686–687). He was once more driven out in 691–692, and spent seven years in Mercia. A great council of the English Church held in Northumbria excommunicated him in 702. He again appealed to Rome in person, and obtained another decision in his favour (703–704). Despite the intercession of Brihwald, archbishop of Canterbury, Aldfrith king of Northumbria refused to admit the aged prelate into his kingdom till his last illness (705). This year or the next a council was held near the River Nidd, the papal letters were read, and, despite the opposition of the bishops, Wilfrid once more received the abbeys of Ripon and Hexham. Not long after he died at Oundle in Northamptonshire as he was going on a visit to Ceolred, king of Mercia (709). He was buried at Ripon, whence, according to Eadmer, his bones were afterwards removed to Canterbury.

Wilfrid's is a memorable name in English history, not only because of the large part he played in supplanting the Celtic discipline and in establishing a precedent of appeal to papal authority, but also by reason of his services to architecture and learning. At York he renewed Paulinus's old church, roofing it with lead and furnishing it with glass windows; at Ripon he built an entirely new basilica with columns and porches; at Hexham in honour of St Andrew he reared a still nobler church, over which Eddius grows eloquent. In the early days of his bishopric he used to travel about his diocese attended by a little troop of skilled masons. He seems to have also reformed the method of conducting the divine services by the aid of his skilled chanters, Ædde and Æona, and to have established or renewed the rule of St Benedict in the monasteries. On each visit to Rome it was his delight to collect relics for his native land; and to his favourite basilica at Ripon he gave a bookcase wrought in gold and precious stones, besides a splendid copy of the Gospels.

Wilfrid's life was written shortly after his death by Eddius at the request of Acca, his successor at Hexham, and Tatbert, abbot of Ripon—both intimate friends of the great bishop. Other lives were written by Frithegode in the 10th, by Folcard in the 11th, and by Eadmer early in the 12th century. See also Bede's *Hist. Eccl.* v. 19, iii. 25, iv. 13, &c. All the lives are printed in J. Raine's *Historians of the Church of York,* vol. i. "Rolls" series.

WILHELMINA [Wilhelmina Helena Pauline Maria of Orange-Nassau] (1880–), queen of the Netherlands, was born at the Hague on the 31st of August 1880. Her father, William III. (Willem Paul Alexander Frederik Lodewijk), had by his first wife, Sophia Frederika Mathilde of Württemberg, three sons, all of whom predeceased him. Having been left a widower on the 3rd of June 1877, he married on the 7th of January 1879 Adelheid Emma Wilhelmina Theresia, second daughter of Prince George Victor of Waldeck-Pyrmont, born on the 2nd of August 1858, and Wilhelmina was the only issue of that union. She succeeded to the throne on her father's death, which took place on the 23rd of November 1890; but until her eighteenth year, when she was "inaugurated" at Amsterdam on the 6th of September 1898, the business of the state was carried on under the regency of the queen-mother, in accordance with a law made on the 2nd of August 1884. On the 7th of February 1901 Queen Wilhelmina married Henry Wladimir Albert Ernst, duke of Mecklenburg-Schwerin (born on the 19th of April 1876). To the great joy of the Dutch people, Queen Wilhelmina, on the 30th of April 1909, gave birth to an heir to the throne, the Princess Juliana (Juliana Louise Emma Maria Wilhelmina). (See Holland: *History.*)

WILHELMINA (Sophia Friderika Wilhelmina) (1709–1758), margravine of Baireuth, was born in Berlin on the 3rd of July 1709, the daughter of Frederick William I., crown prince, afterwards king of Prussia, and of Sophia Dorothea, daughter of the elector of Hanover (George I. of England). Wilhelmina shared the unhappy childhood of her brother, Frederick the Great, whose friend and confidante she remained, with the exception of one short interval, all her life. Sophia Dorothea wished to marry her daughter to Frederick, prince of Wales, but on the English side there was no disposition to make the offer except in exchange for substantial concessions, to which the king of Prussia was not prepared to assent. The fruitless intrigues carried on by Sophia Dorothea to bring about this match played a large part in Wilhelmina's early life. After much talk of other matches, which came to nothing, she was eventually married in 1731 to Frederick, hereditary prince of Baireuth. The marriage, only accepted by Wilhelmina under threats from her father and with a view to lightening her brother's disgrace, proved at the outset a happy one, though it was clouded at first by narrow means, and afterwards by the infidelities of the future margrave with Dorothea von Marwitz, whose ascendancy at the court of Baireuth was bitterly resented by Frederick the Great, and caused an estrangement of some three years between Wilhelmina and the brother she so devotedly loved. When Wilhelmina's husband came into his inheritance in 1735 the pair set about making Baireuth a miniature Versailles. Their building operations included the rebuilding of their summer residence, the Ermitage, the great Baireuth opera-house, the building of a theatre and the reconstruction of the Baireuth palace and of the new opera house. They also founded the university of Erlangen, the undertakings bringing the court to the verge of bankruptcy.

The margravine made Baireuth one of the intellectual centres of Germany, surrounding herself with a little court of wits and artists which gained added prestige from the occasional visits of Voltaire and Frederick the Great. With the outbreak of the Seven Years' War, Wilhelmina's interests shifted from dilettantism to diplomacy. She acted as eyes and ears for her brother in southern Germany until her death on the 14th of October 1758, the day of Frederick's defeat by the Austrians at Hochkirch. Her only daughter Frederica had contracted in 1748 an unhappy marriage with Charles Eugene, duke of Württemberg.

The margravine's memoirs, *Mémoires de ma vie*, written or revised between 1748 and her death, are preserved in the Royal Library of Berlin. They were first printed in two forms in 1810—a German translation down to the year 1733 from the firm of Cotta of Tübingen; and in French published by Vieweg of Brunswick, and coming down to 1742. There have been several subsequent editions, including a German one published at Leipzig in 1908. An English translation was published in Berlin in 1904. For the discussion on the authenticity of these entertaining, though not very trustworthy, memoirs, see G. H. Pertz, *Über die Merkwürdigkeiten der Markgräfin* (1851). See also Arvède Barine, *Princesses et grandes dames* (Paris, 1890); E. E. Cuttell, *Wilhelmine, Margravine of Baireuth* (London, 2 vols., 1905); and R. Fester, *Die Bayreuther Schwester Friedricks des Grossen* (Berlin, 1902).

WILHELMSHAVEN, or Wilhelmshafen, a town of Germany, and the chief naval station and war harbour of the empire on the North Sea, situated on the north-west shore of the Jade Busen, a large shallow basin formed by inundations and united with the sea by the Jade, a channel 3 m. long. Pop. (1885), 19,422; (1905), 26,012, of whom 8227 belonged to the navy or army. The ground on which it stands (4 sq. m.) was purchased by Prussia from the grand-duke of Oldenburg in 1853, when the Prussian navy was being formed. The construction of the harbour and town was begun in 1855, and the former was opened in 1869. Though reckoned a part of the Prussian province of Hanover it is completely surrounded on the landward side by Oldenburg territory. The town is laid out on a regular plan and ample scale, and the streets are wide and shaded with trees. The main thoroughfare is the Roonstrasse, which, running E. and W., passes the market-square, upon which stand the town hall and the post office. There are two Evangelical and two Roman Catholic churches, a gymnasium, schools for warrant officers and engineers and other naval educational institutions. The original harbour, constructed in 1855–1869, consists of an inner and outer basin. To the south-east of the inner harbour a large new harbour has been more recently constructed for war vessels in commission. This so-called new harbour (170 acres in area and 26½ ft. deep) is connected by means of a lock (571 ft. long) with the new harbour entrance, which was completed in 1886. On the north it is connected with the fitting-out basin (3832 ft. long, 446 ft. wide), which again is connected by a lock (158 ft. long) with the outer basin (617 ft. long, 410 ft. wide), and so with the old harbour entrance. North of this the "third entrance" has been recently constructed, with two enormous locks, one of which in an emergency could be used as an additional dock. On the west side of the fitting-out basin lies the shipbuilding basin (1237 ft. long by 742 ft. wide), with three dry-docks (of which two are each 453 ft. long, 85 ft. wide and more than 30 ft. deep, whilst the third is 394 ft. long), and also with two slips of the largest size. Further new docks (each about 617 ft. by 97 ft.), capable of containing large battle-ships, were completed in 1906. A torpedo harbour lies to the south-east of the new harbour. The three entrances to the old and new harbours are sheltered by long and massive moles; and the whole complex of docks, building slips, machine shops, &c., forms the government dockyard, which is enclosed by a lofty wall with fourteen iron gates. The establishment is defended by strong fortifications. The commercial harbour lies on the south side of the town at the east end of the Ems-Jade canal. The industries of the place are almost exclusively connected with the requirements of the dockyard, and embrace machine shops, iron foundries and boiler works. Wilhelmshaven is visited for its sea-bathing. It possesses depots for artillery and mines, a meteorological observatory and a signalling station. A battalion of marines is stationed here. Since 1900 the development of the naval establishment and of the town has been exceptionally rapid, coincident with the growth of the German navy, and with the shifting of political and naval activity from the Baltic to the North Sea.

See Eberhard, *Führer durch Wilhelmshaven und seine Umgebung* (Wilhelmshaven, 1906); L. v. Krohn, *Vierzig Jahre in einem deutschen Kriegshafen* (Wilhelmshaven, 1905).

WILKES, CHARLES (1798–1877), American naval officer and explorer, was born in New York City on the 3rd of April 1798. He entered the United States Navy as a midshipman in 1818, and became a lieutenant in 1826. In 1830 he was placed in charge of the division of instruments and charts, and in 1838 was appointed to command an exploring and surveying expedition in the Southern Seas, authorized by Congress in 1836. The expedition, including naturalists, botanists, a mineralogist, taxidermists, a philologist, &c., was carried by the sloops-of-war "Vincennes" and "Peacock," the brig "Porpoise," the storeship "Relief" and two tenders. Leaving Hampton Roads on the 18th of August 1838, it stopped at Madeira and Rio de Janeiro; visited Tierra del Fuego, Chile, Peru, the Paumotu group of the Low Archipelago, the Samoan islands and New South Wales; from Sydney sailed into the Antarctic Ocean in December 1839 and reported the discovery of an Antarctic continent west of the Balleny islands;[1] visited the Fiji and the Hawaiian islands in 1840, explored the west coast of the United States, including the Columbia river, San Francisco Bay and the Sacramento river, in 1841, and returned by way of the Philippine islands, the Sulu archipelago, Borneo, Singapore, Polynesia and the Cape of Good Hope, reaching New York on the 10th of June 1842. He was court-martialled on his return, but was acquitted on all charges except that of illegally punishing men in his squadron. For a short time he was attached to the Coast Survey, but from 1844 to 1861 he was chiefly engaged in preparing the report of the expedition. Twenty-eight volumes were planned but only nineteen were published. Of these Wilkes wrote the *Narrative* (6 vols., 1845; 5 vols., 1850) and the volumes *Hydrography* and *Meteorology* (1851). The *Narrative* contains much interesting material concerning the manners and customs and political and economic conditions in many places then little known. Other valuable contributions were the three reports of James D. Dana on *Zoophytes* (1846), *Geology* (1849) and *Crustacea* (2 vols., 1852–1854). At the outbreak of the Civil War, Wilkes (who had reached the rank of commander in 1843 and that of captain in 1855) was assigned to the command of the "San Jacinto" to search for the Confederate commerce destroyer, "Sumter." On the 8th of November 1861 he stopped the British mail packet "Trent," and took off the Confederate commissioners to Europe, James M. Mason and John Slidell. Though he was officially thanked by Congress, his action was later disavowed by President Lincoln. His next service was in the James river flotilla, but after reaching the rank of commodore, on the 16th of July 1862, he was assigned to duty against blockade runners in the West Indies. He was disrated (becoming a captain on the retired list) in November 1862 on the ground that he had been too old to receive the rank of commodore under the act then governing promotions; and engaged in a long controversy with Gideon Welles, secretary of the navy. This controversy ended in his being court-martialled in 1864 and being found guilty on several counts and sentenced to public reprimand and suspension for three years. But on the 25th of July 1866 he was promoted to the rank of rear-admiral on the retired list. He died at Washington on the 8th of February 1877.

In addition to many shorter articles, reports, &c., he published *Western America, including California and Oregon* (1849) and *Theory of the Winds* (1856).

WILKES, JOHN (1727–1797), English politician, descended from a family long connected with Leighton-Buzzard in Bedfordshire, was born at Clerkenwell, London, on the 17th of October 1727, being the second son of Israel Wilkes, a rich distiller, and the owner, through his wife Sarah, daughter of John Heaton of Hoxton, of considerable house property in its north-eastern suburbs. After some training under private tuition John Wilkes was sent to the university of Leyden, matriculating there on the 8th of September 1744. Several young men of talent from Scotland and England were studying in this Dutch university at that period, and a lively picture of their life, in which Wilkes displays the gaiety of temper which remained faithful to him all his days, is presented to us by Alexander Carlyle (*Autobiog.*, 1860, ed. J. H. Burton). With this training he acquired an intimate knowledge of classical literature, and he enlarged his mind by travelling through Holland, Flanders and part of Germany. At the close of 1748 he returned to his native land, and in a few months (October 1749) was drawn by his relations into marrying Mary, sole daughter and heiress of John Mead, citizen and grocer of London, who was ten years his senior. The ill-assorted pair—for she was grave and staid, while he rioted in exuberant spirits and love of society—lived together at Aylesbury for some months, when, to make matters worse, they returned to town to dwell with the wife's mother. One child, a daughter, was born to them (5th of August 1750), and then Wilkes left his wife and removed to Westminster, where he kept open house for many young men about town possessing more wit than morals. In 1754 he contested the constituency of Berwick-upon-Tweed, but failed to gain the seat.

Wilkes was now a well-known figure in the life of the west end, and among his associates were Thomas Potter, the son of the archbishop of Canterbury, Sir Francis Dashwood, afterwards Lord le Despencer, and Lord Sandwich, the last of whom in after years showed great animosity towards his old companion in revelry. In July 1757, by a triangular arrangement in which Potter and the first William Pitt played the other parts, Wilkes was elected for Aylesbury, and for this constituency he was again returned at the general election in March 1761. Pitt was his leader in politics; but to Pitt he applied in vain for a seat at the Board of Trade, nor was he successful in his application for the post of ambassador at Constantinople, or for that of governor of Quebec. As he attributed these failures to the opposition of Lord Bute, he established a paper called the *North Briton* (June 1762), in which he from the first attacked the Scotch prime minister with exceeding bitterness, and grew bolder as it proceeded in its course. One of its articles ridiculed Lord Talbot, the steward of the royal household, and a duel was the result. When Bute resigned, the issue of the journal was suspended; but, when the royal speech framed by George Grenville's ministry showed that the change was one of men only, not of measures, a supplementary number, No. 45, was published, 23rd of April 1763, containing a caustic criticism of the king's message to his parliament. Lord Halifax, the leading secretary of state, issued a general warrant "to search for authors, printers and publishers," and to bring them before him for examination. Charles Churchill, the poet and a coadjutor in this newspaper enterprise, escaped through the good offices of Wilkes; but the chief offender was arrested and thrown into the Tower (30th of April 1763). A week later, however, he was released by order of the Court of Common Pleas on the ground that his privilege as a member of parliament afforded him immunity from arrest. General warrants were afterwards declared illegal, and Halifax himself, after a series of discreditable shifts, was cast in heavy sums, on actions brought against him by the persons whom he had injured—the total expenses incurred by the ministry in these lawless proceedings amounting to at least £100,000. So far Wilkes had triumphed over his enemies, but he gave them cause for rejoicing by an indiscreet reprint of the obnoxious No. 45, and by striking off at his private press thirteen copies of an obscene *Essay on Woman*, written by his friend Potter, in parody of Pope's *Essay on Man*, one of which got into the hands of Lord Sandwich. Immediately on the meeting of the House of Commons (15th of November 1763) proceedings were taken against him. Lord North moved that No. 45 was "a false, scandalous and seditious libel," and the paper was publicly burnt in Cheapside on the 4th of December. The *Essay on Woman* was on the same day brought before the Upper House by Lord Sandwich, and, on account of the improper use which had been made of Bishop Warburton's name as the author of some coarse notes, the work was voted a breach of privilege, and Wilkes was ordered to be prosecuted in the Court of King's Bench for printing and publishing an impious libel. He was expelled from the House of Commons on the 19th of January 1764; and on the 21st of February he was found guilty in the King's Bench of reprinting No. 45 and of printing and publishing the *Essay on Woman*. Wilkes was on these dates absent from England. Some strong expressions applied to him by Samuel Martin, an ex-secretary of the treasury, had provoked a duel (16th of November 1763), in which Wilkes was severely wounded in the stomach. He withdrew to Paris, and as he did not return to England to receive his sentence in the law courts was pronounced an outlaw.

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[1] This discovery was made on the 19th of January 1840, one day before Dumont d'Urville sighted Adélie Land about 400 m. farther W[illegible] Antarctic continent was long doubted, [illegible] him when he was court-martialled [illegible] discovery, but the expedition of Sir [illegible] corroborated Wilkes. That part [illegible] as Wilkes Land was named in his [illegible]

For several years Wilkes remained abroad, receiving £1000 a year from the leading Whigs, and in the course of his travels he visited many parts of Italy. In February 1768 he returned to London and sued the king for pardon, but in vain. His next step was to offer himself as a candidate for the representation of the city of London, when he was the lowest at the poll. Undaunted by this defeat, he solicited the freeholders of Middlesex to return him as their champion, and they placed him at the head of all competitors (28th of March). He appeared before the King's Bench, and on a technical point procured a reversal of his outlawry; but the original verdict was maintained, and he was sentenced to imprisonment for twenty-two months as well as to a fine of £1000, and he was further ordered to produce securities for good behaviour for seven years after his liberation. His conduct was brought before the House of Commons, with the result that he was expelled from the House on the 3rd of February 1769, and with this proceeding there began a series of contests between the ministry and the electors of Middlesex without parallel in English history. They promptly re-elected him (16th of February), only to find him pronounced incapable of sitting and his election void. Again they returned him (16th of March) and again he was rejected. A fourth election then followed (13th of April), when Colonel Henry Lawes Luttrell, with all the influence of the court and the Fox family in his favour, obtained 296 votes, while 1143 were given for Wilkes, but two days later the House declared that Luttrell had been duly elected. Through these audacious proceedings a storm of fury broke out throughout the country. In the cause of "Wilkes and liberty" high and low enlisted themselves. His prison cell was thronged daily by the chief of the Whigs, and large sums of money were subscribed for his support. So great was the popular sympathy in his favour, that a keen judge of contemporary politics declared that, had George III. possessed a bad and Wilkes a good character, the king would have been an outcast from his dominions. At the height of the combat in January 1769 Wilkes was elected an alderman for the city of London; in 1771 he served as sheriff for London and Middlesex, and as alderman he took an active part in the struggle between the corporation and the House of Commons by which freedom of publication of the parliamentary debates was obtained. His admirers endeavoured in 1772 to procure his election as lord mayor of London, but he was set aside by the aldermen, some of whom were allied with the ministry of Lord North, while others, as Oliver and Townshend, leant to the Liberalism of Lord Shelburne. In 1774, however, he obtained that dignity, and he retained his seat for Middlesex from the dissolution in 1774 until 1790. He moved in 1776 for leave to bring in a bill "for a just and equal representation of the people of England in parliament"; but attempts at parliamentary reform were premature by at least half a century. After several failures better fortune attended his efforts in another direction, for on the 3rd of May 1782 all the declarations and orders against him for his elections in Middlesex were ordered to be expunged from the journals of the House. In 1779 Wilkes was elected chamberlain of the city by a large majority, and the office became his freehold for life. He died at his house in Grosvenor Square, London, on the 26th of December 1797. His daughter Mary, to whom he was tenderly attached, died on the 12th of March 1802.

Wilkes printed editions of Catullus (1788) and Theophrastus (1790), and at the time of his death had made considerable progress with a translation of Anacreon. His conversation was often sullied by obscenity and profanity; but he knew how to suit his conversation to his company, and his well-known assertion that, in spite of his squint and ugly as he was, with the start of a quarter of an hour he could get the better of any man, however good-looking, in the graces of any lady, shows his confidence in his powers of fascination. The king was obliged to own that he had never met so well-bred a lord mayor, and Dr Johnson, who made his acquaintance at the house of Dilly, the bookseller in the Poultry, confessed that "Jack has great variety of talk, Jack is a scholar, and Jack has the manners of a gentleman." It is doubtful how far he himself believed in the justice of the principles which he espoused. To George III. he remarked of his devoted friend and legal adviser, Serjeant Glynn, "Ah, sir! he was a Wilkite, which I never was." His writings were marked by great power of sarcasm. Two collections of his letters were published, one of *Letters to his Daughter*, in four volumes in 1804, the other *Correspondence with his Friends, in which are introduced Memoirs of his Life, by John Almon*, in five volumes, in 1805. A *Life* by Percy Fitzgerald was published in 1888. Essays on him are in *Historical Gleanings*, by J. E. Thorold Rogers, 2nd ser. (1870); *Wilkes and Cobbett*, by J. S. Watson (1870); and *Wilkes, Sheridan and Fox*, by W. F. Rae (1874). His connexion with Bath is set out in *John Wilkes*, by W. Gregory (1888), and that with the city of London in *Modern History of the City*, by Charles Welch (1896). A fragment of his autobiography (Br. Museum Addit. MSS. 30865), chiefly descriptive of his exile in France and Italy, was printed for W. F. Taylor of Harrow in 1888. (W. P. C.)

WILKES-BARRÉ, a city and the county-seat of Luzerne county, Pennsylvania, U.S.A., on the north branch of the Susquehanna river, about 100 m. N.N.W. of Philadelphia. Pop. (1890), 37,718; (1900), 51,721, of whom 12,188 were foreign-born, including 2792 Germans, 2083 Welsh, 2034 Irish, 1578 English and 1000 Russian Poles; (1910 census), 67,105. Area, 4·8 sq. m. Wilkes-Barré is served by the Central Railroad of New Jersey, the Lehigh Valley, the Delaware, Lackawanna & Western, the Delaware & Hudson, the New York, Susquehanna & Western and the Pennsylvania railways, and by three inter-urban electric lines—the Wilkes-Barré & Hazleton, connecting with Hazleton, about 20 m. S., the Wilkes-Barré & Wyoming Valley, and the Lackawanna & Wyoming Valley, connecting with Scranton about 17 m. N.E. On the opposite bank of the river (which is here spanned by two iron bridges) lies Kingston.

The city is attractively situated in the historic Wyoming Valley. The principal public buildings include the county court-house, the post office, the city hall, the county gaol and the 9th Regiment Armory. Among the city parks are Hollenback (102 acres) and Riverside (19 acres) parks, the River Common (35 acres) and the Frances Slocum Playground. In the city are the Harry Hillman Academy (non-sectarian), a secondary school for boys; the Malinckrodt Convent, the Wilkes-Barré Institute (Presbyterian), a school for girls; St Mary's Academy (Roman Catholic), for girls; the Osterhout Free Library (44,000 vols.), the Library of the Law and Library Association (10,000 vols.) and that of the Wyoming Historical and Geological Society (18,000 vols.), which was founded in 1858. Wilkes-Barré is situated in the centre of the richest anthracite coal region in the United States, Luzerne county ranking first in 1908 in the production of anthracite in Pennsylvania; and the value of the factory products increased from $8,616,765 in 1900 to $11,240,893 in 1905, or 30·5 %. Among important manufactures are foundry and machine-shop products, valued at $1,273,491 in 1905; silk and silk goods ($1,054,863); lace curtains, cotton goods, wirework, &c. The city is governed by a mayor elected for three years, and by a legislative body composed of a select council (one member from each of the 16 wards elected for four years) and of a common council (one member from each ward, elected for two years).

The township of Wilkes-Barré was one of five townships the free grant of which, in December 1768, by the Susquehanna Land Company of Connecticut was intended to encourage settlement and make good the company's claim to the Wyoming Valley (*q.v.*). In May 1769 more than 100 settlers from New England, in command of Major John Durkee (1728–1782), arrived at this place. With others who came a few days later they erected the necessary log cabins on the river bank, near the present Ross Street, and in June began to enclose these within a stockade, known as Fort Durkee. During the same summer Major Durkee gave the town its present name in honour of John Wilkes (1727–1797) and Colonel Isaac Barré (1726–1802), both stout defenders in parliament of the American colonists' cause before and during the War of Independence, and in the following year the town plat was made. In September 1769 the "First Pennamite-Yankee War," as the conflict between Connecticut and Pennsylvania for the possession of the valley is called, broke out. The Yankees lost Fort Durkee in November, but recovered it in the following February. The Pennamites erected Fort Wyoming on the river bank near the present Northampton Street in January 1771, but the Yankees took it from them in the following August. In the War of Independence, immediately after the battle of Wyoming (July 3, 1778), Wilkes-Barré was burned by the Indians and British Rangers; and again in July 1784, during the "Second Pennamite-Yankee War," twenty-three of the twenty-six buildings were burned. In 1786 the Pennsylvania legislature sent here Colonel Timothy Pickering (*q.v.*) to organize Luzerne county, and to effect a reconciliation between the Connecticut settlers and the government of Pennsylvania. Colonel John Franklin (1749–1831) led a counter movement, and was imprisoned on a charge of treason in October 1787, but Franklin's followers retaliated by kidnapping Pickering in June 1788, and kept him in the woods for nearly three weeks in a vain effort to make him promise to intercede for Franklin's pardon. Wilkes-Barré was gradually rebuilt after its destruction in 1784, and in 1806 the borough was erected, though it was not separated politically from the township until 1818 (or 1819). A new charter was granted to the borough in 1855, and Wilkes-Barré was chartered as a city in 1871.

See O. J. Harvey, *A History of Wilkes-Barré* (3 vols., Wilkes-Barré, 1909–1910).

WILKIE, SIR DAVID (17[illegible] [illegible] painter, was born on the 18th of November 17[illegible] [illegible] of the parish minister of Cults in Fifeshire. He [illegible] love for art. In 179[illegible] Kettle [illegible] [illegible] Leven Wilkie was admitted to the Trustees' Academy in Edinburgh, and began the study of art under John Graham, the teacher of the school. From William Allan (afterwards Sir William Allan and president of the Royal Scottish Academy) and John Burnet, the engraver of Wilkie's works, we have an interesting account of his early studies, of his indomitable perseverance and power of close application, of his habit of haunting fairs and market-places, and transferring to his sketch-book all that struck him as characteristic and telling in figure or incident, and of his admiration for the works of Carse and David Allan, two Scottish painters of scenes from humble life. Among his pictures of this period are mentioned a subject from Macbeth, "Ceres in Search of Proserpine," and "Diana and Calisto," which in 1803 gained a premium of ten guineas at the Trustees' Academy, while his pencil portraits of himself and his mother, dated that year, and now in the possession of the duke of Buccleuch, prove that he had already attained considerable certainty of touch and power of rendering character. A scene from Allan Ramsay, and a sketch from Macneill's ballad of *Scotland's Skaith*, afterwards developed into the well-known "Village Politicians," were the first subjects in which his true artistic individuality began to assert itself.

In 1804 Wilkie returned to Cults, established himself in the manse, and began his first important subject-picture, "Pitlessie Fair," which includes about 140 figures, and in which he introduced portraits of his neighbours and of several members of his family circle. In addition to this elaborate figure-piece, Wilkie was much employed at the time upon portraits, both at home and in Kinghorn, St Andrews and Aberdeen. In the spring of 1805 he left Scotland for London, carrying with him his "Bounty-Money, or the Village Recruit," which he soon disposed of for £6, and began to study in the schools of the Royal Academy. One of his first patrons in London was Stodart, a pianoforte maker, a distant connexion of the Wilkie family, who commissioned his portrait and other works and introduced the young artist to the dowager-countess of Mansfield. This lady's son was the purchaser of the "Village Politicians," which attracted great attention when it was exhibited in the Royal Academy of 1806, where it was followed in the succeeding year by the "Blind Fiddler," a commission from the painter's lifelong friend Sir George Beaumont. Wilkie now turned aside into the paths of historical art, and painted his "Alfred in the Neatherd's Cottage," for the gallery illustrative of English history which was being formed by Alexander Davison. After its completion he returned to genre-painting, producing the "Card-Players" and the admirable picture of the "Rent Day," which was composed during recovery from a fever contracted in 1807 while on a visit to his native village. His next great work was the "Ale-House Door," afterwards entitled the "Village Festival" (now in the National Gallery), which was purchased by J. J. Angerstein for 800 guineas. It was followed in 1813 by the well-known "Blind Man's Buff," a commission from the prince regent, to which a companion picture, the "Penny Wedding," was added in 1818.

Meanwhile Wilkie's eminent success in art had been rewarded by professional honours. In November 1809 he was elected an associate of the Royal Academy, when he had hardly attained the age prescribed by its laws, and in February 1811 he became a full academician. In 1812 he opened an exhibition of his collected works in Pall Mall, but the experiment was unsuccessful, entailing pecuniary loss upon the artist. In 1814 he executed the "Letter of Introduction," one of the most delicately finished and perfect of his cabinet pictures. In the same year he made his first visit to the continent, and at Paris entered upon a profitable and delighted study of the works of art collected in the Louvre. Interesting particulars of the time are preserved in his own matter-of-fact diary, and in the more sprightly and flowing pages of the journal of Haydon, his fellow-traveller. On his return he began "Distraining for Rent," [illegible] of the most popular and dramatic of his works. In 1816 he [illegible] a tour through Holland and Belgium in company with Raimbach, the engraver of many of his paintings. The "Sir

Walter Scott and his Family," a cabinet-sized picture with small full-length figures in the dress of Scottish peasants, was the result of a visit to Abbotsford in 1818. "Reading a Will," a commission from the king of Bavaria, now in the New Pinakothek at Munich, was completed in 1820; and two years later the great picture of "Chelsea Pensioners Reading the Gazette of the Battle of Waterloo," commissioned by the duke of Wellington in 1816, at a cost of 1200 guineas, was exhibited at the Royal Academy.

In 1822 Wilkie visited Edinburgh, in order to select from the royal progress of George IV. a fitting subject for a picture. The "Reception of the King at the Entrance of Holyrood Palace" was the incident ultimately chosen; and in the following year, when the artist, upon the death of Raeburn, had been appointed royal limner for Scotland, he received sittings from the monarch, and began to work diligently upon the subject. But several years elapsed before its completion; for, like all such ceremonial works, it proved a harassing commission, uncongenial to the painter while in progress and unsatisfactory when finished. His health suffered from the strain to which he was subjected, and his condition was aggravated by heavy domestic trials and responsibilities. In 1825 he sought relief in foreign travel: after visiting Paris, he passed into Italy, where, at Rome, he received the news of fresh disasters through the failure of his publishers. A residence at Töplitz and Carlsbad was tried in 1826, with little good result, and then Wilkie returned to Italy, to Venice and Florence. The summer of 1827 was spent in Geneva, where he had sufficiently recovered to paint his "Princess Doria Washing the Pilgrims' Feet," a work which, like several small pictures executed at Rome, was strongly influenced by the Italian art by which the painter had been surrounded. In October he passed into Spain, whence he returned to England in June 1828.

It is impossible to over-estimate the influence upon Wilkie's art of these three years of foreign travel. It amounts to nothing short of a complete change of style. Up to the period of his leaving England he had been mainly influenced by the Dutch genre-painters, whose technique he had carefully studied, whose works he frequently kept beside him in his studio for reference as he painted, and whose method he applied to the rendering of those scenes of English and Scottish life of which he was so close and faithful an observer. Teniers, in particular, appears to have been his chief master; and in his earlier productions we find the sharp, precise, spirited touch, the rather subdued colouring, and the clear, silvery grey tone which distinguish this master; while in his subjects of a slightly later period—those, such as the "Chelsea Pensioners," the "Highland Whisky Still" and the "Rabbit on the Wall," executed in what Burnet styles his second manner, which, however, may be regarded as only the development and maturity of his first—he begins to unite to the qualities of Teniers that greater richness and fulness of effect which are characteristic of Ostade. But now he experienced the spell of the Italian masters, and of Velazquez and the great Spaniards.

In the works which Wilkie produced in his final period he exchanged the detailed handling, the delicate finish and the reticent hues of his earlier works for a style distinguished by breadth of touch, largeness of effect, richness of tone and full force of melting and powerful colour. His subjects, too, were no longer the homely things of the genre-painter: with his broader method he attempted the portrayal of scenes from history, suggested for the most part by the associations of his foreign travel. His change of style and change of subject were severely criticized at the time; to some extent he lost his hold upon the public, who regretted the familiar subjects and the interest and pathos of his earlier productions, and were less ready to follow him into the historic scenes towards which this final phase of his art sought to lead them. The popular verdict had in it a basis of truth: Wilkie was indeed greatest as a genre-painter. But on technical grounds his change of style was criticized with undue severity. While his later works are admittedly more frequently faulty in form and draughtsmanship than those of his earlier period, some of them at least (the "Bride's Toilet," 1837, for instance) show a true gain and development in power of handling, and in mastery over complex and forcible colour harmonies. Most of Wilkie's foreign subjects—the "Pifferari," "Princess Doria," the "Maid of Saragossa," the "Spanish Podado," a "Guerilla Council of War," the "Guerilla Taking Leave of his Family" and the "Guerilla's Return to his Family"—passed into the English royal collection; but the dramatic "Two Spanish Monks of Toledo," also entitled the "Confessor Confessing," became the property of the marquis of Lansdowne. On his return to England Wilkie completed the "Reception of the King at the Entrance of Holyrood Palace,"—a curious example of a union of his earlier and later styles, a "mixture" which was very justly pronounced by Haydon to be "like oil and water." His "Preaching of John Knox before the Lords of the Congregation" had also been begun before he left for abroad; but it was painted throughout in the later style, and consequently presents a more satisfactory unity and harmony of treatment and handling. It was one of the most successful pictures of the artist's later period.

In the beginning of 1830 Wilkie was appointed to succeed Sir T. Lawrence as painter in ordinary to the king, and in 1836 he received the honour of knighthood. The main figure-pictures which occupied him until the end were "Columbus in the Convent at La Rabida" (1835); "Napoleon and Pius VII. at Fontainebleau" (1836); "Sir David Baird Discovering the Body of Tippoo Sahib" (1838); the "Empress Josephine and the Fortune-Teller" (1838); and "Queen Victoria Presiding at her First Council" (1838). His time was also much occupied with portraiture, many of his works of this class being royal commissions. His portraits are pictorial and excellent in general distribution, but the faces are frequently wanting in drawing and character. He seldom succeeded in showing his sitters at their best, and his female portraits, in particular, rarely gave satisfaction. A favourable example of his cabinet-sized portraits is that of Sir Robert Liston; his likeness of W. Esdaile is an admirable three-quarter length; and one of his finest full-lengths is the gallery portrait of Lord Kellie, in the town hall of Cupar.

In the autumn of 1840 Wilkie resolved on a voyage to the East. Passing through Holland and Germany, he reached Constantinople, where, while detained by the war in Syria, he painted a portrait of the young sultan. He then sailed for Smyrna and travelled to Jerusalem, where he remained for some five busy weeks. The last work of all upon which he was engaged was a portrait of Mehemet Ali, done at Alexandria. On his return voyage he suffered from an attack of illness at Malta, and died at sea off Gibraltar on the morning of the 1st of June 1841. His body was consigned to the deep in the Bay of Gibraltar.

An elaborate *Life of Sir David Wilkie*, by Allan Cunningham, containing the painter's journals and his observant and well-considered "Critical Remarks on Works of Art," was published in 1843. Redgrave's *Century of Painters of the English School* and John Burnet's *Practical Essays on the Fine Arts* may also be referred to for a critical estimate of his works. A list of the exceptionally numerous and excellent engravings from his pictures will be found in the *Art Union Journal* for January 1840. Apart from his skill as a painter Wilkie was an admirable etcher. The best of his plates, such as the "Gentleman at his Desk" (Laing, VII.), the "Pope examining a Censer" (Laing, VIII.), and the "Seat of Hands" (Laing, IV.), are worthy to rank with the work of the greatest figure-etchers. During his lifetime he issued a portfolio of seven plates, and in 1875 Dr David Laing catalogued and published the complete series of his etchings and dry-points, supplying the place of a few copper-plates that had been lost by reproductions, in his *Etchings of David Wilkie and Andrew Geddes*. (J. M. G.)

WILKINS, SIR CHARLES (1749?–1836), English Orientalist, was born at Frome, Somersetshire, probably in 1749, and in 1770 he went to India as a writer in the East India Company's service. He was soon attracted to the study of Oriental languages, particularly Sanskrit, and did an important work towards facilitating such study by founding a printing press for these languages, taking a large personal share in the practical work of preparing the type. He returned to England in 1786, but continued his study of Sanskrit, and he afterwards became librarian to the East India Company, and examiner at Haileybury on the establishment of the college there in 1805. Wilkins was knighted in 1833 in recognition of his services to Oriental scholarship, and he died in London in 1836. He was a pioneer in the department of learning with which his name was associated, being the first Englishman to acquire mastery of Sanskrit, and to make a thorough study of Indian inscriptions in that script. He compiled a Sanskrit grammar and published several translations from the sacred books of the East, besides preparing a new edition of Richardson's Persian and Arabic dictionary, and a catalogue of the manuscripts collected by Sir William Jones, who acknowledged his indebtedness to Wilkins, and whom the latter assisted in founding the Asiatic Society of Bengal.

WILKINS, GEORGE (fl. 1607), English playwright and pamphleteer, is first mentioned as the author of a pamphlet on the *Three Miseries of Barbary*, which probably dates from 1604. He was associated with the King's Men, and was thus a colleague of Shakespeare. He was chiefly employed in remodelling old plays. He collaborated in 1607 with William Rowley and John Day in *The Travailes of the Three English Brothers*. In the same year a play was produced which was apparently entirely Wilkins's work. It is *The Miseries of Inforst Mariage*, and treats the story of Walter Calverley, whose identity is thinly veiled under the name of "Scarborough." This man had killed his two children and had attempted to murder his wife. The play had originally a tragic ending, but as played in 1607 ended in comedy, and the story stopped short before the catastrophe, perhaps because of objections raised by Mrs Calverley's family, the Cobhams. The crime itself is dealt with in *A Yorkshire Tragedy*, which was originally performed with three other plays under the title of *All's One*. It was entered on the Stationers' Register in 1608 as "written by William Shakespeare," published with the same ascription in that year, and reprinted in 1619 without contradiction of the statement. Mr Sidney Lee assigns to George Wilkins a share in Shakespeare's *Pericles* and possibly in *Timon of Athens*. Delius conjectured that Wilkins was the original author of *Pericles* and that Shakespeare remodelled it. However that may be, Wilkins published in 1608 a novel entitled *The Painfull Adventures of Pericles, Prynce of Tyre, being the true history of Pericles as it was lately presented by . . . John Gower*, which sometimes follows the play very closely.

Mr Fleay (*Biog. Chron. of the Drama*) says that the external evidence for the Shakespearian authorship of the *Yorkshire Tragedy* cannot be impugned, and in the absence of other authorship cannot be lightly set aside, but he does not abandon the hope of establishing a contrary opinion. Both Mr Fleay and Professor A. W. Ward (*Eng. Dram. Lit.* ii. p. 182) seem to think that the story of Marina in *Pericles* was a complete original play by Shakespeare, and that the remodelling story should be reversed, *i.e.* that *Pericles* is a Shakespearian play remodelled by a playwright, possibly Wilkins. Mr Lee (*Dict. Nat. Biog.*, Art. "Wilkins") says the *Yorkshire Tragedy* was "fraudulently" assigned to Shakespeare by Thomas Pavier, the publisher.

WILKINS, JOHN (1614–1672), bishop of Chester, was born at Fawsley, Northamptonshire, and educated at Magdalen Hall, Oxford. He was ordained and became vicar of Fawsley in 1637, but soon resigned and became chaplain successively to Lord Saye and Sele, Lord Berkeley, and Prince Charles Louis, nephew of Charles I. and afterwards elector palatine of the Rhine. In 1648 he became warden of Wadham College, Oxford. Under him the college was extraordinarily prosperous, for, although a supporter of Cromwell, he was in touch with the most cultured royalists, who placed their sons in his charge. In 1659 Richard Cromwell appointed him master of Trinity College, Cambridge. At the Restoration in 1660 he was deprived, but appointed [illegible] of York and rector of Cranford, Middlesex. In [illegible] preacher at Gray's Inn, and in 1662 vicar of St [illegible] London. He became vicar of Pol[illegible] in 1666, prebendary of Exeter [illegible] prebendary of St Paul's [illegible] scientific tastes, he [illegible] and its first secretary. He died in London on the 19th of November 1672.

The chief of his numerous works is an *Essay towards a Real Character and a Philosophical Language* (London, 1668), in which he expounds a new universal language for the use of philosophers. He is remembered also for a curious work entitled *The Discovery of a World in the Moon* (1638, 3rd ed., with an appendix "The possibility of a passage thither," 1640). Other works are *A Discourse concerning a New Planet* (1640); *Mercury, or the Secret and Swift Messenger* (1641), a work of some ingenuity on the means of rapid correspondence; and *Mathematical Magick* (1648).

See P. A. Wright Henderson, *The Life and Times of John Wilkins* (1910), and also the article AERONAUTICS.

WILKINS, MARY ELEANOR (1862–), American novelist, was born in Randolph, Massachusetts, on the 7th of January 1862, of Puritan ancestry. Her early education, chiefly from reading and observation, was supplemented by a course at Mount Holyoke Seminary, South Hadley, Mass. Her home was in her native village and in Brattleboro, Vermont, until her marriage in 1902 to Dr Charles M. Freeman of Metuchen, New Jersey. She contributed poems and stories to children's magazines, and published several books for children, including *Young Lucretia and other Stories* (1892), *The Pot of Gold and other Stories* (1892), and *Once upon a Time and other Child Verses* (1897). For older readers she wrote the following volumes of short stories: *A Humble Romance and other Stories* (1887), *A New England Nun and other Stories* (1891), *Silence and other Stories* (1898), three books which gave her a prominent place among American short-story writers; *The People of Our Neighborhood* (1898), *The Love of Parson Lord and other Stories* (1900), *Understudies* (1901) and *The Givers* (1904); the novels *Jane Field* (1892), *Pembroke* (1894), *Madelon* (1896), *Jerome, a Poor Man* (1897), *The Jamesons* (1899), *The Portion of Labor* (1901) and *The Debtor* (1905); and *Giles Corey, Yeoman* (1893), a prose tragedy founded on incidents from New England history. Her longer novels, though successful in the portrayal of character, lack something of the unity, suggestiveness and charm of her short stories, which are notable contributions to modern American literature. She deals usually with a few traits peculiar to the village and country life of New England, and she gave literary permanence to certain characteristics of New England life which are fast disappearing.

WILKINSBURG, a borough of Allegheny county, Pennsylvania, U.S.A., immediately E. of Pittsburg, of which it is a residential suburb. Pop. (1890) 4662; (1900) 11,886, of whom 1336 were foreign-born and 275 were negroes; (1910 census) 18,924. Wilkinsburg is served by the Pennsylvania railway and by interurban electric lines. It is a post-station of Pittsburg. In the borough are a Home for Aged Protestants (1882), the United Presbyterian Home for the Aged (1879), and Columbia hospital (1908). Settled in 1798 and known first as McNairville and then as Rippeyville, the place was renamed about 1840 in honour of William Wilkins (1779–1865), a member of the United States Senate in 1831–1834, minister to Russia in 1834–1835, a representative in Congress in 1843–1844, and secretary of war in President John Tyler's cabinet in 1844–1845. In 1887 Wilkinsburg was incorporated as a borough.

WILKINSON, JAMES (1757–1825), American soldier and adventurer, was born in Calvert county, Maryland, in 1757. At the outbreak of the War of Independence he abandoned the study of medicine to enter the American army, and he served with General Benedict Arnold in the Quebec campaign and was later under General Horatio Gates, acting from May 1777 to March 1778 as adjutant-general of the Northern Department. He was sent to Congress to report Gates's success against Burgoyne, but his tardiness secured for him a sarcastic reception. Gates recommended him for a brigadier-general's commission for services which another actually performed, and succeeded [illegible] their friendship was broken by the collapse [illegible] against Washington in which both were [illegible] which Wilkinson had indiscreetly blabbed. [illegible] (March 1778) his newly-acquired [illegible] re-entered the service in the quartermaster general's department, and was clothier-general from July 1779 to March 1781.

In common with many other army officers Wilkinson now turned toward the West, and in 1784 settled near the Falls of the Ohio (Louisville), where he speedily became a prominent merchant and farmer and a man of considerable influence. He began to take an active part in the movement for separate statehood for Kentucky, and in 1787 he entered into an irregular commercial agreement with the Spanish officials of Louisiana. At this time, as his own papers in the Spanish archives show, he took an oath of allegiance to Spain and began to intrigue with his fellow-Kentuckians to detach the western settlements from the Union and bring them under the influence of the Louisiana authorities. His commercial connections at New Orleans enabled him to hold out the lure of a ready market at that port for Kentucky products, and this added greatly to the strength of the separatist movement. He neutralized the intrigues of certain British agents who were then working in Kentucky. For these various services he received until 1800 a substantial pension from the Spanish authorities, being officially known in their correspondence as "Number Thirteen." At the same time he worked actively against the Spanish authorities, especially through Philip Nolan. Wilkinson's ventures were not as lucrative as he hoped for, and in October 1791 he was given a lieut.-colonel's commission in the regular army, possibly, as a contemporary suggested, to keep him out of mischief. During this year he took an active part in the minor campaigns which preceded General Arthur St Clair's disastrous defeat by the Indians. As brigadier-general (from March 1792) and second in command, he served under General Anthony Wayne in the latter's successful campaign of 1794 against the Indians, and in this campaign he seems to have tried to arouse discontent against his superior among the Kentucky troops, and to have intrigued to supplant him upon the reduction of the army. Upon Wayne's death in 1796, Wilkinson became general in command of the regular army, retaining his rank as brigadier and likewise his Spanish pension. He seems to have tried to stir up both the Indians and the Spaniards to prevent the survey of the southern boundary of the United States in 1797 and 1798, and succeeded in delaying Commissioner Andrew Ellicott for several months in this important task. At the same time his protégé, the filibusterer, Philip Nolan, was engaged in a reconnaissance for him west of the Mississippi. In 1803 Wilkinson was one of the commissioners to receive Louisiana from France, and in 1805 became governor of that portion of the Purchase above the 33rd parallel, with headquarters at St Louis. In his double capacity as governor of the Territory and commanding officer of the army, reasonably certain of his hold on Jefferson, and favourably situated upon the frontier remote from the centre of government, he attempted to realize his ambition to conquer the Mexican provinces of Spain. For this purpose in 1805 he entered into some sort of agreement with Aaron Burr, and in 1806 sent Z. M. Pike to explore the most favourable route for the conquest of the south-west. Before his agent returned, however, he had betrayed his colleague's plans to Jefferson, formed the Neutral Ground Agreement with the Spanish commander of the Texas frontier, placed New Orleans under martial law, and apprehended Burr and some of his alleged accomplices. In the ensuing trial at Richmond the prisoners were released for lack of sufficient evidence to convict, and Wilkinson himself emerged with a much damaged reputation. He was then subjected to a series of courts-martial and congressional investigations, but succeeded so well in hiding traces of his duplicity that in 1812 he resumed his military command at New Orleans, and in 1813 was promoted major-general and took possession of Mobile. Later in this year he made a most miserable fiasco of the campaign against Montreal, and this finally brought his military career to a dishonourable end. For a time he lived upon his plantation near New Orleans, but later appeared in Mexico City as an applicant for a land grant, incidentally acting as agent for the American Bible Society. Here on the 28th of December 1825 he succumbed to the combined effects of climate and of opium.

See Wilkinson's *Memoirs of My Own Time* (Philadelphia, 1816); untrustworthy and to be used with caution; W. R. Shepherd, "Wilkinson and the Beginning of the Spanish Conspiracy" in *American Historical Review*, vol. ix. (New York, 1904). (I. J. C.)

WILKINSON, JAMES JOHN GARTH (1812–1899), Swedenborgian writer, the son of James John Wilkinson (died 1845), a writer on mercantile law and judge of the County Palatine of Durham, was born in London on the 3rd of June 1812. He studied medicine, and set up as a homoeopathic doctor in Wimpole Street in 1834. He was early attracted by the works of William Blake, whose *Songs of Experience* he endeavoured to interpret, and of Swedenborg, to the elucidation of whose writings he devoted the best energies of his life. Between 1840 and 1850 he edited Swedenborg's treatises on *The Doctrine of Charity, The Animal Kingdom, Outlines of a Philosophic Argument on the Infinite*, and *Hieroglyphic Key to Natural and Spiritual Mysteries*. Wilkinson's preliminary discourses to these translations and his criticisms of Coleridge's comments upon Swedenborg displayed a striking aptitude not only for mystical research, but also for original philosophic debate. The vigour of his thought won admiration from Henry James (father of the novelist) and from Emerson, through whom he became known to Carlyle and Froude; and his speculation further attracted Tennyson, the Oliphants and Edward Maitland. He wrote an able sketch of Swedenborg for the *Penny Cyclopaedia*, and a standard biography, *Emanuel Swedenborg* (published in 1849); but interest in this subject far from exhausted his intellectual energy, which was, indeed, multiform. He was a traveller, a linguist, well versed in Scandinavian literature and philology, the author of mystical poems entitled *Improvisations from the Spirit* (1857), a social and medical reformer, and a convinced opponent of vivisection and also of vaccination. He died at Finchley Road, South Hampstead, where he had resided for nearly fifty years, on 18th October 1899. He is commemorated by a bust and portrait in the rooms of the Swedenborgian Society in Bloomsbury Street, London.

WILKINSON, JOHN (1728–1808), "the great Staffordshire iron-master," was born in 1728 at Clifton, Cumberland, where his father had risen from day labourer to be overlooker in an iron furnace. A box-iron, patented by his father, but said to have been invented by the son, helping laundresses to gratify the frilled taste of the dandies of the day, was the beginning of their fortunes. This they made at Blackbarrow, near Furness. When he was about twenty, John moved to Staffordshire, and built, at Bilston, the first furnace there, and, after many experiments, succeeded in utilizing coal instead of wood-charcoal in puddling and smelting. The father, who now had works at Bersham, near Chester, was again joined by his son, who constructed a new boring machine, of an accuracy heretofore unequalled. James Watt found that the work of this machine exactly filled his requirements for his "fire-engine" for cylinders bored with greater precision. Wilkinson, who now owned the Bersham works, resolved to start the manufacture of wrought iron at Broseley on a larger scale, and the first engine made by Boulton and Watt was for him to blow the bellows there. Heretofore bellows were worked by a water wheel or, when power failed, by horses. His neighbours in the business, who were contemplating installing Newcomen engines, waited to see how his would turn out. Great care was taken in all its parts, and Watt himself set it up early in 1776. Its success made the reputation of Boulton and Watt in the Midland counties. Wilkinson now found he had the power alike for the nicest and the most stupendous operations. The steam cylinder suggested to him the plan of producing blast now in use. He was near coal; he surrounded himself with capable men, whom he fully trusted; he made a good article, and soon obtained large orders and prospered. In 1786 he was making 32-pounders, howitzers, swivels, mortars and shells for government. The difficulty of getting barges to carry his war material down the Severn led him, in 1787, to construct the first iron barge—creating a wonderful sensation among owners and builders. Wilkinson taught the French the art of boring cannon from the solid, and cast all the tubes, cylinders and iron work required for the Paris water-works, the most formidable undertaking of the day. He also erected the first steam engine in France, in connexion with these works.

Wilkinson is said to have anticipated by many years the introduction of the hot blast for furnaces, but the leathern pipes, then used, scorched, and it was not a success. His were the first coal-cutting machines. He proposed and cast the first iron bridge. It connected Broseley and Madeley, across the Severn, and its span of 100 ft. 6 in. was considered a triumphal wonder. Wilkinson was now a man of great means and greater influence. He issued tokens of copper, bearing his likeness and on the reverse a forge and tools of the trade, silver coins for 3s. 6d., and also pound notes, as other tradesmen of that day did. He never wrote a letter without using the word iron, indeed he was iron-mad, and provided by will that he should be buried in an iron coffin, preferably in his garden at Castle Head, near Lindal. He died on the 14th of July 1808.

Wilkinson was twice married without issue. His very large property was frittered away during a lawsuit brought by a nephew against the illegitimate children whom he had named as his heirs. It was carried from various courts in the kingdom to the House of Lords and then to the Court of Chancery. Here Lord Eldon decided for the defendants, thus reversing all previous decisions taken upon the law of the case.

WILKINSON, SIR JOHN GARDNER (1797–1875), English traveller and Egyptologist, was born on the 5th of October 1797, the son of the Rev. John Wilkinson, a well-known student of antiquarian subjects. Having inherited a sufficient income from his parents, who died when he was young, he was sent by his guardian to Harrow in 1813, and to Exeter College, Oxford, in 1816. He took no degree, and, suffering from ill-health, went to Italy, where he met Sir William Gell, and resolved to study Egyptology. Between 1821 and 1833 he travelled widely in the Nile Valley and began to publish the results. He returned to England in 1833 for the sake of his health, was elected fellow of the Royal Society in 1834, published *The Topography of Thebes and General Survey of Egypt* (1835) and *Manners and Customs of the Ancient Egyptians* (3 vols., 1837), and on the 26th of August 1839 was knighted by the Melbourne ministry. In 1842 he returned to Egypt and contributed to the *Journal* of the Geographical Society an article entitled "Survey of the Valley of the Natron Lakes." This appeared in 1843, in which year he also published an enlarged edition of his *Topography*, entitled *Moslem Egypt and Thebes*, a work afterwards reissued in Murray's series. During 1844 he travelled in Montenegro, Bosnia and Herzegovina, an account of his observations being published in 1848 (*Dalmatia and Montenegro*, 2 vols.). A third visit to Egypt in 1848–1849 resulted in a further article in the *Journal*, "On the Country between Wady Halfah and Jebel Berkel" (1851); in 1855 he again visited Thebes. Subsequently he investigated Cornish antiquities, and studied zoology. He died at Llandovery on the 29th of October 1875. To his old school, Harrow, he had already in 1864 presented his collections with an elaborate catalogue.

Besides the works mentioned he published *Materia Hieroglyphica* (Malta, 1828); *Extracts from several Hieroglyphical Subjects* (1830); *Topographical Survey of Thebes* (1830); facsimile of the Turin papyrus (1851), previously edited without the writing on the back of the papyrus by Lepsius; *Architecture of Ancient Egypt* (1850); *A Popular Account of the Ancient Egyptians* (1854); important notes in Rawlinson's *Herodotus*; *Colour and Taste* (1858); articles in archaeological and scientific periodicals.

WILKINSON, TATE (1739–1803), English actor and manager, was born on the 27th of October 1739, the son of a clergyman. His first attempts at acting were badly received, and it was to his wonderful gift of mimicry that he owed his success. His imitations, however, naturally gave offence to the important actors and managers whose peculiarities he hit off to the life. Garrick, Peg Woffington, Samuel Foote and Sheridan, after being [illegible] the imitations of the others, were among [illegible] came to their turn, and threatened never [illegible] never did. As an actor, Wilkinson [illegible] plays, but his list of parts was a long one. In Shakespearian characters he was very popular in the provinces. In 1766 he became a partner of Joseph Baker in the management of several Yorkshire theatres, and sole manager after his partner's death in 1770 of these and others. In this capacity he was both liberal and successful. He died on the 16th of November 1803.

See his *Memoirs* (4 vols., 1790) and *The Wandering Patentee* (4 vols., 1795).

WILL, in philosophy. The "Problem of Freedom" provides in reality a common title under which are grouped difficulties and questions of varying and divergent interest and character. These difficulties arise quite naturally from the obligation, which metaphysicians, theologians, moral philosophers, men of science, and psychologists alike recognize, to give an account, consistent with their theories, of the relation of man's power of deliberate and purposive activity to the rest of the universe. In the main, no doubt, the problem is a metaphysical problem, and has its origin in the effort to reconcile that belief in man's freedom which is regarded by the unsophisticated moral consciousness as indisputable, with a belief in a universe governed by rational and necessary laws. But the historical origin of the questions at issue is to be sought rather in theology than in metaphysics, while the discovery made from time to time by men of science of the inapplicability of natural laws or modes of operation (which they have been accustomed to regard as of universal range and necessity) to the facts or assumed facts of human activity, is a constant source of fresh discussions of the problem. Similarly the modern attempt upon the part of psychology to analyse (under whatever limitations and with whatever object of inquiry) all the forms and processes of human consciousness has inevitably led to an examination of the consciousness of human freedom: while the postulate of most modern psychologists that conscious processes are not to be considered as removed from the sphere of those necessary causal sequences with which science deals, produces, if the consciousness of freedom be admitted as a fact of mental history, the old metaphysical difficulty in a new and highly specialized form.

There is some ground nevertheless for maintaining, contrary to much modern opinion, that the controversy is fundamentally and in the main a moral controversy. It is true that the precise relation between the activities of human wills and other forms of activity in the natural world is a highly speculative problem and one with which the ordinary man is not immediately concerned. It is true also that the ordinary moral consciousness accepts without hesitation the postulate of freedom, and is unaware of, or imperfectly acquainted with, the speculative difficulties that surround its possibility. Moreover, much work of the highest importance in ethics in modern as well as ancient times has been completed with but scanty, if any, reference to the subject of the freedom of the will, or upon a metaphysical basis compatible with most of the doctrines of both the rival theories. The determinist equally with the libertarian moral philosopher can give an account of morality possessing internal coherence and a certain degree of verisimilitude. Yet it may be doubted (1) whether the problem would ever have arisen at all except for the necessity of reconciling the theological and metaphysical hypotheses of the omniscience and omnipotence of God with the needs of a moral universe: and (2) whether it would retain its perennial interest if the incursions of modern scientific and psychological inquiry into the domain of human consciousness did not appear to come into conflict from time to time with the presuppositions of morality. The arguments proceeding from either of the disputants by means of which the controversy is debated may be largely or almost wholly speculative and philosophical. But that which produces the rival arguments is primarily a moral need. And there are not wanting signs of a revival in recent years of the earlier tendency of philosophical speculation to subordinate the necessities of metaphysical, scientific and even psychological inquiries to the prima facie demands of the moral consciousness.

There is no trace of the emergence of the problem of freedom

Greek philosophers.

in any intelligible or distinct form in the minds of early Greek physicists or philosophers. Their doctrines were mainly based upon a belief in the government of the universe by some form of physical necessity, and though different opinions might prevail as to the mode of operation of the various forms of physical necessity the occasional recognition of non-material contributory causes never amounted to a recognition of the independence of human volition or intelligence. Nor can it be seriously maintained that the problem of freedom in the form in which it is presented to the modern mind ever became the subject of debate in the philosophy of Socrates, Plato or Aristotle. It is true that Socrates brought into prominence the moral importance of rational and intelligent conduct as opposed to action which is the result of unintelligent caprice. Moral conduct was, according to Socrates, the result of knowledge while it is strictly impossible to do wrong knowingly. Vice, therefore, is the result of ignorance and to this extent Socrates is a determinist. But the subsequent speculations of Aristotle upon the extent to which ignorance invalidates responsibility, though they seem to assume man's immediate consciousness of freedom, do not in reality amount to very much more than an analysis of the conditions ordinarily held sufficient to constitute voluntary or involuntary action. The further question whether the voluntary acts for which a man is ordinarily held responsible are really the outcome of his freedom of choice, is barely touched upon, and most of the problems which surround the attempt to distinguish human agency from natural and necessary causation and caprice or chance are left unsolved. For Aristotle remained content with a successful demonstration of the dependence of "voluntariness" as an attribute of conduct upon knowledge and human personality. And though ultimately the attribution of responsibility for conduct is further limited to actions which are the result of purposive choice (*προαίρεσις*), Aristotle appears to waver between a view which regards *προαίρεσις* as involving an ultimate choice between divergent ends of moral action and one which would make it consist in the choice of means to an end already determined. A similar absence of discussion of the main problem at issue is noticeable in Plato. It is true that in a famous passage in the tenth book of the *Republic* (x. 617 ff.) he seems to make human souls responsible through their power of choice for the destinies which they meet with during their respective lives. But, as with Socrates, their power of making a right choice is limited by their degree of knowledge or of ignorance, and the vexed question of the relation of this determining intelligence to the human will is left unsolved. With the Stoic and Epicurean philosophies the problem as it shapes itself for the consideration of the modern world begins to appear in clearer outlines. Stoic loyalty to a belief in responsibility based on freedom of choice appeared difficult to reconcile with a belief in an all-pervading *Anima Mundi*, a world power directing and controlling actions of every kind. And though the Stoic doctrine of determinism did not, when applied to moral problems, advance much beyond the reiteration of arguments derived from the universal validity of the principles of causality, nor the Epicurean counter-assertion of freedom avoid the error of regarding chance as a real cause and universal contingency as an explanation of the universe, it was nevertheless a real step forward to perceive the existence of the problem. Moreover, the argument by means of which Chrysippus endeavoured to prove the compatibility of determinism with ethical responsibility is in some respects an anticipation of modern views. For the distinction between main and contributory causes of conduct (*causae adjuvantes* and *causae principales*—the *αἴτιον* and *ξυναίτιον* of Platonic and Aristotelian philosophy) preserved the possibility of regarding character, the main cause, as the responsible and accountable element in morality. And there is much that is anticipatory of modern libertarian views in the psychological argument by which Carneades attempted at once to avoid the Epicurean identification of will with chance, and to prove the rationality of choice, undetermined by any external or antecedent necessity, as an explanation of human actions (cf. Janet and Séailles, *Hist. of Problems of Philosophy—Psychology*, p. 324).

Christianity.

It was not until the rise of Christianity as an historical religion that the difficulty of reconciling a belief in human freedom with a belief in the Divine government of the world became apparent to its fullest extent. The Christian doctrine of the Creation at once challenged the pantheistic presuppositions of Hellenic thought and reinforced the belief already existing in will as a real cause. At the same time the dualism involved in the simultaneous acceptance of an optimistic account of the origin and nature of the universe (such as is implied in Christian theology) and a belief in the reality of moral evil witnessed to by the Christian doctrine of Redemption, intensified the difficulties already felt concerning man's responsibility and God's omnipotence. Neoplatonic philosophy had been in the main content either to formulate the contradiction or to deny the reality of one of the opposing terms. And traces of Neoplatonic influence, more especially as regards their doctrine of the unreality of the material and sensible world, are to be found everywhere in the Christian philosophers of Alexandria, preventing or impeding their formulation of the problem of freedom in its full scope and urgency. St Augustine was, perhaps, the first thinker to face, though not to solve, the true theological and moral difficulty inherent in Christian thought. Two lines of thought are to be traced in the most implacable hostility and contradiction throughout his system. On the one hand no thinker reiterates or emphasizes more cogently the reality of individual responsibility and of will. He affirms the priority of will to knowledge and the dependence of consciousness upon physical attention. He asserts also the fact that our human power of receiving divine illumination (*i.e.* a capacity of spiritual insight in no sense dependent upon the creative activity of the intellect) is conditioned by our spontaneous acts of faith. And he finds in the existence of divine foreknowledge no argument for the impotence or determined character of human acts of will. The timeless foreknowledge of the Deity foresees human actions as contingent, not as causally determined. But when Augustine is concerned to reconcile the reality of individual freedom with humanity's universal need of redemption and with the absolute voluntariness of Divine Grace, he is constrained to contradict most of those postulates of which in his advocacy of libertarianism he was an eager champion. He limits the possession of freedom to Adam, the first man, who, by abusing his prerogative, has corrupted the human race. Man as he now is cannot do otherwise than evil. Inherited incapacity for the choice of good is the punishment for Adam's misuse of freedom. The possibility of redemption depends upon the bestowal of Divine Grace, which, because it is in no instance deserved, can be awarded or withdrawn without injustice. And because Adam's choice necessitates punishment it follows that in some instances Divine Grace can never be bestowed. Hence arises in Augustine's system the doctrine of Predestination (*q.v.*). From the theological standpoint every individual is predestined either by his natural birthright to evil or by Divine Grace to good, and the absolute foreknowledge and omnipotence of God excludes even the possibility of any initiative on the part of the individual by means of which he might influence God's timeless choice.

Scholasticism.

The medieval treatment of the problem follows in the main Augustinian or Aristotelian traditional lines of thought, though successive thinkers arrive at very diverse conclusions. Thomas Aquinas, for example, develops the Platonic argument which proves the dependence of the will upon the intellect and makes the identification of morality with knowledge. Freedom exists for Thomas, if it exists at all, only as the power of choosing what is necessarily determined by the intellect to be choiceworthy, the various possibilities of choice being themselves presented by the understanding to the will. And though in a certain sense Divine foreknowledge is compatible upon his view with human freedom, the freedom with which men act is itself the product of Divine determination. Man is predetermined to act freely, and Divine foreknowledge foresees human actions as contingent. Duns Scotus on the other hand is the great champion of indeterminism. Upon his view the intellect must always be subordinate to the will, and to the will belongs the power of complete self-determination. Morality in effect—to such an extreme position is he driven in his opposition to the Thomists—becomes the arbitrary creation of the Divine Will and in no sense depends for its authority upon rational principles or is a form of knowledge.

Hobbes and Descartes.

The modern treatment of the problem from Descartes, Hobbes, Spinoza and Leibnitz down to Kant is too much inwoven into the metaphysical systems of individual great philosophers to afford the possibility of detailed treatment in the present article. Reference should be made either to the individual philosophers themselves or to articles on metaphysics or on ethics. Hobbes is the great exponent of materialistic determinism. Ideals and volitions are upon his view ultimately movements of the brain. Will is identified with appetite or fear, the causes of which are to be found only in the external world. Descartes advocates a kind of freedom which is apparently consistent with forms both of determinism and indeterminism. He explains the possibility of error on the ground that the mind possesses the *liberum arbitrium indifferentiae* and can always refuse to affirm the truth of a conclusion drawn from premises which are not self-evident. And even when the presentations before the mind are so clear that assent to their truth cannot be refused, the possibility of assenting still rests with the will, which can refuse to attend to any presentation, or can refuse assent with the sole motive of proving its freedom. Spinoza is a convinced determinist regarding the will as necessarily determined by ideas. Extension, *i.e.* the spatial world, and the world of consciousness are alike attributes of the one substance which can only be called free in the sense of being determined by nothing but itself. Freedom in the moral sphere consists simply in the control of the passions by reason. Leibnitz retains this attenuated belief in moral freedom and combines with it a belief in the spontaneity of moral agents in the sense that they possess the power of acting and need no other principle of action save the laws of their own natures. But inasmuch as the agreement between the acts of Leibnitz's monads is due to a divine pre-established harmony, and the theoretical contingency which in the abstract, *i.e.* as logically possible, can be predicated of their acts, is in practice non-existent, Leibnitz is in effect a determinist.

Spinoza and Leibnitz.

Locke and Hume.

Locke's treatment of the problem is in some respects more interesting than the theories of other English philosophers of his school. Freedom, according to Locke, belongs to the man, not to the will. If we will at all we are to that extent free, *i.e.* our actions express our purposes. If, on the other hand, we press Leibnitz's objection, *i.e.* that such an argument is no answer to the question whether an act of will can be free in the sense that it is not determined by reasons presented by the understanding, Locke replies that the will is in effect determined by the uneasiness of desire, *i.e.* by the desire to avoid pain. Hume's doctrine follows logically from his theory as to the nature of causality. If our belief in necessary connexion in the physical world is in reality an illusion, it follows that the opposition between freedom and necessity will be illusory also. On the other hand if our belief in the necessity of causal connexion is the result of custom, to custom will be due also the belief in a necessity governing human actions observable everywhere in men's ordinary opinions and practice. Contrasted with this belief in necessity the supposition we have of freedom is illusory, and, if extended so as to involve a belief that men's actions do not proceed from character or habitual disposition, immoral.

Kant.

Kant's theory of freedom is, perhaps, the most characteristic doctrine of his system of ethics. Distinguishing between two worlds, the sensuous and the intelligible, the phenomenal and the noumenal, Kant allows no freedom to the natural will determined by the succession of motives, desires and appetites which form the empirical and sensuous self. But in contrast with the phenomenal world governed by empirical laws Kant sets the noumenal and intelligible world in which by a timeless act of will man is free to accept the moral command of an unconditional imperative for no reason other than its own rational necessity as the deliverance of his highest nature. The difficulties of the Kantian system are mainly to be looked for in his account of the relation between the phenomenal and noumenal world.

Modern materialism.

In more recent times the controversy has been concerned either with the attempted proof of determinism by the advocates of psychological Hedonism, an attempt which at the present time is generally admitted to have failed; or with the new biological knowledge concerning the influence of heredity and environment in its bearing upon the development of character and the possibility of freedom. The great advance of biological knowledge in recent times though it has in no sense created a new problem (men have always been aware of the importance of racial or hereditary physical qualities in their influence upon human conduct) has certainly rendered the existence of complete individual freedom (in the sense in which it was advocated by older libertarians) in the highest degree unlikely. The advocates of freedom are content in the present day to postulate a relative power of influencing conduct, *e.g.* a power of controlling inherited temperament or subduing natural passion. Such a relative freedom, indeed, taking into account the admitted inviolability of natural laws, was from the very beginning all that they could claim.

But it was inevitable that the enormous advances made by the physical and other sciences in modern times should bring with them a reasoned attempt to bring the phenomena of consciousness within the sphere controlled by physical laws and natural necessity. There will never perhaps in any period of the world's history be wanting advocates of materialism, who find in the sensible the only reality. But the materialism of modern times is more subtle than that of Hobbes. And the determinism of modern science no longer consists in a crude denial of the reality of conscious processes, or an attempt to explain them as only a sublimated form of matter and its movements; it is content to admit the relative independence of the world of consciousness, while it maintains that laws and hypotheses sufficient to explain material processes may be extended to and will be discovered to be valid of the changing sequences of conscious states of mind. Moreover, much of the apparent cogency of modern scientific determinist arguments has been derived from the unguarded admissions or timorous acquiescence of their opponents. It is not enough merely to repel the incursions of physiological science, armed with hypotheses and theories valid enough in their own sphere, upon the domain of consciousness. If the attack is to be finally repulsed it will be imperatively necessary for the libertarian to maintain that no full explanation of the physical universe can ever gain assent, which does not take account of the reality and influence within the material world of human power of initiative and freedom. Of this necessity there is a growing consciousness in recent years, and no more notable exposition of it has been published than is contained in James Ward's *Naturalism and Agnosticism*. Nor is there any lack of evidence of a growing dissatisfaction on the part of many physiologists with the complacent assumption that the methods of physical science, and particularly the conception of causal activity common to the sciences which study inorganic nature, can be transferred without further criticism to the examination of life and mind. Meanwhile the scientific onslaught upon the libertarian position has been directed from two chief quarters It has been maintained, on the one hand, that any theory which presupposes a direct correspondence between the molecular movements of the brain, and the states of consciousness which accompany them must make the freedom of the will impossible. On the other hand it is asserted that quite apart from any particular view as to the relation between mind and body the existence of the freedom of the will is necessarily incompatible with the principle of the conservation of energy and is therefore in direct contradiction to many if not most of the assured conclusions of the physical sciences.

As regards the first of these two main contentions, it must suffice here to point out the main difficulties in which a determinist and especially materialist account of the relation between consciousness and the organic processes which accompany it appears to be involved.

Objections to materialism.

The arguments of thorough-going materialism can in most cases be met with a direct negative. No kind of evidence can be adduced sufficient to prove that consciousness is a secretion of the brain, an effect or even a consequent of material processes or modes of motion. No direct causal relationship between a molecular movement and a state of consciousness has ever been established. No physiologist has ever claimed the power to prophesy with any approach to accuracy the future mental states of any individual from an examination of his brain. And, though some kind of correspondence between the physical and conscious series of states has been observed and is commonly taken for granted in a number of instances, proof that entire correspondence exists is still wanting, and the precise kind of correspondence is left undetermined. Nevertheless, the belief that material processes must be held sufficient to account for material changes in the human organism as in all other regions of the material world, can be held quite independently of any particular theory as to the relation between mind and body, and in many of its forms is equally destructive of a belief in the freedom of the will. It is a belief, too, which is increasingly prevalent in modern science. The theory of psychophysical parallelism involves no doubt in the minds of the majority of its upholders the further assumption of some unity underlying both the physical and psychical series which may one day be discovered to be susceptible of scientific expression and interpretation. Certainly without some such assumption the hypothesis of an exact correspondence between the series described as parallel becomes, as Professor Ward has shown, unmeaning. And many scientific thinkers, while professing allegiance to a theory which insists upon the independence of each parallel series, in reality tacitly assume the superior importance if not the controlling force of the physical over the psychical terms. But a mere insistence upon the complete independence of the physical series coupled with the belief that its changes are wholly explicable as modes of motion, *i.e.* that the study of molecular physics is competent to explain all the phenomena of life and organic movements, is sufficient to eliminate the possibility of spontaneity and free origination from the universe. For if consciousness be looked upon as simply an epiphenomenon, an unaccountable appearance accompanying the succession of material changes, the possibility either of active interference by human volition at any point within the physical series or of any controlling or directing efficacy of consciousness over the whole set of material changes which accompany its activity becomes unthinkable. There are, nevertheless, serious difficulties involved in the supposition that the changes in the brain with which physiology and the biological sciences deal can be satisfactorily explained by the mechanical and mathematical conceptions common to all these sciences, or, indeed, that any of these organic changes is susceptible in the last resort of explanation derived from purely material premises. The phenomena of life and growth and assimilation have not been satisfactorily explained as mechanical modes of motion, and the fact that identical cerebral movements have not been discovered to recur makes scientific and accurate prediction of future cerebral changes an impossibility. But more convincing than most of the philosophical arguments by which the theories of psychophysical parallelism have been assailed is the fact that it runs counter to the plain evidence of the ordinary consciousness. No matter to what extent the unphilosophical thinker may be under the influence of materialistic presuppositions, he always recoils from the conclusion that the facts of his mental life have no influence upon his physical movements. Meaning, design and purpose are to him terms far more explanatory of his movements in the outer world than the mechanical and mathematical [illegible] be [illegible]. To regard [illegible] persuaded [illegible] consequences [illegible] which certain [illegible] of his physical [illegible] facts: he is far more [illegible] efficacy of causes [illegible] for which they are [illegible]

Nor, finally, is the [illegible] minism—the theory [illegible] incompatible with the [illegible] to be accepted without [illegible] possess cogency as a proof of [illegible] position, must assume that the [illegible] account for physical and psychical [illegible] invariable in quantity, an [illegible] vestigator is competent to prove [illegible] may possess great value when applied [illegible] comparatively abstract material of the [illegible] mathematical sciences is highly dangerous [illegible] investigation of living bodies. "In its present [illegible] the development of the mechanical theory of [illegible] of the conservation of energy certainly seems [illegible] whole range of physico-chemical phenomena. [illegible] tell whether the study of physiological phenomena [illegible] and of nervous phenomena in particular, will not [illegible] besides the *vis viva* or kinetic energy of which [illegible] and the potential energy which was a later and [illegible] junct, some new kind of energy which may differ from the [illegible] two by rebelling against calculation" (Bergson, *Time and Free Will*, Eng. trans. by F. L. Pogson, pp. 151, 152).

Modern psychology.

It is, however, from the development of the scientific study of psychology more than from any other region of thought that light has been thrown upon the problem of freedom. The determinist presuppositions of psychology (determinist because they involve the application of the causal conceptions of modern science to mental phenomena) have in many instances in no way retarded the utilization of new information concerning mental processes in order to prove the reality of freedom. Bergson is perhaps the most notable instance of a philosopher fully conversant with psychological studies and methods who remains a convinced libertarian. But the contribution made by psychology to the solution of the problem has taken the form not so much of a direct reinforcement of the arguments of either of the opponent systems, as of a searching criticism of the false assumptions concerning conative processes and the phenomena of choice common alike to determinists and libertarians. It has already been pointed out that the problem as it presented itself to utilitarian philosophers could lead only to a false solution, depending as it did upon a wholly fictitious theory as to the nature of desire. There are still many traces to be found in modern psychology of a similar unreal identification of desire with will. But, nevertheless, the new light thrown upon the unity of the self and the more careful and accurate scrutiny made by recent psychologists of the phenomena of decision have rendered it no longer possible either for determinists to deny the fact of choice (whatever be their theory as to its nature) or for libertarians to regard the self or the will as isolated from and unaffected by other mental constituents and antecedents, and hence, by an appeal to wholly fictitious entities, to prove the truth of freedom. The self or the will can no longer be looked upon as possessing a kind of *imperium in imperio*, "this way and that dividing the swift mind." And if freedom of choice be a possibility at all, it must in future be regarded as the prerogative of a man's whole personality, exhibited continuously throughout the development of his character, displayed to some extent in all conscious conative processes, though especially apparent in crises necessitating deliberate and serious purpose. The mistake of earlier advocates of determinism lay in the supposition that self-conscious moral action could be explained by the use of the same categories and upon the same hypotheses usually considered sufficient to explain the causal sequences observable in the physical world. Conduct was regarded as the result of interaction between character and environment; or it was asserted to be the resultant effect of a struggle between motives in which the strongest prevailed. And the libertarian critic had before him a comparatively easy task when he exhibited the complete interdependence of character and environment, or rather the impossibility of treating either as definite and fixed factors in a process explicable by the use of ordinary scientific categories.

It was not difficult to show that motives have meaning only with reference to a self, and that it is the self which alone has power to erect a desire into a motive, or that the attraction of an object of appetite derives much of its power from the character of the self to which it makes its appeal. What is possibly not so obvious is the extent to which libertarians have themselves been guilty of a similar fallacy. It is comparatively unimportant to the determinist whether the cause to which he attributes conduct be the self, or the will, or character, or the strongest motive, provided that each of these causes be regarded as definitely ascertainable and that its effects in sufficiently known circumstances be calculable. It is possible to treat will as a permanent cause manifesting itself through a series of sequent changes, and obedient to the laws which govern the development of the personality of the single individual.

Objections to libertarianism.

And the libertarian, by his arguments showing that appeal must be made to an act of will or of the self in the explanation of the phenomena of choice, does nothing directly to disprove the truth of such a contention. If, however, it be argued by libertarians that no explanation is possible of the manner in which the self or the will makes its decisions and inclines to this motive or to that, while they still assert the independent existence of the self or will, then they are undoubtedly open to the retort of their opponents that upon such a theory no rational explanation of conduct will be possible. For to regard a particular decision as the effect of the "fiat" of a self or will unmotived and uninfluenced by the idea of a future object of attainment seems to be equivalent to the simple statement that the choice was made or the decision taken. Such a theory can prove nothing either for or against the possibility of freedom.

Idealism.

Moreover, many of the arguments by which the position of rigid libertarians of the older school has been proved untenable have been advanced by moral philosophers, and by thinkers not always inclined to regard psychology with complete sympathy. The doctrine of self-determination, advocated by T. H. Green and idealist writers of his school, has little or nothing in common with the doctrine that the self manifests its freedom in unmotived acts of will. The advocates of self-determination maintain that conduct is never determined, in the sense in which, *e.g.* movements in the physical world are determined, because man in virtue of his self-consciousness has a power of distinguishing himself from, even while he identifies himself with, a purely natural object of desire; and this must always make it impossible to regard him as an object governed by purely natural forces. Consciousness and especially self-consciousness, can never be explained upon hypotheses adequate only to explain the blind working of the unconscious world. But the insistence of idealist writers upon the relation of the world of nature to conscious intelligence, and especially to a universal consciousness realizing itself throughout the history of individuals, rendered it alike impossible to deny altogether some influence of environ[illegible]racter, and to regard the history of individ[illegible] as consisting in isolated and unconnecte[illegible] Self-consciousness, if it be conceived as [illegible]r from the[illegible]to- [illegible] sense al[illegible] nd to [illegible] recise [illegible] scure.

Nor is that obscurity to any appreciable degree illuminated by the tendency also noticeable in idealist writers to find the true possession of freedom only in a self emancipated from the influence of irrational passion, and liberated by knowledge from the dominion of chance or the despotism of unknown natural forces. Here also psychology, by its elucidation of the important part which instinctive appetites and animal impulses play in the development of intelligence, still more perhaps by arguments (based largely upon the examination of hypnotic subjects or the phenomena of fixed ideas) which show the permanent influence of irrational or semi-rational suggestions or habits upon human conduct, has done much to aid and abet idealists in their contentions. It cannot in fact be denied that from one point of view human freedom is strictly relative, a possession to be won only after painful effort, exhibiting itself in its entirety only in supreme moments when the self is unswayed by habit, and out of full knowledge makes an individual and personal choice. Ideal freedom will be the supreme achievement of a self completely moralized. But the process by which such freedom is eventually to be gained must, if the prize is to be worth the having, itself exhibit the gradual development of a self which, under whatever limitations, possesses the same liberty of choice in its early stages as in its latest. And no theory which limits the exercise of freedom to the choice only of what is strictly good or rational can avoid the imputation of destroying man's responsibility for the choice of evil.

The ethical problem.

But the most important point at issue between the opposing theories has remained throughout the history of the controversy, the morality or immorality of their respective solutions of the problem. The advocates of either theory must in the last resort appeal to the direct evidence of the moral consciousness. It remains to give a brief sketch of the arguments advanced on either side.

It has always been maintained by convinced libertarians that without a belief in the freedom of the will morality becomes unmeaning (see DETERMINISM). Moreover, without a belief in the freedom of the will the conception of moral obligation upon which the existence of morality depends and from which all other moral terms derive their meaning loses its chief significance. What is opposed to obligation, or at least always distinguished from it, is that very domain of necessity within which determinists would bring the will. For even when the felt obligation is absolute, where the will is completely moralized, where it is inconceivable in the case of a good man that the act which he performs should be other than it is, there the obligation which he recognizes is an obligation to choose autonomously, and as such is distinguished from desire or appetite or any of the other alleged determinants of action. If the question be asked "Where is the evidence for this alleged freedom to choose between alternatives?" the appeal is always made to the witness of the moral consciousness itself. No one, it is said, who ever feels remorse for the committal of a wrong act can honestly avoid the admission that at the moment when the act was committed he could have acted otherwise. No one at the moment of action is ever aware that his will is being necessitated. What he is clearly conscious of is the power to choose. Any proof, in the scientific sense, that a man's acts are due to his power of free initiative would be from the nature of the case impossible. For, inasmuch as scientific proof depends upon the evidence of causality, such efforts after scientific demonstration would end only by bringing either the man's whole personality or some element in it within the sequence of the chain of natural causes and effects, under the domination of that natural necessity from which as a conscious being he is free. The science of morality must be content in its search for causes to recognize the rationality of choice as a real determining agent in human affairs. And no account of the psychology of human action which regards conduct as due to self-determination, but leaves open the question whether the self is free to choose is, so it is argued, capable of providing an adequate theory of the admitted facts of moral consciousness.

We must now consider the arguments by which determinists

Determinist ethics.

attack the position of their opponents and the evidence which they adduce to show that the freedom of the will is no necessary postulate for moral action. For thorough-going determinism of the older type the dependence of morality upon freedom did not of necessity prove an obstacle. Hedonistic psychology denied the libertarian hypothesis, but it denied also the absoluteness and intuitive character of moral obligation, and attached no validity to the ordinary interpretation of terms like "ought" and duty. Modern determinists differ from the earlier advocates of their theory in their endeavour to exhibit at least the compatibility of morality with the absence of freedom, if not the enhancement of moral values which, according to some of its advocates, follows upon the acceptance of the deterministic account of conduct.

Punishment.

If a coherent theory capable of giving an explanation of the ordinary facts of morality and not involving too violent a breach with the meaning of moral terms in their accepted usage were all that need be required of determinists in order to reconcile the defenders of the moral consciousness to the loss of their belief in the will's freedom, it would follow without question that the determinists have proved their case. Neither the deterrent nor the reformatory theories of punishment (*q.v.*) necessarily depend upon or carry with them a belief in the freedom of the will. On the contrary, a belief that conduct necessarily results upon the presence of certain motives, and that upon the application of certain incentives, whether of pain or pleasure, upon the presence of certain stimuli whether in the shape of rewards or punishments, actions of a certain character will necessarily ensue, would seem to vindicate the rationality of ordinary penal legislation, if its aim be deterrent or reformatory, to a far greater extent than is possible upon the libertarian hypothesis. Humanitarian moralists, who hesitate to believe in the retributive theory of punishment because, as they think, its aim is not the criminal's future well-being but merely the vindication through pain of an outrage upon the moral law which the criminal need never have committed, might welcome a theory which urges that the sole aim of punishment should be the exercise of an influence determining the criminal's future conduct for his own or the social good.

Moreover, the belief that the justice of punishment depends upon the responsibility of the criminal for his past offences and the admission of the moral consciousness that his previous wrong-doing was freely chosen carries with it, so it is argued, consequences which the libertarian moralist might be willing to accept with reluctance. For whatever may have been the character of the individual in the past, it is possible upon the libertarian view that by the exercise of his freedom he has brought about in himself a complete change of character: he may be now the exact opposite in character of what he was then. Upon what grounds, therefore, shall we discriminate between the justice of punishing him for what he was at a previous period in his life and the injustice of forgiving him because of what he is in the present? While if the deterrent and reformatory theories alone provide a rational end for punishment to aim at then the libertarian hypothesis pushed to its extreme conclusion must make all punishments equally useless. For no punishments can prevent the individual from becoming a person of whatsoever character he chooses or from committing acts of whatsoever moral quality he determines to prefer. A similar line of argument would lead to the conclusion that the conception of the state as an educating, controlling and civilizing agency involves the belief that individual citizens can be influenced and directed by motives which have their origin in external suggestion, *i.e.* that the determinist theory alone provides a rational basis for state activity of whatever kind.

Remorse.

It might, however, be thought that whatever be the compatibility of theories of punishment or of the activity of the state as a moralizing agency with determinism, to reconcile the denial of freedom with a belief in the reality of remorse or penitence will be plainly impossible. Nevertheless there is no tendency on the part of modern determinists to evade the difficulty. They argue with considerable cogency that determinism is very far from affording any ground for believing in the impotence of will. The belief that our actions have been determined in the past carries with it no argument that they will be of a like character in the future. Though in the future as in the past they must be equally determined, yet the forces that will determine their character in the future may be as yet unanalysed and unapparent. No man can exhaust by introspective analysis the hidden elements in his personality. The existence of feelings of remorse and penitence testify to the presence in the individual of motives to good conduct which, if acted upon and allowed full scope and development, may produce a complete change of character. Determinism is not necessarily the logic of despair. Moreover, in a certain sense the very feelings of remorse and penitence which are the chief weapons in the libertarians' armoury testify to the truth of the determinists' contention. For they are the natural and logical consequence of the acts which the penitent deplores. Such feelings follow the committal of acts of a certain character in a consciousness sufficiently moralized as inevitably as pain in the natural world follows upon the violation of one of nature's laws. And they would lose a great part of their significance if they did not testify to the continued existence in a man's personality of motives and tendencies likely to influence his conduct in the future as they have already influenced it in the past. Nor is it possible to give any rational explanation of the idea of responsibility itself upon indeterminist assumptions. For to hold a person to be a responsible agent is to believe that he possesses a certain fixity and stability of character. Freedom in the sense of complete liberty of choice would seem to lead to the conclusion that free agents are irresponsible, unaccountable. The truth seems to be that throughout the history of the controversy the chief arguments for either side have been provided by the extreme and exaggerated statements to which their opponents have been driven in the presentation of their case. So long as libertarians contend that what alone possesses moral value is unmotived choice, acts of will of which no explanation can be given save the arbitrary fiat of individual selves at the moment of decision, it is not difficult for determinists to exhibit the absurdities to which their arguments lead. It can easily be shown that men do as a matter of fact attach moral adjectives to environment, temperamental tendencies, natural endowments, instinctive desires, in a word to all or most of those forces moulding character, from which, according to libertarians, the individual's freedom of choice should be clearly distinguished and separated, and to which it can be and is frequently opposed. While it is not easy to avoid the suspicion that a choice of which nothing can be predicated, which is guided by no motive, influenced by no desire, which is due neither to the natural display of character nor to the influence of environment, is either merely fortuitous or the product of a philosophical theory.

But, as has been already suggested, the libertarian argument by no means necessarily leads to such extreme conclusions. The libertarian is not pledged to the belief that acts which alone exhibit real freedom are isolated acts which depend upon a complete change of character, a change which is in no sense continuous with, and is in no kind of relation to, the series of successive changes which make up an individual's mental and moral history. It is true that a consistent advocate of indeterminism must deny that the will is determined by motives, and must admit that no reason can finally be given for the individual's choice beyond the act of choice itself. For to give a reason for choosing (where "reason" is not merely equivalent to the determinists' "cause" or "necessary antecedent") would simply be to find the explanation of the individual's choice in some previous decision. Moral conduct is conduct which follows upon the choice of ends, and to give a reason for the choice of an end in any particular instance is either to explain the nature of the end chosen and thus to describe the choice (a process which can in no sense show that the act of choice was itself necessitated), or it is to find the ground of the particular decision in its relation to an end already chosen. But whatever be the nature of the end chosen the libertarian is not concerned to deny that it must possess a fixed determinate character. If duty be chosen as opposed to pleasure the opposition between duty and pleasure is a necessary one. The recognition of such a necessary opposition is involved in the determinate act of choice. But the choice itself is neither necessary nor determined. The belief that libertarianism denies the binding force of habit or the gradual development of unchecked tendencies in character depends upon a similar misconception. The continuity of a man's life and purposes would be equally apparent whether he habitually performed the same acts and made the same decisions in virtue of his freedom of choice or as the product of necessary forces moulding his character in accordance with fixed laws. Just as the phenomena of sudden conversion, complete revolutions of character occurring to outward appearance in a momentary space of time, are no valid argument against determinism—they may be due to the sudden emergence of elements in life and character long concealed—so what looks like the orderly and necessary development of a character growing and exhibiting its activity in accordance with fixed laws may in reality be due to innumerable secret struggles and momentous decisions, acts of choice of which only the results are outwardly apparent. The ends which at any moment the individual is free to choose or reject possess a determinate character: their existence or non-existence as possibilities is also to a very large extent determined for him. No man can choose to become whatsoever he will, for the ends which he can accomplish are restricted in number as well as definite in quality. But the real strength of the libertarian position is to be found in the fact that consciousness is capable of distinguishing ends at all. Whenever, for example, there is an admission on the part of any individual that in any previous act he made the attainment of pleasure his end rather than the performance of duty, there is also a tacit admission that he might have acted otherwise. And the existence of penitence and remorse is not merely a sign of the emergence in consciousness of elements in character nobler than and opposed to those tendencies which once held sway. They are feelings which are incapable of coming into being at all save when coupled with the judgment, "I ought to have acted otherwise because I possessed the power." The same argument holds good concerning our feelings with regard to the justice or injustice of punishing a criminal if we believe that his will was determined. It may be politic or expedient to inflict pain upon a criminal in order either to effect an alteration in his character or to deter him or others from future performance of acts of a certain character. But even with regard to the expediency of such punishments we may have doubts. For the very argument from the undeveloped possibilities of each man's character by which the determinist proves the compatibility of his theory with the phenomenon of sudden conversion and the like is sufficient also to prove that the state can never be sure that the punishments which it inflicts upon the individual will have the effect upon his character and conduct which it desires. It may be replied that experience makes it reasonably certain that the infliction of certain penalties will produce acts of a certain character and that the influence of certain incentives upon conduct may be established as reasonably probable by induction. But when the data are admittedly so uncertain is a valid inductive argument of such a character possible? And even if it were what would be its bearing upon the justice or injustice of inflicting punishments at all? The unsophisticated moral consciousness will still consider it unjust to punish a man for deeds of which he could not avoid the performance, and regard the alleged desire to produce in his future life consequences favourable to himself or society as beside the mark and irrelevant to the question at issue.

The free-will position.

At the moment of action the individual invariably regards himself as free to choose between alternatives. This immediate consciousness of freedom persists upon another occasion even though subsequent reflection upon conduct should lead the individual to regard himself as determined at the very moment when he was aware of himself as free. It is this immediate consciousness of the power of choosing between alternatives which the determinist finds so difficult to explain. He may regard it as an illusion, and attempt to prove the incompatibility of our consciousness of freedom with the facts of existence and the nature of the world. But, in ordinary cases of illusion, once let the reason for the illusion be discovered, and there is no longer the possibility of our being longer deceived. The phenomena which deceived us may continue to persist, but they no longer persist as illusory; the appearance which deceived us is seen in its true nature, even though it should still retain those characteristic marks or signs of reality which hitherto we regarded as significant of a nature which we now no longer believe it to possess. But can it be maintained that the same truth holds good of our consciousness of freedom? Is it possible to hold that determinist arguments are of so convincing a character as to enable us to perceive at the moment of action the untrustworthy nature of our consciousness that we are free to choose between alternatives and to grasp beneath the appearance the underlying necessity which rules our wills? Our actual consciousness of freedom is not seriously disputed. And though reflection upon conduct may lead us to suppose that our past acts were determined, that desire of pleasure or the wish to avoid pain controlled our wills, the unphilosophical observer interprets, in offenders against morality, such arguments as a mere excuse. Moreover, remorse and penitence are witnesses in the wrongdoer to the truth of the interpretation. On the other hand we have no such immediate consciousness of the necessity which is said to control our wills. We sharply distinguish that freedom which is the prerogative of human action from the necessary causation discoverable in nature. Within the domain of consciousness introspective analysis is unable to discover those chains of necessary sequences which it is the province of science to investigate in the physical world. And until the determinist can successfully explain to us how in a world obeying throughout its history necessary laws and limited in its nature to the exhibition of causal sequences the consciousness of freedom could ever have arisen, we may be content to trust the immediate affirmation of our moral selves.

For modern discussions of the problem consult Lotze, *Microcosmus*, i. 256 seq., English trans. Martineau; *Study of Religion*, vol. ii. bk. iii. chap. 2; Ward, *Naturalism and Agnosticism*; Rashdall, *The Theory of Good and Evil*, vol. ii. bk. iii.; Taylor, *Elements of* [illegible] bk. iv. chap. 4; McTaggart, *Some Dogmas of Religion*, [illegible] Hodgson, *The Philosophy of Experience*, iv. [illegible] *in the Philosophy of Religion*; Bergson, [illegible] *de la conscience*; James, *The Will* [illegible] *sur le libre arbitre*; Renouvier, *Les* [illegible] *pure*; Boutroux, *La Contingence des lois* [illegible] *du libre arbitre*; Boyce Gibson, [illegible] on "The Problem of Freedom."

(H. H. W.)

WILL, or **Testament**, the legal documentary instrument by which a person regulates the rights of others over his property or family after his death.[1] For the devolution of property not disposed of by will, see Inheritance, Intestacy. In strictness "will" is a general term whilst "testament" applies only to dispositions of personalty; but this distinction is seldom observed. The conception of freedom of disposition by will, familiar as it is in modern England, is by no means universal. In fact, complete freedom is the exception rather than the rule. Legal systems which are based upon Roman law, such as those of Scotland and France, allow the whole property to be alienated only where the deceased leaves no widow or near relatives. In France this restriction has met with condemnation from eminent legal and economical authorities. R. T. Troplong, for instance, held that "un peuple n'est pas libre, s'il n'a pas le droit de tester, et la liberté du testament est la plus grande preuve de la liberté civile."[2]

Roman law.

History.—The will, if not purely Roman in origin, at least owes to Roman law its complete development—a development which in most European countries was greatly aided at a later period by ecclesiastics versed in Roman law. In India, according to the better opinion, it was unknown before the English conquest; in the Mosaic law and in ancient Athens the will, if it existed at all, was of a very rudimentary character. The same is the case with the *Leges barbarorum*, where they are unaffected by Roman law. The will is, on the other hand, recognized by Rabbinical and Mohammedan law. The early Roman will, as Sir H. Maine shows,[3] differed from the modern will in most important respects. It was at first effectual during the lifetime of the person who made it; it was made in public; and it was irrevocable. Its original object, like that of adoption, was to secure the perpetuation of the family. This was done by securing the due vesting of the *hereditas* in a person who could be relied upon to keep up the family rites. There is much probability in the conjecture that a will was only allowed to be made when the testator had no *gentiles* discoverable, or when the *gentiles* had waived their rights. It is certain from the text of Gaius[4] that the earliest forms of will were those made in the *comitia calata* and those made *in procinctu*, or on the eve of battle. The former were published before the *comitia*, as representative of the patrician *gentes*, and were originally a legislative act. These wills were the peculiar privilege of patricians. At a later time grew up a form of plebeian will (*testamentum per aes et libram*), and the law of succession under testament was further modified by the influence of the praetor, especially in the direction of recognition of *fideicommissa* or testamentary trusts. *Codicilli* or informal wills, also came into use, and were sufficient for almost every purpose but the appointment of an heir. In the time of Justinian a will founded partly on the *jus civile*, partly on the edict of the praetor, partly on imperial constitutions and so called *testamentum tripertitum*, was generally in use. The main points essential to its validity were that the testator should possess testamentary capacity, and that the will should be signed or acknowledged by the testator in the presence of seven witnesses, or published orally in open court. The witnesses must be *idonei*, or free from legal disability. For instance, women and slaves were not good witnesses. The whole property of the testator could not be alienated. The rights of heirs and descendants were protected by enactments which secured to them a legal minimum, the *querela inofficiosi testamenti* being the remedy of those passed over. The age at which testamentary capacity began was fourteen in the case of males, twelve in the case of females. Up to A.D. 439 a will must have been in Latin; after that date Greek was allowed. Certain persons, especially soldiers, were privileged from observing the ordinary forms. The liability of the heir to the debts of the testator varied at different periods. At first it was practically unlimited. Then the law was gradually modified in his favour, until in the time of Justinian the heir who duly made an inventory of the property of the deceased was liable only to the assets to which he had succeeded. This limitation of liability is generally termed by the civilians *beneficium inventarii*. Something like the English probate is to be found in the rules for breaking the seals of a will in presence of the praetor. Closely connected with the will was the *donatio mortis causa*, the rules of which have been as a whole adopted in England (see below). An immense space in the *Corpus juris* is occupied with testamentary law. The whole of part v. of the *Digest* (books xxviii.-xxxvi.) deals with the subject, and so do a large number of constitutions in the *Code* and *Novels*.

The effect of Christianity upon the will was very marked. For instance, the duty of bequeathing to the Church was inculcated as

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[1] This is practically in accordance with the definition of Modestinus in *Digest* xxviii. 1, 1, *voluntatis nostrae justa sententia de eo quod quis post mortem suam fieri velit.*

[2] *Traité des donations entre-vifs et des testaments* (1855), preface.

[3] *Ancient Law*, chap. vi.

[4] ii. 101.

Canon law.

early as Constantine, and heretics and monks were placed under a disability to make a will or take gifts left by will. A will was often deposited in a church. The canon law follows the Roman law with a still greater leaning to the advantage of the Church. No Church property could be bequeathed. Manifest usurers were added to the list of those under disability. For the validity of a will it was generally necessary that it should be made in the presence of a priest and two witnesses, unless where it was made *in pias causas*. The witnesses, as in Roman law, must be *idonei*. Gifts to the Church were not subject to the deductions in favour of the heir and the children necessary in ordinary cases.[1] In England the Church succeeded in holding in its own hands for centuries jurisdiction in testamentary matters.

English law.

The Roman law of wills has had considerable effect upon English law. In the words of Sir H. Maine, "The English law of testamentary succession to personalty has become a modified form of the dispensation under which the inheritances of Roman citizens were administered."[2] At the same time there are some broad and striking differences which should be borne in mind. The following among others may be noticed. (1) A Roman testator could not, unless a soldier, die partly testate and partly intestate. The will must stand or fall as a whole. This is not the case in England. (2) There is no one in English law to whom the *universitas juris* of the testator descends as it did to the Roman *heres*, whose appointment was essential to the validity of a formal will, and who partook of the nature of the English heir, executor, administrator, devisee and legatee. (3) The disabilities of testators differed in the two systems. The disability of a slave or a heretic is peculiar to Roman law, of a youth between fourteen and twenty-one to English law. (4) The whole property may be disposed of in England; but it was not so at Rome, where, except by the wills of soldiers, children could not be disinherited unless for specified acts of misconduct. During the greater part of the period of Roman law the heir must also have had his Falcidian fourth in order to induce him to accept the inheritance. (5) In English law all wills must conform to certain statutory requirements; the Romans recognized from the time of Augustus an informal will called *codicilli*. The English codicil has little in common with this but the name. It is not an informal will, but an addition to a will, read as a part of it, and needing the same formalities of execution. (6) The Roman *legatum* applied to both movables and immovables; in England a legacy or bequest is a gift of personalty only, a gift of real estate being called a devise.[3] (7) The Roman will spoke from the time of making; the English speaks from the time of death. This difference becomes very important in case of alteration in the position of the testator between the making of the will and his death. As a rule the Roman will could not, the English can, pass after-acquired property.

Liberty of alienation by will is found at an early period in England. To judge from the words of a law of Canute, intestacy appears to have been the exception at that time.[4] How far the liberty extended is uncertain; it is the opinion of some authorities that complete disposition of land and goods was allowed, of others that limited rights of wife and children were recognized. However this may be, after the Conquest a distinction, the result of feudalism, to use a convenient if inaccurate term, arose between real and personal property. It will be convenient to treat the history of the two kinds of will separately.

Real property.

It became the law after the Conquest, according to Sir E. Coke,[5] that no estate greater than for a term of years could be disposed of by will, unless in Kent, where the custom of gavelkind prevailed, and in some manors and boroughs (especially the City of London), where the pre-Conquest law was preserved by special indulgence. The reason why devise of land was not acknowledged by law was, no doubt, partly to discourage death-bed gifts in mortmain, a view supported by Glanvill, partly because the testator could not give the devisee that seisin which was the principal element in a feudal conveyance. By means of the doctrine of uses, however, the devise of land was secured by a circuitous method, generally by conveyance to feoffees to uses in the lifetime of the feoffor to such uses as he should appoint by his will (see TRUST).[6] Up to comparatively recent times a will of lands still bore traces of its origin in the conveyance to uses *inter vivos*. On the passing of the Statute of Uses lands again became non-devisable, with a saving in the statute for the validity of wills made before the 1st of May 1536. The inconvenience of this state of things soon began to be felt, and was probably aggravated by the large amount of land thrown into the market after the dissolution of the monasteries. As a remedy an act was passed in 1540, and a further explanatory act in 1542–1543. The effect of these acts was to make lands held in fee simple devisable by will in writing, to the extent of two-thirds where the tenure was by knight service, and the whole where it was in socage. Corporations were incapacitated to receive, and married women, infants, idiots and lunatics to devise. An act of 1660, by abolishing tenure by knight service, made all lands devisable. In the same reign the Statute of Frauds (1677) dealt with the formalities of execution. Up to this time simple notes, even in the handwriting of another person, constituted a sufficient will, if published by the testator as such. The Statute of Frauds required, *inter alia*, that all devises should be in writing, signed by the testator or by some person for him in his presence and by his direction, and should also be subscribed by three or four credible witnesses. The strict interpretation by the courts of the credibility of witnesses led to the passing of an act in 1751–1752, making interested witnesses sufficient for the due execution of the will, but declaring gifts to them void. The will of a man was revoked by marriage and the birth of a child, of a woman by marriage only. A will was also revoked by an alteration in circumstances, and even by a void conveyance *inter vivos* of land devised by the will made subsequently to the date of the will, which was presumed to be an attempt by the grantor to give legal effect to a change of intention. As in Roman law, a will spoke from the time of the making, so that it could not avail to pass after-acquired property without republication, which was equivalent to making a new will. Copyholds were not devisable before 1815, but were usually surrendered to the use of the will of the copyhold tenant; an act of 1815 made them devisable simply. Devises of lands have gradually been made liable to the claims of creditors by a series of statutes beginning with the year 1691.

Personal property.

The history of wills of personalty was considerably different, but to some extent followed parallel lines. In both cases partial preceded complete power of disposition. The general opinion of the best authorities is that by the common law of England a man could only dispose of his whole personal property if he left no wife or children; if he left either wife or children he could only dispose of one-half, and one-third if he left both wife and children. The shares of wife and children were called their *pars rationabilis*. This *pars rationabilis* is expressly recognized in Magna Carta and was sued for by the writ *de rationabili parte*. At what period the right of disposition of the whole personalty superseded the old law is uncertain. That it did so is certain, and the places where the old rule still existed—the province of York, Wales and the City of London—were regarded as exceptions. The right of bequest in these places was not assimilated to the general law until comparatively recent times by acts passed between 1693 and 1726. A will of personalty could be made by a male at fourteen, by a female at twelve. The formalities in the case of wills of personalty were not as numerous as in the case of wills of land. Up to 1838 a nuncupative or oral will was sufficient, subject, where the gift was of £30 or more, to the restrictions contained in the Statute of Frauds. The witnesses to a written will need not be "credible," and it was specially enacted by an act of 1705 that any one who could give evidence in a court of law was a good witness to a will of personalty. A will entirely in the testator's handwriting, called a holograph will, was valid without signature. At one time the executor was entitled to the residue in default of a residuary legatee. But the Executors Act 1830 made him in such an event trustee for the next of kin.

Jurisdiction over wills of personalty was till 1858 in the ecclesiastical courts, probate being granted by the diocesan court[7] if the goods of the deceased lay in the same diocese, in the provincial court of Canterbury (the prerogative court) or York (the chancery court) if the deceased had *bona notabilia*, that is, goods to the value of £5 in two dioceses. The ecclesiastical jurisdiction was of a very ancient origin. It was fully established under Henry II., as it is mentioned by Glanvill. In the city of London wills were enrolled in the Court of Hustings from 1258 to 1688 after having been proved before the ordinary. Contested cases before 1858 were tried in the provincial court with an appeal originally to the Court of Delegates, later to the judicial committee of the privy council. There were also a few special local jurisdictions, courts baron, the university courts, and others, probably for the most part survivals of the pre-Conquest period, when wills seem to have been published in the county court. The ecclesiastical courts had no jurisdiction over wills of land, and the common law courts were careful to keep the ecclesiastical courts within their limits by means of prohibition. No probate of a will of land was necessary, and title to real estate by will might be made by production of the will as a document of title. The liability of the executor and legatee for the debts of the testator has been gradually established by legislation. In general it is limited to the amount of the succession. Personal liability of the executor beyond this can by the Statute of Frauds only be established by contract in writing.

Modern English Law.—Such were the principal stages in the history of the law as it affected wills made before 1838 or proved before 1858. The principal acts now in force are the Wills Act 1837, the amending act of 1852, the Court of Probate Act 1857, the Judicature Acts 1873 and 1875 and the Land Transfer Act 1897. All but the acts of 1837 and 1852 deal mainly with what happens to the will after death, whether under the voluntary or contentious jurisdiction of the Probate Division (see **Probate**). Some of the earlier acts are still law, though of little importance since the more modern and comprehensive enactments.

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[1] Most of the law is contained in *Decretals*, iii. 26, "De Testamentis."

[2] *Ancient Law*, chap. vi.

[3] The distinction between bequest and devise did not always exist. For instance, the Assize of Northampton, c. 4, speaks of a devise (*divisa*) of chattels (see BEQUEST).

[4] *Secular Laws*, c. 68.

[5] *2 Inst.* 7.

[6] Many instances of such conveyances occur in Sir Harris Nicolas' *Testamenta vetusta* and in *Fifty Earliest English Wills* (1387–1439), edited by Dr F. J. Furnivall in 1882.

[7] The testamentary jurisdiction of the archdeacon's court is alluded to by Chaucer in the "Friar's Tale," but it was afterwards completely superseded by the bishop's court.

The earliest on the statute roll is an act of Henry III. (1236), enabling a widow to bequeath the crops of her lands. Before the Wills Act uniformity in the law had been urgently recommended by the Real Property Commissioners in 1833. It appears from their report[1] that at the time of its appearance there were ten different ways in which a will might be made under different circumstances.

The act of 1837 affected both the making and the interpretation of wills.[2] Excluding the latter for the present, its main provisions were these. All property, real and personal, and of whatever tenure, may be disposed of by will. If customary freeholds or copyholds be devised, the will must be entered on the court rolls. No will made by any person under the age of twenty-one is valid. Every will is to be in writing, signed at the foot or end thereof by the testator or by some person in his presence and by his direction, and such signature is to be made or acknowledged by the testator in the presence of two or more witnesses present at the same time, who are to subscribe the will in the presence of the testator. It is usual for the testator and the witnesses to sign every sheet. Publication is not necessary. A will is not void on account of the incompetency of a witness. Gifts to a witness or the husband or wife of a witness are void. A creditor or executor may attest. A will is revoked (except where made in exercise of a power of appointment of a certain kind) by a later will, or by destruction with the intention of revoking, but not by presumption arising from an alteration in circumstances. Alterations in a will must be executed and attested as a will. A will speaks from the death of the testator, unless a contrary intention appear. An unattested document may be, if properly identified, incorporated in a will, but such a document, if executed subsequently to the will, is inoperative.

Rules of interpretation or construction depend chiefly on decisions of the courts, to a smaller extent on statutory enactment. The law was gradually brought into its present condition through precedents extending back for centuries, especially decisions of the court of chancery, the court *par excellence* of construction, as distinguished from the court of probate. The court of probate did not deal unless incidentally with the meaning of the will; its jurisdiction was confined to seeing that it was duly executed. The present state of the law of interpretation is highly technical. Some phrases have obtained a conventional meaning which the testators who used them probably did not dream of. Many of the judicial doctrines which had gradually become established were altered by the Wills Act. These provisions of the act have since that time themselves become the subject of judicial decision. Among other provisions are these, most of them to take effect only in the absence of a contrary intention. A residuary devise is to include estates comprised in lapsed and void devises. A general gift of the testator's lands is to include copyholds and leaseholds. A general gift of real or personal estate is to include real or personal estate over which the testator had a general power of appointment. A devise without words of limitation is to pass the fee simple. The words "die without issue," or similar words, are to mean die without issue living at the time of the death of the person whose issue was named, not as before the act, an indefinite failure of issue, an estate tail being thus created. Trustees under an unlimited devise are to take the fee simple. Devises of estates tail are not to lapse if the devisee, though he predeceased the testator, left issue inheritable under the entail. Gifts to children or other issue leaving issue living at the testator's death are not to lapse. Rules of interpretation founded on principles of equity independent of statute are very numerous, and for them the works devoted to the subject must be consulted. Some of the more important, stated in as general a form as possible, are these. The intention of the testator is to be observed. This rule is called by Sir E. Coke the pole star to guide the judges. There is a presumption against intestacy, against double portions, against constructing merely precatory words to import a trust, &c. One part of the will is to be expounded by another. Interlineations and alterations are presumed to have been made after, not as in deeds before, execution. Words are supposed to be used in their strict and primary sense. Many words and phrases, however, such as "money," "residue" and "issue" and other words of relationship, have become invested with a technical meaning, but there has been a recent tendency to include illegitimate children in a gift to "children." Evidence is admissible in certain cases to explain latent ambiguity, and parol evidence of the terms of a lost will may be given as in the famous case of *Sugden* v. *Lord St Leonards* (1876), 1 Prob. Div. 154.

A will may be void, in whole or in part, for many reasons, which may be divided into two great classes, those arising from external circumstances and those arising from the will itself. The main examples of the former class are revocation by burning, tearing, &c., by a later will, or by marriage of the testator (except as below), incapacity of the testator from insanity, infancy or legal disability (such as being a convict), undue influence and fraud, any one of which is ground for the court to refuse or revoke probate of a will. A will being ambulatory is always revocable, unless in one or two exceptional instances. Undue influence is a ground upon which frequent attempts are made to set aside wills. Its nature is well explained in a judgment of Lord Penzance's: "Pressure of whatever character, whether acting on the fears or the hopes, if so exerted as to overpower the volition without convincing the judgment, is a species of restraint under which no valid will can be made."[3] There is nothing corresponding to the *querela inofficiosi testamenti*, but unnatural provisions may be evidence of mental defect. The circumstances appearing on the face of the will which make it open to objection may either avoid it altogether or create a partial intestacy, the will remaining good as a whole. Where the will is not duly executed, *e.g.* if it is a forgery or if it is not signed by the testator or the proper number of witnesses, the will is not admitted to probate at all. Where it contains devises or bequests bad in law, as in general restraint of marriage, or tending to create perpetuities, or contrary to public policy, or to some particular enactment, only the illegal part is void. A remarkable instance is a well-known case in which a condition subsequent in a devise was held void as against public policy, being a gift over of the estate devised in case the first devisee, the eldest son of an earl, did not before his death obtain the lapsed title of duke of Bridgewater.[4]

There are some wills of an exceptional kind which demand special notice. The *King*.—It was resolved in parliament in Richard II.'s reign (1392) that the king, his heirs and successors, might lawfully make their testaments.[5] In some later cases parliamentary authority has been given to royal wills, in others not. The executors of Henry IV. were confirmed in their office by letters patent of Henry V., those of Henry V. by parliament. The largest testamentary powers ever conferred on an English king were given to Henry VIII. by an act of 1533–1534, empowering him to limit and appoint the succession to the crown by will, in default of children by Jane Seymour or any future wife. By 39 & 40 Geo. III. c. 88 the king and his successor may devise or bequeath their private property.[6] No court, however, has jurisdiction to grant probate of the will of a king. *Guardianship*.—As a general rule wills deal with property, but even at common law a will simply appointing a guardian was good. The common law was superseded by an act of 1660, under which a father may dispose of the custody of his unmarried infant children by will. The Guardianship of Infants Act 1886 extended such powers in certain cases to the mother. *Married Woman*.—At common law a married woman could not (with a few exceptions) make a will without her husband's licence and consent, and this disability was specially preserved by the Wills Acts of Henry VIII. and of 1837. A common mode of avoiding this difficulty was for the husband to contract before marriage to permit the wife to make an appointment disposing of personalty to a certain value. Courts of equity from an early time allowed her, under certain restrictions, to make a will of property held for her separate use. In some cases her husband could dispose of her property by will, in others not. The law as it existed previously to 1883 is now practically obsolete, the Married Women's Property Act 1882 enabling a married woman to dispose by will of any real or personal property as her separate property as a *feme sole* without the intervention of any trustee. The act also enables a married woman who is executrix of a will to act as if she were a *feme sole*. The Married Women's Property Act 1893 extended the act of 1882 by making it unnecessary for the will of a married woman to be re-executed or republished after the death of her husband. *Alien*.—Before 1870 an alien enemy resident in England could only dispose of property by will with the king's licence. The Naturalization Act 1870 enables him to do so as fully as a natural-born British subject. But if he be an alien domiciled abroad he cannot avail himself of Lord Kingsdown's Act (see below). *Soldier and Sailor*.—Wills of soldiers in actual military service, and of sailors, are subject to special legislation, and are excepted from the operation of the Wills Act. The privilege only applies to wills of personal estate. Such wills may usually be made when the testator has attained the age of fourteen, and are not revoked by marriage only but by marriage and the birth of a child. Wills of soldiers on an expedition may be made by unattested writing or by nuncupative testament before two witnesses. Wills of petty officers and seamen in the navy, and of marines, as far as relates to their pay or prize-money, must be attested by an officer, and wills made by a seaman in the merchant service must, if made at sea, be attested by the master or mate, if made on land by a superintendent of a mercantile marine office, a minister of religion, justice of the peace, or consular or customs officer. See the Merchant Shipping Act 1894, s. 177. The wills of prisoners of war are subject to special regulations, and the Admiralty may at its discretion waive the due execution of wills in other instances. The effects of seamen, marines and soldiers, killed or dying in the service, are exempt from duty. Pay, wages, prize money and pensions due to persons employed in the navy may be paid out without probate where the whole assets do not exceed £32. The Board of Trade may at its discretion dispense with probate of the will of a merchant seaman whose effects do not exceed £50 in value. By an act passed in 1868 the existing exemptions are extended to the sum of £100 in the case of civil service pay or annuities, of civil or military allowances chargeable to the army votes, and of army prize money. *Will made under power.*—A will made under a power of appointment is not revoked by marriage when the real or personal estate thereby appointed would not in default of appointment pass to the testator's executor or administrator or to the next of kin. Before the Wills Act a will exercising a power of appointment had to conform to any special requisitions in the power, but since the act the power is duly exercised if executed and attested like an ordinary will. *Registration.*—In the register counties memorials of wills affecting lands in those counties must be registered. *Member of friendly society*, &c.—Members of friendly, industrial and provident societies, depositors in savings banks, and servants in certain public offices, may under the provisions of numerous acts make a nomination to an amount not exceeding £100. Such nomination is practically equivalent to a will, and may be made at the age of sixteen.

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[1] *Fourth Report*, p. 12.

[2] By § 1 of the act the [illegible] includes codicil.

[3] *Hall* v. *Hall*, L.R. 1 Prob. 481.

[4] *Egerton* v. *Earl Brownlow*, 4 House of Lords Cases, 210.

[5] 4 *Inst.* 335.

[6] See the *Collection of Royal Wills* printed for the Society of Antiquaries by J. Nichols (1780).

At common law there could be no larceny of a will of lands. But now by the Larceny Act of 1861 stealing, injuring or concealing a will, whether of real or personal estate, is punishable with penal servitude for life. Forgery of a will (at one time a capital crime) renders the offender liable to the same penalty. Fraudulent concealment of a will material to the title by a vendor or mortgagor of land or chattels is, by the Law of Property Amendment Act 1859, a misdemeanour punishable by fine or imprisonment or both. It should be noticed that a contract to make a will containing provisions in favour of a certain person or certain persons is valid if it fulfil the requirements of the law regulating contract. A good example is *Synge* v. *Synge* (1894) 1 K.B. 466.

For death duties see ESTATE DUTY, LEGACY, SUCCESSION DUTY.

The principal authorities for the English law are, for the formalities, Sir E. V. Williams, *Executors*; Holdsworth and Vickers, *Law of Succession*; J. Williams, *Wills and Succession*; for the construction, the works of Sir James Wigram and of Messrs Jarman, F. V. Hawkins and Theobald. Precedents will be found in Hayes and Jarman's *Concise forms of Wills*, and in ordinary collections of precedents in conveyancing. For comparative law see E. Lambert, *Le Régime successoral* (Paris, 1903).

Ireland.

The act of 1837 applies to Ireland. The main difference between the law of the two countries is that in Ireland a bequest for masses for the repose of the testator's soul is valid, provided that the masses be public, in England such a bequest is void as tending to superstitious uses.

Scotland.

Up to 1868 wills of immovables were not allowed in Scotland. The usual means of obtaining disposition of heritage after death was a trust disposition and settlement by deed *de praesenti*, under which the truster disponed the property to trustees according to the trusts of the settlement, reserving a life interest. Thus something very similar to a testamentary disposition was secured by means resembling those employed in England before the Wills Act of Henry VIII. The main disadvantage of the trust disposition was that it was liable to be overthrown by the heir, who could reduce *ex capite lecti* all voluntary deeds made to his prejudice within sixty days of the death of his ancestor. In 1868 the Titles to Land Consolidation Act made it competent to any owner of lands to settle the succession to the same in the event of death by testamentary or *mortis causa* deeds or writings. In 1871 reduction *ex capite lecti* was abolished. A will of immovables must be executed with the formalities of a deed and registered to give title. The disability of a woman as a witness was removed by the Titles to Land Consolidation Act. As to wills of movables, there are several important points in which they differ from corresponding wills in England, the influence of Roman law being more marked. Males may make a will at fourteen, females at twelve. A nuncupative legacy is good to the amount of £100 Scots (£8, 6s. 8d.), and a holograph testament is good without witnesses, but it must be signed by the testator, differing in this from the old English holograph. By the Conveyancing Act 1874 such a will is presumed to have been executed on the date which it bears. Not all movables can be left, as in England. The movable property of the deceased is subject to *jus relictae* and *legitim*. See McLaren, *Wills and Succession*, for the law, and *Judicial Styles* for styles.

United States.—By the constitutions of many states laws giving effect to informal or invalid wills are forbidden. The age of testamentary capacity varies very much. Eighteen is a common one. Full liberty of disposition is not universal. Homesteads generally, and dower estates frequently, are not devisable. In some states only a disposable portion of the property can be left, so that children cannot be disinherited without good cause, and in some children omitted in a will may still take their share. It is frequently provided that a certain amount must be left to the widow. Louisiana follows French law, by which the testator can under no circumstances alienate by will more than half his property if he leave issue or ascendants. In some states a married woman may not leave more than half her property away from her husband. Some require the husband's consent and subscription to make the will of a married woman valid. Nuncupative and holograph wills are in use. The former are confined to personalty and must generally be reduced to writing within a short time after the words are spoken. In Louisiana the mystic or sealed will still exists. The number of witnesses necessary for the validity of a will of any kind is usually two, sometimes three. Wills of soldiers and sailors are privileged, as in England. There are several decisions of state courts that belief in spiritualism does not of itself constitute testamentary incapacity.

See Jarman, American edition by Randolph and Talcott.

France.—The law is mainly contained in ss. 967-1074 of the *Code Civil*. Wills in France may be of three kinds: (1) *holograph*, which must be wholly written, dated and signed by the testator; (2) made as a *public instrument*, *i.e.* received by two notaries before two witnesses or by one notary before four witnesses; this form of will must be dictated by the testator and written by the notary, must be read over to the testator in the presence of the witnesses and must be signed by testator and witnesses; (3) *mystic*, which are signed by the testator, then closed and sealed and delivered by him to a notary before six witnesses; the notary then draws up an account of the proceedings on the instrument which is signed by the testator, notary and witnesses. Legatees and their blood relations to the fourth degree may not be witnesses. Nuncupative wills are not recognized. Soldiers' and sailors' wills are subject to special rules as in most other countries. Full liberty of disposition only exists where the testator has no ascendants or descendants, in other cases his *quantité disponible* is subject to *réserve*; if the testator has one child he may only dispose of half his estate, if two only one-third, if three or more only one-fourth; if he has no descendants but ascendants in both lines he may dispose of half, if ascendants in one line only he may dispose of three-fourths. The full age of testamentary capacity is twenty-one years, but minors over the age of sixteen may dispose by will of half of the estate of which they could dispose had they been of full age. There is no restriction against married women making wills. A contract to dispose of the succession is invalid, s. 791.

The codes of the Latin races in Europe are in general accordance with the French law.

Germany.—Most of the law will be found in the *Bürgerliches Gesetzbuch*, ss. 2064-2273. A holograph will, either single or joint, is allowed. Other wills must be declared before a judge or notary or (outside Germany) a consul. Two witnesses are required, unless the witness be a notary or the registrar of the court, who is sufficient alone. The formalities may be relaxed in certain cases, such as imminent death, a state of siege, a prevailing epidemic, &c. Descendants, ascendants and the husband and wife, are entitled to compulsory portions (*pflichtteilsberechtigt*). But those prima facie entitled may be deprived of their share for certain specified kinds of misconduct. A contract to make any specified testamentary disposition is inoperative. But a contract of inheritance (*Erbvertrag*) made *inter vivos* by direct disposition is valid in certain cases and will operate on the death of the contractor. The modes of revocation are much the same as in England (except marriage). But there is one peculiar to Germany, the inconsistency of a will with an *Erbvertrag*; in such an event the will is wholly or *pro tanto* revoked.

International Law.—There are three main directions which the opinion of jurists and the practice of courts have taken. (1) The whole property of the testator may be subjected to the law of his domicil. To this effect is the opinion of Savigny and the German practice. Certain modifications have been made by modern law, especially by the *Einführungsgesetz* of 1896. (2) The property may be subjected to the law of the place where it happens to be at the time of the testator's death. (3) The movable property may be subjected to the law of the domicil, the immovable (including leaseholds) to the law of the place where it is situate, the *lex loci rei sitae*. England and the United States follow this rule. Testamentary capacity is generally governed by the law of the testator's domicil at the time of his death, the form of the instrument in most countries either by the law of his domicil or the law of the place where the will was made, at his option. The old rule of English law was to allow the former alternative only. The law was altered for the United Kingdom in 1861 by the Wills Act 1861 (known as Lord Kingsdown's Act), by which a will made out of the United Kingdom by a British subject is, as far as regards personal estate, good if made according to the forms required by the law of the place where it was made, or by the law of the testator's domicil at the time of making it, or by the law of the place of his domicil of origin. Subsequent change of domicil does not avoid such a will. Another act passed on the same day, the Domicile Act 1861, enacted that by convention with any foreign government foreign domicil with regard to wills could not be acquired by a testator without a year's residence and a written declaration of intention to become domiciled. By the same act foreign consuls may by convention have certain authority over the wills and property of subjects of foreign states dying in England. In the United States some states have adopted the narrow policy of enacting by statute the old common law rule, and providing that no will is valid unless made in the form required by the law of the state of the testator's domicil. The capacity of the testator, revocation and construction of a will, are governed by the law of the domicil of the testator at the time of his death—except in cases affected by Lord Kingsdown's Act, as he must be supposed to have used language in consonance with that law, unless indeed he express himself in technical language of another country. A good instance is *Groos' Case* (1904), Prob. 269, where it was held that the will of a Dutch woman (at the time of her death domiciled in England) duly made in Holland was not revoked by her marriage, that being no ground of revocation by the law of Holland.[1] The persons who are to take under a will are decided by different rules according as the property is movable or immovable, the former being governed by the law of the domicil, the latter by the *lex loci rei sitae*. It was held, however, in 1881 by the court of appeal in England that, under the will of an Englishman domiciled in Holland, leaving personal property to children, children legitimated *per subsequens matrimonium* could take, as they were legitimate by the law of Holland, though not by the law of England (*re Goodman's Trusts*, 17 Ch. D. 266). This principle was carried further in *re Grey's Trusts* (1892), 3 Ch. 88, where it was held that a legitimated child was entitled to share in a devise of English realty. But it is to be noted that a person born out of lawful wedlock, though legitimated, cannot succeed as *heir* to real estate in England (*Birtwhistle v. Vardill*, 2 Cl. and F. 895). A will duly executed abroad is generally required to be clothed with the authority of a court of the country where any property affected by the will is situate. (J. W.)

WILLARD, FRANCES ELIZABETH (1839–1898), American reformer, was born at Churchville, Monroe county, New York, on the 28th of September 1839. She attended the Milwaukee Female College in 1857 and in 1859 graduated at the North-western Female College at Evanston, Illinois. She then became a teacher, and in 1871–1874 she was president and professor of aesthetics of the Woman's College at Evanston, which became part of the North-Western University in 1873. In 1874 she became corresponding secretary and from 1879 until her death was president of the National Woman's Christian Temperance Union, and from 1887 until her death was president of the World's Woman's Christian Temperance Union. She first spoke in favour of woman's suffrage in 1877; and in 1884 she was a member of the Executive Committee of the Prohibition party. In 1890 she was elected president of the Woman's National Council, which represented nearly all of the women's societies in America. She was one of the founders of *Our Union*, a New York publication in the interests of the National Woman's Christian Temperance Union, and of the *Signal* (after 1882 the *Union Signal*), which she edited in 1892–1898 and which was the Illinois organ of the union. She died in New York City on the 18th of February 1898.

With Mary A. Livermore she edited *A Woman of the Century* (Buffalo, N.Y., 1893), which includes a sketch of her life; and she published *Nineteen Beautiful Years* (1864), a life of her sister; *How to Win: A Book for Girls* (1886), *Glimpses of Fifty Years* (1889), and, in collaboration with H. M. Winslow, Mrs S. J. White and others, *Occupations for Women* (1897). See A. A. Gordon, *The Beautiful Life of Frances E. Willard* (Chicago, 1898), with an introduction by Lady [illegible] and W. M. Thayer, *Women Who Win* (New York, [illegible]

[illegible] will be found set out in the case. It is in [illegible] that of France.

WILLEMITE, a mineral consisting of zinc orthosilicate, Zn_2SiO_4, crystallizing in the parallel-faced hemihedral class of the rhombohedral system. Crystals have the form of hexagonal prisms terminated by rhombohedral planes: there are distinct cleavages parallel to the prism-faces and to the base. Granular and cleavage masses are of more common occurrence. The colour varies considerably, being colourless, white, greenish-yellow, apple-green, flesh-red, &c. The hardness is 5½, and the specific gravity 3·9-4·2. A variety containing much manganese replacing zinc is called "troostite." Willemite occurs at Sterling Hill, Sussex county, and Franklin Furnace in New Jersey, where it is associated with other zinc ores (franklinite and zincite) in crystalline limestone. It has been found at only a few other localities, one of which is near Liége, and for this reason the mineral was named after William I. of the Netherlands. Under the influence of radium radiations, willemite fluoresces with a brilliant green colour. (L. J. S.)

WILLEMS, FLORENT JOSEPH MARIE (1823–1905), Belgian painter, was born at Liége on the 8th of January 1823. He had no regular tuition in painting, but learnt by copying and restoring old pictures at Malines, where he lived from 1832. He made his debut at the Brussels Salon in 1842 with a "Music Party" and an "Interior of a 17th-century Guard-room" in the style of Terburg and Metsu. Soon afterwards he settled in Paris, where his pictures enjoyed considerable popularity under the second empire. Among his most famous works may be mentioned "The Wedding Dress" (Brussels Gallery), "La Fête des grands-parents" (Brussels Gallery), "Le Baise-main" (Mme. Cardon's collection, Brussels), "Farewell" (Willems coll., Brussels), "The Arches of the Peace" (Delahaye coll., Antwerp) and "The Widow" (engraved by Desvachez). He died at Neuilly-sur-Seine on the 23rd of October 1905.

WILLEMS, JEAN FRANÇOIS (1793–1846), Flemish writer, began life in the office of a notary at Anvers. He devoted his leisure to literature, and in 1810 he gained a prize for poetry with an ode in celebration of the peace of Tilsit. He hailed with enthusiasm the constitution of the kingdom of the Netherlands, and the revival of Flemish literature; and he published a number of spirited and eloquent writings in support of the claims of the native tongue of the Netherlands. His political sympathies were with the Orange party at the revolution of 1830, and these views led him into trouble with the provisional government. Willems, however, was soon recognized as the unquestioned leader of the Flemish popular movement, the chief plank in whose platform he made the complete equality of the languages in the government and the law courts. He died at Ghent in 1846.

Among his writings, which were very numerous, the most important were: *Les Sciences et les arts* (1816), *Aux Belges* (1818); *Étude sur les origines et l'histoire des temps primitifs de la ville d'Anvers* (1828); *Mélanges de littérature et d'histoire* (1829); besides several learned critical editions of old Flemish texts.

WILLESDEN, an urban district in the Harrow parliamentary division of Middlesex, England, suburban to London, lying immediately outside the boundary of the county of London (boroughs of Hammersmith and Kensington). Pop. (1881) 27,453; (1901) 114,811. It has increased greatly as a residential district, mainly of the working classes. There are, moreover, considerable railway works attached to Willesden Junction, where the suburban lines of the London & North Western, North London, and Great Western railways connect with the main line of the first-named company. Remains of Norman building have been discovered in the church of St Mary, which is of various dates, and has been much enlarged in modern times. Several ancient monuments and brasses are retained. There is a Jewish cemetery in Willesden Lane. The adjoining residential districts are Harlesden on the south, Kilburn and Brondesbury on the east, Cricklewood and Neasden (with the works of the Metropolitan railway) on the north.

At Domesday the manor of Willesden and Harlesden was held by the canons of St Paul's. In the 12th century it was formed into eight distinct manors, seven of which were held by the same number of prebendaries. A shrine or image of St Mary (Our

Lady of Willesden) was in the 15th century an object of pilgrimage, but by the middle of the century following the ceremonies had fallen into abuse, and the shrine was suppressed.

WILLETTE, LEON ADOLPHE (1857-), French painter, illustrator, caricaturist, and lithographer, was born in Chalons-sur-Marne. He studied for four years at the École des Beaux-Arts under Cabanel—a training which gave him a unique position among the graphic humorists of France. Whether comedy or tragedy, dainty triviality or political satire, his work is instinct with the profound sincerity of the artist. He set Pierrot upon a lofty pedestal among the imaginary heroes of France, and established Mimi Pinson, frail, lovable, and essentially good-hearted, in the affections of the nation. Willette is at once the modern Watteau of the pencil, and the exponent of sentiments that move the more emotional section of the public. Always a poet, and usually gay, fresh, and delicate, in his presentation of idylls exquisitely dainty and characteristically Gallic, illustrating the more "charming" side of love, often pure and sometimes unnecessarily materialistic, Willette frequently reveals himself bitter and fierce, even ferocious, in his hatreds, being a violent though at the same time a generous partizan of political ideas, furiously compassionate with love and pity for the people—whether they be ground down under the heel of political oppression, or are merely the victims of unrequited love, suffering all the pangs of graceful anguish that are born of scornful treatment. There is charm even in his thrilling apotheosis of the guillotine, and in the introduction into his caricatures of the figure of Death itself. The artist was a prolific contributor to the French illustrated press under the pseudonyms "Cémoi," "Pierrot," "Louison," "Bébé," and "Nox," but more often under his own name. He illustrated Mélandri's *Les Pierrots* and *Les Giboulées d'avril*, and has published his own *Pauvre Pierrot* and other works, in which he tells his stories in scenes in the manner of Busch. He decorated several "brasseries artistiques" with wall-paintings, stained glass, &c., notably Le Chat noir and La Palette d'or, and he painted the highly imaginative ceiling for La Cigale music hall. His characteristically fantastic "Parce Domine" was shown in the Franco-British Exhibition in 1908. A remarkable collection of his works was exhibited in 1888. His "Valmy" is in the Luxembourg, Paris.

WILLIAM (A.S. *Wilhelm*, O. Norse *Vilhiálmr*; O. H. Ger. *Willahelm*, *Willahalm*, M. H. Ger. *Willehelm*, *Willehalm*, Mod.Ger. *Wilhelm*; Du. *Willem*; O. Fr. *Villalme*, Mod. Fr. *Guillaume*; from "will," Goth. *vilja*, and "helm," Goth. *hilms*, Old Norse *hiálmr*, meaning possibly "one who wills to protect"), a masculine proper name borne by many European sovereigns and others, of whom the more important are treated below in the following order:—(1) kings of England and Scotland. (2) Other sovereigns in the alphabetical order of their states. (3) Other ruling princes. (4) Prelates, Chroniclers, &c.

WILLIAM I. (1027 or 1028–1087), king of England, surnamed the Conqueror, was born in 1027 or 1028. He was the bastard son of Robert the Devil, duke of Normandy, by Arletta, the daughter of a tanner at Falaise. In 1034 Robert resolved on a pilgrimage to Jerusalem. Having no legitimate son he induced the Norman barons to acknowledge William as his successor. They kept their engagement when Robert died on his journey (1035), though the young duke-elect was a mere boy. But the next twelve years was a period of the wildest anarchy. Three of William's guardians were murdered; and for some time he was kept in strict concealment by his relatives, who feared that he might experience the same fate. Trained in a hard school, he showed a precocious aptitude for war and government. He was but twenty years old when he stamped out, with the help of his overlord, Henry I. of France, a serious rising in the districts of the Bessin and Cotentin, the object of which was to put in his place his kinsman, Guy of Brionne. Accompanied by King Henry, he met and overthrew the rebels at Val-des-Dunes near Caen (1047). It was by no means his last encounter with Norman traitors, but for the moment the victory gave him an assured position. Next year he joined Henry in attacking their common enemy, Geoffrey Martel, count of Anjou. Geoffrey occupied the border fortress of Alençon with the good will of the inhabitants. But the duke recovered the place after a severe siege, and inflicted a terrible vengeance on the defenders, who had taunted him with his base birth; he also captured the castle of Domfront from the Angevins (1049).

In 1051 the duke visited England, and probably received from his kinsman, Edward the Confessor, a promise of the English succession. Two years later he strengthened the claims which he had thus established by marrying Matilda, a daughter of Baldwin V. of Flanders, who traced her descent in the female line from Alfred the Great. This union took place in defiance of a prohibition which had been promulgated, in 1049, by the papal council of Reims. But the affinity of William and Matilda was so remote that political rather than moral considerations may have determined the pope's action. The marriage was zealously opposed by Archbishop Malger of Rouen and Lanfranc, the prior of Bec; but Lanfranc was persuaded to intercede with the Curia, and Pope Nicholas II. at length granted the needful dispensation (1059). By way of penance William and his wife founded the abbeys of St Stephen and the Holy Trinity at Caen. The political difficulties caused by the marriage were more serious. Alarmed at the close connexion of Normandy with Flanders, Henry I. renounced the alliance which had long existed between the Capets and the house of Rollo. He joined forces with Geoffrey Martel in order to crush the duke, and Normandy was twice invaded by the allies. In each case William decided the campaign by a signal victory. The invasion of 1054 was checked by the battle of Mortemer; in 1058 the French rearguard was cut to pieces at Varaville on the Dive, in the act of crossing the stream. Between these two wars William aggrandized his power at the expense of Anjou by annexing Mayenne. Soon after the campaign of Varaville both Henry I. and Geoffrey Martel were removed from his path by death (1060). He at once recovered Maine from the Angevins, nominally in the interest of Herbert II., the lawful count, who became his vassal. In 1062, however, Herbert died and Maine was formally annexed to Normandy. This acquisition brought the Norman frontier almost to the Loire and isolated Brittany, long coveted by the Norman dukes, from the rest of France.

About 1064 the accidental visit of Harold to the Norman court added another link to the chain of events by which William's fortunes were connected with England. Whatever doubt hangs over the details of the story, it seems clear that the earl made a promise to support the claims of his host upon the English succession. This promise he was invited to fulfil in 1066, after the Confessor's death and his own coronation. Harold's perjury formed the chief excuse for the Norman Conquest of England, which in reality was a piratical venture resembling that of the sons of Tancred d'Hauteville in Lower Italy. William had some difficulty in securing the help of his barons. When consulted in a great council at Lillebonne they returned an unfavourable reply, and it was necessary to convince them individually by threats and persuasions. Otherwise the conditions were favourable. William secured the benevolent neutrality of the emperor Henry IV.; the influence of the archdeacon Hildebrand obtained for the expedition the solemn approval of Pope Alexander II. Philip I. of France was a minor under the guardianship of William's father-in-law, the count of Flanders. With Tostig, the banished brother of Harold, William formed an alliance which proved of the utmost service. The duke and his Normans were enabled, by Tostig's invasion of northern England, to land unmolested at Pevensey on the 28th of September 1066. On the 14th of October a crushing defeat was inflicted on Harold at the battle of Senlac or Hastings; and on Christmas Day William was crowned at Westminster.

Five years more were to elapse before he became master of the west and north. Early in 1067 he made a progress through parts of the south, receiving submissions, disposing of the lands of those who had fought against him, and ordering castles to be built; he then crossed the Channel to celebrate his triumph in Normandy. Disturbances at once occurred in Northumbria, on the Welsh marches and in Kent; and he was compelled to return in December. The year 1068 was spent in military expeditions against Exeter and York, in both of which the adherents of Harold had found a welcome. In 1069 Robert of Comines, a Norman to whom William had given the earldom of Northumberland, was murdered by the English at Durham; the north declared for Edgar Atheling, the last male representative of the West-Saxon dynasty; and Sweyn Estrithson of Denmark sent a fleet to aid the rebels. Joining forces, the Danes and English captured York, although it was defended by two Norman castles. The position seemed critical; but, fortunately for the king, the south and west gave no effective support to the rebellion. Marching rapidly on York he drove the Danes to their ships; and the city was then reduced by a blockade. The king ravaged the country as far north as Durham with such completeness that traces of devastation were still to be seen sixty years later. But the English leaders were treated with politic clemency, and the Danish leader, Jarl Osbiorn, was bribed to withdraw his fleet. Early in 1070 the reduction of the north was completed by a march over the moors to Chester, which had not hitherto submitted but was now placed under an earl of William's choice. From this point we hear no more of general rebellions against the foreign rule. In 1071 a local rising in the fens caused some trouble. An outlawed Englishman, Hereward by name, fortified the Isle of Ely and attracted a number of desperate spirits to his side; amongst others came Morcar, formerly earl of Northumbria, who had been disappointed in the hopes which he based on William's personal favour. The king in person undertook the siege of Ely, which proved unexpectedly difficult. But the failure of the insurgents was a foregone conclusion.

Of the measures which William took to consolidate his authority we have many details; but the chronological order of his proceedings is obscure. The redistribution of land appears to have proceeded pari passu with the reduction of the country; and at every stage of the conquest each important follower received a new reward. Thus were formed the vast but straggling fiefs which are recorded in Domesday. The great earldoms of the West-Saxon period were allowed to lapse; the new earls, for the most part closely connected with William by the ties of blood or friendship, were lords of single shires; and only on the marches of the kingdom was the whole of the royal jurisdiction delegated to such feudatories. William's writs show not only that he kept intact the old system of governing through the sheriffs and the courts of shire and hundred, but also that he found it highly serviceable. Those whom he enfeoffed with land held it according to the law of Norman feudalism, which was already becoming precise. They were thus brought into close personal relations with the king. But he forced the most powerful of them to acknowledge the jurisdiction of the ancient local courts; and the old fyrd-system was maintained in order that the crown might not be wholly dependent on feudal levies. Though his forest-laws and his heavy taxation caused bitter complaints, William soon won the respect of his English subjects. They appear to have accepted him as the lawful heir of the Confessor; and they regarded him as their natural protector against feudal oppression. This is to be explained by his regard for legal forms, by his confirmation of the "laws of Edward" and by the support which he received from the church. Domesday Book shows that in his confiscations he can have paid little attention to abstract justice. Almost every English landholder of importance was dispossessed, though only those who had actually borne arms against William should have been so treated. As far as possible Englishmen were excluded from all responsible positions both in church and state. After 1071 our accounts of William's doings become jejune and disconnected. Much of his attention must have been engrossed by the work of administration, carried on without the help of those elaborate institutions [illegible] which were perfected by Henry I. and [illegible] few ministers of note. William F[illegible] been his right-hand man i[illegible] Flanders (1071). Odo, [illegible]ther, lost favour and was finally thrown into prison on a charge of disloyalty (1082). Another half-brother, Robert of Mortain, earl of Cornwall, showed little capacity. Of the king's sons Robert, though titular count of Maine, was kept in leading strings; and even William Rufus, who was in constant attendance on his father, never held a public office. The Conqueror reposed much confidence in two prelates, Lanfranc of Canterbury and Geoffrey of Coutances. They took an active part in the civil no less than the ecclesiastical government. But the king himself worked hard in hearing lawsuits, in holding councils and ceremonious courts, in travelling between England and Normandy, and finally in conducting military operations.

In 1072 he undertook a campaign against Malcolm, king of Scots, who had married Margaret, the sister of Edgar Atheling, and was inclined to promote English rebellions. When William reached the Forth his adversary submitted, did homage as a vassal, and consented to expel Edgar Atheling, who was subsequently endowed with an English estate and admitted to William's favour. From Scotland the king turned to Maine, which had profited by the troubles of 1069 to expel the Norman garrisons. Since then the Manceaux had fallen out among themselves. The barons supported Azo of Liguria, the lawful successor of Herbert II.; the citizens of Le Mans set up a commune, expelled Azo's representatives and made war on the barons. William had therefore no difficulty in reducing the country, even though Le Mans was assisted by Fulk of Anjou (1073). In 1075 the king's attention was claimed by a conspiracy of the earls of Hereford and Norfolk, in which the Englishman Waltheof, earl of Northampton, was implicated to some degree. The rebels were defeated by Lanfranc in the king's absence; but William returned to settle the difficult question of their punishment, and to stamp out the last sparks of disaffection. The execution of Waltheof, though strictly in accordance with the English law of treason, was a measure which he sanctioned after long hesitation, and probably from considerations of expediency rather than justice. This severity to a man who was generally thought innocent, is one of the dark stains on his career. In 1076 he invaded Brittany to get possession of the fugitive earl of Norfolk; but Philip of France came to the aid of the Bretons, and William gave way before his suzerain. The next few years were troubled by a quarrel between the king and his eldest son. Robert fled from Normandy and after aimless wanderings obtained from King Philip the castle of Gerberoi, in the Beauvaisis, from which he harassed the Norman marches. William besieged Gerberoi in 1079, and was wounded in single combat by his son. A little later they were reconciled; but the reconciliation was short-lived; to the end of the reign Robert was a source of trouble. In the years 1083–1085 there was a second rising in Maine which was not laid to rest until William had granted liberal terms to the leader, Hubert of Beaumont. In 1085 news arrived that Cnut the Saint, king of Denmark, was preparing to assert the claims of his house in England. The project fell through, but gave occasion for the famous moot at Salisbury in which William took an oath of direct allegiance from "all the land-sitting men that were in England" (1086). While the danger was still impending he took in hand the compilation of Domesday Book. The necessary inquiries were ordered at the Christmas Council of 1085, and carried out in the following year. It is probable that William never saw the Domesday Book as we possess it, since he left England in the summer of 1086 and never returned. In 1087 he invaded the French Vexin to retaliate on the garrison of Mantes for raids committed on his territory. He sacked and burned the town. But as he rode out to view the ruins his horse plunged on the burning cinders and inflicted on him an internal injury. He was carried in great suffering to Rouen and there died on the 9th of September 1087. He was buried in St Stephen's at Caen. A plain slab still marks the place of his tomb, before the high altar; but his bones were scattered by the Huguenots in 1562.

In a profligate age William was distinguished by the purity of his married life, by temperate habits and by a sincere piety. His most severe measures were taken in cold blood, as part of his general policy; but his natural disposition was averse to unnecessary bloodshed or cruelty. His one act of wanton devastation, the clearing of the New Forest, has been grossly exaggerated. He was avaricious, but his church policy (see article English History) shows a disinterestedness as rare as it was honourable. In personal appearance he was tall and corpulent, of a dignified presence and extremely powerful physique, with a bald forehead, close-cropped hair and short moustaches.

By Matilda, who died in Normandy on the 3rd of November 1083, William had four sons, Robert, duke of Normandy, Richard, who was killed whilst hunting, and the future kings, William II. and Henry I., and five or six daughters, including Adela, who married Stephen, count of Blois.

Of the original authorities the most important are the *Gesta Willelmi*, by William of Poitiers (ed. A. Duchesne in *Historiae Normannorum scriptores*, Paris, 1619); the Winchester, Worcester and Peterborough texts of the *Anglo-Saxon Chronicle* (ed. B. Thorpe, "Rolls" series, 2 vols., 1861, and also C. Plummer, 2 vols., Oxford, 1892–1899); William of Malmesbury's *De gestis regum* (ed. W. Stubbs, "Rolls" series, 2 vols., 1887–1889); William of Jumièges' *Historia Normannorum* (ed. A. Duchesne, *op. cit.*); Ordericus Vitalis' *Historia ecclesiastica* (ed. A. le Prévost, *Soc. de l'historie de France*, 5 vols., Paris, 1838–1855). Of modern works the most elaborate is E. A. Freeman's *History of the Norman Conquest*, vols. iii.–v. (Oxford, 1870–1876). Domesday Book was edited in 1783–1816 by H. Farley and Sir H. Ellis in four volumes. Of commentaries the following are important: *Domesday Studies* (ed. P. E. Dove, 2 vols., London, 1888–1891); *Feudal England*, by J. H. Round (London, 1895); *Domesday Book and Beyond*, by F. W. Maitland (Cambridge, 1897); *English Society in the Eleventh Century*, by P. Vinogradoff (Oxford, 1908). See also F. M. Stenton, *William the Conqueror* (1908). (H. W. C. D.)

WILLIAM II. (*c.* 1056–1100), king of England, surnamed Rufus, was the third son of William I. by his queen Matilda of Flanders. Rufus was born some years before the conquest of England, but the exact date is uncertain. He seems to have been his father's favourite son, and constantly appears in the Conqueror's company, although like his brothers he was carefully excluded from any share in the government either of England or Normandy. A squabble with Rufus was the immediate cause of Robert's first rupture with the Conqueror; in the ensuing civil war we find Rufus bearing arms on the royal side (1077–1080). On this death-bed the Conqueror was inclined to disinherit his eldest son in favour of Rufus, who, by the early death of Prince Richard, was now left second in the order of succession. The king's advisers, however, used their influence to obtain a partition; Normandy was accordingly bequeathed to Robert, while Rufus was designated as the son on whom the Conqueror desired that the kingdom of England should devolve. With the help of Lanfranc the English were easily induced to accept this arrangement. Rufus was crowned at Westminster on the 26th of September 1087, fifteen days after the death of his father.

It may be in part the fault of our authorities that the reign of Rufus presents itself to us as a series of episodes between which the connexion is often of the slightest. In his domestic administration we can trace a certain continuity of purpose, and in his dealings with the Welsh and Scots he proceeded, though intermittently, along the broad lines of policy which his father had marked out. Beyond the Channel he busied himself with schemes, first for the reunion of England and Normandy, then for the aggrandisement of Normandy at the expense of France. But his attention was perpetually distracted by the exigencies of the moment. He threw himself into each particular design with unreflecting impetuosity, but never completed what had been well begun. The violence, the irregularity, the shamelessness of his private life are faithfully reflected in his public career. Even in cases where his general purpose could be justified, his methods of execution were crudely conceived, brutal and short-sighted. Rufus may well stand as the typical product of early feudalism. He was not without valour or glimmerings of chivalry, but perfidious to his equals, oppressive to his subjects, contemptuous of religion; with no sense of his responsibilities, and possessed by a fixed determination to exact the last farthing of his rights. The first year of his reign was troubled by a general conspiracy among the baronage, who took up arms for Robert in the name of the hereditary principle, but with the secret design of substituting a weak and indolent for a ruthless and energetic sovereign. Local risings in Norfolk, Somerset and the Welsh marches were easily repressed by the king's lieutenants. The castles of Kent and Sussex offered a more formidable resistance, since their lords were in direct communication with Robert of Normandy, and were led by the able Odo of Bayeux (*q.v.*), the king's uncle, who had been released from prison at the opening of the reign. Rufus, however, made an earnest appeal to the native English, promising good laws, the abolition of unjust taxes and redress for those who had suffered by the afforestments of the late king. These promises, which he never attempted to fulfil, served the purpose of the moment. Followed by large contingents of the national militia he successfully laid siege to the strongholds of the rebels. They were leniently treated, and the arch-conspirator, Odo of Bayeux, left England under a safe-conduct to sow fresh seeds of discord in Normandy. But Rufus resolved to take vengeance on his brother, and two years later invaded eastern Normandy. Encountering little resistance—for under Robert's rule the duchy had relapsed into a state of anarchy—he might have expelled the duke with no great trouble. But in 1091 a treaty was hastily patched up. Rufus retained the eastern marches of the duchy, and also received certain seaports. In return he undertook to aid Robert in reducing the rebellious county of Maine, and in recovering the Cotentin from their younger brother, Henry Beauclerk, to whom it had been pledged by the impecunious duke. The last part of the agreement was duly executed. But Rufus then recrossed the Channel to chastise the Scots who in his absence had raided the north country. By a march to the Firth of Forth he vindicated English honour; Malcolm III. of Scotland prudently purchased his withdrawal, by doing homage (Aug. 1091) on the same terms which William I. had imposed in 1072. Next year Rufus broke the treaty by seizing the stronghold of Carlisle and the other lands held or claimed by Malcolm in Cumberland and Westmorland. Malcolm in vain demanded satisfaction; while attempting reprisals on Northumberland he was slain in an obscure skirmish (1093). Rufus immediately put forward a candidate for the vacant throne; and this policy, though at first unsuccessful, finally resulted in the accession of Edgar (1097), a son of Malcolm, who had acknowledged the English overlordship. Carlisle remained an English possession; in the next reign Cumberland and Westmorland appear as shires in the accounts of the Exchequer. The Scottish policy of Rufus, though legally unjustifiable, was thus comparatively successful. In dealing with the Welsh he was less fortunate. Three campaigns which he conducted in North Wales, during 1095 and 1097, yielded no tangible result. The expansion of the Welsh marches in this reign was due to the enterprise of individual adventurers.

The affairs of Wales and Scotland did not prevent Rufus from resuming his designs on Normandy at the first opportunity. Robert was rash enough to reproach his brother with non-fulfilment of the terms arranged in 1091; and Rufus seized the excuse for a second invasion of the duchy (1094). Less prosperous than the first, and interrupted by a baronial conspiracy, which kept Rufus in England for the whole of 1095, this enterprise found an unexpected termination. Robert resolved to go upon Crusade and, to obtain the necessary funds, gave Normandy in pledge to his brother (1096). There can be no doubt that Rufus intended to remain in lasting possession of this rich security. The interests of Normandy at once became the first consideration of his policy. In 1098–1099 he recovered Maine at the cost of a vast expenditure on mercenaries, and commenced operations for the recovery of the Vexin. Early in 1100 he accepted a proposal, made by William IX. of Aquitaine, that he should take over that duchy on terms similar to those arranged in the case of Normandy. Contemporaries were startled at the rapid progress of the king's ambitions, and saw the direct interposition of heaven in the fate which cut them short. On the 2nd of August 1100 Rufus fell, in the New

Forest, the victim of an arrow from an unknown hand. The common story names Walter Tirel, who was certainly close at hand and fled the country without venturing to abide the issue of a trial. But a certain Ralph of Aix is also accused; and Tirel, from a safe distance, solemnly protested his innocence.

It remains to notice the main features of the domestic administration which made the names of William and his minister, Ralph Flambard, infamous. Respecting the grievances of the laity we have few specific details. But we are told that the "moots" all over England were "driven" in the interests of the king; which perhaps means that aids were extorted from the shire-courts. We also learn that the forest-laws were rigorously administered; that the king revived, for certain offences, the death-penalty which his father had abolished; that all men were vexed by unjust gelds and the feudal classes by unscrupulous misinterpretations of the customs relating to the incidents of wardship, marriage and relief. On one occasion the militia were summoned in considerable numbers for a Norman expedition, which was no part of their duty; but when they arrived at the sea-coast they were bidden to hand over their journey money and go home. The incident is not uninstructive as a side-light on the king's finance. As to the oppression of the church we are more fully informed; after allowing for exaggeration there still remains evidence enough to prove that the ecclesiastical policy of Rufus was unscrupulously venal. Vacant sees and abbacies were either kept for years in the hands of the king, who claimed the right of a feudal guardian to appropriate the revenues so long as the vacancy continued; or they were openly sold to the highest bidder. The history of Anselm's relations with the king is fully narrated by the biographer Eadmer. Anselm received the see of Canterbury in 1093, after it had been in the king's hands for upwards of four years. William made the appointment in a moment of repentance, when sick and at death's door. But he resented Anselm's demand for full restitution of the temporalities and his refusal to make any payment, in the nature of an aid or relief, which might be construed as simoniacal. Other grounds of quarrel were found in the reproofs which the primate aimed at the vices of the court, and in his requests for leave to hold a church-council and initiate reforms. Finally, in 1095, Anselm exasperated the king by insisting on his right to recognize Urban II. as the lawful pope. By the "customs" of the Conqueror it had been the rule that no pope should be recognized in England without the king's permission; and Rufus was unwilling that the English Church should be committed to either party in the papal schism which had already lasted fifteen years. Anselm, on the other hand, asserted that he had accepted the primacy on the distinct condition that he should be allowed to acknowledge Urban. The dispute came before a great council which was held at Rockingham (Feb. 25, 1095). The king demanded that the assembly should adjudge Anselm guilty of contumacy, and was supported by the bishops. The lay barons, however, showed their ill-will towards the king's general policy by taking Anselm's part. Rufus was forced to give way. He recognized Urban, but entered upon intrigues at Rome to procure the suspension of the archbishop. Finding that Urban would not betray a loyal supporter, the king fell back upon his authority as a feudal suzerain. He taxed Anselm with having failed to provide a satisfactory quota of knights for the Welsh war (1097). The archbishop, seeing that he was never to be left in peace, and despairing of an opportunity to effect the reforms on which his heart was set, demanded urgently that he should be allowed to leave England for the purpose of visiting Urban. Both the king and the barons suspected that this was the first step towards an appeal to the pope's jurisdiction against that of the royal court. Leave was at first refused; but ultimately, as Anselm continued to press his demand, he was suffered to depart, [illegible] some petty insults on his way (Oct. [illegible] of the king's apparent clemency was [illegible] estates of the archbishopric, [illegible] for the future. The [illegible] in their assertion that the zeal of Rufus for his father's "customs" was a mere cloak for avarice and tyranny.

In appearance William II. was unattractive; bull-necked, with sloping shoulders, extremely corpulent and awkward in his gait. His long locks and clean-shaven face marked his predilection for the new-fangled fashions which contemporary ecclesiastics were never weary of denouncing. His features were strongly marked and coarse, his eyes grey and deeply set; he owed his nickname to the fiery hue of his complexion. He stuttered violently and in moments of passion was almost inarticulate. His familiar conversation was witty and blasphemous. He was surrounded by a circle of vicious parasites, and no semblance of decorum was maintained in his household. His character was assailed by the darkest rumours which he never attempted to confute. He died unmarried and without issue.

The main authorities for the reign are the *Peterborough Chronicle* (ed. C. Plummer, 2 vols., Oxford, 1892–1899); Eadmer's *Vita Anselmi* and *Historia Novorum* (ed. M. Rule, "Rolls" series, 1884); William of Malmesbury's *De gestis regum* (ed. W. Stubbs, "Rolls" series, 2 vols., 1887–1889); Orderic Vitalis' *Historia ecclesiastica* (ed. A. le Prévost, 5 vols., Paris, 1838–1855). Of modern works the most exhaustive is E. A. Freeman's *Reign of William Rufus* (2 vols., Oxford, 1882). See also J. H. Round's *Feudal England* (London, 1895). (H. W. C. D.)

WILLIAM III. (1650–1702), king of England and prince of Orange, was the only son of William II., prince of Orange, stadtholder of the Dutch republic, and Mary, daughter of Charles I. of England, and was born at the Hague on the 4th of November 1650, eight days after his father's death. His father had attempted a *coup d'état*, which had failed, with the result that on his death the office of stadtholder was abolished. Power passed into the hands of John de Witt, who represented the oligarchic element and the special interests of one province, Holland, and was taken from the Orange party which represented the more democratic element and the more general interests of the Seven Provinces. William inherited the baleful lustre, without the substantial power, which his ancestors had given to the name of Orange. He grew up among enemies, and became artful, suspicious and self-controlled, concealing his feeling behind the mask of an immobile, almost repulsive, coldness. Like Charles XII. of Sweden and the younger Pitt, he was a wonderful example of premature mental development.

In 1672 Louis XIV. suddenly invaded Dutch territory. The startling successes of the French produced a revolution among the Dutch people, who naturally turned for help to the scion of the house of Orange. On the 8th of July 1672 the states general revived the stadtholderate, and declared William stadtholder, captain-general and admiral for life. This revolution was followed by a riot, in which John de Witt and his brother Cornelius were murdered by the mob at the Hague. Evidence may be sought in vain to connect William with the outrage, but since he lavishly rewarded its leaders and promoters this circumstance is not very much to his credit. The cold cynicism with which he acted towards de Witt is only matched by the heroic obstinacy with which he confronted Louis. Resolved as he said "to die in the last ditch," he rejected all thought of surrender and appealed to the last resource of Dutch patriotism by opening the sluices and laying vast tracts under water. The French army could not advance, while the French and English fleets were defeated by the Dutch admiral, De Ruyter. William summoned Brandenburg to his aid (1672) and made treaties with Austria and Spain (1673). In August 1674 he fought his first great battle at Seneffe, where, though the struggle was not unequal, the honours lay with Condé. The French evacuated Dutch territory early in 1674, but continued to hold places on the Rhine and in Flanders. In April 1677 William was badly beaten at St Omer, but balanced his military defeat by France by a diplomatic victory over England. In November 1677 he married Mary, eldest daughter of James, duke of York, afterwards King James II., and undertook negotiations with England [illegible] following year which forced Louis to make terms and [illegible] treaty of Nijmwegen in August 1678, which gave

Franche Comté and other places in Spanish Flanders to France. For some reason never yet made clear, but perhaps in order to produce a modification of terms which threatened the balance of power, William attacked the French army at Mons four days after the signature of peace. Luxembourg defeated him after a sanguinary and resultless struggle, and William gained nothing by his inexplicable action.

After the war Louis continued a course of aggression, absorbing frontier-towns in imperial or Spanish territory. William started a new coalition against him in October 1681 by making a treaty with Sweden, and subsequently with the empire, Spain and several German princes. After absorbing Strassburg (1681), Louis invaded Spanish Flanders and took Luxemburg (1684). Even then the new league would not fight and allowed Louis to retain his conquests by the truce of Regensburg (1685), but none the less these humiliations gave rise to a more closely-knit and aggressive coalition, which was organized in 1686 and known as the League of Augsburg.

From 1677 onwards William had carefully watched the politics of England. On the accession of James II. in 1685 he forced the duke of Monmouth to leave Holland, and sought to dissuade him from his ill-starred expedition to England. He apparently tried to conciliate his father-in-law in the hope of bringing him into the League of Augsburg. At the same time he astutely avoided offending the party in England which was opposed to James. By November 1687 he had decided that it was hopeless to expect that James would join the league against Louis, and he therefore turned for support to the English opposition. He caused his chief minister Fagel to write a letter expressing his disapprobation of the religious policy of James, which was published in November 1687. This announcement of his views was received with wild enthusiasm by the English who saw in him the friend of their liberties and their Church. But he knew too much of the English to suppose they would tolerate an armed invasion, and he accordingly made it clear that he would not undertake active interference unless he received a definite invitation from leading Englishmen. On the 30th of June 1688 Admiral Herbert, disguised as a blue-jacket, set out from England with a letter from seven influential Englishmen, asking William to "bring over an army and secure the infringed liberties" of England.

William set out from Holland with an army on the 2nd of November and landed at Torbay (Nov. 5th 1688). After a few days of hesitation, many influential noblemen declared for him in different parts of the country. James, who had at first joined his army at Salisbury, fell back to London and tried to negotiate. While his commissioners were amusing William, James sent off his wife and son to France, and tried to follow them. He was stopped in his flight by some fishermen at Faversham, and was forced to return to London. William insisted that he should be sent to Rochester, and there allowed him to escape to France. After this final flight of James, William, on the advice of an assembly of notables, summoned a convention parliament on the 22nd of January 1689. After a great deal of discussion, William was at length proclaimed joint-sovereign of England in conjunction with his wife, Mary (Feb. 13th 1689).

A constitutional settlement was effected by the end of 1689, almost all the disputed points between king and parliament being settled in favour of the latter. Though William by no means appreciated this confinement of his prerogative, he was too wise to oppose it. His own initiative is more clearly traceable in the Toleration Act, extending liberty of private worship to Dissenters. He also succeeded in passing an Act of Grace and Indemnity in 1690, by which he calmed the violence of party passion. But in general his domestic policy was not very fortunate, and he can hardly claim any personal credit for the reassessment of the land-tax (1692), the creation of the national debt or the recoinage act (1693–1695). Further, he threatened the existence of the Bank of England, by lending his support to a counter-institution, the Land Bank, which ignominiously collapsed. Though he was not blind to the commercial interests of England, he was neglectful of the administration and affairs of her oversea colonies. But though he was unable to extract the best results from parliament he was always able to avert its worst excesses. In spite of strong personal opinions to the contrary, he accepted the Triennial Act (1694), the vote reducing the army to 10,000 men (1697), the vote disbanding his favourite Dutch Guards (1699) and even (November 1699) a bill rescinding the grants of forfeited Irish estates, which he had made to his favourites. The main cause of the humiliations William suffered from parliament lay in his incapacity to understand the party or cabinet system. In his view the best way to govern was to have both parties represented in the ministry, so that, as Whig and Tory fell out, the king came by his own. A study of his reign shows that this method was unsuccessful, and that his affairs went most smoothly when the parliamentary majority held the same views as the ministry. It is not often remembered that William possessed an experience of the workings of representative government in Holland, which was remarkably similar to that in England. Hence his mistakes though easy to understand are by no means so pardonable as were, for example, those of the Georges, who had been absolute monarchs in their own country. William's unpopularity with his new people was, on the whole, unjustified, but his memory is rightly darkened by the stain of the "Massacre of Glencoe." In 1692 he signed an order for the "extirpation" of the Macdonalds, a small clan in the vale of Glencoe. It is improbable that he meant his order to be literally executed, it is not certain that he knew they had taken the oath of allegiance to him. None the less, when the massacre was carried out with circumstances of revolting barbarity, William behaved as he had done after the murder of De Witt. Popular pressure forced him to bring the murderers to justice, to punish them and dismiss them his service. But shortly afterwards they were all received into favour; "one became a colonel, another a knight, a third a peer."

These and other actions indicate that William could show on occasion a cold and cynical ruthlessness. But while admitting that his means were sometimes unprincipled, it must be recollected that his real ends were high and noble. While he sometimes disregarded the wishes of others, no one was more ready to sacrifice his own feelings for the attainment of the master aim of his life, the restoration of the "Balance of Power," by the overthrow of the predominance of France. This was the real aim of William in going to England in 1688. He had set off to secure an ally against Louis, and he came back from his expedition with a crown on his head and a new nation at his back, united in its detestation of popery and of France.

As king of England he concluded treaties of alliance with the members of the League of Augsburg and sent a large army to oppose the French in Flanders. But his greatest immediate peril during 1689–1690 came from the circumstance that the French disputed the mastery of the seas with the Anglo-Dutch fleet, and that Ireland was strongly for King James. On the 1st of July 1690 the allies were badly beaten at sea off Beachy Head, but on the same day William himself won a decisive victory over James's army at the Boyne in Ireland. Dublin and Drogheda soon fell and James fled from Ireland. The chances of continued resistance in Ireland, which depended on communication with France, were finally destroyed by the great victory off Cape La Hogue (May 19th, 1692). Ireland was speedily conquered when once the supremacy of England on the sea became assured. Now the French fleet was definitely destroyed, and though a destructive privateering warfare continued, England was no longer in danger of invasion.

The decisive successes for the Alliance were gained by its naval victories, whose importance William somewhat underrated and for whose execution he had only an indirect responsibility. In 1692 he lost Namur and was badly defeated at Steinkirk (August 4th), and in 1693 he was disastrously beaten at Neerwinden or Landen (July 19th). In 1695 he was able to resume the offensive and to retake Namur in a brilliant and, what was more unusual, a successful campaign. William had assumed the duties of commander-in-chief too young to learn the full duties of a professional soldier himself, and his imperious will did not suffer others to direct him. Hence though often fertile in resource and ingenious in plan, he was always a brilliant amateur; and, though sometimes unlucky, he was never really the equal of such generals as Condé or Luxembourg.

In diplomacy William was as uniformly successful as in war he was the reverse. His unity of aim and constancy of purpose make him one of the greatest of modern diplomatists. He held together his ill-assorted coalition, and finally concluded peace at Ryswick in September 1697. Louis restored all his acquisitions since 1678, except Strassburg, and recognized William as king of England. During the subsequent years William tried to arrange a partition treaty with France, by which the domains of the childless Charles II. of Spain were to be divided at his death. But on the death of Charles in 1700 the whole heritage was left to France. William endeavoured to oppose this, and used Louis's recognition of James Edward the "Old Pretender" as king of England (September 1701) to set the English people in a flame. War was already declared in 1702, but William, who had long been ailing, died from the combined effects of a fall from his horse and a chill on the 8th of March 1702. It was truly tragic that his doom should have come at the moment when he had once more drawn together a great alliance in Europe, and when he possessed a popularity in England such as he had never before enjoyed.

In viewing William's character as a whole one is struck by its entire absence of ostentation, a circumstance which reveals his mind and policy more clearly than would otherwise be the case. No one can doubt his real belief in religion in spite of many moral failings or weaknesses. He was an unfaithful husband and often treated his wife with scant consideration; he was too fond of Dutch favourites like Keppel or worthless women like Lady Orkney. When it suited his interests he sanctioned the systematic corruption of members of parliament, and he condoned massacres like those at the Hague or in Glencoe. On the other hand he did not hesitate to inflict considerable injury on his own people, the Dutch, by the terms of the treaty with England (1689), when it became clear that only in this way could England's co-operation be secured. The Dutch criticism on him has been that he might have done more to reform the clumsiness of their constitutional procedure, and thus given them some return for the crippling expenses of the war. English criticism avers that he ought to have recognized more fully the system of party government, and to have done more to promote our colonial and commercial development. Military historians point out that he sometimes sacrificed great advantages to impetuosity; naval experts that he sometimes threw away great opportunities by indifference. Some of these criticisms are rather beside the mark, but were all true, they would not impair his essential greatness, which lay in another sphere. The best proof of his real powers of statesmanship is that the peace of Utrecht was subsequently made on the broad lines which he had laid down as the only security for European peace nearly a dozen years before its conclusion. While he lacked in diplomacy the arts of a Louis XIV. or the graces of a Marlborough, he grasped the central problems of his time with more clearness, or advanced solutions with more ultimate success, than any other statesman of his age. Often baffled, but never despairing, William fought on to the end, and the ideas and the spirit of his policy continued to triumph long after the death of their author.

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WILLIAM IV. (1765–1837), king of England, third son of George III., was born at Buckingham Palace on the 21st of August 1765. In 1779 he was sent to sea and became a midshipman under Admiral Digby. Next year he sailed under Rodney and took part in the action off Cape St Vincent (16th of January 1780). During the rest of the war the young prince saw plenty of service, for which he imbibed a strong liking, and so laid the foundation of his popularity. On the conclusion of the war he travelled in Germany, visiting Hanover and Berlin, where he was entertained by Frederick the Great. In 1785 he passed for lieutenant; next year he was made captain and stationed in the West Indies. Shortly after 1787, being tired of his station, he sailed home without orders, and was punished for his insubordination by being obliged to stay at Plymouth till his ship was refitted, when he again sailed for the West Indies.

In 1789 he was made duke of Clarence. When war was declared against the French republic in 1793, he strongly supported it and was anxious for active employment; but, though he was made rear-admiral of the red, he could obtain no command. Thus condemned to inactivity, he amused or revenged himself by joining the prince of Wales and the duke of York in their opposition to the king. He threw himself into the dissipations of society, and his hearty geniality and bluff, sailor-like manners gained him popularity, though they did not secure him respect. He took his seat in the House of Lords, where he defended the extravagancies of the prince of Wales, spoke on the Divorce Bill, vehemently opposed the emancipation of slaves and defended slavery on the ground of his experience in the West Indies. Meanwhile he formed a connexion with Mrs Jordan, the actress, with whom he lived on terms of mutual affection and fidelity for nearly twenty years, and the union was only broken off eventually for political reasons. During all this period the prince had lived in comparative obscurity. The death of Princess Charlotte in 1817 brought him forward as in the line of succession to the crown. In 1818 he married Adelaide of Saxe-Meiningen, a lady half his age, without special attractions, but of a strong, self-willed nature, which enabled her subsequently to obtain great influence over her husband. On the death of the duke of York in 1827 the duke of Clarence became heir to the throne, and in the same year he was appointed lord high admiral. In discharging the functions of that office he endeavoured to assume independent control of naval affairs, although his patent precluded him from acting without the advice of two members of his council. This involved him in a quarrel with Sir George Cockburn, in which he had to give way. As he still continued to act in defiance of rules, the king was at length obliged to call upon him to resign.

On the 28th of June 1830 the death of George IV. placed him on the throne. During the first two years of his reign England underwent an agitation more violent than any from which it had suffered since 1688. William IV. was well-meaning and conscientious; but his timidity and irresolution drove ministers to despair, while his anxiety to avoid extremes and his want of insight into affairs prolonged a dangerous crisis and brought the country to the verge of revolution. Immediately after his accession the revolution of July broke out in France and gave a great impulse to the reform movement in England. The king, though he called himself an "old Whig," did not dismiss the Tory ministry which had governed the country during the last two years of his brother's reign; but the elections for the new parliament placed them in a minority. Within a fortnight of the opening of parliament they were beaten on a motion for the reform of the civil list, and resigned. Lord Grey undertook to form a ministry, with the avowed intention of bringing in a large measure of reform. This was not in itself displeasing to the king, who had [illegible] tendencies, and a few years before had supported [illegible] struggle in [illegible] attitude [illegible] Reform [illegible] the second [illegible] majority of one. [illegible] in committee, and offered to resign. The king declined to accept their resignation, but at the same time was unwilling to dissolve, although it was obvious that in the existing parliament a ministry pledged to reform could not retain office. From this dilemma William was rescued by the conduct of the opposition, which, anxious to bring on a change of ministry, moved an address against dissolution. Regarding this as an attack on his prerogative, William at once dissolved parliament (April 1831). The elections gave the ministry an overwhelming majority. The second Reform Bill was brought in in June, and passed its third reading (21st of September) by a majority of 109. A fortnight later (8th of October) the Lords threw out the bill by a majority of 41. But after a protracted political crisis (see the article on GREY, CHARLES GREY, 2nd earl) the king was compelled to consent to create a sufficient number of new peers to carry the bill, and the threat was successful in bringing about the passing of the act in 1832.

During the rest of his reign William IV. had not much opportunity of active political interference, but on one other occasion he made an unjustifiable use of his prerogative. Two years after the passing of the Reform Bill the ministry of Lord Grey had become unpopular. In July 1834 Lord Grey himself retired and Lord Melbourne took the lead. There were divergences of opinion in the cabinet, and the king strongly objected to the ministerial policy respecting the Irish Church. On the shallow pretext that Lord Althorp's removal to the Upper House would weaken the ministry in the House of Commons, where, however, they still had a majority, he suddenly dismissed them and summoned Sir Robert Peel (14th of November). Peel's ministry, containing many members who had been in the government on the king's accession, was called from its short duration "the ministry of the hundred days." Its formation clearly indicated that the Whig proclivities of the king, which had never been more than partial or lukewarm, had wholly disappeared. The step was regarded with general disapprobation. It was immediately followed by a dissolution, and the ministry soon found themselves in a minority. Beaten on Lord John Russell's motion respecting the Irish Church (3rd of April 1835), Peel resigned and Melbourne again came into power. Under him the Whigs retained the lead during the remainder of the reign. This *coup d'état* of November 1834 was the last occasion on which the English sovereign has attempted to impose an unpopular ministry on the majority in parliament.

In May 1837 the king began to show signs of debility, and died from an affection of the heart on the 20th of June, leaving behind him the memory of a genial, frank, warm-hearted man, but a blundering, though well-intentioned prince. He was succeeded by his niece Queen Victoria.

AUTHORITIES.—*Correspondence of Earl Grey with William IV. and Sir Herbert Taylor* (London, 1867); Fitzgerald's *Life and Times of William IV.*; Greville's *Memoirs*; *Memoirs* of Sir Robert Peel; the *Creevey Papers*; *Civil Correspondence of the Duke of Wellington*; Walpole's *History of England*; Martineau's *History of the Peace*.

(G. W. P.)

WILLIAM (1143–1214), king of Scotland, surnamed "the Lion," was the second son of Henry, earl of Huntingdon (d. 1152), a son of King David I., and became king of Scotland on the death of his brother, Malcolm IV., in December 1165, being crowned at Scone during the same month. After his accession to the throne William spent some time at the court of the English king, Henry II.; then, quarrelling with Henry, he arranged in 1168 the first definite treaty of alliance between France and Scotland, and with Louis VII. of France assisted Henry's sons in their revolt against their father in 1173. In return for this aid the younger Henry granted to William the earldom of Northumberland, a possession which the latter had vainly sought from the [illegible] king, and which was possibly the cause of their [illegible]. However, when ravaging the country near [illegible] was taken prisoner in July 1174, and after a [illegible] Richmond was carried to Normandy, where he [illegible] release by assenting in December 1174 to the [illegible] By this arrangement the king and his nobles, [illegible] undertook to do homage to Henry and his son; this and other provisions placing both the church and state of Scotland thoroughly under the suzerainty of England. William's next quarrel was with Pope Alexander III., and arose out of a double choice for the vacant bishopric of St Andrews. The king put forward his chaplain, Hugh; the pope supported the archdeacon, John the Scot, who had been canonically elected. The usual interchange of threats and defiances followed; then after the death of Alexander in 1181 his successor, Lucius III., consented to a compromise by which Hugh got the coveted bishopric and John became bishop of Dunkeld. In 1188 William secured a papal bull which declared that the Church of Scotland was directly subject only to the see of Rome, thus rejecting the claims to supremacy put forward by the English archbishop. This step was followed by the temporal independence of Scotland, which was one result of the continual poverty of Richard I. In December 1189, by the treaty of Canterbury, Richard gave up all claim to suzerainty over Scotland in return for 10,000 marks, the treaty of Falaise being thus definitely annulled.

In 1186 at Woodstock William married Ermengarde de Beaumont, a cousin of Henry II., and peace with England being assured three years later, he turned his arms against the turbulent chiefs in the outlying parts of his kingdom. His authority was recognized in Galloway which, hitherto, had been practically independent; he put an end to a formidable insurrection in Moray and Inverness; and a series of campaigns taught the far north, Caithness and Sutherland, to respect the power of the crown. The story of William's relations with King John is interesting, although the details are somewhat obscure. Soon after John's accession in 1199 the Scottish king asked for the earldom of Northumberland, which Richard I., like his father, had refused to restore to Scotland. John, too, refused this demand, but the threatened war did not take place, and in 1200 William did homage to the English king at Lincoln with the ambiguous phrase "saving his own rights." After a period of inaction war between the two countries again became imminent in 1209; but a peace was made at Norham, and about three years later another amicable arrangement was reached. Both these treaties seem to have been more favourable to England than to Scotland, and it is possible that William acknowledged John as overlord of his kingdom. William died at Stirling on the 4th of December 1214 and was buried at Arbroath. He left one son, his successor Alexander II., and two daughters, Margaret and Isabella, who were sent to England after the treaty of 1209, and who both married English nobles, Margaret becoming the wife of Hubert de Burgh. He also left some illegitimate children. William's reign is a very important period in the early history of Scotland, and may almost be said to mark an epoch in every department of public life. The relations of England and Scotland and of Scotland and France; the rise of towns, the development of trade and the establishment of order in Scotland itself; and the attitude of the Scottish Church, both to the papal see and to England, were all vitally affected by the events of this reign. William founded and richly endowed the abbey at Arbroath, and many of the Scottish towns owe their origin to his charters.

See E. W. Robertson, *Scotland under her Early Kings* (Edinburgh, 1862); Lord Hailes, *Annals of Scotland* (Edinburgh, 1819); A. Lang, *History of Scotland*, vol. i. (1900); also SCOTLAND: *History*.

WILLIAM I. (1797–1888), king of Prussia and German emperor, was the second son of Frederick William III. of Prussia and Louise, a princess of Mecklenburg-Strelitz. He was born at Berlin on the 22nd of March 1797, and received the names of Wilhelm Friedrich Ludwig. He was a delicate child and had to be carefully nurtured. His constitution, however, was sound, and he became one of the most vigorous men in Germany. After the battle of Jena he spent three years at Königsberg and Memel. Meanwhile he had given evidence of sterling honesty, a strict love of order, and an almost passionate interest in everything relating to war. On the 1st of January 1807 he received an officer's patent, and on the 30th of October 1813 was appointed a captain. William accompanied his father in the campaign of 1814, and early in the following year received the iron cross for personal bravery shown at Bar-sur-Aube. He took part in the entry into Paris on the 31st of March 1814, and afterwards visited London. He joined the Prussian army in the final campaign of the Napoleonic wars, and again entered Paris. The prince was made a colonel and a member of the permanent military commission immediately after his twentieth birthday, and at the age of twenty-one became a major-general. In 1820 he received the command of a division; and during the following nine years he had not only made himself master of the military system of his own country but studied closely those of the other European states. In 1825 he was promoted to the rank of lieutenant-general, and obtained the command of the corps of guards. On the 11th of June 1829 he married Augusta, daughter of Charles Frederick, grand duke of Saxe-Weimar. This lady, who had imbibed the Liberal tendencies of the court of Weimar and later developed a keen sympathy with Catholicism, exercised afterwards as queen and empress a considerable influence at court, in a sense generally hostile to Bismarck's views. She died on the 7th of January 1890.

On the death of his father in 1840—the new king, Frederick William IV., being childless—Prince William, as heir presumptive to the throne, received the title of prince of Prussia. He was also made lieutenant-governor of Pomerania and appointed a general of infantry. In politics he was decidedly conservative; but at the outbreak of the revolutionary movement of 1848 he saw that some concessions to the popular demand for liberal forms of government were necessary. He urged, however, that order should be restored before the establishment of a constitutional system. At this time he was the best-hated man in Germany, the mass of the Prussian people believing him to be a vehement supporter of an absolutist and reactionary policy. He was even held responsible for the blood shed in Berlin on the 18th of March, and was nicknamed the "Cartridge Prince," although he had been relieved nine days before of his command of the guards. So bitter was the feeling against him that the king entreated him to leave the country for some time, and accordingly he went to London, where he formed intimate personal relations with Prince Albert, Sir Robert Peel, Lord John Russell, Lord Palmerston and other English statesmen. On the 8th of June he was back at Berlin, and on the same day he took his seat as member for Wirsitz in the Prussian national assembly, and delivered a speech in which he expressed belief in constitutional principles. In 1849, when the revolutionary party in the grand-duchy of Baden became dangerous, he accepted the command of "the army of operation in Baden and the Palatinate," and his plans were so judiciously formed and so skilfully executed that in the course of a few days the rebellion was crushed. At the beginning of the campaign an unsuccessful attempt was made on his life. In October 1849 he was appointed military governor of the Rhineland and Westphalia, and took up his residence at Coblenz. In 1854 the prince was raised to the rank of a field-marshal and made governor of the federal fortress of Mainz. When the king was attacked with a disease of the brain, Prince William assumed the regency (7th October 1858), and on his brother's death, on the 2nd of January 1861, succeeded him as William I.

The political events of William's regency and reign are told elsewhere (see GERMANY: *History*; PRUSSIA: *History*). His personal influence upon these events is, however, of great importance and deserves separate notice. William was not a ruler of the intellectual type of Frederick the Great; but he believed intensely in the "God of battles" and in his own divine right as the vicegerent of God so conceived. He believed also in the ultimate union of Germany and in the destiny of Prussia as its instrument; and he held that whoever aspired to rule Germany must seize it for himself (Letter to von Natzmer of the 20th of May 1849, in Natzmer's *Unter den Hohenzollern*). But an attitude so wholly alien to the Liberal temper of contemporary Germany was tempered by shrewd common sense, and, above all, by a capacity to choose his advisers well and [illegible] advice. Thus it came about that the [illegible] views were feared, called the Liberals [illegible] advice, though later he did not [illegible] tion when the refusal of the [illegible] made this course necessary. From September 1862, when Bismarck took office as minister president, William's personality tends to be obscured by that of his masterful servant, who remained beside him till his death. But Bismarck's *Reminiscences* contain plentiful proof that his master was by no means a cipher. His prejudices, indeed, were apt to run athwart the minister's plans; as in the Schleswig-Holstein question, when the king's conscience in the matter of the claims of the Augustenburg prince threatened to wreck Bismarck's combinations. But, as Bismarck put it, the annexation of the duchies gave him "a taste for conquest," and in the campaign of 1866 the difficulty was to restrain the king, who wished to enter Vienna in triumph. Whatever may have been the feelings of the Prussians before the war, its striking success fully justified the king's policy, and on his return to Berlin he was received with unbounded enthusiasm.

In the events immediately preceding the Franco-German War of 1870–71 again it was Bismarck and not the king that gave the determining impulse. In the matter of the Hohenzollern candidature King William's attitude was strictly "correct." He was justified in refusing to discuss further with Benedetti the question of "guarantees," a matter which touched his honour; and if the refusal, courteously framed, was read in Paris as an insult, this was due to Bismarck's "editing" of the Ems telegram (see BISMARCK). The result of the outcry in France and of the French declaration of war was that all Germany rallied round the king of Prussia, and when, on the 31st of July, he quitted Berlin to join his army, he knew that he had the support of a united nation. He crossed the French frontier on the 11th of August, and personally commanded at the battles of Gravelotte and Sedan. It was during the siege of Paris, at his headquarters in Versailles, that he was proclaimed German emperor on the 18th of January 1871. On the 3rd of March 1871 he signed the preliminaries of peace which had been accepted by the French Assembly; and on the 21st of March he opened the first imperial parliament of Germany. On the 16th of June he triumphantly entered Berlin at the head of his troops.

After that period the emperor left the destinies of Germany almost entirely in the hands of Bismarck, who held the office of imperial chancellor. In his personal history the most notable events were two attempts upon his life in 1878—one by a working lad called Hödel, another by an educated man, Karl Nobiling. On the first occasion the emperor escaped without injury, but on the second he was seriously wounded. These attacks grew out of the Socialist agitation; and a new Reichstag, elected for the purpose, passed a severe anti-Socialist law, which was afterwards from time to time renewed. Until within a few days of his death the emperor's health was remarkably robust; he died at Berlin on the 9th of March 1888.

The reign of William I. marked an era of vast importance in the history of Germany. In his time Prussia became the first power in Germany and Germany the first power in Europe, though these momentous changes were due in a less degree to him than to Bismarck and Moltke; but to him belongs the credit of having recognized the genius of these men, and of having trusted them absolutely. Personally William maintained the best traditions of the Hohenzollerns, not only by the splendour of the achievements with which his name will always be intimately associated, but by the simplicity, manliness and uprightness of his daily life. By his marriage with Augusta of Saxe-Weimar William I. had two children: the crown prince Frederick William (b. 1831), who succeeded him as Frederick III. (*q.v.*), and the princess Louise (b. 1838), married in 1856 to the grand-duke of Baden.

William I.'s military writings were published in 2 vols. at Berlin in 1897. Of his letters and speeches several collections have appeared: *Politische Korrespondenz Kaiser Wilhelms I.* (1890); *Kaiser Wilhelms des Grossen Briefe, Reden und Schriften* (2 vols., 1905), and [illegible] with Bismarck [illegible] Penzler, Leipzig, 1900). A [illegible] in German, of which [illegible] *Leben Kaiser Wilhelms* [illegible] (1888); v. Bernhardi, *Die* [illegible] *buchblätter* (Leipzig, 1895); [illegible] (2 vols., Berlin, 1890–1892); [illegible] *Friedrich Wilhelm IV. von* [illegible] *Wilhelm I., Tagebuchblätter* [illegible] *im und . . . Roon als Bildner* [illegible] 1906); E. Marcks, *Kaiser*

Wilhelm I. (Leipzig, 1897; 5th ed. 1905). In English have appeared *William of Germany*, by Archibald Forbes (1888), a translation of Edouard Simon's *The Emperor William and his Reign* (2 vols., 1886). See also Sybel's *Founding of the German Empire* (Eng. trans., New York, 1890–1891).

WILLIAM II. [Friedrich Wilhelm Victor Albert] (1859–), king of Prussia and German emperor, was born on the 27th of January 1859 at Berlin, being the eldest child of Prince Frederick of Prussia, afterwards crown prince and second German emperor, and of Victoria, princess royal of Great Britain and Ireland. On his tenth birthday he was appointed second lieutenant in the First Regiment of the Guards. From September 1874 to January 1877 he attended the gymnasium at Cassel; he studied for two years at Bonn, and was then for some time chiefly occupied with his military duties. In 1885 he was appointed colonel of the Hussars of the Guard. He was much influenced by the military atmosphere in which his life was spent, and was more in sympathy with the strongly monarchical feelings of the emperor William and Bismarck than with the more liberal views of his own parents, but until the illness of his father in 1887 he took no part in political life. The death of his grandfather was quickly followed by that of his father, and on the 15th of June he became ninth king of Prussia and third German emperor. The chief events of his reign up to 1910 are narrated under Germany: *History*, but here it is necessary to dwell rather on the personality of the emperor himself. His first act was an address to the army and navy, while that to his people followed after three days. Throughout his reign, indeed, he repeatedly stated that the army was the true basis of his throne: "The soldier and the army, not parliamentary majorities, have welded together the German Empire. My confidence is placed on the army."

From the first he showed his intention to be his own chancellor, and it was this which brought about the quarrel with Bismarck, who could not endure to be less than all-powerful. The dismissal and disgrace of the great statesman first revealed the resolution of the new ruler; but, as regards foreign affairs, the apprehensions felt at his accession were not fulfilled. While he maintained and confirmed the alliance with Austria and Italy, in obedience to the last injunctions of his grandfather, he repeatedly attempted to establish more cordial relations with Russia. His overtures, indeed, were scarcely received with corresponding cordiality. The intimacy of Russia with France increased, and more than a year passed before the Russian emperor appeared on a short visit to Berlin. In 1890 the emperor again went to Russia, and the last meeting between him and Alexander III. took place at Kiel in the autumn of 1891, but was marked by considerable coolness. By his visit to Copenhagen, as in his treatment of the duke of Cumberland and in his frequent overtures to France, the emperor showed the strong desire, by the exercise of his own great personal charm and ability, to heal the wounds left by the events of a generation before. In the autumn of 1888 he visited not only the courts of the confederate princes, but those of Austria and Italy. While at Rome he went to the Vatican and had a private conversation with Pope Leo XIII., and this visit was repeated in 1895 and again in 1903. In 1889 the marriage of his sister, the Princess Sophie, to the duke of Sparta, took him to Athens; and thence he sailed to Constantinople. It was the first time that one of the great rulers of Christendom had been the guest of the sultan. A more active interest was now taken by Germany in the affairs of the Levant, and the emperor showed that he would not be content to follow the secure and ascertained roads [illegible] Bismarck had so long guided the country. It was [illegible] Berlin had become the centre of the European [illegible] emperor was the apostle of a new Germany, [illegible] that her voice should be heard in all political [illegible]tever quarter of the globe they might rise. Once [illegible], he went to Constantinople. It was the time [illegible]menian massacres had made the name of Abd-ul [illegible]rious, and the very striking friendliness shown [illegible] scarcely seemed consistent with the frequent claims made by the emperor to be the leader of Christendom; but any scruples were doubtless outweighed by the great impulse he was able to give to German influence in the East. From Constantinople he passed on to Palestine. He was present at the consecration of the German Protestant church of the Redeemer. By the favour of the sultan he was able to present to the German Catholics a plot of ground, the Dormition de la Sainte Vierge, very near to the Holy Places.

The motive of his frequent travels, which gained for him the nickname of *Der Reise-Kaiser*, was not solely political, but a keen interest in men and things. His love of the sea was shown in an annual voyage to Norway, and in repeated visits to the Cowes regatta. He was a keen yachtsman and fond of all sorts of sport, and, though deprived of the use of his left arm through an accident when he was a child, he became an excellent shot and rider.

At the time of his accession there was a strong manifestation of anti-British feeling in Berlin, and there seemed reason to suppose that the party from which it proceeded had the patronage of the emperor. Any temporary misunderstanding was removed, however, by his visit to England in 1889. For the next six years he was every year the guest of Queen Victoria, and during the period that Caprivi held office the political relations between Germany and Great Britain were very close. While the emperor's visits were largely prompted by personal reasons, they had an important political effect; and in 1890, when he was entertained at the Mansion House in London and visited Lord Salisbury at Hatfield, the basis for an *entente cordiale* seemed to be under discussion. But after 1895 the growth of the colonial spirit in Germany and the strong commercial rivalry with Great Britain, which was creating in Germany a feeling that a navy must be built adequate to protect German interests, made the situation as regards England more difficult. And an unexpected incident occurred at the end of that year, which brought to a head all the latent feelings of suspicion and jealousy in both countries. On the occasion of the Jameson Raid he despatched to the president of the Transvaal a telegram, in which he congratulated him that "without appealing to the help of friendly powers," he had succeeded in restoring peace and preserving the independence of his country. It was very difficult to regard this merely as an impulsive act of generous sympathy with a weak state unjustly attacked, and though warmly approved in Germany, it caused a long alienation from Great Britain. The emperor did not again visit England till the beginning of 1901, when he attended the deathbed and funeral of Queen Victoria. On this occasion he placed himself in strong opposition to the feelings of the large majority of his countrymen by conferring on Lord Roberts the Order of the Black Eagle, the most highly prized of Prussian decorations. He had already refused to receive the ex-president of the Transvaal on his visit to Europe. Meanwhile, with the other great branch of the English-speaking people in the United States, it was the emperor's policy to cultivate more cordial relations. In 1902, on the occasion of the launching of a yacht built for him in America, he sent his brother Prince Henry to the United States as his representative. The occasion was rendered of international importance by his official attitude and by his gifts to the American people, which included a statue of Frederick the Great. The emperor also initiated in 1906 the exchange of professors between German and American universities.

As regards home policy, the most important work to which the emperor turned his attention was the increase of the German naval forces. From the moment of his accession he constantly showed the keenest interest in naval affairs, and the numerous changes made in the organization were due to his personal initiative. It was in January 1895, at an evening reception to members of the Reichstag, that he publicly put himself at the head of the movement for making Germany a sea power. In all the subsequent discussions on the naval bills his influence was decisively used to overcome the resistance of the Reichstag. "Our future," he declared, "is on the water," and in speeches in all parts of the country he combated the indifference of the inland Germans to the sea. "I will not rest," he telegraphed to his brother, "till I have brought my navy to the same height at which my army stands." The development of German armaments during the next few years (see Navy) showed that this was no idle boast. But, while it was inevitable that the inference should be drawn that the increase of the German navy was directed towards eventual hostilities with Great Britain, the emperor himself insisted that the real object was the preservation of peace consistently with the maintenance of Germany's "place in the sun." In March 1905, in a speech at Bremen, he declared the aim of the Hohenzollerns to be "a world-wide dominion founded upon conquests not gained by the sword, but by the mutual confidence of nations that press towards the same goal." "Every German warship launched," he said, "is one guarantee more for peace on earth." In the same spirit he protested later, in an "interview" published in the *Daily Telegraph* of the 28th of October 1908, that he had always been actuated by the friendliest feelings towards England, but that "Germany must be prepared for any eventualities in the East," and that, in view of the growing naval power of Japan, England should welcome the existence of a German fleet "when they speak together on the same side in the great debates of the future" For to the emperor, who had published a cartoon, drawn by himself, representing the European powers in league against the Yellow Peril, the Anglo-Japanese alliance seemed a betrayal of the white race, an unnatural league which could not last. The justification of his naval policy so far as European affairs were concerned was revealed in the effective intervention of Germany in regard to France and Morocco in 1905, and in 1909 in the defiance of British policy when Austria, backed by Germany, tore up the treaty of Berlin in regard to Bosnia and Herzegovina.

In numerous rhetorical speeches the emperor had impressed the world with his personal conviction of autocratic sovereignty, and his monarchical activity was certain, sooner or later, to bring him into conflict with the constitutional limitations of his position as king of Prussia and German emperor. His imperial style, constitutionally but the honorary title of the *primus inter pares* in a free confederation of sovereign princes, was invested by him with something of the glamour of that of the Holy Roman emperors, with their shadowy claim to world-dominion. In speech after speech he proclaimed the world-mission of Germany, of which he himself was the divinely appointed instrument; Germans are "the salt of the earth[1];" they must not "weary in the work of civilization," and Germanism, like the spirit of imperial Rome, must expand and impose itself.[2] This new imperialism, too, had a religious basis, for "the whole of human life hinges simply and solely on our attitude towards our Lord and Saviour."[3] The emperor's progresses in the East were conceived in the spirit of the new crusade, at once Christian and German; and a solemn service, to which none but the emperor and his train were admitted, was held on the summit of the Mount of Olives. In the same spirit, too, the emperor dispensed the marks of his approval and disapproval beyond the borders of his own jurisdiction, sometimes with results which were open to criticism. The "Kruger telegram" has been mentioned; scarcely less characteristic was the message despatched by him on the 9th of April 1906, after the Algeciras conference, to Count Goluchowski, the Austro-Hungarian foreign minister, congratulating him on having proved "a brilliant second on the duelling-ground." Goluchowski's retirement was mainly due to this compliment. In 1905 he bestowed the order *Pour le Mérite* not only on the Japanese general Nogi, but also on the Russian general Stössel, the defender of Port Arthur, who was afterwards condemned by a Russian [illegible] martial for dereliction of duty. In 1902 his telegram [illegible] regent of Bavaria condemning the refusal of the [illegible] in the diet to vote £5000 for art pur[illegible] to supply the money, was re[illegible] ference in the internal affairs of Bavaria and roused strong resentment among the clericals all over Germany.

Owing to the political conditions in Germany it was generally left for the Socialists to attack these excursions on the part of the emperor into fields which lay beyond his strict prerogative. But, apart from the traditional lines of political cleavage, such as the inherited hatred of the Liberal South for the Hohenzollern "corporal's cane," other centres of dissatisfaction were coming into being. The emperor was isolated in his efforts to impose the old, strenuous, Prussian ideals of "self-denial, discipline, religion, avoidance of foreign contagion." With the growth of wealth Germany was becoming materialized and to some extent Americanized, partly through the actual reflux of emigrants grown rich in the United States. In this new society, far removed from the days, denounced by the historian Gervinus, when the Germans were content to "fiddle and be slaves," the phrases which still woke responsive echoes in the squires of the Old Mark of Brandenburg were apt to create surprise, if not indignation; and in the great industrial classes the principles of Social Democracy spread apace. The emperor himself here and there even yielded a little to the new ideas, as when, in the famous "Babel and Bible" controversy of 1903, arising out of lectures in which Professor Delitzsch had derived Jewish monotheism from Babylonian polytheism, he publicly accepted the main conclusion of the "higher criticism" of the Old Testament, while maintaining that the kernel and contents, God and His works, remain always the same; or when on the 17th of November 1906, on the 25th anniversary of William I.'s edict announcing national insurance, he promised further social reforms. But he was impatient of what he considered factious opposition, and was apt to appeal from the nation in parliament to the nation in arms, as when in 1906, at the Silesian manœuvres, he condemned the critical spirit exercised towards the government, and invoked once more the protection of Germany's "Divine Ally." Clearly, this was an attitude which was inconsistent with the development of what prided itself on being a constitutional state; but there were obvious difficulties in the way of controlling the utterances of a ruler, vigorous, self-confident and conscious of the best intentions, who was also the master of many legions, whose military spirit he could evoke at will. In October 1906 the publication of Prince Hohenlohe's *Memoirs*, containing indiscreet revelations of the emperor's action in the dismissal of Bismarck, caused a profound sensation. A few months later, in February 1907, the prestige of the court was further damaged by various unsavoury revelations, made by Herr Harden in the *Zukunft*, as to the character of the "camarilla" by which the emperor was surrounded, and it was affirmed that a connexion could here be traced with the fall of Caprivi in 1894. The long-drawn-out trials and counter-trials left the character of the emperor entirely unstained, but they resulted in the disgrace of men who had been his confidants—Prince Philip Eulenburg, Count Kuno Moltke and others. The attitude of the emperor throughout was manly and sensible; and not the least satisfactory outcome of the whole sorry business was the issue, on the 28th of January 1907, of an edict, afterwards embodied in a bill, greatly modifying the law of *lèse-majesté*, which in the earlier part of the reign had been used to ridiculous excess in the imprisonment of the authors of the slightest reflection on the person of the sovereign.

Anglo-German relations were apparently improved by a visit of the emperor to England in November 1907. But early in 1908 they were again strained by the revelation, made in *The Times* of the 6th of March, of a correspondence between the emperor and Lord Tweedmouth, the first lord of the admiralty, in which, [illegible] in [illegible] assurances on the emperor's part, the [illegible] communicated to him an outline [illegible] before it had even been laid on the [illegible]ons. The angry controversy to [illegible] emperor's attempts to allay it, led [illegible] serious crisis in his relations with his [illegible] August he had met Edward VII. at [illegible] in a speech at Strassburg, he reiterated the intention of Germany to maintain the high level of her armaments; and on the 28th of October there appeared in the *Daily Telegraph* an extraordinary "interview," authorized by him, in which he expounded his attitude. The document was a résumé of his table-talk during his stay at Highcliffe Castle, on the Hampshire coast opposite the Isle of Wight, in the autumn of 1907. In it he reiterated that his heart was set on peace; he declared that, so far from being hostile to the English, he had offended large sections of his people by his friendship for England. He instanced his refusal to receive the Boer delegates and his rejection of the proposals of France and Russia for a joint intervention to stop the South African War; he also mentioned the curious fact that at an early stage of the war he had himself drawn up a plan of campaign for the British and sent it to Windsor. It was on this occasion, too, that he made the suggestion of an eventual co-operation of the British and German fleets in the Far East. This pronouncement created a profound sensation, not only in Germany, where the indignation was intense, but in Russia, France and Japan, where it was regarded as a Machiavellian attempt to loosen existing alliances. In the German press and parliament a storm of protest arose. Prince Bülow, as technically responsible, handed in his resignation, which was not accepted, and he was forced to make in the Reichstag the best defence that he could for the imperial indiscretion, declaring that henceforth the emperor would show more reserve. The emperor publicly endorsed the chancellor's explanations, and for nearly two years maintained in public an almost unbroken silence. But this came to an end in a speech delivered at Königsberg, on the 25th of August 1910. In this the emperor again laid special stress upon the divine right by which alone the kings of Prussia rule, adding: "considering myself as the instrument of the Lord, without heeding the views and opinions of the day, I go my way." This speech led to a debate, on a Socialist interpellation, in the Reichstag (November 26). In reply to the enquiry what the government intended to do in fulfilment of the pledge given in 1908, the chancellor denied that the emperor had exceeded his constitutional rights, a view supported by the majority of the House.

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[1] Speech at [illegible]

[2] Speech at [illegible]

[3] Speech at [illegible]

The emperor married on the 27th of February 1881 Princess Auguste Victoria, daughter of Frederick, duke of Augustenburg, who in 1864 had come forward as claimant to the duchies of Schleswig-Holstein; the marriage had, therefore, some political importance, for it sealed the reconciliation of one of the dynasties that had suffered by the rise of Prussia. They had six sons and one daughter: (1) Wilhelm, born 6th May 1882, Crown Prince, whose coming of age was celebrated with much ceremony on his eighteenth birthday, and who married on the 6th of June 1905 the duchess Cecilia of Mecklenburg, their eldest son, Wilhelm, being born on the 4th of July 1906; (2) Eitel Friedrich, born on the 7th of July 1883; (3) Adalbert, born on the 14th of July 1884; (4) August Wilhelm, born on the 29th of January 1887; (5) Oskar, born on the 27th of July 1888; (6) Joachim, born on the 17th of December 1890; and (7) Viktoria Luise, born on the 13th of September 1892.

For the emperor's speeches, &c., see *Kaiserreden. Reden und Erlasse, Briefe und Telegramme Kaiser Wilhelms II.* (Leipzig, 1902); translated by L. Elkind, as *The German Emperor's Speeches* (London, 1904).

WILLIAM I. (1772–1844), king of the Netherlands, born at the Hague on the 24th of August 1772, was the son of William V., prince of Orange and hereditary stadtholder of the United Netherlands by Sophia Wilhelmina, princess of Prussia. In 1791 he married Frederica Wilhelmina, daughter of Frederick William II., king of Prussia, thus cementing very closely the relations between the houses of Orange-Nassau and Hohenzollern. After the outbreak of war with the French republic in 1793, he distinguished himself in the struggle against the revolutionary army under Dumouriez by the capture of Landrecies and the relief of Charleroi. By the victories of Pichegru the stadtholder [illegible] family were, however, compelled to leave Holland and [illegible] in England, where the palace of Hampton Court was [illegible] their use. He afterwards made Berlin his residence, [illegible] active part in the unfortunate campaign under the [illegible] York for the reconquest of the Netherlands. After the [illegible] Amiens he had an interview with Napoleon at Paris, [illegible]ived some territory adjoining the hereditary domains of the house of Nassau in Westphalia as a compensation for the abandonment of the stadtholderate and the domains of his house. William refused, however, in 1806, in which year by the death of his father he became prince of Orange, to separate his interests from those of his Prussian relatives, and fought bravely at Jena. He was therefore despoiled by Napoleon of all his possessions. In 1809 he accepted a command in the Austrian army under the archduke Charles and was wounded at the battle of Wagram. When Holland rose in revolt against French domination in 1813, after eighteen years of exile he landed at Scheveningen (on the 19th of November) and was on the 3rd of December, amid universal rejoicing, proclaimed prince sovereign of the Netherlands. His assumption in the following year of the title of king of the Netherlands was recognized by the powers, and by the treaty of Paris his sovereignty was extended over the southern as well as the northern Netherlands, Belgium being added to Holland "as an increase of territory." After the battle of Waterloo, in which Dutch and Belgian troops fought side by side under his command, the congress of Vienna further aggrandized him by making him sovereign of the territory of Luxemburg with the title of grand duke.

William had many excellent qualities, but his long life of exile and hardship had made him niggardly and narrow. He was unable to rise to the great opportunity which lay before him of creating out of the Dutch and Belgian provinces a strong and united state. Two hundred and fifty years of political separation and widely differing experiences had caused the two kindred populations on this and that side of the Scheldt to grow apart in sentiment and tradition. This difference was still further accentuated by strong divergence in religious creed. Further, one-third of the Belgian provinces was inhabited by a Walloon population divided from the Flemings by racial characteristics and their use of a Romance instead of a Teutonic dialect. All these things William was inclined to ignore. He drew up a constitution, which was accepted unanimously by the Dutch, but was rejected by the Belgians, because it contained provisions for liberty of worship. The king, however, by a subterfuge declared that the fundamental law had been approved. The new constitution, therefore, started badly, and it was soon evident that William intended to make his will prevail, and to carry out his projects for what he conceived the social, industrial and educational welfare of the kingdom regardless of the opposition of Belgian public opinion. The Belgians had many grievances. Their representation in the states general was exactly equal to that of the Dutch, though their population was in the proportion of seven to five. With the help of the official vote of ministers the Dutch were thus able to have a perpetual majority. The whole machinery of government was centralized at the Hague, and Dutchmen filled nearly all the principal posts. The attempt of the king to enforce the official use of the Dutch language, and the foundation of the so-called philosophical college at Louvain helped to exacerbate the growing discontent. The rapid advance of Belgium in industrial and manufacturing prosperity, due largely to the stimulus of William's personal initiative, did nothing to bring north and south together, but rather increased their rivalry and jealousy, for the Dutch provinces had neither manufactures nor iron- and coal-mines, but were dependent on agriculture and sea-borne commerce for their welfare. Such clashing of interests was sure to produce alienation, but the king remained apparently blind to the signs of the times, and the severe enforcement of a harsh law restricting freedom of the press led suddenly in 1830 to a revolt (see BELGIUM), which, beginning at Brussels at the end of August, rapidly spread over the whole country. The Dutch were almost without striking a blow expelled from the country, the strongly fortified seaport of Antwerp alone remaining in their hands. Had the king consented at once to the administrative autonomy of Belgium, and appointed the prince of Orange governor of the southern Netherlands, it is probable that the revolt might have been appeased. At the first there was undoubtedly a strong body of public opinion in favour of such a compromise, and the house of Orange had many adherents in the country. William, however, was too proud and too obstinate to lend himself to such a course. He appealed to the powers, who had, in 1815, created and guaranteed the independence of the kingdom of the Netherlands. By the treaty of the eighteen articles, however, concluded at London on the 29th of June 1831, the kingdom of Belgium was recognized, and Leopold of Saxe-Coburg was elected king. William refused his assent, and in August suddenly invaded Belgium. The Belgian forces were dispersed, and the Dutch would have entered Brussels in triumph but for the intervention of the French. Still, however, William declined to recognize the new throne, and he had behind him the unanimous support of Dutch public opinion. For nine years he maintained this attitude, and resolutely refused to append his signature to the treaty of 1831. His subjects at length grew weary of the heavy expense of maintaining a large military force on the Belgian frontier and in 1839 the king gave way. He did so, however, on favourable terms and was able to insist on the Belgians yielding up their possession of portions of Limburg and Luxemburg, which they had occupied since 1830.

A cry now arose in Holland for a revision of the fundamental law and for more liberal institutions; ministerial responsibility was introduced, and the royal control over finance diminished. William, however, disliked these changes, and finding further that his proposed marriage with the countess d'Oultremont, a Belgian and a Roman Catholic, was very unpopular, he suddenly abdicated on the 7th of October 1840. After his abdication he married the countess and spent the rest of his life in quiet retirement upon his private estate in Silesia. He died in 1844.

See L. Jottsand, *Guillaume d'Orange avant son avènement au trône des Pays-Bas*; E. C. de Gerlache, *Histoire du royaume des Pays-Bas depuis 1814 jusqu'en 1830* (3 vols., Brussels, 1842); W. H. de Beaufort, *De eerste regeeringsjaren van Koning Willem I.* (Amsterdam, 1886); H. C. Colenbrander, *De Belgische Omwenteling* (The Hague, 1905); T. Juste, *Le Soulèvement de la Hollande en 1813 et la fondation du royaume des Pays-Bas* (Brussels, 1870); and P. Blok, *Geschiedenis der Nederlandsche Volk*, vols. vii. and viii. (Leiden, 1907–1908).

WILLIAM II. (1792–1849), king of the Netherlands, son of William I., was born at the Hague on the 6th of December 1792. When he was three years old his family was driven out of Holland by the French republican armies, and lived in exile until 1813. He was educated at the military school at Berlin and afterwards at the university of Oxford. He entered the English army, and in 1811, as *aide-de-camp* to the duke of Wellington, took part in several campaigns of the Peninsula War. In 1815 he commanded the Dutch and Belgian contingents, and won high commendations for his courage and conduct at the battles of Quatre Bras and Waterloo, at the latter of which he was wounded. The prince of Orange married in 1816 the grand duchess Anna Paulowna, sister of the tzar Alexander I. He enjoyed considerable popularity in Belgium, as well as in Holland for his affability and moderation, and in 1830, on the outbreak of the Belgian revolution, he betook himself to Brussels, and did his utmost by personal conferences with the most influential men in the Belgian capital to bring about a peaceable settlement on the basis of the administrative autonomy of the southern provinces under the house of Orange. His father had given him powers to treat, but afterwards threw him over and rejected the terms of accommodation that he had proposed. He withdrew on this to England and resided there for several months. In April 1831 William took the command of a Dutch army for the invasion of Belgium, and in a ten-days' campaign defeated and dispersed the Belgian forces under Leopold I. after a sharp fight near Louvain. He would have entered Brussels in triumph, but his victorious advance was stayed by the intervention of the French. In 1840, on the abdication of his father, he ascended the throne as William II. The peace of 1839 had settled all differences between Holland and Belgium, and the new king found himself confronted with the task of the reorganization of the finances, and the necessity of meeting the popular demand for a revision of the fundamental law, and the establishment of the [illegible] franchise on a wider basis. He acted [illegible] moderation, and, although by no [illegible] ideas, he saw the necessity [illegible] frankly gave his support to larger measures of reform. The fundamental law was altered in 1848 and the Dutch monarchy, from being autocratic, became henceforth constitutional. The king's attitude secured for him the good will and affection of a people, loyal by tradition to the house of Orange, and the revolutionary disturbances of 1848 found no echo in Holland. William died suddenly on the 17th of March 1849.

See J. J. Abbink, *Leven van Koning Willem II.* (Amsterdam, 1849); J. Bosscha, *Het Leven van Willem den Tweede, Koning der Nederlanden, 1793–1849* (Amsterdam, 1852); P. Blok, *Geschiedenis der Nederlandsche Volk* (Leiden, 1908). (G. E.)

WILLIAM III. (1817–1890), king of the Netherlands, son of William II., was born at Brussels on the 19th of February 1817. He married in 1839 Sophia, daughter of William I., king of Württemberg. Sophia was an accomplished woman of high intelligence, but unfortunately the relations between the royal pair were far from cordial and finally ended in complete disagreement, and the breach between them continued until the death of the queen in 1877. The private life of the king in fact gave rise to much scandal; nevertheless he was an excellent constitutional monarch, and, though he never sought to win popular favour, succeeded in winning and retaining in a remarkable degree his people's affectionate loyalty. He had no sympathy with political liberalism, but throughout his long reign of forty-two years, with a constant interchange of ministries and many ministerial crises, he never had a serious conflict with the states-general, and his ministers could always count upon his fair-mindedness and an earnest desire to help them to further the national welfare. He was economical, and gave up a third of his civil list in order to help forward the task of establishing an equilibrium in the annual budget, and he was always ready from his large private fortune to help forward all schemes for the social or industrial progress of the country. It was largely due to his prudent diplomacy that Holland passed pacifically through the difficult period of the Luxemburg settlement in 1866 and the Franco-German War of 1870.

William III. had two sons by his marriage with Sophia of Württemberg, William (1841–1879), and Alexander (1843–1884). Both of them died unmarried. The decease of Prince Alexander left the house of Orange without a direct heir male, but the prospect of a disputed succession had fortunately been averted by the marriage of the king in 1879 with the princess Emma of Waldeck-Pyrmont. From this union a daughter, Wilhelmina, was born in 1880. On her father's death at the Loo, on the 23rd of November 1890, she succeeded as queen of the Netherlands under the regency of her mother.

William was grand duke of Luxemburg by a personal title, and his death severed the dynastic relation between the kingdom of the Netherlands and the grand duchy. The sovereignty of the Luxemburg duchy passed to the next heir male of the house of Nassau, Adolphus, ex-duke of Nassau.

See J. A. Bruijne, *Geschiedenis van Nederland in onzen tijd.* (5 vols., Schiedam, 1889–1906); P. Blok, *Geschiedenis der Nederlandsche Volk* (Leiden, 1908), vol. viii.; and G. L. Keppers, *De regeering van Koning Willem III.* (Groningen, 1887). (G. E.)

WILLIAM (1227–1256), king of the Romans and count of Holland, was the son of Count Floris IV. and his wife Matilda, daughter of Henry, duke of Brabant. He was about six years of age when his father was killed in a tournament, and the fact that his long minority was peaceful and uneventful speaks well for the good government of his two paternal uncles, who were his guardians. William was, however, suddenly in 1247 to become a prominent figure in the great Guelph-Ghibelline struggle, which at that time was disturbing the peace of Europe. The quarrel between the church and the emperor Frederick II. had now reached an acute stage. Pope Innocent IV., who had failed [illegible] efforts to induce various princes to accept the [illegible] communicated [illegible] and ready to [illegible] William succeeded [illegible] where he was [illegible] recognized head of [illegible] for himself friends in Germany, but he never really succeeded in forming a party or gaining for himself a footing in the Empire during the lifetime of Frederick. With the extinction of the Hohenstaufen house in 1254 his chances were much improved, but shortly afterwards his death occurred on the 28th of January 1256 through his horse breaking through the ice during an obscure campaign among the Frisian marshes. William was more successful in his struggles with Margaret, countess of Flanders and Hainaut, known as "Black Meg." She wished her succession to pass to the sons of her second marriage with William of Dampierre in preference to those of his first marriage with Bouchard of Avennes. But John of Avennes, her eldest son, had married William's sister Aleidis. William took up arms in defence of his brother-in-law's rights and Margaret was decisively beaten at West Kappel in 1253, and was compelled to acknowledge John of Avennes as her successor to the county of Hainaut.

See A. Ulrich, *Geschichte des römischen Königs, Wilhelm von Holland* (Hanover, 1882).

WILLIAM I. (d. 1166), king of Sicily, son of King Roger II. by Elvira of Castile, succeeded in 1154. His title "the Bad" seems little merited and expresses the bias of the historian Falcandus and the baronial class against the king and the official class by whom he was guided. It is obvious, however, that William was far inferior in character and energy to his father, and was attached to the semi-Moslem life of his gorgeous palaces of Palermo. The real power in the kingdom was at first exercised by Maio of Bari, a man of low birth, whose title *ammiratus ammiratorum* was the highest in the realm. Maio continued Roger's policy of excluding the nobles from the administration, and sought also to curtail the liberties of the towns. The barons, always chafing against the royal power, were encouraged to revolt by Pope Adrian IV., whose recognition William had not yet sought, by the Basileus Manuel and the emperor Frederick II. At the end of 1155 Greek troops recovered Bari and began to besiege Brindisi. William, however, was not devoid of military energy; landing in Italy he destroyed the Greek fleet and army at Brindisi (28th May 1156) and recovered Bari. Adrian came to terms at Benevento (18th June 1156), abandoned the rebels and confirmed William as king, and in 1158 peace was made with the Greeks. These diplomatic successes were probably due to Maio; on the other hand, the African dominions were lost to the Almohads (1156–1160), and it is possible that he advised their abandonment in face of the dangers threatening the kingdom down from the north. The policy of the minister led to a general conspiracy, and in November 1160 he was murdered in Palermo by Matthew Bonello, leader of the Sicilian nobles. For a while the king was in the hands of the conspirators, who purposed murdering or deposing him, but the people and the army rallied round him; he recovered power, crushed the Sicilian rebels, had Bonello blinded, and in a short campaign reduced the rest of the Regno. Thus freed from feudal revolts, William confided the government to men trained in Maio's school, such as the grand notary, Matthew d'Agello. His latter years were peaceful; he was now the champion of the true pope against the emperor, and Alexander III. was installed in the Lateran in November 1165 by a guard of Normans. William died on the 7th of May 1166. (E. Cu.)

WILLIAM II. (d. 1189), king of Sicily, was only thirteen years old at the death of his father William I. when he was placed under the regency of his mother, Marguerite of Navarre. Until the king came of age in 1171 the government was controlled first by the chancellor Stephen of Perche, cousin of Marguerite (1166–1168), and then by Walter Ophamil, archbishop of Palermo, and Matthew d'Ajello, the vice-chancellor. William's character is very indistinct. Lacking in military enterprise, secluded and pleasure-loving, he seldom emerged from his palace life at Palermo. [illegible] ked by an ambitious foreign policy and a [illegible]. Champion of the papacy and in secret [illegible] rd cities he was able to defy the common [illegible] In 1174 and 1175 he made treaties with [illegible] and his marriage in February 1177 with [illegible] enry II. of England, marks his high position in European politics. To secure peace with the emperor he sanctioned the marriage of his aunt Constance, daughter of Roger II., with Frederick's son Henry, afterwards the emperor Henry VI., causing a general oath to be taken to her as his successor in case of his death without heirs. This step, fatal to the Norman kingdom, was possibly taken that William might devote himself to foreign conquests.[1]

Unable to revive the African dominion, William directed his attack on Egypt, from which Saladin threatened the Latin kingdom of Jerusalem. In July 1174, 50,000 men were landed before Alexandria, but Saladin's arrival forced the Sicilians to re-embark in disorder. A better prospect opened in the confusion in Byzantine affairs which followed the death of Manuel Comnenus (1180), and William took up the old design and feud against Constantinople. Durazzo was captured (11th June 1185) and in August Thessalonica surrendered to the joint attack of the Sicilian fleet and army. The troops then marched upon the capital, but the troop of the emperor Isaac Angelus overthrew the invaders on the banks of the Strymon (7th Sept. 1185). Thessalonica was at once abandoned and in 1189 William made peace with Isaac, abandoning all the conquests. He was now planning to induce the crusading armies of the West to pass through his territories, and seemed about to play a leading part in the third Crusade. His admiral Margarito, a naval genius equal to George of Antioch, with 600 vessels kept the eastern Mediterranean open for the Franks, and forced the all-victorious Saladin to retire from before Tripoli in the spring of 1188. In November 1189 William died, leaving no children. His title of "the Good" is due perhaps less to his character than to the cessation of internal troubles in his reign. The "Voyage" of Ibn-Giobair, a traveller in Sicily in 1183–1185, shows William surrounded by Moslem women and eunuchs, speaking and reading Arabic and living like "a Moslem king." (E. Cu.)

WILLIAM I. [Friedrich Karl] (1781–1864), king of Württemberg, son of Frederick, afterwards King Frederick I. of Württemberg, was born at Lüben in Silesia on the 27th of September 1781. In his early days he was debarred from public life owing to a quarrel with his father, whose time-serving deference to Napoleon was distasteful to him. In 1814–1815 he suddenly rose into prominence through the Wars of Liberation against France, in which he commanded an army corps with no little credit to himself. On his accession to the throne of Württemberg in 1816 he realized the expectations formed of him as a liberal-minded ruler by promulgating a constitution (1819), under which serfdom and obsolete class privileges were swept away, and by issuing ordinances which greatly assisted the financial and industrial development and the educational progress of his country. In 1848 he sought to disarm the revolutionary movement by a series of further liberal reforms which removed the restrictions more recently imposed at Metternich's instance by the Germanic diet. But his relations with the legislature, which had from time to time become strained owing to the bureaucratic spirit which he kept alive in the administration, were definitely broken off in consequence of a prolonged conflict on questions of Germanic policy. He cut the knot by repudiating the enactments of 1848–1849 and by summoning a packed parliament (1851), which re-enforced the code of 1819.

The same difficulties which beset William as a constitutional reformer impeded him as a champion of Germanic union. Intent above all on preserving the rights of the Middle Germanic states against encroachments by Austria and Prussia he lapsed into a policy of mere obstruction. The protests which he made in 1820–1823 against Metternich's policy of making the minor German states subservient to Austria met with less success than they perhaps deserved. In 1849–1850 he made a firm stand against the proposals for a Germanic union propounded in the National Parliament at Frankfort, for fear lest the exaltation of Prussia should eclipse the lesser principalities. Though forced to accede to the proffering of the imperial crown to the king of Prussia, he joined heartily in Prince Schwarzenberg's schemes for undoing the work of the National Parliament, and by means of the *coup d'état* described above forced his country into a policy of alliance with Austria against Prussia. Nevertheless his devotion to the cause of Germanic union is proved by the eagerness with which he helped the formation of the Zollverein (1828–1830), and in spite of his conflicts with his chambers he achieved unusual popularity among his subjects. He died on the 25th of June 1864, and was succeeded by his son Charles.

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[1] Chalandon, *La Domination normande*, ii. 389.

See Nick, *Wilhelm I., König von Württemberg, und seine Regierung* (Stuttgart, 1864); P. Stälin, "König Wilhelm I. von Württemberg," *Zeitschrift für allgemeine Geschichte*, 1885, pp. 353-367, 417-434.

WILLIAM IV., landgrave of Hesse (1532–1592), was the son and successor of the landgrave Philip the Magnanimous. He took a leading part in safeguarding the results of the Reformation and was indefatigable in his endeavours to unite the different sections of Protestantism for the sake of effective resistance against the Catholic reaction. His counsels were marred by his reluctance to appeal to arms at the critical moments of action, and by the slenderness of his own resources, but they deserve attention for their broad common sense and spirit of tolerance. As an administrator of his principality he displayed rare energy, issuing numerous ordinances, appointing expert officials, and in particular establishing the finances on a scientific basis. By a law of primogeniture he secured his land against such testamentary divisions as had diminished his own portion of his father's estate. He not only patronized art and science, but continued as ruler the intercourse with scholars which he had cultivated in his youth.

William was a pioneer in astronomical research and perhaps owes his most lasting fame to his discoveries in this branch of study. Most of the mechanical contrivances which made Tycho Brahe's instruments so superior to those of his contemporaries were adopted at Cassel about 1584, and from that time the observations made there seem to have been about as accurate as Tycho's; but the resulting longitudes were 6′ too great in consequence of the adopted solar parallax of 3′. The principal fruit of the observations was a catalogue of about a thousand stars, the places of which were determined by the methods usually employed in the 16th century, connecting a fundamental star by means of Venus with the sun, and thus finding its longitude and latitude, while other stars could at any time be referred to the fundamental star. It should be noticed that clocks, on which Tycho Brahe depended very little, were used at Cassel for finding the difference of right ascension between Venus and the sun before sunset; Tycho preferred observing the angular distance between the sun and Venus when the latter was visible in the daytime. The Hessian star catalogue was published in Lucius Barettus's *Historia coelestis* (Augsburg, 1668), and a number of other observations are to be found in *Coeli et siderum in eo errantium observationes Hassiacae* (Leiden, 1618), edited by Willebrord Snell. R. Wolf, in his "Astronomische Mittheilungen," No. 45 (*Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich*, 1878), has given a résumé of the manuscripts still preserved at Cassel, which throw much light on the methods adopted in the observations and reductions.

WILLIAM (1533–1584), surnamed the SILENT, prince of Orange and count of Nassau, was born at the castle of Dillenburg in Nassau, on the 25th of April 1533. His grandfather, John, count of Nassau, had left his Netherland possessions to his elder son Henry, his German to his younger son William. This William of Nassau (d. 1559) had by his wife, Juliana of Stolberg, a family of five sons, of whom the subject of this notice was the eldest, and seven daughters. Henry became the trusted friend and counsellor of Charles V., and married (1515) Claude, sister of Philibert, prince of Orange. Philibert, having no issue, made Réné, the son of Henry and Claude, his heir. Réné, at the age of twenty-six, was killed at the siege of St Dizier in 1544, and left his titles and great possessions by will to his cousin William, who thus became prince of Orange. William's parents were Lutherans, but the emperor insisted that the boy-successor to Réné's heritage should be brought up in his court at Brussels, as a Catholic. The remembrance of his ancestors' services and his own high qualities endeared William to Charles, who secured for him, at the age of seventeen, the hand of Anne of Egmont, heiress of the count of Buren. Anne died in 1558, leaving issue a son Philip William, prince of Orange and count of Buren, and a daughter. It was on the shoulder of the young prince of Orange that Charles V. leant when, in 1555, in the presence of a great assembly at Brussels, he abdicated, in favour of his son Philip, the sovereignty of the Netherlands. William was also selected to carry the insignia of the empire to Ferdinand, king of the Romans, when Charles resigned the imperial crown. He had, at the age of twenty-one, been placed by the emperor, before his abdication, at the head of an army of 20,000 men in the war with France, and he continued to fill that post under Philip in 1556, but without distinction. His services, as a diplomatist, were much more brilliant. He was one of the three plenipotentiaries who negotiated the treaty of Cateau-Cambrésis (1559), and was largely responsible for bringing about a settlement so favourable to Spanish interests. After the conclusion of the peace, the prince spent some time at the French court, in the capacity of a state hostage for the carrying out of the treaty. It was during his sojourn in France that William by his discreetness acquired the soubriquet of *le Taciturne* (the Silent), which has ever since clung to his name. The appellation is in no way expressive of the character of the man, who was fond of conversation, most eloquent in speech, and a master of persuasion. His two great adversaries of the decade, which followed the peace of Cateau-Cambrésis, were in 1559 closely associated with him; Granvelle as a plenipotentiary, Alva as a fellow hostage.

Up to this time the life of Orange had been marked by lavish display and extravagance. As a *grand seigneur* in one of the most splendid of courts, he surrounded himself with a retinue of gay young noblemen and dependents, kept open house in his magnificent Nassau palace at Brussels, and indulged in every kind of pleasure and dissipation. The revenue of his vast estates was not sufficient to prevent him being crippled by debt. But after his return from France, a change began to come over Orange. Philip made him councillor of state, knight of the Golden Fleece, and stadtholder of Holland, Zeeland and Utrecht; but there was a latent antagonism between the natures of the two men which speedily developed into relations of coolness and then of distrust. The harshness with which the stern laws against heretics were carried out, the presence of Spanish troops, the filling up of ministerial offices by Spaniards and other foreigners had, even before the departure of Philip for Spain (August 1559), stirred the most influential Netherland noblemen—foremost among them the prince of Orange, and the counts of Egmont and Hoorn—to a policy of constitutional opposition. With the advent of Margaret of Parma the situation became more serious. All state business was carried out by the *Consulta*; all power virtually placed in the hands of Cardinal Granvelle; the edicts against heretics enforced with the utmost severity; the number of bishoprics increased from three to fourteen (see NETHERLANDS). As a protest, Orange, Egmont and Hoorn withdrew from the council of state, and wrote to the king setting forth their grievances. At this time Orange was still nominally a Catholic, but his marriage in August 1561 with Anne, daughter and heiress of the elector Maurice of Saxony, with Lutheran rites, at Dresden, was significant of what was to come. It marked the beginning of that gradual change in his religious opinions, which was to lead William through Lutheranism to that moderate Calvinism which he professed after 1573. Of the sincerity of the man during this period of transformation there can be little doubt. Policy possibly played its part in dictating the particular moments at which the changes of faith were acknowledged. No student of the prince's voluminous correspondence can fail, however, to see that he was a deeply religious man. The charges of insincerity brought against him by his enemies arise from the fact that in an age of bigotry and fanaticism the statesmanlike breadth and tolerance of William's treatment of religious questions, and his aversion to persecution for matters of opinion, were misunderstood. His point of view was in advance of that of his time.

In the spring of 1564 the constitutional opposition of the great nobles to the policy of the king appeared to be successful. Granvelle was withdrawn, the *Consulta* abolished, and Orange, Egmont and Hoorn took their seats once more on the Council. They speedily found, however, that things did not mend. Granvelle had gone, but the royal policy was unchanged. In

August 1564 Philip issued an order for carrying out the decrees of the Council of Trent, and for the strict execution of the placards against heretics. Protests, letters, personal missions were in vain, the king's will was not to be moved from its purpose. The spirit of resistance spread first to the lesser nobles, then to the people. In the memorable year 1566 came "the Compromise," "the Request," the banquet at the Hotel Culemburg with its cries of "*Vivent les Gueux*" followed by the wild iconoclastic riots and outrages by bodies of fanatical Protestant sectaries at Antwerp and elsewhere. The effect of this last outbreak was disastrous. Philip was filled with anger and vowed vengeance. The national leaders drew back, afraid to identify themselves with revolutionary movements, or the cause of extreme Protestantism. Egmont was a good Catholic, and took active steps to suppress disorder, and Orange himself at the request of the regent betook himself to Antwerp, where the citizens in arms were on the point of engaging in civil strife. At the risk of his life the prince succeeded in bringing about an accord, and as he proclaimed its terms to a sullen and half-hostile crowd he uttered for the last time the words, "Long live the King!" It was his final act of loyal service to a sovereign, who from secret emissaries that he kept at Madrid, he knew to be plotting the destruction of himself and his friends. In vain he endeavoured to rouse Egmont to a sense of his danger, and to induce him and other prominent leaders to take steps, if necessary by armed resistance, to avert their doom. Finding all his efforts fruitless William, after resigning all his posts, left the country (22nd of April 1567), and took up his residence with his family at the ancestral home of the Nassaus at Dillenburg.

At that very time Alva was quitting Madrid for his terrible mission of vengeance in the Netherlands (see ALVA). The story of the Council of Blood and of the executions of Egmont and Hoorn is told elsewhere. The prince of Orange was out of reach of the tyrant's arm, but by an act of imprudence he had left his eldest son, Philip William, count of Buren, studying at the university of Louvain. He was seized (February 1568) and carried off to Spain, to be brought up as an enemy to the political and religious principles of his father. He himself was outlawed, and his property confiscated. In March he published a lengthy defence of his conduct, entitled "Justification of the Prince of Orange against his Calumniators," and meanwhile strained every nerve to enlist an armed force for the invasion of the Netherlands. To raise money his brother, John of Nassau, pledged his estates, William himself sold his plate and jewels. An attack was made in three directions, but with disastrous results. The force under Louis of Nassau indeed gained a victory at Heiligerlee in Friesland (May 23rd), but met with a crushing defeat at the hands of Alva in person (July 21st) at Jemmingen. All seemed lost, but William's indomitable spirit did not despair. "With God's help," he wrote to his brother Louis, "I am determined to go on." In September he himself crossed the Meuse at the head of 18,000 infantry and 7000 cavalry. But Alva, while clinging to his steps, refused to fight, and William, through lack of funds, was compelled to disband his mercenaries, and withdraw over the French frontier (November 17th).

Then followed the most miserable period of Orange's life. In fear of assassination, in fear of creditors, he wandered about from place to place, and his misfortunes were aggravated by the bad conduct of his wife, Anne of Saxony, who left him. She was finally, on the ground of insanity, placed in close confinement by her own family, and remained incarcerated until her death six years later. During the years 1569–1572 the brothers William and Louis, the one in Germany, the other in France, were, however, actively preparing for a renewal of the struggle for the freedom of the Netherlands. The barbarities of Alva had caused Spanish rule to be universally hated, and the agents of the Nassaus were busy in the provinces rousing the spirit of resistance and trying to raise funds. In 1569 eighteen vessels provided with letters of marque from the prince of Orange were preying upon Spanish commerce in the narrow seas. Stimulated by the hope of plunder their number rapidly grew, until the wild and fierce corsairs—named "Beggars of the sea" (*Gueux de mer*)—became a terror to their enemies. The refusal of Queen Elizabeth in 1572 to allow the Beggars to refit in English harbours led to the first success of the patriot cause. On the 1st of April a force under the command of Lumbres and Tresling, being compelled to take refuge in the Maas, seized the town of Brill by surprise. Encouraged by their success they likewise took by assault the important sea-port of Flushing. Like wildfire the revolt spread through Holland, Zeeland, Utrecht and Friesland, and the principal towns, one after the other, submitted themselves to the authority of the prince of Orange as their lawful stadtholder. Louis of Nassau immediately afterwards dashed with a small force from France into Hainault, and captured Valenciennes and Mons. In Mons, however, Louis was blockaded by a superior Spanish force, and eventually forced to surrender. William crossed the Rhine with 20,000 men to relieve him, but he was out-generalled by Alva, nearly lost his life during a night attack on his camp at Harmignies (September 11th), and retired into Holland. Delft became henceforth his home, and he cast in his lot for good and all with the brave Hollanders and Zeelanders in their struggle for freedom, "being resolved," as he wrote to his brother John, "to maintain the affair there as long as possible and decided to find there my grave." It was his spirit that animated the desperate resistance that was offered to the Spanish arms at Haarlem and Alkmaar, and it was through his personal and unremitting exertions that, despite an attack of fever which kept him to his bed, the relief of Leiden, on the 3rd of October 1574, was effected just as the town had been reduced to the last extremity.

In order to identify himself more closely with the cause for which he was fighting, Orange had, on October 23rd, 1573, made a public profession of the Calvinist religion. But he was never a bigot in religious matters. The three conditions which he laid down as the irreducible minimum on which negotiations could be based, and from which he never departed, were: (1) freedom of worship and liberty to preach the Gospel according to the word of God; (2) the restoration and maintenance of all the ancient charters, privileges and liberties of the land; (3) the withdrawal of all Spaniards and other foreigners from all posts and employments, civil and military. On these points he was inflexible, but he was a thoroughly moderate man. He hated religious tyranny whether it were exercised by Papist or Calvinist, and his political aims were not self-seeking. His object was to prevent the liberties of the Netherlands from being trampled underfoot by a foreign despotism, and he did not counsel the provinces to abjure their allegiance to Philip, until he found the Spanish monarch was intractable. But when the abjuration became a necessity he sought to find in Elizabeth of England or the duke of Anjou, a sovereign possessing sufficient resources to protect the land from the Spaniard.

William (24th of June 1575) took as his third wife, Charlotte de Bourbon, daughter of the duke of Montpensier. This marriage gave great offence to the Catholic party, for Charlotte was a renegade nun, having been abbess of Jouarre, and Anne of Saxony was still alive. In April 1576, an act of Union between Holland and Zeeland was agreed upon and signed at Delft, by which supreme authority was conferred upon the prince, as *ad interim* ruler. In this year (1576) the outrages of the Spanish troops in the southern Netherlands, who had mutinied for want of pay, caused a revulsion of feeling. The horrors of the "Spanish Fury" at Antwerp (November 4th) led to a definite treaty being concluded, known as the Pacification of Ghent, by which under the leadership of the prince of Orange, the whole seventeen provinces bound themselves together to drive the foreigners out of the country. This was supplemented by the Union of Brussels (January 1577) by which the Southerners pledged themselves to expel the Spaniards, but to maintain the Catholic religion and the king's authority. To these conditions William willingly assented; he desired to force no man's conscience, and as yet he professed to be acting as stadtholder under the king's commission. On September 23rd he entered Brussels in triumph as the acknowledged leader of the whole people of the Netherlands, Catholic as well as Protestant, in their resistance to foreign oppression. At this moment he touched the zenith of his career. It was, however, but a short-lived position of eminence. After the entry into Brussels followed the period of tangled intrigue during which the archduke Matthias, the duke of Anjou, the palatine count John Casimir and Don John of Austria were all striving to secure for themselves a position of supremacy in the land. William had to steer a difficult course amidst shoals and quicksands, and never did his brilliant talents as diplomatist and statesman shine more brightly. But after the sudden death of Don John he found himself face to face with an opponent of abilities equal to his own in the person of Alexander Farnese, prince of Parma, appointed governor general by Philip. Farnese skilfully fomented the jealousy of the Catholic nobles of the south—the Malcontents—against the prince of Orange, and the Pacification of Ghent was henceforth doomed. The Walloon provinces bound themselves together in a defensive league, known as the league of Arras (5th of January 1579) and by the exertions of John of Nassau (at that time governor of Gelderland) Holland, Zeeland, Utrecht, Gelderland and Zutphen replied by signing (29th of January) the compact known as the Union of Utrecht. William still struggled to keep the larger federation together, but in vain. The die was now cast, and the Northern and Southern Netherlands from this time forward had separate histories.

On the 25th of March 1581 a ban was promulgated by King Philip against the prince of Orange, in which William was denounced as a traitor and enemy of the human race, and a reward of 25,000 crowns in gold or land with a patent of nobility was offered to any one who should deliver the world of this pest. William replied in a lengthy document, the *Apology*, in which he defended himself from the accusations brought against him, and on his part charged the Spanish king with a series of misdeeds and crimes. The *Apology* is valuable for the biographical details which it contains. William now felt that his struggle with Philip was a war *à outrance*, and knowing that the United Provinces were too weak to resist the Spanish armies unaided, he endeavoured to secure the powerful aid of France, by making the duke of Anjou sovereign of the Netherlands. Holland and Zeeland were averse to this project, and to conciliate their prejudices Orange, provisionally, and after some demur, accepted from those provinces the offer of the countship (24th of July 1581). Two days later the representatives of Brabant, Flanders, Utrecht, Gelderland, Holland and Zeeland assembled at The Hague, solemnly abjured the sovereignty of Philip, and agreed to accept the French duke as their sovereign in his place. Anjou was solemnly inaugurated by the prince in person at Antwerp, as duke of Brabant, on the 19th of February 1582. While at Antwerp an attempt was made upon William's life (March 18th) by a Biscayan youth, named Juan Jaureguy. Professing to offer a petition he fired a pistol at the prince's head, the ball passing in at the right ear and out by the left jaw. After hanging for some time between life and death, William ultimately recovered and was able to attend a thanksgiving service on the 2nd of May. The shock and anxiety proved, however, fatal to his wife, Charlotte de Bourbon. She expired on the 5th of May after a very short illness.

The French sovereign soon made himself impossible to his new subjects, and the hopes that William had based upon Anjou were sorely disappointed. The duke was dissatisfied with his position, aimed at being an absolute ruler, and tried to carry his ambitious ideas into effect by the treacherous attack on Antwerp, which bears the name of the "French Fury." Its failure rendered Anjou at once ridiculous and detested, and his shameless misconduct brought no small share of opprobrium on William himself. The trusty Hollanders and Zeelanders remained, however, staunchly loyal to him, and Orange now fixed his residence permanently in their midst. On the 7th of April 1583 he married in fourth wedlock Louise de Coligny, daughter of the famous Huguenot leader, and widow of the Seigneur de Téligny. With her "Father William," as he was affectionately styled, settled [illegible] Prinsenhof at Delft, and lived like a plain, homely Dutch [illegible] unostentatiously, as became a man who had spent his all in his country's cause, and whose resources were now of the most modest description.

Ever since the promulgation of the ban and the offer of a reward upon his life, religion and political fanaticism had been continually compassing his assassination, and the free access which the prince gave to his person offered facilities for such a purpose, despite the careful watch and ward kept over him by the burghers of Delft and his own household. He was shot dead by a Burgundian, Balthazar Gérard, on the 9th of July 1584, as he was leaving his dining hall. Gérard was moved by devoted loyalty to his faith and king, and endured the torments of a barbarous death with supreme courage and resignation. William was buried with great pomp at the public charges in the Neuwe Kerk at Delft amidst the tears of a mourning people.

William the Silent was tall and well formed, of a dark complexion, with brown hair and eyes. He was the foremost statesman of his time, capable of forming wise and far-reaching plans and of modifying them to suit the changing circumstances in which it was necessary to put them in execution. In moments of difficulty he displayed splendid resource and courage, and he had a will of iron, which misfortunes were never able to bend or break. To rescue the Netherlands from the tyrannical power of Spain, he sacrificed a great position, vast wealth and eventually his life. He had the satisfaction, however, of knowing before he died that the cause for which he had endured so much and striven so hard had survived many dangers, and had acquired strength to offer successful resistance to the overwhelming power of King Philip. He was the real founder of the independence and greatness of the Dutch republic.

He left a large number of children. By Anne of Egmont he had a son Philip William, who was kidnapped from Louvain (1567) and educated at Madrid, and a daughter. By Anne of Saxony, a son Maurice (see MAURICE OF NASSAU, prince of Orange) and two daughters. By Charlotte de Bourbon, six daughters. By Louise de Coligny, one son, Frederick Henry (see FREDERICK HENRY, prince of Orange).

See Genhard, *Correspondance de Guillaume le Taciturne*; Groen von Prinsterer, *Archives ou correspondance inédile de la maison d'Orange-Nassau*; Commelin, *Wilhelm en Maurits van Nassau, prinsen van Orangien, haer leven en bedrijf*; Meursius, *Gulielmus Auriacus*; Putnam, *William the Silent, Prince of Orange, the Moderate Man of the Sixteenth Century*; Harrison, *William the Silent*; Vorsterman van Oyen, *Het Vorstenhuis Orange-Nassau*; Delaborde, *Charlotte de Bourbon, princesse d'Orange*; Delaborde, *Louise de Coligny, princesse d'Orange*; Blok, *Geschiedenis van het Nederlandsche Volk*, vol. ii.; R. Fruin, *Het voorspel van den tachtigjarigen oorlog*; Motley, *Rise of the Dutch Republic; Cambridge Modern History*, vol. iii. cc. vi., vii. (G. E.)

WILLIAM II. (1626–1650), prince of Orange, born at The Hague on the 27th of May 1626, was the son of Frederick Henry, prince of Orange, and his wife Amalia von Solms, and grandson of William the Silent. By the act of survivance passed in 1631 the offices and dignities held by Frederick Henry were made hereditary in his family. On the 12th of May 1641 William married, in the royal chapel at Whitehall, Mary, princess royal of England, eldest daughter of King Charles I. At the time of the wedding the bridegroom was not yet fifteen years old, the bride was five years younger. William from his early youth accompanied his father in his campaigns, and already in 1643 highly distinguished himself in a brilliant cavalry fight at Burgerhout (September 5). On the death of Frederick Henry William succeeded him, not only in the family honours and possessions, but in accordance with the terms of the act of survivance in all his official posts, as stadtholder of Holland, Zeeland, Utrecht, Gelderland, Overyssel and Groningen and captain-general and admiral-general of the Union. At the moment of his accession to power the negotiations for a separate treaty of peace with Spain were almost concluded, and peace was actually signed at Münster on the 30th of January 1648. By this treaty Spain recognized the independence of the United Netherlands and made large concessions to the Dutch. William, who had always been bitterly opposed to the policy of abandoning the French alliance in order to gain better terms from Spain, did his utmost to prevent the ratification, but matters were too far advanced for his interposition to prevail in the face of the determination of the states of Holland to conclude a peace so advantageous to their trade interests. William, however, speedily opened secret negotiations with France in the hope of securing the armed assistance of that power for the carrying out of his ambitious projects of a war of aggrandisement against the Spanish Netherlands and of a restoration of his brother-in-law, Charles II., to the throne of England. The states of Holland, on the other hand, were determined to thwart any attempts for a renewal of war, and insisted, in defiance of the authority of the captain-general supported by the states-general, in virtue of their claim to be a sovereign province, in disbanding a large part of the regiments in their pay. A prolonged controversy arose, which ended in the states-general in June 1650 commissioning the prince of Orange to visit the towns of Holland and secure a recognition of their authority. The mission was unsuccessful. Amsterdam refused any hearing at all. William resolved therefore to use force and crush resistance. On the 30th of July six leading members of the states of Holland were seized and imprisoned in the castle of Loevestein. On the same day an attempt was made to occupy Amsterdam with troops. The citizens were, however, warned in time, and the gates closed. William's triumph was nevertheless complete. Cowed by the bold seizure of their leaders, the states of Holland submitted. The prince had now obtained that position of supremacy in the republic at which he had been aiming, and could count on the support alike of the states-general and of the provincial states for his policy. He lost no time in entering into fresh negotiations with the French government, and a draft treaty was already early in October drawn up in Paris and the Count d'Estrades was commissioned to deliver it in person to the prince of Orange. It was, however, never to reach his hands. William had, on the 8th of October, after his victory was assured, gone to his hunting seat at Dieren. Here on the 27th he became ill and returned to The Hague. The complaint proved to be small-pox, and on the 6th of November he died. William was one of the ablest of a race rich in great men, and had he lived he would probably have left his mark upon history. A week after his death his widow gave birth to a son, who was one day to become William III., king of England. (G. E.)

WILLIAM THE BRETON (c. 1160–c. 1225), French chronicler and poet, was as his name indicates born in Brittany. He was educated at Mantes and at the university of Paris, afterwards becoming chaplain to the French king Philip Augustus, who employed him on diplomatic errands, and entrusted him with the education of his natural son, Pierre Charlot. William is supposed to have been present at the battle of Bouvines. His works are the *Philippide* and the *Gesta Philippi II. regis Francorum*. The former, a poem three versions of which were written by the author, gives some very interesting details about Philip Augustus and his time, including some information about military matters and shows that William was an excellent Latin scholar. In its final form the *Gesta* is an abbreviation of the work of Rigord (*q.v.*), who wrote a life of Philip Augustus from 1179 to 1206, and a continuation by William himself from 1207 to 1220. In both works William speaks in very laudatory terms of the king; but his writings are valuable because he had personal knowledge of many of the facts which he relates. He also wrote a poem *Karlotis*, dedicated to Pierre Charlot, which is lost.

William's works have been edited with introduction by H. F. Delaborde as *Œuvres de Rigord et de Guillaume le Breton* (Paris, 1882–1885), and have been translated into French by Guizot in *Collection des mémoires relatifs à l'histoire de France*, tomes xi. and xii. (Paris, 1823–1835). See Delaborde's introduction, and A. Molinier, *Les Sources de l'histoire de France*, tome iii. (Paris, 1903).

WILLIAM THE CLITO (1101–1128) was the son of Robert, duke of Normandy, by his marriage with Sibylla of Conversano. After his father's defeat and capture by Henry I. of England at the battle of Tinchebrai (1106) the young William fell into the hands of the conqueror. Henry magnanimously placed his nephew in the custody of Helias of Saint Saens, who had married a natural daughter of Duke Robert. Fearing for the safety of the boy, Helias carried him, in 1111, to the court of Louis VI. of France. That sovereign joined with the discontented Norman barons and others of Henry's enemies in recognizing William as the rightful claimant to the duchy; Robert, a prisoner whom there was no hope of releasing, they appear to have regarded as dead in the eye of the law. William's claims furnished the pretext for two Norman rebellions. The first which lasted from 1112 to 1120 was abetted by Louis, by Fulk V. of Anjou and by Baldwin VII. of Flanders. In the second, which broke out during 1123, Henry I. had merely to encounter the forces of his own Norman subjects; his diplomatic skill had been successfully employed to paralyse the ill-will of other enemies. In 1122 or 1123 William married Sibylle, daughter of Fulk of Anjou, and with her received the county of Maine; but Henry I. prevailed upon the Curia to annul this union, as being within the forbidden degrees. In 1127, however, the pretender obtained from Louis the hand of Johanna of Montferrat, half-sister of the French queen, and the vacant fief of Flanders. His own rigorous government or the intrigues of Henry I. raised up against William a host of rebels; a rival claimant to Flanders appeared in the person of Thierry or Dirk of Alsace. In besieging Alost, one of the strongholds of the rival party, William received a wound which mortified and proved fatal (July 28, 1128). He left no issue; although Duke Robert survived him and only died in 1134, the power of Henry I. was thenceforth undisputed by the Normans.

See Ordericus Vitalis, *Hist. ecclesiastica*, and Sir James Ramsay's *Foundations of England*, vol. ii. (1898).

WILLIAM OF MALMESBURY (c. 1080–c. 1143), English historian of the 12th century, was born about the year 1080, in the south country. He had French as well as English blood in his veins, but he appears to have spent his whole life in England, and the best years of it as a monk at Malmesbury. His tastes were literary, and the earliest fact which he records of his career is that he assisted Abbot Godfrey (1081–1105) in collecting a library for the use of the community. The education which he received at Malmesbury included a smattering of logic and physics; but moral philosophy and history, especially the latter, were the subjects to which he devoted most attention. Later he made for himself a collection of the histories of foreign countries, from reading which he conceived an ambition to produce a popular account of English history, modelled on the great work of Bede. In fulfilment of this idea, William produced about 1120 the first edition of his *Gesta regum*, which at once gave him a reputation. It was followed by the first edition of the *Gesta pontificum* (1125). Subsequently the author turned aside to write on theological subjects. A second edition of the *Gesta regum* (1127) was dedicated to Earl Robert of Gloucester, whose literary tastes made him an appreciative patron. William also formed an acquaintance with Bishop Roger of Salisbury, who had a castle at Malmesbury. It may have been due to these friends that he was offered the abbacy of Malmesbury in 1140. But he preferred to remain a simple *bibliothecarius*. His one public appearance was made at the council of Winchester (1141), in which the clergy declared for the empress Matilda. About this date he undertook to write the *Historia novella*, giving an account of events since 1125. This work breaks off abruptly at the end of 1142, with an unfulfilled promise that it will be continued. Presumably William died before he could redeem his pledge.

He is the best English historian of his time. The master of a good Latin style, he shows literary instincts which are, for his time, remarkably sound. But his contempt for the annalistic form makes him at times careless in his chronology and arbitrary in his method of arranging his material; he not infrequently flies off at a tangent to relate stories which have little or no connexion with the main narrative; his critical faculty is too often allowed to lie dormant. His researches were by no means profound; he gives us less of the history of his own time than we have a right to expect—far less, for example, than Orderic. He is, however, an authority of considerable value from 1066 onwards; many telling anecdotes, many shrewd judgments on persons and events, can be gleaned from his pages.

Printed Works.—The *Gesta regum* covers, in its final form, the years 449–1127. But the later recensions add little, beyond fulsome dedications to Earl Robert, to the edition of 1120. The sources used are not always easy to trace. But for the pre-Conquest period William had at his disposal the works of Bede, Ado of Vienne and William of Jumièges; one or more English chronicles similar to the extant "Worcester" and "Peterborough" texts; Asser's life of Alfred, and a metrical biography of Æthelstan; the chronicles of S. Riquier and Fontanelle; a collection of tales relating to the reign of the emperor Henry III.; and the lives of various saints. For the life of William I. he draws on William of Poitiers; for the first crusade he mainly follows Fulcher of Chartres; his knowledge of Anselm's primacy comes mainly from Eadmer; and at least up to 1100, he makes use of an English chronicle. The fifth and last book, dealing with the reign of Henry I., is chiefly remarkable for its desultoriness and an obvious desire to make the best case for that monarch, whose treatment of Anselm he prudently ascribes to Robert of Meulan (d. 1118). Both in this work and in the *Gesta pontificum* the later recensions are remarkable for the omission of certain passages which might give offence to those in high places. The deleted sentences usually relate to eminent persons; they sometimes repeat scandal, sometimes give the author's own opinion. The *Gesta pontificum* gives accounts of the several English sees and their bishops, from the beginning to about 1120; the later recensions continue the work, in part, to 1140. Many saints of the south and midlands are also noticed. This work, like the *Gesta regum*, contains five books; the fifth relates the life and miracles of St Aldhelm of Malmesbury, and is based upon the biography by Abbot Faricius; it is less useful than books i.-iv., which are of the greatest value to the ecclesiastical historian. The *Historia novella* is annalistic in form. It was projected soon after the battle of Lincoln, as an apology for the supporters of the empress. The author embarks on special pleading in favour of Earl Robert and Bishop Roger of Salisbury, but shows a certain liking for the personal character of Stephen, whose case he states with studious fairness.

The historical works of William of Malmesbury were edited by Savile in his *Scriptores post Bedam* (London, 1596); but the text of that edition is full of errors. Sir T. D. Hardy edited the *Gesta regum* and *Historia novella* for the English Historical Society in 1840, and put the criticism of the manuscripts on a sound basis. But the standard edition of these works is that of W. Stubbs in the "Rolls" series (1 vol., in 2, 1887–1889); the second part of this edition contains a valuable introduction on the sources and value of the chronicler.. The *Gesta pontificum* has been edited for the "Rolls" series by N. G. S. A. Hamilton (London, 1870) from a manuscript which he was the first to identify as the archetype. Another work, *De antiquitate Glastoniensis ecclesiae* (A.D. 63–1126), is printed in Gale's *Scriptores XV.* (Oxford, 1691). Wharton in the second volume of his *Anglia sacra* (London, 1691) gives considerable portions of a life of Wulfstan which is an amplified translation of an Anglo-Saxon biography. Finally Stubbs in his *Memorials of St Dunstan* ("Rolls" series, London, 1874) prints a *Vita S. Dunstani* which was written about 1126.

Unprinted Extant Works.—Among these are *Miracles of the Virgin*; *Liber super explanationem lamentationum Yeremiae prophetae*; an abridgment of Amalarius' *De divinis officiis*; *De dictis et factis memorabilibus philosophorum*; an epitome of the *Historia* of Haymo of Fleury and some other works, historical and legal (autograph in the Bodleian); *Lives of the English Saints*. The MSS. of these works are to be found partly in the British Museum, partly in the Bodleian.

Lost Works.—A *Vita Sancti Patricii* and *Miracula Sancti Benigni* are mentioned in the prologue to the book on Glastonbury; a metrical life of St Ælfgyfu is quoted in the *Gesta pontificum*; *Chronica tribus libellis* are mentioned in the prologue to the *Historia novella*, and a fragment of them is apparently preserved in the Brit. Mus. Lansdowne MS. 436. Leland gives extracts from an *Itinerarium Johannis abbatis*, describing the journey of Abbot John to Rome in 1140 (Leland, *Collectanea*, iii. 272). (H. W. C. D.)

WILLIAM OF NANGIS (d. 1300), French chronicler, was a monk in the abbey of St Denis. About 1285 he was placed in charge of the abbey library as *custos cartarum*, and he died in June or July 1300. Having doubtless done some work on the Latin manuscripts on which the *Grandes Chroniques de France* are based, William wrote a long *Chronicon*, dealing with the history of the world from the creation until 1300. For the period before 1113 this work merely repeats that of Sigebert of Gembloux and others; but after this date it contains some new and [illegible]

[illegible] *Ludovici IX.*; *Gesta Philippi* [illegible] *regum Francorum*; and a [illegible] for the laity. Making [illegible] Denis, William was a com- [illegible] the exception of the latter [illegible] materially to our know- [illegible] became very popular [illegible] being among those who made use of the *Chronicon*. This work from 1113 to 1300, with continuations to 1368, has been edited by H. Géraud for the *Société de l'histoire de France* (Paris, 1843), and practically all William's writings are found in tome xx. of Dom Bouquet's *Recueil des historiens des Gaules et de la France* (Paris, 1738–1876). A French translation of the *Chronicon* is in tome xiii. of Guizot's *Collection des mémoires relatifs à l'histoire de France* (Paris, 1823–1835).

See A. Potthast, *Bibliotheca historica* (Berlin, 1896); and A. Molinier, *Les Sources de l'histoire de France*, tome iii. (Paris, 1903).

WILLIAM OF NEWBURGH (d. *c.* 1198), or, as he is sometimes styled, Guillelmus Parvus, English ecclesiastic and chronicler, was a canon of the Augustinian priory of Newburgh in the North Riding of Yorkshire. He was born about 1136, and lived at Newburgh from his boyhood. Shortly before 1196 he began his *Historia rerum Anglicarum*. This work, divided into five books, covers the period 1066–1198. A great part of it is derived from known sources, especially from Henry of Huntingdon, Jordan Fantosme, the *Itinerarium regis Ricardi*, or its French original, and a lost account, by Anselm the chaplain, of the captivity of Richard I. The value of Newburgh's work lies in his estimates of men and situations. Except for the years 1154–1173 and the reign of Richard he records few facts which cannot be found elsewhere; and in matters of detail he is prone to inaccuracy. But his political insight and his impartiality entitle him to a high place among the historians of the 12th century.

See the editions of the *Historia* by H. C. Hamilton (2 vols., London, 1856) and by R. Howlett in *Chronicles of the Reigns of Stephen, &c.* ("Rolls" series, 1884–1885), vols. i. and ii. In the latter edition a continuation, the *Annales Furnesienses* (1190–1298), composed by a monk of Furness Abbey, Lancashire, is also given. See also Sir T. D. Hardy's *Descriptive Catalogue* ("Rolls" series, 1865), ii. p. 512; and H. E. Salter in the *English Historical Review*, vol. xxii. (1907). (H. W. C. D.)

WILLIAM OF POITIERS (*c.* 1020–*c.* 1090), Norman chronicler, was born at Préaux, near Pont Audemer, and belonged to an influential Norman family. After serving as a soldier he studied at Poitiers, and then returning to Normandy became chaplain to Duke William (William the Conqueror) and archdeacon of Lisieux. He wrote an eulogistic life of the duke, the earlier and concluding parts of which are lost; and Ordericus Vitalis, who gives a short biography of him in his *Historia ecclesiastica*, says that he also wrote verses. William's *Gesta Guilelmi II. ducis Normannorum*, the extant part of which covers the period between 1047 and 1068, is valuable for details of the Conqueror's life, although untrustworthy with regard to affairs in England. According to Freeman, "the work is disfigured by his constant spirit of violent partisanship." It was written between 1071 and 1077, and was used by Ordericus Vitalis.

The *Gesta* was first published by A. Duchesne in the *Historiae Normannorum scriptores* (Paris, 1619); and it is also found in the *Scriptores rerum gestarum Willelmi Conquestoris* of J. A. Giles (London, 1845). There is a French translation in tome xxix. of Guizot's *Collection des mémoires relatifs à l'histoire de France* (Paris, 1826). See G. Körting, *Wilhelms von Poitiers Gesta Guilelmi ducis* (Dresden, 1875); and A. Molinier, *Les Sources de l'histoire de France*, tome iii. (Paris, 1903).

WILLIAM OF ST CALAIS (CARILEF) (d. 1096), bishop of Durham and chief counsellor of William Rufus, was a Norman monk and prior of St Calais in Maine, who received the see of Durham from the Conqueror (1081). In Durham annals he is honourably remembered as the prelate who designed the existing cathedral, and also for his reform of ecclesiastical discipline. His political career is less creditable. Honoured with the special confidence of William Rufus he deserted his patron's cause at the first sign of rebellion, and joined with Odo of Bayeux in urging Duke Robert of Normandy to claim the crown (1088). After the collapse of this plot William was put upon his trial before the Great Council. He claimed the right to be judged by his fellow-bishops alone; this claim being rejected he appealed to the see of Rome. This was the first case of an appeal to the pope from an English tribunal which had occurred since the 7th century. Rufus and Lanfranc did not venture to dispute the right of appeal, but contended that the bishop, as a royal vassal, could not appeal against the forfeiture of his temporalities. These were confiscated, and William left the kingdom, but no more was heard of his appeal, and in 1091 he regained the royal favour and his see. Thenceforward he showed the utmost subservience. He managed the king's case against Anselm, and at Rockingham (1095) actually claimed the right of appeal, when it was claimed by the archbishop. Notwithstanding his zeal for the royal interests, William was soon afterwards disgraced. He died in January 1096.

See E. A. Freeman, *William Rufus* (1882), and *Symeon of Durham*, vol. i. pp. 170-195 (Rolls ed.).

WILLIAM (*c.* 1130–*c.* 1190), archbishop of Tyre and chronicler, belonged to a noble French family and was probably born in Palestine about 1130. This, however, is only an inference from his works, borne out by the fact that he had seen Ralph, the patriarch of Antioch, who died about 1141; that he seems to call himself a contemporary historian from the accession of Baldwin III. to the throne of Jerusalem, an event which he places in November 1142; and that he remembered the fall of Edessa in 1144. Unfortunately the chapter (xix. 12) which relates to his early life has been excised or omitted from every extant manuscript of his *Historia*, and this remark holds good, not only for the original Latin, but also for the French translation of the 13th century. William was still pursuing his studies in Europe when Amalric I. became king of Jerusalem in 1162, but he returned to Palestine towards the close of 1166, or early in 1167, and was appointed archdeacon of Tyre at the request of Amalric in August 1167. In 1168 he was sent on an embassy, the forerunner of several others, to the emperor Manuel I. at Constantinople, and in 1169, at the time of the disastrous campaign against Damietta, he was obliged to take refuge in Rome from the “unmerited anger” of his archbishop. But he was soon in Palestine again, and about 1170 he was appointed tutor to Amalric's son, Baldwin, afterwards King Baldwin IV. Towards the end of 1174, soon after Baldwin's accession to the throne, he was made chancellor of the kingdom of Jerusalem, an office which he held until 1183, and less than a year later (May 1175) he was consecrated archbishop of Tyre. He was one of those who went to negotiate with Philip I., count of Flanders, in 1177, and in 1179 he was one of the bishops who represented the Latin Church of the East at the Lateran council in Rome. On his return to Palestine he stayed seven months at Constantinople with Manuel. This is William's last appearance in history, but he was writing his history in 1181, and this breaks off abruptly at the end of 1183 or early in 1184. He died probably between 1187 and 1190. About fifty years later one of his continuators accused Heraclius, the patriarch of Jerusalem, of procuring his death by poison at Rome, but this story appears to be legendary. Equally untrustworthy is the theory which identifies William with the archbishop of Tyre sent to Europe to preach a new crusade in 1188. It is true that Matthew Paris speaks of the English king, Henry II., as receiving the cross from the hands of *Willelmus episcopus Tyrensis*; but more contemporary writers omit the Christian name, while others write it Josce or Joscius.

If not the greatest, William of Tyre is at least among the greatest, of medieval historians. His *Historia rerum in partibus transmarinis gestarum*, or *Historia Hierosolymitana* or *Belli sacri historia* covers the period between 1095 and 1184, and is the main authority for the history of the Latin kingdom of Jerusalem between 1127, where Fulcher of Chartres leaves off, and 1183 or 1184, where Ernoul takes up the narrative. It was translated into French in the 13th century, or possibly before the end of the 12th, and this translation, known as the *Chronique d'outremer*, or *Livre d'Eracles* or *Livre du conquest*, is quoted by Jean de Joinville, and increased by various continuations, is the standard account of the exploits of the French warriors in the East. William's work consists of twenty-two books and a fragment of another book; it extends from the preaching of the first crusade by Peter the Hermit and Pope Urban II. to the end of 1183 or the beginning of 1184. It was undertaken at the request of Amalric, who was himself a lover of history and who supplied the author with Arabic manuscripts, and William says of it, “in this work we have had no guide, whether Greek or Arab, but have had recourse to traditions only, save as regards a few things that we ourselves have seen.” The “traditions” here referred to must be taken to include the *Gesta Francorum* of Tudebode, the writings of Fulcher of Chartres, of Baudry of Bourgueil and, above all, of Albert of Aix. From the beginning to about 1144 the *Historia* is taken from these writers; from 1144 to the end it is contemporary and original.

William also wrote *Historia de orientalibus principibus*. This work, which is now unfortunately lost, was partly based upon the Arabic chronicle of a certain Said-ibn-Batrik (d. 940), patriarch of Alexandria.

No medieval writer, except perhaps Giraldus Cambrensis, possesses William's power of delineating the physical and mental features of his heroes. Very few, moreover, had his instinctive insight into what would be of real value to future ages; genealogy, topography, archaeology, social life, both political and ecclesiastical, and military and naval matters all find due exposition in his pages. It is hardly too much to say that from his work alone a fairly detailed map of the Levant, as it was in the 12th century, might be constructed; and it is impossible to praise too highly the scrupulous fidelity with which he defines nearly all the technical terms, whether relating to land or sea, which he uses. His chief fault is in his chronology, where, indeed, he is often at discord with himself. In the later books of the *Historia* his information, even regarding events taking place beyond the Nile or the Euphrates as well as in Europe, is singularly exact.

His powers of industry were exceptionally great, and although a man of much learning and almost certainly acquainted with Greek and Arabic, he is as ready to enliven his pages with a homely proverb as he is to embellish them with quotations from Cicero, Virgil, Ovid or Plato. A prelate of pious character, he was inclined to see the judgment of God on the iniquities of his fellow-countrymen in every disaster that overtook them and in every success which attended the arms of the Saracens.

As *Belli sacri historia* the *Historia rerum* was first published in 1549 at Basel. More recent editions are in J. P. Migne's *Patrologia Latina*, tome cci., and in the “Recueil des historiens des croisades,” *Hist. occid.* i. (Paris, 1844). Manuscripts are in the British Museum, London, and in Corpus Christi College, Cambridge. It has been translated into German by E. and R. Kausler (Stuttgart, 1848); into French in Guizot's *Collection des mémoires*, tomes xvi., xviii. (Paris, 1824); into Italian and into Spanish. An English translation has been made for the Early English Text Society by M. N. Colvin (London, 1893). See the *Histoire littéraire de la France*, tome xiv. (1869); B. Kugler, *Studien zur Geschichte des zweiten Kreuzzuges* (Stuttgart, 1866); H. Prutz, *Studien über Wilhelm von Tyrus* (Hanover, 1883); and H. von Sybel, *Geschichte des ersten Kreuzzuges* (Leipzig, 1881).

WILLIAM OF VALENCE (d. 1296), brother of Henry III. of England, was a son of John's widow, Isabelle of Angoulême, by her second marriage. William came to England with his brothers in 1247, and at once became a court favourite. He married Joan de Munchensi, the heiress to the Pembroke estates, whence he is sometimes styled earl of Pembroke. In 1258 he was attacked by the baronial opposition and forced to leave England. He returned in 1261, after Henry III. had repudiated the Provisions of Oxford, and fought on the royal side at Lewes (1264). Escaping from the pursuit of the victorious Montfortians, he later appeared at the head of a small army in Pembrokeshire. This gave the signal for the outbreak of a new civil war which ended with the defeat of Montfort at Evesham (1265). Valence accompanied Prince Edward to the Holy Land and, in later years, became a trusted agent of the crown, especially in the Welsh wars. The position of his estates made him the natural leader of all expeditions undertaken against Llewelyn from South Wales. He was also employed in Aquitaine. He died at Bayonne in 1296. Despite his origin he had become, in course of time, a respected leader of the baronage; and as a military commander rose high above the average level.

See R. Pauli's *Geschichte von England*, vol. iii. (Hamburg, 1853); W. H. Blaauw, *Barons' War* (1871).

WILLIAM OF WYKEHAM (1323–1404), English lord chancellor and bishop of Winchester. William de Wykham, as he is called in earlier, William Wykeham in later life, has been variously guessed to be the son of a freedman carpenter, and an illegitimate son of Queen Isabella and Roger Mortimer (*Notes and Queries*, 10th s. i. 222). In sober truth (*Life* by Robert Heete in *Reg. Winch. Coll. c.* 1430) he was born at Wickham, Hants, in 1323 or 1324, son of John, whose name was probably Wykeham, but nicknamed Long, who was “endowed with the freedom of his ancestors,” and “according to some” had a brother called Henry Aas. His mother Sibyl was “of gentle birth,” a daughter of William Bowate and granddaughter of William Stratton of Stratton, Hants. His education at Winchester, no doubt in the Great Grammar school or High school in Minster Street, was paid for by some patron unnamed by the biographer, perhaps Sir Ralph Sutton, who is named first by Wykeham among his benefactors to be prayed for by his colleges. That he was, as stated by Archdeacon Thomas Martin, the author of a *Life of Wykeham*, published in 1597, taught classics, French and geometry by a learned Frenchman on the site of Winchester College, is a guess due to Wykeham's extant letters being in French and to the assumption that he was an architect. After some unspecified secular employment, Wykeham became "under-notary (*vice tabellio*) to a certain squire, constable of Winchester Castle," probably Robert of Popham, sheriff of Hampshire, appointed constable on the 25th of April 1340, not as commonly asserted Sir John Scures, the lord of Wykeham, who was not a squire but a knight, and had held the office from 1321, though, from Scures being named as second of his benefactors, Wykeham perhaps owed this appointment to his influence. "Two or three years afterwards, namely after he was twenty," Wykeham "was transferred to the king's court," *i.e. c.* 1343. Wykeham has been credited (*Gent. Mag.* lxxxv. 189) with the living of Irstead, Norfolk, of the king's gift on the 12th of July 1349. But apart from the fact that this Wykeham is described in the grant as "chaplain," the probate of his will on the 8th of March 1376–1377 (Norwich Reg. Heydon, f. 139) shows that he was a different person (H. Chitty in *Notes and Queries*, 10th ser. iv. 130). Our Wykeham first appears in the public records in 1350 as keeper of the manor of Rochford, Hants, during the minority of the heir, William Botreaux.

On the 12th of October 1352 Henry Sturmy of Elvetham, sheriff and escheator of Hants, and frequently a justice in eyre for the forests of Hants and Wilts, at Winchester, describes William of Wykeham as "my clerk" in a power of attorney dated at Winchester, to deliver seisin of lands in Meonstoke Ferrand, Hants, which he had sold to William of Edyndon, bishop of Winchester (Win. Coll. Lib. H. 249). On the 10th of November (not December as Lowth, *Life of Wykeham*, 14) Edyndon, by a letter dated at London, appointed William of Wykeham, clerk (not "my clerk" as Kirby, *Archaeol.* 57, ii. 292, where the deed is also misdated 1353), his attorney to take seisin of lands in Meonstoke Tour, Hants, which he had bought from Alice de Roche, daughter of William of Tour (*ibid.* f. 250). These lands were afterwards bought by Wykeham and given to Winchester College. On the 14th of April 1353 (Claus. 29 E. III. m. 29 d) Wykeham served as attorney of John of Foxle, of Bramshill, Hants, son of Thomas of Foxle, constable of Windsor Castle, in acknowledging payment of a debt due from John of Palton, sheriff of Somerset and of Hants. On the 15th of April 1356 schedules touching the New Forest and other forests in Hants and Wilts were delivered out of the Tower of London to William of Wykeham to take to the justices in eyre (Claus. 30 E. III. m. 19 d). In the same year on the 24th of August Peter-atte-Wode and William of Wykeham, clerk, were appointed keepers of the rolls and writs in the eyre for the forests of Hants and Wilts, of which Henry Sturmy was one of the justices. On the 10th of May 1356 Wykeham first appears in the direct employment of the king, being appointed clerk of the king's works in the manors of Henley and Yeshampsted (Easthampstead) to pay all outgoings and expenses, including wages of masons and carpenters and other workmen, the purchase of stone, timber and other materials, and their carriage, under the view of one controller in Henley and two in Easthampstead. On the 8th of June Walter Nuthirst and Wykeham were made commissioners to keep the statute of labourers and servants in the liberty of the Free Chapel (St George's), Windsor. On the 30th of October 1356 Wykeham was appointed during pleasure surveyor (supervisor) of the king's works in the castle of Windsor, for the same purposes as at Henley, with power to take workmen everywhere, except in the fee of the church or those employed in the king's works at Westminster, the Tower of Dartford, at the same wages as Robert of Bernham, probably Burnham, Bucks, who had been appointed in 1353, used to have, viz. 1s. a day and 3s. a week for his clerk. He was to do this under supervision of Richard of Teynton, John le Peyntour (the painter) and another. From this appointment it has been inferred that Wykeham was the [illegible] "Round Table" at Windsor, which has been co[illegible] Tower, and a story which is first tol[illegible], writing thirty years afterwards (*Antiq. Brit. Eccles.* ed. 1729, p. 385), relates that Wykeham nearly got into trouble for inscribing on it, "This made Wickam," which he only escaped by explaining that it did not mean that Wykeham made the tower, but that the tower was the making of Wykeham. But Wykeham had nothing to do with building either the Round Tower or the Round Table. The Round Tower, called the High Tower in Wykeham's day, is the Norman Keep. It was being refitted for apartments for the king and queen a little before Wykeham's time, and his first accounts include the last items for its internal decoration, including 28 stained glass windows. The Round Table, a building 200 ft. in diameter for the knights of the Round Table, who preceded the knights of the Garter, had been built in 1344 (*Chron. Angl.* "Rolls" ser. No. 61, p. 17) when Wykeham had nothing to do with Windsor. The inscription, "This made Wykeham," did exist on a small square tower in the Middle Bailey formerly known as Wykeham Tower, now entirely rebuilt with the inscription recopied and known as Winchester Tower. But it could hardly be of sufficient importance to cause Wykeham to play the sphinx, and the story is apparently due to the Elizabethan love of quips. All that was built during the five years, 1356 to 1361, when Wykeham was clerk of the works, were the new royal apartments, two long halls and some chambers in the upper ward, quite unconnected with and east of the Round Tower, and a gateway or two leading to them, the order for building which was given on the 1st of August 1351 (Pipe Roll 30 Ed. III.). The accounts of Robert of Bernham, Wykeham's predecessor, who was a canon of St George's Chapel (Le Neve's *Fasti*, iii. 378), are extant, and from the payments of 1s. a day to Mr John Sponle, mason and orderer or setter-out (ordinator) of the king's works, and Geoffrey of Carlton "appareller" of the carpentry work, it is clear that they, and not Bernham, were the architects and builders. Canon Bernham was only the paymaster and overlooker to see that men and materials were provided and to pay for them. While in 1353–1354 £1440 and in 1355–1356 £747 was expended under the supervision of Robert of Bernham, in 1357–1358 £867 was spent by Wykeham, including Winchester Tower. In 1358–1359 the expenditure rose to £1254, while between the 6th of June 1360 and the 12th of April 1361 it amounted to £2817. The chief items were a new Great Gate with two flanking towers, a belfry for St George's Chapel and houses in the Lower Bailey, probably for the canons, and in the Upper Bailey, probably for the royal household. On the 1st of November 1361 Wykeham was succeeded as clerk of the works by William of Mulsho, another canon of Windsor, who afterwards succeeded him also as dean of St Martin-le-Grand. Under Wykeham, William of Wynford, who appears in 1360 as "appareller" under Sponle, in 1361 became chief mason and ordinator, and he was probably what we should call the architect of the Great Gate, the rest of which was built under Wykeham's supervision. For wherever we find Wykeham building afterwards, we find Wynford as chief mason. When Wykeham was provost of Wells, Wynford was retained as architect on the 1st of February 1364–1365 at a fee of 40s. a year and 6d. a day when in Wells (Wells, *Lib. Abb.* f. 253). He was architect to Abingdon Abbey (at a fee of £3, 6s. 8d. and a furred robe) in 1375–1376 when the existing Outer Gate of the abbey was built (*Abingdon Obed. Acc.* Camd. Soc., 1892). He was chief mason for Wykeham's works at Winchester Cathedral and for Winchester College, where his portrait may be seen in the east window of the chapel, and where his contract with the clerk of the works, an ex-scholar of the college, for the building of the outer gate, is still preserved.

The ascription to Wykeham of the invention of the Perpendicular style of medieval architecture is now an abandoned theory. In so far as he gave vogue to that style the credit must be given to William of Wynford, not to William of Wykeham. At all events he had very little to do with building Windsor Castle. How far he really was responsible for the other great castle attributed to him, that of Queenborough Castle in the Isle of Sheppey, cannot be tested, as the building accounts for it are only partially extant. The account from the 1st of

November 1361 to 1362 shows Simon of Bradstede, clerk of the works, then expending £1773, of which £100 was received by the hands of William of Wykeham at the exchequer, and that from 1369 shows Bernard Cokles, clerk of the works, expending £2306. The chief evidence cited in support of the theory that Wykeham owed his advancement to his skill as an architect is the remark in a tract *Why Poor Priests have no benefices* that "Lords will not present a clerk able of cunning of God's law and good life and holy ensample . . . but a kitchen clerk or a fancy clerk or wise in building castles or worldly doing, though he cannot well read his psalter." This tract has been attributed to Wycliffe, but without adequate authority, and it is thought to be of later date, and if Wykeham is meant by the castle-building clerk it only shows that popular repute is no guide to fact. That Wykeham, who was clearly an extremely good man of business, should, when clerk of the works, have played a considerable part in determining what works should be done and the general character of the buildings with which he was connected, we may believe; but to think that this attorney and notary, this keeper of the king's dogs (20th Aug. 1356, Devon's *Issues of the Exchequer*, 163) and of the king's forests, this carrier of rolls and paymaster at the exchequer, was also the architect of Windsor and Queenborough Castles, of Winchester Cathedral and College, is to credit Wykeham with a superhuman combination of knowledge, of training and of functions.

That he gave great satisfaction to the king when once he was appointed surveyor at Windsor in 1356 is unquestionable. He is first called king's clerk on the 14th of November 1357, when he was given 1s. a day, beyond the wages he was already receiving for his offices at Windsor and elsewhere, "until peacefully advanced to some benefice." Ecclesiastical benefices were the chief means by which, before the Reformation, the civil servants of the crown were paid for services which, being clerical, were also ecclesiastical, and for which the settled stipends were wholly inadequate. In his accumulation of benefices Wykeham seems to have distanced all his predecessors and successors, except perhaps John Maunsell, the chancellor of Henry III., and Thomas Wolsey, the chancellor of Henry VIII., the latter being a pluralist not in canonries and livings but in bishoprics.

Wykeham's first benefice was the rectory of Pulham, the richest in Norfolk, worth £53 a year, or some £1600 of our money, to which he was presented on the 30th of November 1357. But this was not a "peaceful" advancement, for it was only in the king's patronage by reason of the temporalities of the see of Ely having been seized into the king's hands the year before, on account of the bishop being implicated in certain murders and robberies, which he denied, contesting the king's action in the papal court. On the 16th of April 1359 the king gave Wykeham a pension of £20 a year from the exchequer until he could obtain peaceful possession of Pulham. On this, and what may have been a similarly contested presentation to the canonry and prebend of Flixton in Lichfield cathedral on the 1st of March 1359, repeated on the 22nd of August 1360, and supported by a mandate to the new bishop on the 29th of January 1361, Wykeham's latest biographer (George Herbert Moberly, *Life of Wykeham*, 1887, 2nd ed., 1893) has built an elaborate story of Wykeham's advancement being opposed by the pope because he was the leader of a national party against papal authority in England. The baselessness of this is clear when we find that Wykeham had obtained from Innocent VI., on the 27th of January 1357, an indulgence to choose his own confessor (*Cal. Pap Reg.*), and on the 8th of July 1358 (*Cal. Pap. Pet.* i. 331) asked and obtained a papal provision to this very church of Pulham on the ground that it had passed to the pope's patronage by the promotion of its former possessor to the see of London. In spite of papal and royal authority, it is doubtful whether Wykeham obtained peaceful possession of Pulham till again presented to it by the king on the 10th of July 1361 after the bishop of Ely's death. The difficulty as to the prebend of Flixton was no doubt something of the same kind. Between bishop, pope and king the next vacant prebend in every great church was generally promised two or three deep before it was vacant, and the episcopal and chapter registers are full of the contests which ensued.

Wykeham's civil offices rapidly increased. On the Ides (15th) of March 1359 a French fleet sacked Winchelsea, carrying off the women and girls. On the 10th of July 1359 Wykeham was made chief keeper and surveyor, not only of Windsor, but of the castles of Dover, Hadley and Leeds (Kent), and of the manors of Foliejohn, Eton, Guildford, Kennington, Sheen (now Richmond), Eltham and Langly and their parks, with power to repair them and to pay for workmen and materials. On the 20th of February 1360, when another French invasion was feared, the bailiff of Sandwich was ordered to send all the lead he had to Wykeham for the works at Dover. In April the sheriffs of four batches of counties were each ordered to send forty masons to Wykeham at Windsor This secular activity was rewarded by presentation to the deanery of St Martin-le-Grand, with an order for induction on the 21st of May, on which day he was commissioned to inquire by a jury of men of Kent into the defects of the walls and tower of Dover (Pat. 34 E. III. pt. i. m. 12). On the 15th of August he was directed to hand over £40 given him for the purpose, to a successor, the treaty of Brétigny having been made meanwhile and confirmed at Calais with Wykeham as one of the witnesses on the 24th of October. In January 1361 building work at Windsor was vigorously resumed, and again the sheriffs were ordered to contribute their quotas of 40 freestone masons and 40 *cementarii* to Wykeham's charge. On the 13th of February, on the joint petition of the kings of England and of France, the pope "provided" Wykeham to a canonry and dignity at Lincoln, notwithstanding his deanery and a prebend at Llandaff. On the 2nd of April four commissioners were appointed to superintend the construction of the new castle ordered in the Isle of Sheppey, which when finished was called Queenborough, the purchases and payments, not the works, being under the beloved clerk, Wykeham In this year came the second visitation of the Black Death, the Second Plague, as it was called, and carried off four bishops and several magnates, with many clerics, whose vacated preferments were poured on Wykeham. The bishop of Hereford being dead, on the 12th of July 1361, the king presented Wykeham to a prebend in Hereford cathedral, and on the 24th of July to one in Bromyard collegiate church; the bishop of St David's being dead, prebends in the collegiate churches of Abergwilly and Llandewybrewi were given him on the 16th of July. On the 11th of August the pope, on the king's request, provided him with a prebend in St Andrew's Auckland collegiate church. This Mr Moberly curiously misrepresents as action against Wykeham. He in fact never obtained possession of it, probably because the pope had already "provided" it to Robert of Stretton, a papal chaplain, who, however, asked in January 1362 for a canonry at Lincoln instead, because he was "in fear and terror of a certain William of Wykeham." On the 24th of September 1361 the king gave Wykeham a prebend in Beverley Minster, on the 1st of October the prebend of Oxgate in St Paul's (which he exchanged for Tattenhall on the 10th of December), on the 22nd of November a prebend in St David's cathedral, on the 20th of December a prebend in Wherwell Abbey, Hants. So far the Patent Rolls. The Salisbury records show him also admitted to a prebend there on the 16th of August, which he exchanged for other prebends on the 9th and 15th of October. All these clerical preferments Wykeham held when he was a simple clerk, who had no doubt undergone the "first tonsure," but was not even ordained an acolyte till the 5th of December of this golden year. He added to his civil offices during the year that of clerk (*officium cirografie*) of the exchequer on the 24th of October. On the 9th of October he acted as attorney to the king in the purchase of the manor of Thunderley, Essex. Next year, 1362, he entered holy orders, being ordained subdeacon on the 12th of March and priest on the 12th of June, and adding to his canonries and prebends one in Shaftesbury Abbey on the 15th of July and another in Lincoln cathedral on the 20th of August. Wykeham meanwhile was acting as keeper of the forests south of Trent and as a trustee for Juliana, countess of Huntingdon. Next year, 1363, he was made a canon of the collegiate church in Hastings Castle on the 3rd of February, and of the royal chapel of St Stephen's, Westminster, then newly founded, or re-founded, on the 21st of April. He obtained the archdeaconry of Northampton on the 26th of April, and resigned it on the 12th of June, having been promoted to that of Lincoln, the richest of all his preferments, on the 23rd of May. On the 31st of October he was made a canon of York, and on the 15th of December provost of the fourteen prebends of Combe in Wells cathedral, while at some date unknown he obtained also prebends in Bridgenorth collegiate church and St Patrick's, Dublin, and the rectory of Menheniot in Cornwall. On the 5th of May 1364 he became privy seal, and in June is addressed by the new pope, Urban V., as king's secretary. On the 14th of March 1365 he was given 20s. a day from the exchequer "notwithstanding that he is living in the household." He was so much the king's factotum that Froissart (i. 249) says "a priest called Sir William de Wican reigned in England . . . by him everything was done and without him they did nothing." In fact, as privy seal he was practically prime minister, as Thomas Cromwell was afterwards to Henry VIII. On the 7th of October 1366, William Edingdon, the treasurer of England and bishop of Winchester, died; on the 13th of October Wykeham was recommended by the king to the chapter of monks of St Swithun's cathedral priory and elected bishop.

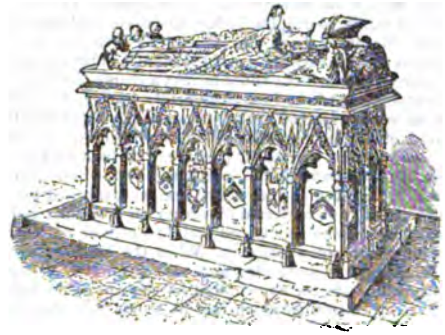
A long story has been made out of Pope Urban V.'s delay in the recognition of Wykeham, which has been conjectured to have been because of his nationalist proclivities. But little more than the ordinary delays took place. On the 1st of December the king, "for a large sum of money paid down," gave Wykeham, not only the custody of the temporalities of the see, but all the profits from the day of Edingdon's death. On the 11th the pope granted him the administration of the spiritualities. The papal court was then moving from Avignon to Rome, and on the 14th of July 1367 the bull of "provision" issued at Viterbo. Wykeham was in no hurry himself, as it was not till the 10th of October 1367 that he was consecrated, nor till the 9th of July 1368, after the war parliament which met on the 3rd of June had been dissolved on the 10th of June, that he was enthroned. Meanwhile he had been made chancellor on the 17th of September 1367—thus at the age of forty-three he held the richest ecclesiastical, and the best-paid civil, office in the kingdom at the same time. The war in France was disastrous, how far through Wykeham's fault we have no means of knowing. When parliament again met in 1371, the blame was laid on the clerical ministers, under the influence of Wycliffe. He had been born in the same year as Wykeham, and like him had profited by papal provisions to prebends in 1361, but had since led an attack on papal and clerical abuses. Parliament demanded that laymen only should be chancellor, treasurer, privy seal and chamberlain of the exchequer. On the 8th of March 1372 Wykeham resigned the chancellorship, and Bishop Brantingham of Exeter the treasurership, and laymen were appointed in their places, though Sir Robert Thorp, who became chancellor, was master of Pembroke Hall at Cambridge, and as much a cleric as Wykeham had been when he was dean of St Martin-le-Grand and surveyor of Windsor Castle.

As soon as he became bishop Wykeham had begun his career as founder. In 1367 (Pat. 41 E. III. pt. 2, m. 5) he purchased the estates of Sir John of Boarhunt, near Southwick, with which he endowed a chantry in Southwick Priory for his parents. Next year he began buying lands in Upsomborne, Hants, which he gave to Winchester College, and in Oxford, which he gave to New College. On the 1st of September 1373 he entered into an agreement (*Episc. Reg.* iii. 98) with Master Richard of Herton "gramaticus" for ten years faithfully to teach and instruct the poor scholars, whom the bishop maintained at his own [illegible] the art of grammar, and to provide an usher to [illegible] while the war with France was even more [illegible] lay ministry and John of Gaunt. In the [illegible] Wykeham was named by the Commons [illegible] to treat with them on the state of [illegible] which met on the 12th of February 1376, Lord Latimer and Alice Perrers, the king's mistress, a lady of good birth, and not (as the mendacious St Albans chronicler alleged) the ugly but persuasive daughter of a tiler, were impeached, and Wykeham took a leading part against Latimer, even to the extent of opposing his being allowed counsel. At the dissolution of parliament a council of nine, of whom Wykeham was one, was appointed to assist the king. But on the 8th of June the Black Prince died. Alice Perrers returned. John of Gaunt called a council on the 16th of October to impeach Wykeham on articles which alleged misapplication of the revenues, oppressive fines on the leaders of the free companies, taking bribes for the release of the royal French prisoners, especially of the duke of Bourbon, who helped to make him bishop, failing to send relief to Ponthieu and making illegal profits by buying up crown debts cheap. He was condemned on one only, that of halving a fine of £80 paid by Sir John Grey of Rotherfield for licence to alienate lands, and tampering with the rolls of chancery to conceal the transaction. Wykeham's answer was that he had reduced the fine because it was too large, and that he had received nothing for doing so. Skipwith, a judge of the common pleas, cited a statute under which for any erasure in the rolls to the deceit of the king 100 marks fine was imposed for every penny, and so Wykeham owed 960,000 marks. Wykeham was convicted, and on the 17th of November his revenues were seized and bestowed on the 15th of March 1377 on the young prince Richard, and he was ordered not to come within 20 m. of the king. He "brake up household . . . sending also to Oxford, whear upon almose and for God's sake he found 70 scollers, that they should depart to their frendis for he could no longer help or finde them" (*Chron. Angliae*, lxxx.). But when convocation met in 1377 the bishops refused to proceed to business without Wykeham, and he was fetched back from Waverley Abbey. He was exempted, however, from the general pardon issued on the occasion of Edward III.'s jubilee. But on the 13th of June the prince restored his temporalities, on condition of his maintaining three galleys with 50 men-at-arms and 50 archers for three months, or providing the wages of 300 men. The St Albans monk says that this was obtained by a bribe to Alice Perrers. Meonstoke Perrers, part of the endowment of Winchester College, was certainly bought on the 12th of June 1380 from Sir William Windsor, her husband, whose name seems to be derived from Windsor, near Southampton water. As Hampshire people they may have helped Wykeham. But as Wykeham was of the party of the Black Prince and his widow Joan of Kent, no *dea ex machina* was needed.

On the 21st of June 1377 Edward III. died. Wykeham was present at the coronation of Richard II. on the 19th of July, and on the 31st of July full pardons were granted him under the privy seal, which at the request of Richard's first parliament were ratified under the great seal on the 4th of December 1377. Wykeham at once took an active part in the financial affairs of the new king, giving security for his debts and himself lending 500 marks, afterwards secured on the customs (Pat. 4 Rich. II. pt. i. m. 4). He then set to work to buy endowments for Winchester and New Colleges. On the 30th of June he obtained licence in mortmain and on the 26th of November issued his charter of foundation of "Seynt Marie College of Wynchestre in Oxenford" for a warden and 70 scholars to study theology, canon and civil law and arts, who were temporarily housed in various old halls. On the 5th of March 1380 the first stone was laid of the present buildings, which were entered on by the college on the 14th of April 1386. The foundation of Winchester was begun with a bull of Pope [illegible] on the 1st of June 1378, enabling Wykeham to [illegible] college he proposed to establish for 70 poor [illegible] and study in grammar- [illegible] and appropriate to it [illegible] livings belonging to his [illegible] had, as he asserts, [illegible] of life to scholars [illegible] On the 6th of October [illegible] was issued, on the 10th-13th of October the site was conveyed, and on the 20th of October 1382 "Sancte Marie collegium" or in vulgar tongue "Seinte Marie College of Wynchestre by Wynchestre" was founded for a warden and "70 pore and needy scholars studying and becoming proficient in grammaticals or the art and science of grammar." The first stone of the buildings was laid on the 26th of March 1388, and they were entered on by the scholars on the 28th of March 1394, not, as supposed at the quincentenary celebration in 1893, in 1393. While the new buildings were being erected, the college remained in the parish of "St John the Baptist on the Hill" of St Giles, supplying scholars to New College then as since. A reference to this in a letter of Wykeham's of the 8th of April 1388 has given rise to the creation of an imaginary college of St John the Baptist at Winchester by the Rev. W. Hunt (*Dic. Nat. Biog.* sub. "Chichcley"). The foundation was on the model of Merton and Queen's colleges at Oxford, to which grammar schools were attached by their founders, while fellows of Merton were the first wardens of both of Wykeham's colleges. Both were double the size of Merton, and the same size as the Navarre college of the queen of France and Navarre, founded at Paris in 1304, which also contained a school. But each of Wykeham's colleges contained as many members as the French queen's. The severance of the school which was to feed the college exclusively, placing it not at Oxford, but at Winchester, and constituting it a separate college, was a new departure of great importance in the history of education. Ten fellows and 16 choristers were added in 1394 to the 70 scholars, the choristers attending the school like the scholars, and being generally, during the first three centuries of the foundation, promoted to be scholars. The original statutes have not come down to us. Those which governed the colleges until 1857 were made in 1400. They state that the colleges were provided to repair the ravages caused by the Black Deaths in the ranks of the clergy, and for the benefit of those whose parents could not without help maintain them at the universities, and the names of the boys appointed by Wykeham and in his time show that "poor and indigent" meant the younger sons of the gentry, and the sons of yeomen, citizens of Winchester or London, and the middle classes generally, who needed the help of exhibitions.

The time which elapsed between the foundation and completion of the colleges may be attributed to Wykeham's preoccupation with politics in the disturbed state of affairs, due to the papal schism begun in 1379, in which England adhered to Urban VI. and France to Clement VII., to the rising of the Commons in 1381, and the wars with France, Scotland and Spain during John of Gaunt's ascendancy. Then followed the constitutional revolution of the lords appellant in 1388. When Richard II. took power on himself, on the 3rd of May 1389, he at once made Wykeham chancellor, with Brantingham of Exeter again as treasurer. Wykeham's business capacity is shown perhaps by the first record of the minutes of the privy council being kept during his term of office, and his promulgation in 1390 of general orders as to its business. At least one occasion is recorded in the minutes on which Wykeham, on behalf of the council, took a firm stand against Richard II. and that in spite of the king's leaving the council in a rage. Peace was made with France in August. On the meeting of parliament in January 1390 Wykeham resigned the great seal; and asked for an inquiry into the conduct of the privy council, and on being assured that all was well resumed it. He now showed that he had not by his charities wronged his relations by settling on his great-nephew and heir Thomas Wykeham, whom he had educated at Winchester and New College, Broughton Castle and estates, still held by his descendants in the female line, the family of T[illegible]-Wykeham-Fiennes (peerage of Saye and Sele). In [illegible] he obtained a papal bull enabling him to appoint at [illegible]jutors to do his episcopal business.

[illegible] of September 1391, Wykeham finally resigned the [illegible]. For three years after there are no minutes of [illegible] On the 24th of November 1394 Wykeham lent the [illegible] of £1000 (some £30,000 of our money), which same [illegible] £1000 he promised on the 21st of February 1395 to repay by midsummer, and did so (Pat. 18, Rich. II. pt. ii. m. 23, 41). The murder of the duke of Gloucester, Richard's uncle, in 1397, was followed next year by the assumption of absolute power by Richard. Wykeham was clearly against these proceedings. He excused himself from convocation in 1397, and from the subservient parliament at Shrewsbury in 1398. The extraordinary comings and goings of strangers to Winchester College, just opposite the gates of the bishop's palace at Wolvesey in 1399, suggest that he took part in the revolution of Henry IV. He appeared in the privy council four times at the beginning of Henry's reign (*Proc. P.C.* i. 100). On the 23rd of July 1400 he lent Henry IV. £500 for his journey towards Scotland, and in 1402 another £500, while a general loan for the war with France and Scotland on the 1st of April 1403 was headed by Wykeham with £1000, the bishop of Durham lending 1000 marks (£666, 13s. 4d.), and no one else more than £500. Meanwhile on the 29th of September 1394 he had begun the recasting of the nave of the cathedral with William Wynford, the architect of the college, as chief mason, and Simon Membury, an old Wykehamist, as clerk of the works. On the 24th of July 1403, he made his will, giving large bequests amounting to some £10,000 (£300,000 of our money), to friends and relations and every kind of religious house. On the 16th of August 1404, he signed an agreement with the prior and convent for three monks to sing daily three masses in his beautiful chantry chapel in the nave of the cathedral, while the boys of the almonry, the cathedral choir-boys, were to say their evening prayers there for his soul. He died on the 27th of September 1404, aged eighty.



His effigy in the cathedral chantry and a bust on the groining of the muniment tower at Winchester college are no doubt authentic portraits. The pictures at Winchester and New College are late 16th-century productions. Three autograph letters of his, all in French, and of the years 1364–1366, are preserved, one at the British Museum, one at the Record Office, a third at New College, Oxford. A fourth letter imputed to Wykeham at the British Museum is shown alike by its contents and its handwriting not to be his.

See Thomas Martin, *Wilhelmi Wicami* (1597); R. Lowth, *Life of Wykeham* (1736); Mackenzie E. C. Walcott, *William of Wykeham and his Colleges* (1852); T. F. Kirby, *Annals of Winchester College* (1892); G. H. Moberly, *Life of Wykeham* (1887); A. F. Leach, *History of Winchester College* (1899); and the *Calendars of Patent and Close Rolls. Edward III. and Richard II.* (A. F. L.)

WILLIAMS, JOHN (1582–1650), English archbishop and lord keeper, son of Edmund Williams of Conway, a Welsh gentleman of property, was born in March 1582 and educated at St John's College, Cambridge. He was ordained about 1605, and in 1610 he preached before King James I., whose favour he quickly gained by his love of compromise. The result was the rapid promotion of Williams in the church; he obtained several livings besides prebends at Hereford, Lincoln and Peterborough. In 1617 he became chaplain to the king, in 1619 dean of Salisbury, and in the following year dean of Westminster. On the fall of Bacon in 1621 Williams, who had meantime ingratiated himself with the duke of Buckingham, was appointed lord keeper, and was at the same time made bishop of Lincoln, retaining also the deanery of Westminster. As a political adviser of the king

Williams consistently counselled moderation and compromise between the unqualified assertion of the royal prerogative and the puritan views of popular liberties which were now coming to the front. He warned Buckingham and Prince Charles of the perils of their project for the Spanish marriage, and after their return from Madrid he encountered their resentment by opposing war with Spain. The lord keeper's counsel of moderation was less pleasing to Charles I. than it had been to his father. The new king was offended by Williams's advice to proceed with caution in dealing with the parliament, with the result that within a few months of Charles's accession the Great Seal was taken from Williams. In the quarrel between the king and the Commons over the petition of right, Williams took the popular side in condemning arbitrary imprisonment by the sovereign. In the matter of ecclesiastical administration he similarly followed a middle course; but he had now to contend against the growing influence of Laud and the extreme high church party. A case was preferred against him in the Star Chamber of revealing state secrets, to which was added in 1635 a charge of subornation of perjury, of which he had undoubtedly been guilty and for which he was condemned in 1637 to pay a fine of £10,000, to be deprived of the temporalities of all his benefices, and to be imprisoned during the king's pleasure. He was sent to the Tower. In 1639 he was again condemned by the Star Chamber for libelling Laud, a further heavy fine being imposed for this offence. In 1641 he recovered his liberty on the demand of the House of Lords, who maintained that as a peer he was entitled to be summoned to parliament. When the Long Parliament met, Williams was made chairman of a committee of inquiry into innovations in the church; and he was one of the bishops consulted by Charles as to whether he should veto the bill for the attainder of Strafford. In December 1641 the king, anxious to conciliate public opinion, appointed Williams archbishop of York. In the same month he was one of the twelve bishops impeached by the Commons for high treason and committed to the Tower. Released on an undertaking not to go to Yorkshire, a promise which he did not observe, the archbishop was enthroned in York Minster in June 1642. On the outbreak of the Civil War, after visiting Conway in the Royalist interest, he joined the king at Oxford; he then returned to Wales, and finding that Sir John Owen, acting on Charles's orders, had seized certain property in Conway Castle that had been deposited with the archbishop for safe-keeping, he went over to the Parliamentary side and assisted in the recapture of Conway Castle in November 1646. Williams, who was a generous benefactor of St John's College, Cambridge, died on the 25th of March 1650.

WILLIAMS, JOHN (1796–1839), English Nonconformist missionary, was born at Tottenham near London on the 29th of June 1796. He was trained as an ironmonger, and acquired considerable experience in mechanical work. Having offered himself to the London Missionary Society, he was sent, after some training, in 1816 to Eimeo, in the Society Islands, where he rapidly acquired a knowledge of the native language. After staying there for a short time, he finally settled at Raiatea, which became his permanent headquarters. His success as a missionary here and elsewhere was remarkable. The people rapidly became Christianized and adopted many of the habits of civilization. Williams was fairly liberal for his age, and the results of his labours among the Pacific Islands were essentially beneficial. He travelled unceasingly among the various island groups, planting stations and settling native missionaries whom he himself had trained. From the Society Islands he visited the Hervey group, where he discovered, and stayed for a considerable time on, the island of Rarotonga. Most of the inhabitants of the group were converted in a remarkably short time, and Williams's influence over them, as over the people of other groups, was very great. Besides establishing Christianity and civilization among them, he also, at their own request, [illegible] draw up a code of laws for civil administration [illegible] the new religion. While at Rarotonga he, [illegible] the natives, built himself a 60-ft. ship, "The [illegible]," within about four months; with this he returned to Raiatea, and made voyages among other island groups, including Samoa and the neighbouring islands. Williams returned to England in 1834 (having previously visited New South Wales in 1821); and during his four years' stay at home he had the New Testament, which he had translated into Rarotongan, printed. Returning in 1838 to the Pacific, he visited the stations already established by him, as well as several fresh groups. He went as far west as the New Hebrides, and, while visiting Eromanga, one of the group, for the first time, was murdered by cannibal natives on the 20th of November 1839.

His *Narrative of Missionary Enterprises in the South Sea Islands* was published in 1837, and formed an important contribution to our knowledge of the islands with which the author was acquainted. See *Memoir of John Williams*, by Ebenezer Prout (London, 1843); C. S. Horne, *The Story of the L.M.S.*, pp. 41-54.

WILLIAMS, ROGER (*c.* 1604–1684), founder of the colony of Rhode Island in America and pioneer of religious liberty, son of a merchant tailor, was born (probably) about 1604 in London. It seems reasonably certain that he was educated, under the patronage of Sir Edward Coke, at the Charter House and at Pembroke College, Cambridge, where he received his degree in 1627. According to tradition (probably untrue), he studied law under Sir Edward Coke; he certainly devoted himself to the study of theology, and in 1629 was chaplain to Sir William Masham of Otes, in the parish of High Laver, Essex, but from conscientious scruples, in view of the condition of ecclesiastical affairs in England at the time, refused preferment. He soon decided to emigrate to New England, and, with his wife Mary, arrived at Boston early in February 1631. In April he became teacher of the church at Salem, Mass., as assistant to the Reverend Samuel Skelton. Owing to the opposition of the ecclesiastical authorities at Boston, with whose views his own were not in accord, he removed to Plymouth in the summer, and there remained for two years as assistant pastor. In August 1633 he again became assistant teacher at Salem, and in the following year succeeded Skelton as teacher. Here he incurred the hostility of the authorities of the Massachusetts Bay Colony by asserting, among other things, that the civil power of a state could properly have no jurisdiction over the consciences of men, that the King's patent conveyed no just title to the land of the colonists, which should be bought from its rightful owners, the Indians, and that a magistrate should not tender an oath to an unregenerate man, an oath being, in reality, a form of worship. For the expression of these opinions he was formally tried in July 1635 by the Massachusetts General Court, and at the next meeting of the General Court in October, he not having taken advantage of the opportunity given to him to recant, a sentence of banishment was passed upon him, and he was ordered to leave the jurisdiction of Massachusetts within six weeks. The time was subsequently extended, conditionally, but in January 1636 an attempt was made to seize him and transport him to England, and he, forewarned, escaped from his home at Salem and proceeded alone to Manton's Neck, on the east bank of the Seekonk river. At the instance of the authorities at Plymouth, within whose jurisdiction Manton's Neck was included, Williams, with four companions, who had joined him, founded in June 1636 the first settlement in Rhode Island, to which, in remembrance of "God's merciful providence to him in his distress," he gave the name *Providence*. He immediately established friendly relations with the Indians in the vicinity, whose language he had learned, and, in accordance with his principles, bought the land upon which he had settled from the sachems Canonicus (*c.* 1565–1647) and Miantonomo. His influence with the Indians, and their implicit confidence in him, enabled him in 1636, soon after arriving at Providence, to induce the Narragansets to ally themselves with the Massachusetts colonists at the time of the Pequot War, and thus to render a most effective service to those who had driven him from their community. Williams and his companions founded their new settlement upon the basis of complete religious toleration, with a view to its becoming "a shelter for persons distressed for conscience" (see RHODE ISLAND). Many settlers came from Massachusetts and elsewhere, among others some Anabaptists, by one of whom in 1639 Williams was baptized, he baptizing others in turn and thus establishing what has been considered the first Baptist church in America. Williams, however, maintained his connexion with this church for only three or four months, and then became what was known as a "Seeker," or Independent, though he continued to preach. In June 1643 he went to England, and there in the following year obtained a charter for Providence, Newport and Portsmouth, under the title "The Providence Plantations in the Narragansett Bay." He returned to Providence in the autumn of 1644, and soon afterwards was instrumental in averting an attack by the Narragansets upon the United Colonies of New England and the Mohegans. In 1646 he removed from Providence to a place now known as Wickford, R.I. He was at various times a member of the general assembly of the colony, acted as deputy president for a short time in 1649, was president, or governor, from September 1654 to May 1657, and was an assistant in 1664, 1667 and 1670. In 1651, with John Clarke (1609–1676), he went to England to secure the annulment of a commission which had been obtained by William Coddington for the government of Rhode Island (Newport and Portsmouth) and Connecticut, and the issue of a new and more explicit charter, and in the following year succeeded in having the Coddington commission vacated. He returned in the summer of 1654, having enjoyed the friendship of Cromwell, Milton and other prominent Puritans; but Clarke remained in England and in 1663 obtained from Charles II. a new charter for "Rhode Island and Providence Plantations." Williams died at Providence in March or April 1684; the exact date is unknown.

Though headstrong, opinionative and rigid in his theological views, he was uniformly tolerant, and he occupies a high place among those who have striven for complete liberty of conscience. He was the first and the foremost exponent in America of the theory of the absolute freedom of the individual in matters of religion; and Rhode Island, of which he was pre-eminently the founder, was the first colony consistently to apply this principle in practice.

Williams was a vigorous controversialist, and published, chiefly during his two visits to England, besides *A Key into the Language of the Indians of America* (written at sea on his first voyage to England (1643); reprinted in vol. i. of the *Collections of the Rhode Island Historical Society* (1827), and in series i. vol. iii. of the *Massachusetts Historical Society Collections*); *Mr Cotton's Letter Examined and Answered* (1644); *The Bloudy Tenent of Persecution for the Cause of Conscience* (1644); *Queries of Highest Consideration* (1644); *The Bloudy Tenent yet more Bloudy* (1652); *The Hireling Ministry none of Christ's* (1652); *Experiments of Spiritual Life and Health* (1652); and *George Fox Digged out of his Burrowes* (1676).

His writings have been republished in the *Publications of the Narragansett Club* (6 vols., Providence, 1866–1874), the last volume containing his extant letters, written between 1632 and 1682. The best biographies are those by Oscar Straus (New York, 1894) and E. J. Carpenter (*ibid.* 1910). Also see J. D. Knowles, *Memoir of Roger Williams* (Boston, 1834), and Elton, *Life of Roger Williams* (London, 1852; Providence, 1853); *New England Hist. and Gen. Register*, July and October 1889, and January 1899; and M.C.Tyler, *History of American Literature, 1607–1765* (New York, 1878). For the best apology for his expulsion from Massachusetts, see Henry M. Dexter's *As to Roger Williams and his "Banishment" from the Massachusetts Plantation* (Boston, 1876), an unsuccessful attempt to prevent Massachusetts from revoking the order of banishment.

WILLIAMS, ROWLAND (1817–1870), English divine and scholar, was born at Halkyn, Flint, the son of Rowland Williams (d. 1854), canon of St Asaph, and educated at Eton and Cambridge. He was elected fellow of King's College, Cambridge, in 1839, and took orders in 1842. During the next few years he actively opposed the amalgamation of the sees of St Asaph and Bangor. In 1850 he became vice-principal and Hebrew lecturer at St David's College, Lampeter, where he introduced much-needed educational and financial reforms. He was appointed select preacher of Cambridge University in 1854, and preached a sermon on inspiration, afterwards published in his *Rational Godliness after the Mind of Christ and the Written Voices of the Church* (London, 1855). He was charged with heterodoxy, and Alfred Ollivant (1798–1882), bishop of Llandaff, required him to resign his chaplaincy, but he remained at the college in spite of these difficulties. His views were further defined in *Christianity and Hinduism* (Cambridge, 1856), an expansion of the Muir prize essay which he had won in 1848. He became vicar in 1858 of Broadchalke with Bowerchalke and Alvedistone, Wiltshire. As a result of his favourable review of Bunsen's "Biblical Researches" contributed to *Essays and Reviews* (1860) he was prosecuted for heterodoxy. An unfavourable judgment was given by the Canterbury Court of Arches in 1862, but reversed by the Privy Council in 1864. Williams died on the 18th of January 1870.

Besides the above works his most important production was a translation of the Hebrew Prophets with commentary (pt. i. 1866; pt. ii. edited by Mrs Williams 1871; pt. iii. though planned was never written). See *Life and Letters*, edited by Mrs Williams (2 vols., 1874); and T. K. Cheyne, *Founders of Old Testament Criticism* (1893).

WILLIAMS, SIR WILLIAM FENWICK, Bart. (1800–1883), British general, second son of Commissary-General Thomas Williams, barrack-master at Halifax, Nova Scotia, was born at Annapolis, Nova Scotia, on the 4th of December 1800. He entered the Royal Artillery as second lieutenant in 1825. His services were lent to Turkey in 1841, and he was employed as a captain in the arsenal at Constantinople. He was British commissioner in the conferences preceding the treaty of Erzerûm in 1847, and again in the settlement of the Turko-Persian boundary in 1848 (brevet majority and lieutenant-colonelcy and C.B.). Promoted colonel, he was British commissioner with the Turkish army in Anatolia in the Russian War of 1854–56, and, having been made a *ferik* (lieutenant-general) and a pasha, he practically commanded the Turks during the heroic defence of Kars, repulsing several Russian attacks and severely defeating the Russian general Muraviev in the battle of Kars on 29th September 1855. Cold, cholera, famine and hopelessness of succour from without, however, compelled Williams to make an honourable capitulation on the 28th of November following. A baronetcy with pension for life, the K.C.B., the grand cross of the Legion of Honour and of the Turkish Medjidie, the freedom of the City of London with a sword of honour, and the honorary degree of D.C.L. of Oxford University, were the distinctions conferred upon him for his valour. Promoted major-general in November 1855 on his return from captivity in Russia, he held the Woolwich command, and represented the borough of Calne in parliament from 1856 to 1859. He became lieutenant-general and colonel-commandant Royal Artillery in 1864, general in 1868, commanded the forces in Canada from 1859 to 1865, held the governorship of Nova Scotia until 1870, and the governorship of Gibraltar until 1876. He was made G.C.B. in 1871, and Constable of the Tower of London in 1881. He died in London on the 26th of July 1883.

WILLIAMSBURG, a city and the county-seat of James City county, Virginia, U.S.A., on a peninsula between the York and James rivers, 48 m. by rail E.S.E. of Richmond. Pop. (1900) 2044; (1910) 2714. Williamsburg is served by the Chesapeake & Ohio railway. It is the seat of the Williamsburg Female Institute (Presbyterian), and of the College of William and Mary, chartered by the Crown in 1693 and the second oldest college in the United States. Besides the main building and the president's house, the College of William and Mary has a science hall, a gymnasium, a library building, an infirmary and dormitories; in front of the main building is a statue by Richard Hayward of Norborne Berkeley, Lord Botetourt (1717–1770), the most popular royal governor of Virginia. The college offers a classical course and a scientific course, two-thirds of the work in each being prescribed, and in connexion with the normal department is the Matthew Whaley Model and Practice School. In 1909 there were 21 instructors and 228 students in the college, 6 instructors and 140 pupils in the model school, and 20,000 volumes, many of them rare, in the library. Since 1892 the college has published the *William and Mary College Quarterly*, an historical magazine.

Here in December 1776 was established the Phi Beta Kappa Society, the first American college "Greek Letter" Society, now an inter-collegiate honorary fraternity. The college suffered heavy losses during the War of Independence and in the Civil War. In June 1781 Lord Corriwallis made the president's house his headquarters, and the institution was closed for a few months of that year. It was closed in 1861 because of the Civil War, and the main building was occupied in turn by Confederate troops and by Federal troops until some of the latter burned it in 1862. Although reopened in 1869, the college was closed again from 1881 to 1888 because of the low state of its finances. In 1888 it was reorganized under an act of the state legislature which provided for the addition of a normal course and an annual appropriation towards its maintenance. In 1893 Congress passed an act indemnifying it in some measure for its loss during the Civil War; and in 1906 its endowment was increased to more than $150,000 and it was made a state institution governed by a board (appointed by the governor) and receiving $35,000 annually from the state. Peyton Randolph, Edmund Randolph, Thomas Jefferson, James Monroe, John Tyler, Chief Justice John Marshall and General Winfield Scott were graduates of the college.

Bruton Parish Church, completed in 1717 and enlarged in 1752, is the second church of a parish dating from 1674. It contains a Bible given by King Edward VII., a lectern given by President Roosevelt, and some old relics. The church itself has been restored (1905–1907) so far as practicable to its original form and appearance. The Association for the Preservation of Virginia Antiquities has preserved a powder magazine, erected in 1714, from which the last royal governor of Virginia, Lord Dunmore, removed the powder on the day after the encounter at Lexington, Massachusetts, and thus occasioned the first armed uprising of the Virginia patriots. The County and City Court-House was erected in 1769. The Eastern State Hospital for the Insane was opened here in 1773, but its original building was burned in 1885. Among several colonial residences are the George Wythe House, which was the headquarters of Washington during the siege of Yorktown in 1781, and the Peyton Randolph House. The principal industries are the manufacture of men's winter underwear, lumber and ice, and the shipment of lumber and farm and garden produce.

Williamsburg, originally named Middle Plantation from its position midway between the York and James rivers, was founded in 1632. It was immediately walled in and for several years it served as a refuge from Indian attacks. On the 3rd of August 1676 Nathaniel Bacon held here his "rebel" assembly of the leading men of the province, and in January 1677 two of the "rebels" were hanged here. In 1698 Middle Plantation was made the provincial capital; and in 1699 the present name was adopted in honour of William III. Williamsburg was chartered as a city in 1722. In 1736 the *Virginia Gazette*, the oldest newspaper in the South, was established here. In the capitol here Patrick Henry, on the 30th of May 1765, presented his historic resolutions and made his famous speech against the Stamp Act. On the 15th of May 1776, the Virginia Convention in session here passed resolutions urging the Continental Congress to declare for Independence. In 1779 Richmond became the seat of the state government, and in 1832 fire destroyed the last of the old capitol at Williamsburg with the exception of the foundations, which since 1897 have been cared for by the Association for the Preservation of Virginia Antiquities. In the Peninsula campaign of the Civil War the Battle of Williamsburg was fought on the 5th of May 1862 on the south-eastern outskirts of the city. The Confederate army under General J. E. Johnston was retreating from Yorktown toward Richmond and a part of it under General James Longstreet waited here to check the pursuit of the advance portion of the Union army under General E. V. Sumner. A Union division under General J. D. Hooker began a spirited attack at 7.30 A.M., other Union divisions dealt heavy blows, but they failed from lack of co-operation to rout the Confederates and at night the latter continued their retreat. The Union loss in killed, wounded and missing was 2228; the Confederate about 1560.

See L. G. Tyler, *Williamsburg, the Old Colonial Capital* (Richmond, 1907), and his "Williamsburg, the Ancient Capital," in L. P. Powell's *Historic Towns of the Southern States* (New York, 1900).

WILLIAMSON, ALEXANDER WILLIAM (1824–1904), English chemist, was born at Wandsworth, London, on the 1st of May 1824. After working under Leopold Gmelin at Heidelberg, and Liebig at Giessen, he spent three years in Paris studying the higher mathematics under Comte. In 1849 he was appointed professor of practical chemistry at University College, London, and from 1855 until his retirement in 1887 he also held the professorship of chemistry. He had the credit of being the first to explain the process of etherification and to elucidate the formation of ether by the interaction of sulphuric acid and alcohol. Ether and alcohol he regarded as substances analogous to and built up on the same type as water, and he further introduced the water-type as a widely applicable basis for the classification of chemical compounds. The method of stating the rational constitution of bodies by comparison with water he believed capable of wide extension, and that one type, he thought, would suffice for all inorganic compounds, as well as for the best-known organic ones, the formula of water being taken in certain cases as doubled or tripled. So far back as 1850 he also suggested a view which, in a modified form, is of fundamental importance in the modern theory of ionic dissociation, for, in a paper on the theory of the formation of ether, he urged that in an aggregate of molecules of any compound there is an exchange constantly going on between the elements which are contained in it; for instance, in hydrochloric acid each atom of hydrogen does not remain quietly in juxtaposition with the atom of chlorine with which it first united, but changes places with other atoms of hydrogen. A somewhat similar hypothesis was put forward by R. J. E. Clausius about the same time. For his work on etherification Williamson in 1862 received a Royal medal from the Royal Society, of which he became a fellow in 1855, and which he served as foreign secretary from 1873 to 1889. He was twice president of the London Chemical Society, in 1863–1865, and again in 1869–1871. His death occurred on the 6th of May 1904, at Hindhead, Surrey, England.

WILLIAMSON, SIR JOSEPH (1633–1701), English politician, was born at Bridekirk, near Cockermouth, his father, Joseph Williamson, being vicar of this place. He was educated at St Bees, at Westminster school and at Queen's College, Oxford, of which he became a fellow, and in 1660 he entered the service of the secretary of state, Sir Edward Nicholas, retaining his position under the succeeding secretary, Sir Henry Bennet, afterwards earl of Arlington. For his connexion with the foundation of the *London Gazette* in 1665 see NEWSPAPERS. He entered parliament in 1669, and in 1672 was made one of the clerks of the council and a knight. In 1673 and 1674 he represented his country at the congress of Cologne, and in the latter year he became secretary of state, having practically purchased this position from Arlington for £6000, a sum which he required from his successor when he left office in 1679. Just before his removal he had been arrested on a charge of sharing in the popish plots, but he had been at once released by order of Charles II. After a period of comparative inactivity Sir Joseph represented England at the congress of Nijmwegen in 1697, and in 1698 he signed the first treaty for the partition of the Spanish monarchy. He died at Cobham, Kent, on the 3rd of October 1701. Williamson was the second president of the Royal Society, but his main interests, after politics, were rather in antiquarian than in scientific matters. Taking advantage of the many opportunities of making money which his official position gave him, he became very rich. He left £6000 and his library to Queen's College, Oxford; £5000 to found a school at Rochester; and £2000 to Thetford.

A great number of Williamson's letters, despatches, memoranda, &c., are among the English state papers.

WILLIAMSON, WILLIAM CRAWFORD (1816–1895), English naturalist, was born at Scarborough on the 24th of November 1816. His father, John Williamson, after beginning life as a gardener, became a well-known local naturalist, who, in conjunction with William Bean, first explored the rich fossiliferous beds of the Yorkshire coast. He was for many years curator of the Scarborough natural history museum, and the younger Williamson was thus from the first brought up among scientific surroundings and in association with scientific people. William Smith, the "father of English geology," lived for two years in the Williamsons' house. Young Williamson's maternal grandfather was a lapidary, and from him he learnt the art of cutting stones, an accomplishment which he found of great use in later years, when he undertook his work on the structure of fossil plants. Williamson very early made a beginning as an original contributor to science. When little more than sixteen he published a paper on the rare birds of Yorkshire, and a little later (in 1834) presented to the Geological Society of London his first memoir on the Mesozoic fossils of his native district. In the meantime he had assisted Lindley and Hutton in the preparation of their well-known *Fossil Flora of Great Britain*. On entering the medical profession he still found time to carry on his scientific work during his student days, and for three years acted as curator of the Natural History Society's museum at Manchester. After completing his medical studies at University College, London, in 1841, he returned to Manchester to practise his profession, in which he met with much success. When Owens College at Manchester was founded in 1851 he became professor of natural history there, with the duty of teaching geology, zoology and botany. A very necessary division of labour took place as additional professors were appointed, but he retained the chair of botany down to 1892. Shortly afterwards he removed to Clapham, where he died on the 23rd of June 1895. Williamson's teaching work was not confined to his university classes, for he was also a successful popular lecturer, especially for the Gilchrist Trustees. His scientific work, pursued with remarkable energy throughout life, in the midst of official and professional duties, had a wide scope. In geology, his early work on the zones of distribution of Mesozoic fossils (begun in 1834), and on the part played by microscopic organisms in the formation of marine deposits (1845), was of fundamental importance. In zoology, his investigations of the development of the teeth and bones of fishes (1842–1851), and on recent Foraminifera, a group on which he wrote a monograph for the Ray Society in 1857, were no less valuable. In botany, in addition to a remarkable memoir on the minute structure of *Volvox* (1852), his work on the structure of fossil plants established British palaeobotany on a scientific basis; on the ground of these researches Williamson may rank with A. T. Brongniart as one of the founders of this branch of science. His contributions to fossil botany began in the earliest days of his career, and he returned to the subject from time to time during the period of his geological and zoological activity. His investigation of the Mesozoic cycadioid fossil *Zamia* (now *Williamsonia*) *gigas* was the chief palaeobotanical work of this intermediate period. His long course of researches on the structure of Carboniferous plants belongs mainly to the latter part of his life, and his results are chiefly, though not wholly, embodied in a series of nineteen memoirs, ranging in date from 1871 to 1893, in the *Philosophical Transactions*. In this series, and in some works (notably the monograph on *Stigmaria ficoides*, Palaeontographical Society, 1886), published elsewhere, Williamson elucidated the structure of every group of Palaeozoic vascular plants. Among the chief results of his researches may be mentioned the discovery of plants intermediate between ferns and cycads, the description of the true structure of the fructification in the extinct cryptogamic family Sphenophylleae, and the demonstration of the cryptogamic nature of the dominant Palaeozoic orders Calamarieae, Lepidodendreae and Sigillarieae, plants which on account of the growth of their stems in thickness, after the manner of gymnospermous trees, were regarded as phanerogams by Brongniart and his followers. After a long controversy the truth of Williamson's views has been fully established, and it is now known that the mode of growth, characteristic in present times, of dicotyledons and gymnosperms prevailed in Palaeozoic ages in every family of vascular cryptogams. Thus, as Count Solms-Laubach has pointed out, palaeobotany for the first time spoke the decisive word in an important question of general botany. Williamson's work in fossil botany was scarcely appreciated at the time as it deserved, for its great merits were somewhat obscured by the author's want of familiarity with the modern technicalities of the science. Since, however, the subject has been seriously taken up by botanists of a newer school, the soundness of the foundation he laid has become fully recognized. It may be added that he was a skilled draughtsman, illustrating all his works by his own drawings, and practising water-colour painting as his favourite recreation.

A full account of Williamson's career will be found in his autobiography, entitled *Reminiscences of a Yorkshire Naturalist*, edited by his wife (London, 1896). Among obituary notices may be mentioned that by Count Solms-Laubach, *Nature* (5th September 1895), and one by D. H. Scott in *Proc. R.S.* vol. lx. (1897).
(D. H. S.)

WILLIAMSPORT, a city and the county-seat of Lycoming county, Pennsylvania, U.S.A., on the north bank of the west branch of the Susquehanna river, about 70 m. N. by W. of Harrisburg. Pop. (1890) 27,132; (1900) 28,757, of whom 1144 were negroes and 2228 were foreign-born, including 1089 Germans; (1910 census), 31,860. Area, about 7 sq. m. Williamsport is served by the New York Central & Hudson River, the Pennsylvania, the Susquehanna & New York, and the Philadelphia & Reading railways, and by electric lines connecting with the neighbouring towns of Montoursville (pop. in 1900, 1665), South Williamsport (pop. in 1900, 3328), on the S. bank of the river, and Du Boistown (pop. in 1900, 650). The city has an attractive site, on a high plain, nearly surrounded by hills. It has five parks, Brandon (44 acres) within the city limits, and Vallamont, Starr Island, Sylvan Dell and Nippono in its suburbs. Williamsport is the seat of Williamsport Dickinson Seminary (Methodist Episcopal, co-educational, 1848), a secondary school. Among the principal buildings are the county court house, the city hall, the United States Government building, the Scottish Rite Cathedral, the Masonic Temple, a Y.M.C.A. building, and the James V. Brown Memorial Library (1907). In the city are a Boys' Industrial Home (1898), a Girls' Training School (1895), a Florence Crittenton Home (1895), a Home for Aged Coloured Women (1898), a Home for the Friendless (1872), and Williamsport Hospital (1873). There are practically no tenement houses. The value of factory products in 1905 was $11,738,473, 20·7% more than in 1900. Williamsport has the largest lumber market in Pennsylvania; lumber was for forty years the most important of its manufactures, and Williamsport was styled the "sawdust city." The decreasing importance of the industry is due to the virtual exhaustion of standing timber in the neighbourhood. Lumber and timber products were valued at $1,310,368 in 1905, and lumber and planing mill products at $579,667. Among other manufactures are silk and silk goods, valued at $1,191,273 in 1905; foundry and machine shop products, $1,164,737; rubber and leather boots and shoes, furniture, &c. The city has a large trade with the surrounding country. The water supply is derived from mountain streams S. of the city. Lycoming county was erected in 1795, in which year Williamsport was founded and became the county-seat, after a bitter contest with Jaysburg, which was then a village of only some half a dozen houses and which subsequently ceased to exist. Williamsport was incorporated as a borough in 1806, and was chartered as a city in 1866.

WILLIAMSTOWN, a town of Bourke county, Victoria, Australia, 9 m. by rail S.W. of Melbourne. Pop. (1901) 14,083. Shipping is the chief business of the place, there being commodious piers, breakwater, also provision for the repair of vessels, patent slips and shipbuilding yards. Several quarries of superior basalt are worked near the town, and brown coal of good quality has also been found. The flourishing industries include woollen-milling, bottle-making, fodder-compressing, meat-freezing and cycle-making.

WILLIAMSTOWN, a township of Berkshire county, Massachusetts, U.S.A., on the Hoosick and Green rivers, in the N.W. corner of the state, and about 20 m. N. of Pittsfield. Pop. (1890) 4221; (1900) 5013, of whom 929 were foreign-born and 138 were negroes; (1910 census), 3708. Williamstown is served by the Boston & Maine railway and by an interurban electric line to North Adams. It covers an area of about 49 sq. m. and contains five villages. Williamstown, the principal village, is a pleasant residential centre on the Green river; it is surrounded by beautiful scenery and its streets are shaded by some fine old trees. Mission Park (10 acres) here is adorned by native and foreign shrubs and by maples, elms, pines and arbor vitae, and "Haystack Monument" in this park marks the place where Samuel John Mills (1783–1818), in 1806, held the prayer meeting which was the forerunner of the American foreign missionary movement. Williamstown village is best known as the seat of Williams College, chartered in 1793 as a successor to a "free school" in Williamstown (chartered in 1785 and endowed by a bequest of Colonel Ephraim Williams). Besides recitation and residence halls, it has the Lawrence Hall Library (1846), containing (1910) 68,000 volumes, the Thompson Memorial Chapel (1904), the Lasell Gymnasium (1886), an infirmary (1895), the Hopkins Observatory (1837) and the Field Memorial Observatory (1882), the Thompson Chemical Laboratory (1892), the Thompson Biological Laboratory (1893) and the Thompson Physical Laboratory (1893). In 1910 the college had 59 instructors and 537 students. The fourth president of the college was Mark Hopkins (*q.v.*), and one of its most distinguished alumni was James A. Garfield, president of the United States, whose son, Harry Augustus Garfield (b. 1863), became president of the college in 1908.

The principal manufactures of the township are cotton and woollen goods (especially corduroy), and market gardening is an important industry. The limits of the township, originally called West Hoosac, were determined by a committee of the General Court of Massachusetts in 1749, and two or three years later the village was laid out. Two of the lots were immediately purchased by Captain Ephraim Williams (1715–1755), who was at the time commander of Fort Massachusetts in the vicinity; several other lots were bought by soldiers under him; and in 1753 the proprietors organized a township government. Williams was killed in the battle of Lake George on the 8th of September 1755, but while in camp in Albany, New York, a few days before the battle, he drew a will containing a small bequest for a free school at West Hoosac on condition that the township when incorporated should be called Williamstown. The township was incorporated with that name in 1765.

See A. L. Perry, *Origins in Williamstown* (New York, 1894; 3rd ed. 1900); and *Williamstown and Williams College* (Norwood, Mass., 1899).

WILLIAMS-WYNN, SIR WATKIN, Bart. (1692–1749), Welsh politician, was the eldest son and heir of Sir William Williams, Bart., of Llanforda near Oswestry; his mother, Jane Thelwall, was a descendant of the antiquary, Sir John Wynn of Gwydir, Carnarvonshire. Educated at Jesus College, Oxford, Williams succeeded to Wynnstay near Ruabon and the estates of the Wynns on the death of a later Sir John Wynn in 1719, and took the name of Williams-Wynn. He was member of parliament for Denbighshire from 1716 to 1741, and was prominent among the opponents of Sir Robert Walpole; as a leading and influential Jacobite he was in communication with the supporters of Prince Charles Edward before the rising of 1745, but his definite offer of help did not reach the prince until the retreat to Scotland had begun. He died on the 26th of September 1749. His first wife, Ann Vaughan (d. 1748), was the heiress of extensive estates in Montgomeryshire which still belong to the family. His son and heir, Sir Watkin Williams-Wynn, Bart. (1749–1789), was the father of another Sir Watkin (1772–1842), the 5th baronet. Two other sons attained some measure of distinction: Charles (1775–1850), a prominent Tory politician, and Sir Henry (1783–1856), a diplomatist. A daughter, Frances Williams-Wynn (d. 1857), was the authoress of *Diaries of a Lady of Quality, 1797–1844*, which were edited with notes by Abraham Hayward in 1864.

See Askew Roberts, *Wynnstay and the Wynns* (Oswestry, 1876).

WILLIBRORD (or Wilbrord), **ST** (d. 738), English missionary, "the apostle of the Frisians," was born about 657. His father, Wilgils, an Angle or, as Alcuin styles him, a Saxon, of Northumbria, withdrew from the world and constructed for himself a little oratory dedicated to St Andrew. The king and nobles of the district endowed him with estates till he was at last able to build a church, over which Alcuin afterwards ruled. Willibrord, almost as soon as he was weaned, was sent to be brought up at Ripon, where he must doubtless have come under the influence of Wilfrid. About the age of twenty the desire of increasing his stock of knowledge (*c.* 679) drew him to Ireland, which had so long been the headquarters of learning in western Europe. Here he stayed for twelve years, enjoying the society of Ecgberht and Wihtberht, from the former of whom he received his commission to missionary work among the North-German tribes. In his thirty-third year (*c.* 690) he started with twelve companions for the mouth of the Rhine. These districts were then occupied by the Frisians under their king, Rathbod, who gave allegiance to Pippin of Herstal. Pippin befriended him and sent him to Rome, where he was consecrated archbishop (with the name Clemens) by Pope Sergius on St Cecilia's Day 696.[1] Bede says that when he returned to Frisia his see was fixed in Ultrajectum (Utrecht). He spent several years in founding churches and evangelizing, till his success tempted him to pass into other districts. From Denmark he carried away thirty boys to be brought up among the Franks. On his return he was wrecked on the holy island of Fosite (Heligoland), where his disregard of the pagan superstition nearly cost him his life. When Pippin died, Willibrord found a supporter in his son Charles Martel. He was assisted for three years in his missionary work by St Boniface (719–722), who, however, was not willing to become his successor.

He was still living when Bede wrote in 731. A passage in one of Boniface's letters to Stephen III. speaks of his preaching to the Frisians for fifty years, apparently reckoning from the time of his consecration. This would fix the date of his death in 738; and, as Alcuin tells us he was eighty-one years old when he died, it may be inferred that he was born in 657—a theory on which all the dates given above are based, though it must be added that they are substantially confirmed by the incidental notices of Bede. The day of his death was the 6th of November, and his body was buried in the monastery of Echternach, near Trier, which he had himself founded. Even in Alcuin's time miracles were reported to be still wrought at his tomb.

The chief authorities for Willibrord's life are Alcuin's *Vita Willibrordi*, both in prose and in verse, and Bede's *Hist. Eccl.* v. cc. 9-11. See also Eddius's *Vita Wilfridii*, and J. Mabillon, *Annales ordinis sancti Benedicti*, lib. xviii.

WILLIMANTIC, a city of Windham county, Connecticut, U.S.A., in the township of Windham, at the junction of the Willimantic and Natchaug rivers to form the Shetucket, in the E. part of the state, about 16 m. N.W. of Norwich. Pop. (1890) 8648; (1900) 8937, of whom 2491 were foreign-born; (1910 census) 11,230. It is served by the New York, New Haven & Hartford and the Central Vermont railways, and by electric lines to Baltic, Norwich and New London, and to South Coventry. It is the seat of a State Normal Training School, and has a public library and Dunham Hall Library (1878). The Willimantic river provides good water-power, and there are various manufactures. The total value of the factory product in 1905 was $4,902,447. The township of Windham was incorporated in 1692. Willimantic was settled in 1822, incorporated as a borough in 1833, and chartered as a city in 1893. The name is from an Indian word meaning "good look-out" or "good cedar swamps."

WILLIS, NATHANIEL PARKER (1806–1867), American author, was descended from George Willis, described as a "Puritan of considerable distinction," who arrived in New England about 1630 and settled in Cambridge, Massachusetts. Nathaniel Parker was the eldest son and second child of Nathaniel Willis, a newspaper proprietor in Boston, and was born in Portland, Maine, on the 20th of January 1806. After attending Boston grammar school and the academy at Andover, he entered Yale College in October 1823. Although he did not specially distinguish himself as a student, university life had considerable influence in the development of his character, and furnished him with much of his literary material. Immediately after leaving Yale he published in 1827 a volume of poetical *Sketches*, which attracted some attention, although the critics found in his verses more to blame than to praise. It was followed by *Fugitive Poetry* (1829) and another volume of verse (1831). He also contributed frequently to magazines and periodicals. In 1829 he started the *American Monthly Magazine*, which was continued from April of that year to August 1831, but failed to achieve success. On its discontinuance he went to Europe as foreign editor and correspondent of the *New York Mirror*. To this journal he contributed a series of letters, which, under the title *Pencillings by the Way*, were published at London in 1835 (3 vols.; Philadelphia, 1836, 2 vols.; and first complete edition, New York, 1841). Their vivid and rapid sketches of scenes and modes of life in the old world at once gained them a wide popularity; but he was censured by some critics for indiscretion in reporting conversations in private gatherings. Notwithstanding, however, the small affectations and fopperies which were his besetting weaknesses as a man as well as an author, the grace, ease and artistic finish of his style won general recognition. His "Slingsby Papers," a series of magazine articles descriptive of American life and adventure, republished in 1836 under the title *Inklings of Adventure*, were as successful in England as were his *Pencillings by the Way* in America. He also published while in England *Melanie and other Poems* (London, 1835; New York, 1837), which was introduced by a preface by Barry Cornwall (Procter). After his marriage to Mary Stace, daughter of General William Stace of Woolwich, he returned to America, and settled at a small estate on Oswego Creek, just above its junction with the Susquehanna. Here he lived off and on from 1837 to 1842, and wrote *Letters from under a Bridge* (London, 1840; first complete edition, New York, 1844), the most charming of all his works. During a short visit to England in 1839–1840 he published *Two Ways of Dying for a Husband*. Returning to New York, he established, along with George P. Morris, a newspaper entitled the *Evening Mirror*. On the death of his wife in 1845 he again visited England. Returning to America in the spring of 1846, he married Cornelia Grinnell, and established the *National Press*, afterwards named the *Home Journal*. In 1845 he published *Dashes at Life with a Free Pencil*, in 1846 a collected edition of his *Prose and Poetical Works*, in 1849 *Rural Letters*, and in 1850 *Life Here and There*. In that year he settled at Idlewild on the Hudson river, and on account of failing health spent the remainder of his life chiefly in retirement. Among his later works were *Hurry-Graphs* (1851), *Outdoors at Idlewild* (1854), *Ragbag* (1855), *Paul Fane* (1856), and the *Convalescent* (1859), but he had survived his great reputation. He died on the 20th of January 1867, and was buried in Mount Auburn, Boston.

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[1] He had been consecrated bishop, also by Sergius, on a previous visit in 692.

The best edition of his verse writings is *The Poems, Sacred, Passionate and Humorous, of N. P. Willis* (New York, 1868); 13 volumes of his prose, *Complete Prose Works*, were published at New York (1849–1859), and a *Selection from his Prose Writings* was edited by Henry A. Beers (New York, 1885). His *Life*, by Henry A. Beers, appeared in the series of "American Men of Letters" the same year. See also E. P. Whipple, *Essays and Reviews* (vol. i., 1848); M. A. de Wolfe Howe, *American Bookmen* (New York, 1898).

WILLIS, THOMAS (1621–1675), English anatomist and physician, was born at Great Bedwin, Wiltshire, on the 27th of January 1621. He studied at Christ Church, Oxford; and when that city was garrisoned for the king he bore arms for the Royalists. He took the degree of bachelor of medicine in 1646, and applied himself to the practice of his profession. In 1660, shortly after the Restoration, he became Sedleian professor of natural philosophy in place of Dr Joshua Cross, who was ejected, and the same year he took the degree of doctor of physic In 1664 he discovered the medicinal spring at Astrop, near Brackley in Northamptonshire. He was one of the first members of the Royal Society, and was elected an honorary fellow of the Royal College of Physicians in 1664. In 1666, after the fire of London, he took a house in St Martin's Lane, and there rapidly acquired an extensive practice, his reputation and skill marking him out as one of the first physicians of his time. He died in St Martin's Lane on the 11th of November 1675 and was buried in Westminster Abbey.

Willis was admired for his piety and charity, for his deep insight into natural and experimental philosophy, anatomy and chemistry, and for the elegance and purity of his Latin style. Among his writings were *Cerebri anatome nervorumque descriptio et usus* (1664), in which he described what is still known, in the anatomy of the brain, as the circle of Willis, and *Pharmaceutice rationalis* (1674), in which he characterized diabetes mellitus. He wrote in English *A Plain and Easy Method for Preserving those that are Well from the Infection of the Plague, and for Curing such as are Infected*. His Latin works were printed in two vols. 4to at Geneva in 1676, and at Amsterdam in 1682. Browne Willis (1682–1760), the antiquarian, author of three volumes of *Surveys* of the cathedrals of England, was his grandson.

See Munk, *Roll of the Royal College of Physicians, London* (2nd ed., vol. i., London, 1878).

WILLMORE, JAMES TIBBITTS (1800–1863), English line engraver, was born at Bristnall's End, Handsworth, near Birmingham, on the 15th of September 1800. At the age of fourteen he was apprenticed to William Radcliffe, a Birmingham engraver, and in 1823 he went to London and was employed for three years by Charles Heath. He was afterwards engaged upon the plates of Brockedon's *Passes of the Alps* and Turner's *England and Wales*. He engraved after Chalon, Leitch, Stanfield, Landseer, Eastlake, Creswick and Ansdell, and especially after Turner, from whose "Alnwick Castle by Moonlight," "The Old Téméraire," "Mercury and Argus," "Ancient Rome," and the subjects of the rivers of France, he executed many admirable plates. He was elected an associate engraver of the Royal Academy in 1843. He died on the 12th of March 1863.

WILLOBIE (or Willoughby), **HENRY** (1575?–1596?), the supposed author of a poem called *Willobie his Avisa*, which derives interest from its possible connexion with Shakespeare's personal history. Henry Willoughby was the second son of a Wiltshire gentleman of the same name, and matriculated from St John's College, Oxford, in December 1591, at the age of sixteen. He is probably identical with the Henry Willoughby who graduated B.A. from Exeter College early in 1595, and he died before the 30th of June 1596, when to a new edition of the poem Hadrian Dorrell added an "Apologie" in defence of his friend the author "now of late gone to God," and another poem in praise of chastity written by Henry's brother, Thomas Willoughby. *Willobie his Avisa* was licensed for the press on the 3rd of September 1594, four months after the entry of Shakespeare's *Rape of Lucrece*, and printed by John Windet. It is preceded by two commendatory poems, the second of which, signed "Contraria Contrariis; Vigilantius; Dormitanus," contains the earliest known printed allusion to Shakespeare by name:—

> "Yet Tarquyne pluckt his glistering grape,
> And Shake-speare paints poore Lucrece rape."

In the poem itself, Avisa, whose name is explained in Dorrell's "Epistle to the Reader" as *Amans Uxor Inviolata Semper Amanda*, takes up the parable alternately with her suitors, one of whom is introduced to the reader in a prose interlude signed by the author H. W., as Henrico Willobego Italo Hispalensis. This passage contains a reference which may fairly be applied to the sonnets of Shakespeare. It runs:

> "H. W. being sodenly infected with the contagion of a fantasticall fit, at the first sight of A, . bewrayeth the secresy of his disease unto his familiar frend W. S. who not long before had tryed the curtesy of the like passion, and was now newly recoucred he determined to see whether it would sort to a happier end for this new actor, then it did for the old player."

Then follows a dialogue between H. W. and W. S., in which W S., "the old player," a phrase susceptible of a double sense, gives somewhat commonplace advice to the disconsolate wooer.

Dorrell alleges that he found the MS. of *Willobie his Avisa* among his friend's papers left in his charge when Willoughby departed from Oxford on her majesty's service. There is no trace of any Hadrian Dorrell, and the name is probably fictitious; there is, indeed, good reason to think that the pseudonym, if such it is, covers the personality of the real author of the work. *Willobie his Avisa* proved extremely popular, and passed through numerous editions, and Peter Colse produced in 1596 an imitation named *Penelope's Complaint*.

See *Shakspere Allusion-Books*, part i., ed. C. M. Ingleby (New Shakspere Society, 1874); A. B. Grosart's "Introduction" to his reprint of *Willobie his Avisa* (1880).

WILLOCK (or WILLOCKS), **JOHN** (*c.* 1515–1585), Scottish reformer, was a native of Ayrshire and was educated at the university of Glasgow. After being a monk for a short time he embraced the reformed religion and went to London, where, about 1542, he became chaplain to Henry Grey, afterwards duke of Suffolk, the father of Lady Jane Grey. On the accession of Mary to the English throne in 1553 he went to Emden in Friesland, where he practised as a physician, varying this profession with visits to Scotland. He was associated with the leading Scottish reformers in their opposition to the queen regent, Mary of Lorraine, and the Roman Catholic religion, and in 1558 he returned definitely to his native land. Willock now began to preach and in 1559 was outlawed. Popular sympathy, however, rendered this sentence fruitless, and in the same year, being Knox's deputy as minister of St Giles' cathedral, Edinburgh, he frustrated the efforts of the regent to restore the Roman Catholic religion, and administered the communion for the first time in accordance with the ideas of the reformers. He was one of the four ministers chosen by the convention of October 1559 to seats on the council of government, and was one of those appointed to compile the first book of discipline. About 1562 he became rector of Loughborough in Leicestershire, but he retained his connexion with the Scottish church and was moderator of the general assembly in 1562, and again in 1564, in 1565 and in 1568. He died at Loughborough on the 4th of December 1585.

WILLOUGHBY, the name of an English family long settled in Nottinghamshire, and now represented by Baron Middleton. Having exchanged his name of Bugge for that of Willoughby, Richard de Willoughby became a judge during the reign of Edward II. and purchased the manors of Wollaton in Nottinghamshire and of Risley in Derbyshire. His son, Richard de Willoughby (d. 1362), was justice of the common pleas under Edward III. Richard's descendant, Dorothy, who became the heiress of the family estates, married Robert Willoughby of Bore Place, Kent, and their descendant, Sir Thomas Willoughby, Bart. (*c.* 1670–1729), of Wollaton, was created Baron Middleton in 1712. In 1877 his descendant, Digby Wentworth Bayard Willoughby (b. 1844), became the 9th baron. This title must be distinguished from that of Viscount Midleton, borne by the Brodrick family.

Sir Hugh Willoughby, the seaman, was a member of this family. He was a son of Sir Henry Willoughby (d. 1528), and a grandson of Sir Hugh Willoughby of Wollaton. His early services were as a soldier on the Scottish borders, but he soon turned his thoughts to the sea, and was appointed captain of a fleet of three ships which set out in 1553 with the object of discovering a north-eastern passage to Cathay and India. Two of the three ships reached the coast of Lapland, where it was proposed to winter, and here Willoughby and his companions died of cold and starvation soon after January 1554. A few years later their remains were found, and with them Willoughby's *Journal*, which is printed in vol. i. of R. Hakluyt's *Principal Navigations.*

Another famous member of this family was Sir Nesbit Josiah Willoughby (1777–1849), who entered the British navy in 1790 and was present at the battle of Copenhagen. In 1800, however, he was dismissed from the service by the sentence of a court-martial for his insolent conduct towards a superior officer, a previous offence of this kind having been punished less severely. In 1803, on the renewal of war, as a volunteer he joined an English squadron bound for the West Indies, and was soon admitted again to the navy; his courage and promptness at Cape Français were responsible for saving 900 lives, and he distinguished himself on other occasions, being soon restored to his former rank in the service. After further services in the West Indies, during which he displayed marked gallantry on several occasions, Willoughby was tried by court-martial at Cape Town in 1808 on charges of cruelty; he seems to have taken a great delight in inflicting punishment, but he was acquitted with the advice to be more moderate in future in his language. Again in the West Indies, where he commanded the Néréide frigate, he was responsible for the heroic defence made by his ship against a much stronger French force at Port Louis, Mauritius, in August 1810, when 222 out of his crew of 281 men were disabled before he surrendered. Undeterred by the severe wounds which he had received, and seeing no prospect of active service with the British fleet, Willoughby offered his services in 1812 to the Russian government, and while serving with the Russian army he was captured by the French. He was taken to France, whence he escaped to England. Having seen a little more service in the navy, he was knighted in 1827, was made a rear-admiral in 1847, and died unmarried in London on the 19th of May 1849.

WILLOW (*Salix*), a very well-marked genus of plants constituting, with the poplar (*Populus*), the order Salicaceae. Willows are trees or shrubs, varying in stature from a few inches, like the small British *S. herbacea* and arctic species generally, to 100 ft., and occurring most abundantly in cold or temperate climates in both hemispheres, and generally in moist situations; a few species occur in the tropical and sub-tropical portions of the three great continents. Their leaves are deciduous, alternate, simple, and generally much longer than broad, whence the term willow-leaved has become proverbial. At their base they are provided with stipules, which are also modified to form the scales investing the winter buds. The flowers are borne in catkins (fig. 1), which are on one tree male (staminate) only, on another female (pistillate). Each male flower consists of a small scale or bract, in the axil of which are usually two, sometimes three, rarely five stamens, and still more rarely a larger number. In addition there is a small glandular disk, which assumes different shapes in different species. The female flowers are equally simple, consisting of a bract, from whose axil arises usually a very short stalk, surmounted by two carpels adherent one to the other for their whole length, except that the upper ends of the styles are separated into two stigmas. When ripe the two carpels separate in the form of two valves and liberate a large number of seeds, each provided at the base with a tuft of silky hairs, and containing a straight embryo without any investing albumen. The flowers appear generally before the leaves and are thus rendered more conspicuous, while passage of pollen by the wind is facilitated. Fertilization is effected by insects, especially by bees, which are directed in their search by the colour and fragrance of the

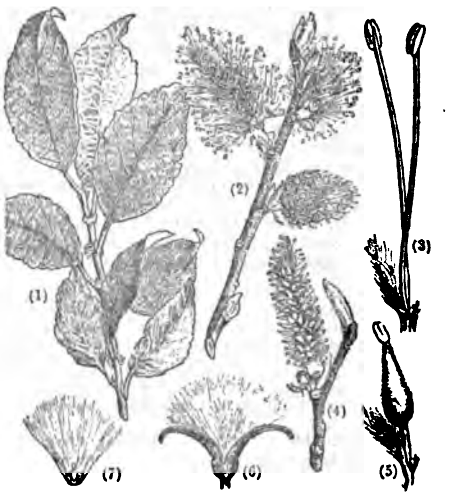

FIG. 1.—*Salix caprea*—Common Sallow or Goat Willow.

1. Leaf shoot.
2. Branchlet bearing male catkins.
3. Male flower.
4. Female catkin.
5. Female flower.
6. Capsule, opened.
7. Seed.

1, 2, 4 reduced; 3, 5-7 enlarged.

flowers; but some pollen must also be transported by the wind to the female flowers, especially in arctic species which, in spite of the poverty of insect life, set abundant fruit. The tuft of hairs at the base facilitates rapid dispersion of the seed, early germination of which is rendered desirable owing to its tenuity. Although the limitations of the genus are well marked, and its recognition in consequence easy, it is otherwise with regard to the species. The greatest difference of opinion exists among botanists as to their number and the bounds to be assigned to each; and the cross-fertilization that takes place between the species intensifies the difficulty. Andersson, a Swede, spent nearly a quarter of a century in their investigation, and ultimately published a monograph which is the standard authority on the subject. He admits about a hundred species. Professor C. S. Sargent (*Silva of North America*) suggests 160 to 170 as the number of distinguishable species. Some botanists have enumerated 80 species from Great Britain alone, while others count only 12 or 15. Dr Buchanan White, who made a special study of the British willows, grouped them under 17 species with numerous varieties and hybrids. To illustrate the great perplexity surrounding the subject, we may mention that to one species, *S. nigricans*, one hundred and twenty synonyms have been attached. Some of these are doubtless such as no botanist, with adequate material for forming an opinion, would accept; but, after making the necessary deductions for actual mistakes and misstatements, there still remains a large number upon which legitimate differences of opinion prevail. Andersson says that he has rarely seen two specimens of this species which were alike in the collective characters offered by the stature, foliage and catkins. No better example could be found of the almost limitless variation in so-called species.

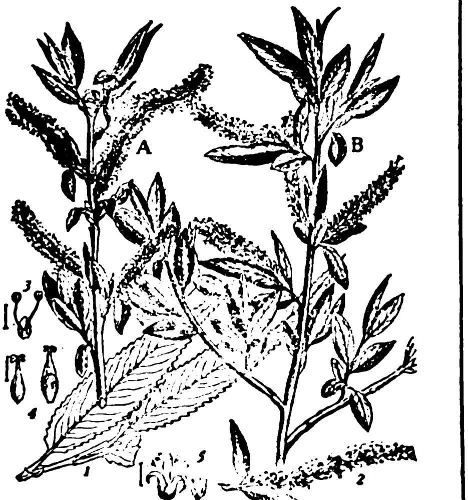

FIG. 2.—*Salix fragilis*—Crack Willow.

A, Flowering shoot from male plant.
B, Flowering shoot from female plant.
1, Foliage.
2, Catkin of fruits.
3, Male flower.
4, Female flower with and without bract.
5, Single fruit from which the hairy seeds are escaping; one seed shown separately.
A, B, 1, 2, about half nat. size, 3-5 enlarged.

Few genera have greater claims to notice from an economic point of view. As timber trees many of the species are valuable from their rapidity of growth and for the production of light durable wood, serviceable for many purposes. Among the best trees of this kind are *S. fragilis*, the crack willow (fig. 2), especially the variety known as *S. fragilis*, var. *Russelliana*, and *S. alba*, the white or Huntingdon willow. These trees are usually found growing by rivers' banks or in other moist situations, and are generally pollarded for the purpose of securing a crop of straight poles. This plan is, however, objectionable, as inducing decay in the centre of the trunk. Where poles are required, it is better to treat the trees as coppice and to cut the trunk level with the soil. The wood of *S. fragilis* is used for cricket-bats; there is a great difference in the value for this purpose of timber from different soils; and wood of the female tree is said to be preferable to that of the male. *S. caprea* (fig. 1), a hedgerow tree, generally grows in drier situations. It is a useful timber tree, and its wood, like that of *S. alba*, is prized in the manufacture of charcoal. Its catkins are collected in England in celebration of Palm Sunday, the bright-coloured flowers being available in early spring when other decorations of the kind are scarce. Certain sorts of willow are largely used for basket-making and wicker-work. The species employed for this purpose are mostly of shrubby habit, and are known under the collective name of osiers (see BASKET, and OSIER). The best for planting is the bitter osier, *S. purpurea*; planted on rich, well-drained soil, subject to occasional immersion, this willow may be grown profitably for basket-work. It is also well adapted for forming wind-breaks or screens, or for holding the banks of streams and preventing the removal of the soil by the current. *S. viminalis* is one of the best of the green osiers, suitable for hoops and valuable for retaining the soil on sloping embankments. *S. vitellina* yields the yellow osiers. *S. acuminata* and other species do well by the seaside, and are serviceable as wind-screens, nurse-trees and hedges. *S. daphnoides*, *S. repens* and other dwarf kinds are useful for binding heathy or sandy soil. In addition to their use for timber or basket-making, willows contain a large quantity of tannin in their bark. A valuable medicinal glucoside named salicin (*q.v.*) is also extracted from the bark. The wood, especially of *S. alba*, is used for paper pulp. As ornamental trees some willows also take a high rank. The white willow is a great favourite, while the drooping habit of the weeping willow renders it very attractive. Though named *S. babylonica*, it is really a native of China, from which it has been widely spread by man; the willow of the Euphrates (Ps. cxxxvii.) is in all probability *Populus euphratica*. *S. babylonica* is sometimes spoken of as Pope's willow, having been cultivated by that poet, or as Napoleon's willow, because his tomb at St Helena is overshadowed by a tree of this species, from which many offsets exist or are reputed to exist in modern gardens. *S. regalis* has very white, silvery leaves. *S. rosmarinifolia* is remarkable for its very narrow leaves—purplish above, silvery beneath.

The larvae of several nocturnal Lepidoptera feed upon the leaves of the willows, and the trunk of the sallow is often injured by the perforations of the lunar hornet sphinx (*Trochilium crabroniforme*).

WILLOW-HERB, in botany, the popular name for the species of *Epilobium*, a genus of often tall herbaceous plants, several of which are natives of Britain. The slender stems bear narrow leaves and pink or purple flowers, which in the rose-bay (*E. angustifolium*), found by moist river-sides and in copses, are 1 in. in diameter and form showy spikes. *E. hirsutum*, found by sides of ditches and rivers, a tall plant with many large rose-purple flowers, is known popularly as codlins-and-cream.

WILLS, WILLIAM GORMAN (1828–1891), Irish dramatist, was born at Kilmurry, Ireland, on the 28th of January 1828, the son of James Wills (1790–1868), author of *Lives of Illustrious and Distinguished Irishmen* (1839–1847). The son was educated at Waterford Grammar School and Trinity College, Dublin. After several years of journalistic and literary work in Dublin, he settled in London, where he wrote stories for the magazines. In 1868 he determined that he could make a better living at portrait-painting, for which, though his art education had been meagre, he had always had talent. He soon made a fair income, though in the long run his excessive Bohemianism, coupled with persistent absent-mindedness, lost him many sitters. Meanwhile he had begun to write for the stage. His first original work was the *Man o' Airlie*, produced at the Princess's theatre, London, in 1867. Early in 1872 he was engaged by Colonel Bateman as "dramatist to the Lyceum" at an annual salary. Under the terms of his agreement he wrote *Medea in Corinth*, *Charles I.* and *Eugene Aram*, all of which were produced at the Lyceum in 1872–1873. With *Charles I.*, in which Mr (afterwards Sir Henry) Irving confirmed the reputation he had earned by his performance in *The Bells*, Wills made a popular success, which he repeated in *Olivia* (adapted from Goldsmith's *Vicar of Wakefield*) in 1873. From this date onwards Wills wrote continuously, and till 1887 his name was practically never absent from the bill of some London theatre. His work never, however, quite came up to the expectations which were based on his genuine ability, and much of it is of an inferior quality. In *Claudian* (Princess's Theatre, 1883) and *Faust* (Lyceum Theatre, 1885) he merely supplied the text to a variety of dramatic situations. In 1887 his mother, whom he had supported for many years, died, and after her death he seemed to have less incentive for work. Wills was a painter by choice, and never put his whole heart into his dramatic work. He had some skill in ballad-writing, shown in the well-known "I'll sing thee songs of Araby." He died on the 13th of December 1891.

WILLUGHBY, FRANCIS (1635–1672), English ornithologist and ichthyologist, son of Sir Francis Willughby, was born at Middleton, Warwickshire, in 1635. He is memorable as the pupil, friend and patron as well as the active and original co-worker of John Ray (*q.v.*), and hence to be reckoned as one of the most important precursors of Linnaeus. His connexion with Ray dated from his studies at Trinity College, Cambridge (1653–1659); and, after concluding his academic life by a brief sojourn at Oxford, and acquiring considerable experience of travel in England, he made an extensive Continental tour in his company. The specimens, figures and notes thus accumulated were in great part elaborated on his return into his *Ornithologia*, which, however, he did not live to publish, having injured a naturally delicate constitution by alternate exposure and over-study. This work was published in 1676, and translated by Ray as the *Ornithology of Fr. Willughby* (London, 1678, fol.); the same friend published his *Historia Piscium* (1686, fol.). Willughby died at Middleton Hall on the 3rd of July 1672.

In Ray's preface to the former work he gives Willughby much of the credit usually assigned to himself, both as critic and systematist. Thus, while founding on Gesner and Aldrovandus, he omitted their irrelevancies, being careful to exclude "hieroglyphics, emblems, morals, fables, presages or ought else pertaining to divinity, ethics, grammar, or any sort of humane learning, and present him [the reader] with what properly belongs only to natural history." Again, he not only devised artificial keys to his species and genera, but, "that he might clear up all these obscurities [of former writers] and render the knowledge and distinction of species facile to all that should come after, he bent his endeavours mainly to find out certain characteristic notes of each kind," while finally, in apologizing for his engravings, he yet not unjustly claims that "they are best and truest of any hitherto graven in brass." (See also ORNITHOLOGY.)

WILMINGTON, a city, a port of entry and the county-seat of New Castle county, Delaware, U.S.A., in the N. part of the state, near the Delaware river, at the mouth of Brandywine and Christiana creeks. Pop. (1890) 61,431; (1900) 76,508, of whom 10,478 were foreign-born (3820 Irish, 1762 German, 998 English) and 9736 were negroes; (1910 census) 87,411. Area, 10·18 sq. m. It is served by the Baltimore & Ohio, the Philadelphia, Baltimore & Washington (Pennsylvania) and the Philadelphia & Reading railways, and by several steamship lines. Wilmington Harbor includes Christiana Creek for 4 m. above its mouth and the navigable part (2 m.) of the Brandywine, which enters the Christiana about 1¾ m. above its mouth. By 1881 the channel depth had been increased from 8½ to 15 ft., in 1896–1906 it was increased to 21 ft. in the lower part of the harbour, and in 1908 the upper part was dredged to 18 or 19 ft. for widths of 100, 200 and 250 ft. Between 1836 and 1909 $994,404 was expended on the improvement of the harbour. Most of the streets which run from E. to W. are numbered; those which run from N. to S. are named, often in honour of prominent American statesmen. The public parks and squares have a total area of 381 acres; the most important parks are Brandywine and Rockford, which lie along and near Brandywine creek, in the northern part of the city. Among the buildings of interest are the City Hall (1798); Holy Trinity (Old Swedes) Church (1698), probably the oldest church in the United States which has been in continuous use; the building occupied by the Historical Society of Delaware (organized in 1864), which was the old First Presbyterian Meeting House, built in 1740; the County Court House; and the Federal building. In Wilmington, besides other educational institutions, is the Wilmington Friends' School (1748), the oldest preparatory school in the state. The Wilmington Institute Free Library (69,000 volumes in 1910) was founded in 1788, but was not made free to the public until 1894. Wilmington is the see of a Roman Catholic bishop, and of a Protestant Episcopal bishop.

The favourable situation, railway facilities and proximity to the coal-fields of Pennsylvania, West Virginia and Virginia, to the sources of supply of raw materials, and the water-power furnished by the Brandywine, combined with the enterprise of its citizens, have made Wilmington the most important manufacturing centre of Delaware. In 1905 the value of the factory product of the city, $30,390,039, was 73·8% of the total product value of the state. The principal manufactures are tanned, curried and finished leather ($10,250,842), steam railway cars ($3,597,736), foundry and machine-shop products ($3,432,118), paper and wood pulp ($1,904,556), &c. Shipbuilding ($1,780,904 in 1905) was established as early as 1739, and in 1836 the first iron steamship and in 1854 the first iron sailing-boat built in the United States were built here. On the Brandywine, near the city, are the works of the Du Pont Powder Company, which extend over nearly 1000 acres, the largest powder plant in the world. The company was founded in 1802 by the French refugee, Eleuthère Irenée du Pont de Nemours (1771–1834), who had learned from Lavoisier the modern methods of powder-making, and here introduced them into the United States. Wilmington is the port of entry of the customs district of Delaware, with branch offices at New Castle and Lewes. In 1909 the imports of the district were valued at $463,092.

The city is governed under a charter of 1886, amended in 1893, by a mayor, who is chosen biennially and who appoints the board of water commissioners and the board of directors of the street and sewer departments, and by a unicameral legislature, the twelve members of which are elected by wards (except the president of the council, who is elected at large, and is acting mayor in the absence of the mayor). The council appoints the auditor, the clerk of council who acts as city clerk and various inspectors, &c. The police commission is appointed by the resident associate judge of New Castle county court. A board of education (two members from each ward), the city attorney and the city treasurer are elected by popular vote.

The site of Wilmington was settled in 1638 on behalf of the South Company of Sweden by Swedish and Dutch colonists, under the leadership of Peter Minuit. The fort which they built was called Christina, and the settlement that grew up around it, Christinaham, in honour of Queen Christina, daughter of Gustavus Adolphus. The fort was captured, without bloodshed, by Governor Peter Stuyvesant of New Netherland in 1655, but very few of the Swedes left Christinaham. The Swedish language and Swedish customs persisted, and the religion of the Swedes was tolerated. After the English conquest in 1664, especially after the annexation of the Delaware counties to Pennsylvania in 1682, Swedish influence declined. In 1731 a large part of the territory now included in the city was owned by Thomas Willing, who named it Willingtown. About eight years later, by a borough charter granted by William Penn, this named was changed to Wilmington, in honour of Spencer Compton, Earl of Wilmington (*c.* 1673–1743). During the War of Independence the battle of Brandywine was fought 13 m. N.W. of Wilmington. In the first half of the 19th century Wilmington was the centre of a strong anti-slavery sentiment and was a "station" of the "Underground Railroad." In 1809 the borough was enlarged by a new charter; in 1832 Wilmington was chartered as a city. In 1900 the city contained 41·4% of the total population of the state and, under the state constitution of 1897, it elects five of the thirty-five representatives and two of the seventeen senators in the state legislature.

See *Records of Holy Trinity (Old Swedes) Church* (Wilmington, 1890); Benjamin Ferris, *History of the Original Settlements on the Delaware*, part iii. (Wilmington, 1846); and Elizabeth Montgomery, *Reminiscences of Wilmington* (Philadelphia, 1851).

WILMINGTON, a city, a port of entry and the county-seat of New Hanover county, North Carolina, U.S.A., on the Cape Fear river, about 30 m. from its mouth, 10 m. in direct line from the ocean, and about 145 m. S.S.E. of Raleigh. Pop. (1890) 20,056; (1900) 20,976, of whom 10,407 were negroes and 467 were foreign-born; (1910 census) 25,748. It is the largest city and the chief seaport of the state. Wilmington is served by the Atlantic Coast Line and the Seaboard Air Line railways, and by steamboat lines to New York, Philadelphia and Baltimore and to ports on the Cape Fear and Black rivers, and is connected by an electric line with Wrightsville Beach, a pleasure resort 12 m. distant on the Atlantic Ocean. Below Wilmington the channel of the Cape Fear river is 20 ft. deep throughout and in some parts 22 and 24 ft. deep; the width of the channel is to be made 270 ft. under Federal projects on which, up to the 30th of June 1909, there had been expended $4,344,029. Above Wilmington the Cape Fear river is navigable for boats drawing 2 ft. for 115 m. to Fayetteville. The city lies on an elevated sand ridge and extends along the river front for about 2½ m. Among its prominent buildings are the United States Government Building, the United States marine hospital, the city and county hospital, the county court house, the city hall (which houses the public library) and the masonic temple. The city is the seat of Cape Fear Academy (1872) for boys, of the Academy of the Incarnation (Roman Catholic) and of the Gregory Normal School (for negroes). The city is the see of a Protestant Episcopal bishop. Wilmington is chiefly a commercial city, and ships large quantities of cotton, lumber, naval stores, rice, market-garden produce and turpentine; in 1909 the value of its exports was $23,310,070 and the value of its imports $1,282,724. The total value of the factory product in 1905 was $3,155,458, of which $893,715 was the value of lumber and timber products.

A settlement was established here in 1730 and was named New Liverpool; about 1732 the name was changed to New Town; in 1739 the town was incorporated, was made the county-seat and was renamed, this time in honour of Spencer Compton, Earl of Wilmington (*c.* 1673-1743). In 1760 it was incorporated as a borough and in 1866 was chartered as a city. Some of Wilmington's citizens were among the first to offer armed resistance to the carrying out of the Stamp Act, compelling the stamp-master to take an oath that he would distribute no stamps. During most of 1781 the borough was occupied by the British, and Lord Cornwallis had his headquarters here. Although blockaded by the Union fleet, Wilmington was during the Civil War the centre of an important intercourse between the Confederacy and foreign countries by means of blockade runners, and was the last important port open to the Confederates. It was defended by Fort Fisher, a heavy earthwork on the peninsula between the ocean and Cape Fear river, manned by 1400 men under Colonel William Lamb. A federal expedition of 150 vessels under Admiral D. D. Porter and land forces (about 3000) under General B. F. Butler approached the fort on the 20th of December 1864; on the 24th the "Louisiana," loaded with 215 tons of powder, was exploded 400 yds. from the fort without doing any damage; on the 24th and 25th there was a terrific naval bombardment, which General Butler decided had not sufficiently injured the fort to make an assault by land possible; on the 13th and 14th of January there was another bombardment, and on the 15th a combined naval and land attack, in which General A. H. Terry, who had succeeded General Butler in command, stormed the fort with the help of the marines and sailors, and took 2000 prisoners and 169 guns. The Union losses were 266 killed, 57 missing and 1018 wounded. A magazine explosion on the morning of the 16th killed about 100 men in each army. The city was evacuated immediately afterwards.

WILMOT, DAVID (1814-1868), American political leader, was born at Bethany, Pennsylvania, on the 20th of January 1814. He was admitted to the bar in 1834 and practised law in Towanda. He entered politics as a Democrat, served in the National House of Representatives from 1845 to 1851, and although he favoured the Walker Tariff, the Mexican War and other party measures, opposed the extension of slavery. On the 8th of August 1846, when a bill was introduced appropriating $2,000,000 to be used by the president in negotiating a treaty of peace with Mexico, Wilmot immediately offered the following amendment: "Provided, That, as an express and fundamental condition to the acquisition of any territory from the Republic of Mexico by the United States, by virtue of any treaty which may be negotiated between them, and to the use by the Executive of the moneys herein appropriated, neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted." The amendment, famous in American history as the "Wilmot Proviso," was adopted by the House, but was defeated, with the original bill, by the Senate's adjournment. A similar measure was brought forward at the next session, the appropriation, however, being increased to $3,000,000, and the amendment being extended to include all territory which might be acquired by the United States; in this form it passed the House by a vote of 115 to 105; but the Senate refused to concur, passed a bill of its own without the amendment; and the House, owing largely to the influence of General Lewis Cass, in March 1847, receded from its position. The amendment was never actually adopted by Congress, and was in fact expressly repudiated in the Compromise of 1850, and its content declared unconstitutional by the Supreme Court in the Dred Scott case. Although known as the Wilmot Proviso it really originated with Jacob Brinkerhoff (1810-1880) of Ohio, Wilmot being selected to present it only because his party standing was more regular. The extension of the principle to territory other than that to be acquired from Mexico was probably due to Preston King (1806-1865) of New York. Wilmot supported Van Buren in 1848 and entered the Republican party at the time of its formation, and was a delegate to the national conventions of 1856 and 1860. He was president judge of the 13th Judicial District of Pennsylvania in 1853-1861, United States senator in 1861-1863 and Judge of the United States Court of Claims in 1863-1868. He died at Towanda, Pennsylvania, on the 16th of March 1868.

See G. P. Garrison, *Westward Extension* (New York and London, 1906).

WILSON, ALEXANDER (1766-1813), American ornithologist, was born in Paisley, Scotland, on the 6th of July 1766. His father, a handloom weaver, soon removed to the country, and there combined weaving with agriculture, distilling and smuggling—conditions which no doubt helped to develop in the boy that love of rural pursuits and adventure which was to determine his career. At first he was placed with a tutor and destined for the church, but afterwards he was apprenticed as a weaver. Then he became a peddler and spent a year or two in travelling through Scotland, recording in his journal every matter of natural history or antiquarian interest. Having incurred a short imprisonment for lampooning the master-weavers in a trade dispute, he emigrated to America in 1794. After a few years of weaving, peddling and desultory observation, he became a village schoolmaster, and in 1802 obtained an appointment near Philadelphia, where he formed the acquaintance of William Bartram the naturalist. Under his influence Wilson began to draw birds, having conceived the idea of illustrating the ornithology of the United States; and thenceforward he steadily accumulated materials and made many expeditions. In 1806 he obtained the assistant-editorship of the American edition of *Rees's Encyclopaedia*, and thus acquired more means and leisure for his great work, *American Ornithology*, the first volume of which appeared in the autumn of 1808, after which he spent the winter in a journey "in search of birds and subscribers." By the spring of 1813 seven volumes had appeared; but the arduous expedition of that summer, in search of the marine waterfowl to which the remaining volume was to be devoted, gave a shock to his already impaired health, and he succumbed to dysentery at Philadelphia on the 23rd of August 1813.

Of his poems, not excepting the *Foresters* (Philadelphia, 1805), nothing need now be said, save that they no doubt served to develop his descriptive powers. The eighth and ninth volumes of the *American Ornithology* were edited after his decease by his friend George Ord, and the work was continued by Lucien Bonaparte (4 vols., Philadelphia, 1825-1833). The complete work was republished several times, and his *Miscellaneous Prose Works and Poems* was edited with a memoir by the Rev. A. B. Grosart (Paisley, 1876). A statue was erected to him at Paisley in 1876.

WILSON, SIR DANIEL (1816–1892), archaeologist and Canadian educational reformer, was born in Edinburgh on the 5th of January 1816, the son of Archibald Wilson, a wine-merchant, and Janet Aitken. After studying at the High School and the University of Edinburgh, he spent the next ten years in journalism and in other forms of literary work (London 1837–1842, Edinburgh 1842–1847). In 1845 he became secretary to the Scottish Society of Antiquaries, and in 1848 published *Memorials of Edinburgh in the Olden Time*, of which the chief value lies in the numerous illustrations, done by himself. In 1851 appeared his most important work, *Prehistoric Annals of Scotland*, which placed him in the front rank of archaeologists. In 1853 he became professor of History and English Literature in the University of Toronto, where his practical ability and energy soon made him the most important member of the staff. While writing extensively on the archaeology and anthropology of Canada, and giving an impetus to the study, he produced nothing of lasting importance. His main work lay in asserting the claims of the University of Toronto, and of University College, the teaching body in connexion with it, against the sectarian universities of the province which denounced the provincial university as godless, and against the private medical schools in Toronto. Largely owing to Wilson's energy in fighting for what he called "the maintenance of a national system of university education in opposition to sectarian or denominational colleges," the provincial university gained the chief position in the intellectual life of Ontario. Two of the sectarian universities, the Methodist and the Anglican, have now become united to the provincial university, but the Baptist and the Presbyterian (see KINGSTON) still retain a vigorous existence. He was equally successful in his struggle against the rival medical schools in Toronto, the chief of which is now incorporated with Toronto university. In his efforts to escape the control of local politicians he was less successful, and in some cases appointments to the provincial university were made for political rather than for academic reasons. Though seeing that in a young and democratic country the Scotch-American model must be followed rather than the English, and though resisting attempts to follow the practice of Oxford or Cambridge, Wilson was a believer in the merits of a modified form of the residential system. He was one of the first in Canada to cast aside the classical tradition, and as early as 1860 had the courage to say: "It is just because... German and French are now the keys of so much modern philosophy and science that all wise University reformers are learning to give to modern languages the place they justly claim in a liberal education." In 1881 he was made president of Toronto university; and in 1885 president of the literature section of the Canadian Royal Society; in 1888 he was knighted; and in 1891 given the freedom of the city of Edinburgh. He died at Toronto on the 6th of August 1892.

Record of Historical Publications relating to Canada, edited by G. M. Wrong, vol. v. (Toronto and London, 1901), pp. 199-217, gives a good sketch of his career, and a bibliography of his numerous works. (W. L. G.)

WILSON, HENRY (1812–1875), vice-president of the United States from 1873 to 1875, was born at Farmington, New Hampshire, on the 16th of February 1812. His name originally was Jeremiah J. Colbaith. His father was a day-labourer and very poor. At ten years of age the son went to work as a farm-labourer. He was fond of reading, and before the end of his apprenticeship had read more than a thousand volumes. At the age of twenty-one, for some unstated reason, he had his name changed by Act of the Legislature to that of Henry Wilson. At Natick, Massachusetts, whither he travelled on foot, he learned the trade of shoemaker, and during his leisure hours studied much and read with avidity. For short periods, also, he studied in the academies of Strafford, N.H., Wolfeborough, N.H., and Concord, N.H. After successfully establishing himself as a shoe manufacturer, he attracted attention as a public speaker in support of William Henry Harrison during the presidential campaign of 1840. He was in the state House of Representatives in 1841-42, 1846 and 1850, and in the Senate in 1844-45 and 1851-52. In 1848 he left the Whig party and became one of the chief leaders of the Free Soil party, serving as presiding officer of that party's national convention in 1852, acting as chairman of the Free Soil national committee and editing from 1848 to 1851 the Boston *Republican*, which he made the chief Free Soil organ. The Free Soil party nominated him for governor of the state in 1853, but he was defeated. For a short time (1855) he identified himself with the American or Know Nothing party, and afterwards acted with the Republican party. In 1855 he was elected to the United States Senate and remained there by re-elections until 1873. His uncompromising opposition to the institution of slavery furnished the keynote of his earlier senatorial career, and he soon took rank as one of the ablest and most effective anti-slavery orators in the United States. He had been deeply interested from 1840 until 1850 in the militia of his state, and had risen through its grades of service to that of brigadier-general. Upon the outbreak of the Civil War he was made chairman of the military committee of the Senate, and in this position performed most laborious and important work for the four years of the war. The Republicans nominated Wilson for the vice-presidency in 1872, and he was elected; but he died on the 22nd of November 1875 before completing his term of office

He published, besides many orations, a *History of the Anti-Slavery Measures of the Thirty-Seventh and Thirty-Eighth United States Congresses* (1865); *Military Measures of the United States Congress* (1868); a *History of the Reconstruction Measures of the Thirty-Ninth and Fortieth Congresses* (1868) and a *History of the Rise and Fall of the Slave Power in America* (3 vols., 1872–1875), his most important work.

The best biography is that by Elias Nason and Thomas Russell, *The Life and Public Services of Henry Wilson* (Boston, 1876).

WILSON, HORACE HAYMAN (1786–1860), English orientalist, was born in London on the 26th of September 1786. He studied medicine at St Thomas's Hospital, and went out to India in 1808 as assistant-surgeon on the Bengal establishment of the East India Company. His knowledge of metallurgy caused him to be attached to the mint at Calcutta, where he was for a time associated with John Leyden. He became deeply interested in the ancient language and literature of India, and by the recommendation of Henry T. Colebrooke, he was in 1811 appointed secretary to the Asiatic Society of Bengal. In 1813 he published the Sanskrit text—with a graceful, if somewhat free, translation in English rhymed verse—of Kālidāsa's charming lyrical poem, the *Meghadūta*, or *Cloud-Messenger*. He prepared the first Sanskrit-English Dictionary (1819) from materials compiled by native scholars, supplemented by his own researches. This work was only superseded by the *Sanskritwörterbuch* (1853–1876) of R. von Roth and Otto Böhtlingk, who expressed their obligations to Wilson in the preface to their great work. Wilson published in 1827 *Select Specimens of the Theatre of the Hindus*, which contained a very full survey of the Indian drama, translations of six complete plays and short accounts of twenty-three others. His *Mackenzie Collection* (1828) is a descriptive catalogue of the extensive collection of Oriental, especially South Indian, MSS. and antiquities made by Colonel Colin Mackenzie, now deposited partly in the India Office, London, and partly at Madras. He also wrote a *Historical Sketch of the First Burmese War, with Documents, Political and Geographical* (1827), a *Review of the External Commerce of Bengal from 1813 to 1828* (1830) and a *History of British India from 1805 to 1835*, in continuation of Mill's *History* (1844–1848). He acted for many years as secretary to the committee of public instruction, and superintended the studies of the Sanskrit College in Calcutta. He was one of the staunchest opponents of the proposal that English should be made the sole medium of instruction in native schools, and became for a time the object of bitter attacks. In 1832 the university of Oxford selected Dr Wilson to be the first occupant of the newly founded Boden chair of Sanskrit, and in 1836 he was appointed librarian to the East India Company. He was an original member of the Royal Asiatic Society, of which he was director from 1837 up to the time of his death, which took place in London on the 8th of May 1860.

A full list of Wilson's works may be found in an Annual Report of the Royal Asiatic Society for 1860. A considerable number of Sanskrit MSS. (540 vols.) collected by Wilson in India are now in the Bodleian Library.

WILSON, JAMES (1742–1798), American statesman and jurist, was born in or near St Andrews, Scotland, on the 14th of September 1742. He matriculated at the University of St Andrews in 1757 and was subsequently a student at the universities of Glasgow and Edinburgh. In 1765 he emigrated to America. Landing at New York in June, he went to Philadelphia in the following year and in 1766–1767 was instructor of Latin in the college of Philadelphia, later the university of Pennsylvania. Meanwhile he studied law in the office of John Dickinson, was admitted to the bar in 1767, removed first to Reading and soon afterward to Carlisle, and rapidly rose to prominence. In August 1774 he published a pamphlet *Considerations on the Nature and Extent of the Legislative Authority of the British Parliament*, in which he argued that parliament had no constitutional power to legislate for the colonies; this pamphlet strongly influenced members of the Continental Congress which met in September. Wilson was a delegate to the Pennsylvania provincial convention in January 1775, and he sustained there the right of Massachusetts to resist the change in its charter, declaring that as the force which the British Government was exercising to compel obedience was "force unwarranted by any act of parliament, unsupported by any principle of the common law, unauthorized by any commission from the crown," resistance was justified by "both the letter and the spirit of the British constitution"; he also, by his speech, led the colonies in shifting the burden of responsibility from parliament or the king's ministers to the king himself. In May 1775 Wilson became a member of the Continental Congress. When a declaration of independence was first proposed in that body he expressed the belief that a majority of the people of Pennsylvania were in favour of it, but as the instructions of the delegates from Pennsylvania and some of the other colonies opposed such a declaration, he urged postponement of action for the purpose of giving the constituents in those colonies an opportunity of removing such instructions. When independence was finally declared the unanimity of all the colonies except New York had been obtained. Receiving a commission as colonel in May 1775, Wilson raised a battalion of troops in his county of Cumberland, and for a short time in 1776 he took part in the New Jersey campaign, but his principal labours in 1776 and 1777 were in Congress. In January 1776 he was appointed a member of a committee to prepare an address to the colonies, and the address was written by him; he served on a similar committee in May 1777, and wrote the address *To the Inhabitants of the United States*, urging their firm support of the cause of Independence; he drafted the plan of treaty with France together with instructions for negotiating it; he was a member of the Board of War from its establishment in June 1776 until his retirement from Congress in September 1777; from January to September 1777 he was chairman of the Committee on Appeals, to hear and determine appeals from the courts of admiralty in the several states; and he was a member of many other important committees. In September 1777 the political faction in his state which had opposed Independence again came into power, and Wilson was kept out of Congress until the close of the war; he was back again, however, in 1783, and 1785–1786, and, advocating a sound currency, laboured in co-operation with Robert Morris to direct the financial policy of the Confederation.

Soon after leaving Congress in 1777 Wilson removed to Annapolis, Maryland, to practise law, but he returned to Philadelphia in the following year. In 1779 he was commissioned Advocate-General for France, and in this capacity he represented Louis XVI. in all claims arising out of the French alliance until the close of the war. In 1781–1782 he was the principal counsel for Pennsylvania in the Wyoming Valley dispute with Connecticut, which was decided in favour of Pennsylvania in December 1782 by an arbitration court appointed by Congress. Wilson was closely associated with Robert Morris in organizing the Bank of North America, and in the Act of Congress incorporating it (December 31, 1781) he was made one of the directors. In 1782 the legislature of Pennsylvania granted a charter to this bank, but three years later it passed an act to repeal it. Wilson responded with a famous constitutional argument in which he sustained the constitutionality of the bank on the basis of the *implied* powers of Congress.

As a constructive statesman Wilson had no superior in the Federal Convention of 1787. He favoured the independence of the executive, legislative and judicial departments, the supremacy of the Federal government over the state governments, and the election of senators as well as representatives by the people, and was opposed to the election of the President or the judges by Congress. His political philosophy was based upon implicit confidence in the people, and he strove for such provisions as he thought would best guarantee a government by the people. When the constitution had been framed Wilson pronounced it "the best form of government which has ever been offered to the world," and he, at least, among the framers regarded it not as a compact but as an ordinance to be established by the people. During the struggle for ratification he made a speech before a mass meeting in Philadelphia which has been characterized as "the ablest single presentation of the whole subject." In the Pennsylvania ratification convention (November 21 to December 15, 1787) he was the constitution's principal defender. Having been appointed professor of law in the university of Pennsylvania in 1790, he delivered at that institution in 1790–1791 a course of lectures on public and private law; some of these lectures, together with his speeches in the Federal convention, before the mass meeting in Philadelphia, and in the Pennsylvania ratification convention, are among the most valuable commentaries on the constitution.

Wilson was a delegate to the state constitutional convention of 1789–1790, and a member of the committee which drafted the new constitution. In 1789 Washington appointed him an associate justice of the United States Supreme Court, and in 1793 he wrote the important decision in the case of *Chisolm* v. *Georgia*, the purport of which was that the people of the United States constituted a sovereign nation and that the United States were not a mere confederacy of sovereign states. He continued to serve as associate justice until his death, near Edenton, North Carolina, on the 28th of August 1798.

Wilson's *Works*, consisting principally of his law lectures and a few speeches, were published under the direction of his son, Bird Wilson (3 vols., Philadelphia, 1803–1804). A revised edition in two volumes with notes by James D. Andrews was published in Chicago in 1896. See also *Documentary History of the Constitution of the United States of America*, vols. i. and iii. (Washington, 1894); J. B. McMaster and F. D. Stone, *Pennsylvania and the Federal Constitution*, 1787–1788 (Philadelphia, 1888); L. H. Alexander (ed.), *James Wilson* (Philadelphia, 1908); a biographical sketch entitled "James Wilson, Nation-Builder," by L. H. Alexander, in the *Green Bag*, vol. 19 (1907); "James Wilson, Patriot, and the Wilson Doctrine," by Alexander, in the *North American Review*, vol. 183 (1906); Justice J. M. Harlan, "James Wilson and the Formation of the Constitution," in the *American Law Review*, vol. 34; B. A. Konkle *et al.* "The James Wilson Memorial," in the *American Law Register*, vol. 55 (1907).

WILSON, JAMES (1835–   ), American administrator, was born in Ayrshire, Scotland, on the 16th of August 1835. In 1851 he was taken by his parents to America, where they originally settled in Connecticut, but in 1855 removed to Tama county Iowa. He studied at Iowa College, and in 1861 became a farmer. He was a Republican member of the state House of Representatives in 1868–1873, and was its speaker in 1872–1873, and he was a member of the National House of Representatives from 1873 to 1877 and again in 1883–1885. From 1870 to 1874 he was a regent of the State University of Iowa; in 1877–1883 was a member of the Iowa State Railway Commission, and from 1890 to 1897 was professor of agriculture at the Iowa Agricultural College, at Ames, and director of the State Agricultural Experiment Station. In March 1897 he became Secretary of Agriculture in President McKinley's Cabinet and served into President Taft's administration, holding office longer than any other cabinet officer since the organization of the government.

WILSON, JOHN (1627–1696), English playwright, son of Aaron Wilson, a royalist divine, was born in London in 1627. He matriculated from Exeter College, Oxford, in 1644, and entered Lincoln's Inn two years later, being called to the bar in 1649. His unswerving support of the royal pretensions recommended him to James, duke of York, through whose influence he became Recorder of Londonderry about 1681. *His Discourse of Monarchy* (1684), a tract in favour of the succession of the duke of York, was followed (1685) by a "Pindarique" on his coronation. In 1688 he wrote *Jus regium Coronae*, a learned defence of James's action in dispensing with the penal statutes. He died in obscurity, due perhaps to his political opinions, in 1696. Wilson was the author of four plays, showing a vigorous and learned wit, and a power of character-drawing that place him rather among the followers of Ben Jonson than with the Restoration dramatists.

The Cheats (written in 1662, printed 1664, 1671, &c.) was played with great success in 1663. John Lacy found one of his best parts in Scruple, a caricature of a Presbyterian minister of accommodating morality. *Andronicus Comnenius* (1664), a blank verse tragedy, is based on the story of Andronicus Comnenus as told by Peter Heylin in his *Cosmography*. It contains a scene between the usurper and the widow of his victim Alexius which follows very closely Shakespeare's treatment of a parallel situation in *Richard III*. *The Projectors* (1665), a prose comedy of London life, is, like Molière's *L'Avare*, founded on the Aulularia of Plautus, but there is no evidence that Wilson was acquainted with the French play. *Belphegor, or the Marriage of the Devil; a Tragi-comedy* (1690), treats of a theme familiar to Elizabethan drama, but Wilson took the subject from the *Belphegor* attributed to Machiavelli, and alludes also to Straparola's version in the *Notti*. He also translated into English Erasmus's *Encomium Moriae* (1668).

See *The Dramatic Works of John Wilson*, edited with introduction and notes by James Maidment and W. H. Logan in 1874 for the "Dramatists of the Restoration" series.

WILSON, JOHN (1785–1854), Scottish writer, the CHRISTOPHER NORTH of *Blackwood's Magazine*, was born at Paisley on the 18th of May 1785, the son of a wealthy gauze manufacturer who died when John was eleven years old. He was the fourth child, but the eldest son, and he had nine brothers and sisters.[1] He was only twelve when he was first entered at the university of Glasgow, and he continued to attend various classes in that university for six years, being for the most part under the tutorship of Professor George Jardine, with whose family he lived. In these six years Wilson "made himself" in all ways, acquiring not inconsiderable scholarship, perfecting himself in all sports and exercises, and falling in love with a certain "Margaret," who was the object of his affections for several years.

In 1803 Wilson was entered as a gentleman commoner at Magdalen College, Oxford. Few men have felt more than he the charm of Oxford, and in much of his later work, notably in the essay called "Old North and Young North," he has expressed his feeling. But it does not appear that his Magdalen days were altogether happy, though he perfected himself in "bruising," pedestrianism and other sports, and read so as to obtain a brilliant first class. His love affairs did not go happily, and he seems to have made no intimate friends at his own college and few in the university. He took his degree in 1807, and found himself at twenty-two his own master, with a good income, no father or guardian to control him, and apparently not under any of the influences which in similar circumstances generally make it necessary for a young man to adopt some profession, if only in name. His profession was an estate on Windermere called Elleray, ever since connected with his name. Here he built, boated, wrestled, shot, fished, walked and otherwise diverted himself for four years, besides composing or collecting from previous compositions a considerable volume of poems, published in 1812 as the *Isle of Palms*. Here he became intimate with Wordsworth, Coleridge, Southey and De Quincey. He married in 1811 Jane Penny, a Liverpool lady of good family, and four years of happy married life at Elleray succeeded; then came the event which made a working man of letters of Wilson, and without which he would probably have produced a few volumes of verse and nothing more. The major part of his fortune was lost by the dishonest speculation of an uncle, in whose hands Wilson had carelessly left it. But this hard fate was by no means unqualified. His mother had a house in Edinburgh, in which she was able and willing to receive her son and his family; nor had he even to give up Elleray, though henceforward he was not able constantly to reside in it. He read law and was called to the Scottish bar, in 1815, still taking many a sporting and pedestrian excursion, and publishing in 1816 a second volume of poems, *The City of the Plague*. In 1817, soon after the founding of *Blackwood's Magazine*, Wilson began his connexion with that great Tory monthly by joining with J. G. Lockhart in the October number, in a satire called the *Chaldee Manuscript*, in the form of biblical parody, on the rival *Edinburgh Review*, its publisher and his contributors. From this time he was the principal writer for *Blackwood's*, though never its nominal editor, the publisher retaining a certain supervision even over Lockhart's and "Christopher North's" contributions, which were the making of the magazine. In 1822 began the series of *Noctes Ambrosianae*, after 1825 mostly Wilson's work. These are discussions in the form of convivial table-talk, giving occasion to wonderfully various digressions of criticism, description and miscellaneous writing. From their origin it necessarily followed that there was much ephemeral, a certain amount purely local, and something wholly trivial in them. But their dramatic force, their incessant flashes of happy thought and happy expression, their almost incomparable fulness of life, and their magnificent humour give them all but the highest place among genial and recreative literature. "The Ettrick Shepherd," an idealized portrait of James Hogg, one of the talkers, is a most delightful creation. Before this, Wilson had contributed to *Blackwood's* prose tales and sketches, and novels, some of which were afterwards published separately in *Lights and Shadows of Scottish Life* (1822), *The Trials of Margaret Lyndsay* (1823) and *The Foresters* (1825); later appeared essays on Spenser, Homer and all sorts of modern subjects and authors.

The first result of his new occupation on Wilson's general mode of life was that he left his mother's house and established himself (1819) in Ann Street, Edinburgh, with his wife and family of five children. The second was much more unlooked for, his election to the chair of moral philosophy in the university of Edinburgh (1820). His qualifications for the post were by no means obvious, even if the fact that the best qualified man in Great Britain, Sir William Hamilton, was also a candidate, be left out of the question. But the matter was made a political one; the Tories still had a majority in the town council; Wilson was powerfully backed by friends, Sir Walter Scott at their head; and his adversaries played into his hands by attacking his moral character, which was not open to any fair reproach. Wilson made a very excellent professor, never perhaps attaining to any great scientific knowledge in his subject or power of expounding it, but acting on generation after generation of students with a stimulating force that is far more valuable than the most exhaustive knowledge of a particular topic. His duties left him plenty of time for magazine work, and for many years his contributions to *Blackwood* were extraordinarily voluminous, in one year (1834) amounting to over fifty separate articles. Most of the best and best known of them appeared between 1825 and 1835.

The domestic events of Wilson's life in the last thirty years of it may be briefly told. He oscillated between Edinburgh and Elleray, with excursions and summer residences elsewhere, a sea trip on board the Experimental Squadron in the Channel during the summer of 1832, and a few other unimportant diversions. The death of his wife in 1837 was an exceedingly severe blow to him, especially as it followed within three years that of his friend Blackwood. For many years after, his literary work was intermittent, and, with some exceptions, not up to the level of his earlier years. Late in 1850 his health showed definite signs of breaking up; and in the next year he resigned his professorship, and a Civil List pension of £300 a year was conferred on him. He died at Edinburgh on the 3rd of April 1854.

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[1] His youngest brother was James Wilson "of Woodville" (1795–1856), the zoologist. He purchased, on behalf of Edinburgh University, in Paris, the Dufresne collection of birds, and arranged them on his return to Scotland. He contributed to *Blackwood's Magazine* and to the *North British Quarterly Review*, and wrote many of the articles on natural history in the seventh edition of the *Encyclopaedia Brit*

Only a very small part of Wilson's extensive work was published in a collected and generally accessible form during his lifetime, the chief and almost sole exceptions being the two volumes of poems referred to, the *Lights and Shadows of Scottish Life*, and the *Recreations of Christopher North* (1842), a selection from his magazine articles. These volumes, with a selected edition of the *Noctes Ambrosianae* in four volumes, and of further essays, critical and imaginative, also in four volumes, were collected and reissued uniformly after his death by his son-in-law, Professor J. F. Ferrier. The collection is very far from exhaustive; and, though it undoubtedly contains most of his best work and comparatively little that is not good, it has been complained, with some justice, that the characteristic, if rather immature, productions of his first eight years on *Blackwood* are almost entirely omitted, that the *Noctes* are given but in part, if in their best part, and that at least three long, important and interesting series of papers, less desultory than is his wont, on "Spenser," on "British Critics" and the set called "Dies Boreales," have been left out altogether. Wilson's characteristics are, however, uniform enough, and the standard edition exhibits them sufficiently, if not exhaustively. His poems may be dismissed at once as little more than interesting. They would probably not have been written at all if he had not been a young man in the time of the full flood of the Lake school influence. His prose tales have in some estimates stood higher, but will hardly survive the tests of universal criticism. It is as an essayist and critic of the most abounding geniality, if not genius, of great acuteness, of extraordinary eloquence and of a fervid and manifold sympathy, in which he has hardly an equal, that Christopher North will live. His defects lay in the directions of measure and of taste properly so called, that is to say, of the modification of capricious likes and dislikes by reason and principle. He is constantly exaggerated, boisterous, wanting in refinement. But these are the almost necessary defects of his qualities of enthusiasm, eloquence and generous feeling. The well-known adaptation of phrase in which he did not recant but made up for numerous earlier attacks on Leigh Hunt, "the Animosities are mortal, but the Humanities live for ever," shows him as a writer at his very best, but not without a little characteristic touch of grandiosity and emphasis. As a literary critic, as a sportsman, as a lover of nature and as a convivial humorist, he is not to be shown at equal advantage in miniature; but almost any volume of his miscellaneous works will exhibit him at full length in one of these capacities, if not in all.

See *Christopher North*, by Mrs Mary Gordon, his daughter (1862); and Mrs Oliphant, *Annals of a Publishing House; William Blackwood and his Sons* (1897).

WILSON, JAMES HARRISON (1837–   ), American cavalry soldier, was born at Shawneetown, Illinois, in 1837 and entered West Point military academy in 1855, graduating in 1860. He was appointed to the engineer branch of the United States army, served in the Port Royal and Fort Pulaski operations, being breveted major for his gallant conduct at Pulaski, was on M'Clellan's staff at Antietam as a lieutenant-colonel in 1862, and as a topographical engineer on the headquarters staff of the Army of the Tennessee during the Vicksburg and Chattanooga campaigns. His services in the intricate operations before Vicksburg were rewarded by promotion to brigadier-general U.S.V. In 1864 he was appointed to command a division in Sheridan's cavalry corps, and played a distinguished part in the cavalry operations of the 4th to 6th of May during the battle of the Wilderness (for which he was breveted colonel U.S.A.), the so-called Richmond Raid, the operations on the Totopotomoy, &c. Later in 1864 he commanded the cavalry of Thomas's army in Tennessee. During the closing operations of the war he led a cavalry expedition on a grand scale through the South-Western states, occupying Selma, Montgomery and Macon, and capturing at different times nearly 7000 prisoners, including President Davis. He was promoted major-general of volunteers and breveted major-general U.S.A. shortly before the end of the war. Returning to duty in the regular army as a lieutenant-colonel of infantry for some years, he resigned in 1870 and engaged in engineering and railway construction. In 1898, during the Spanish-American War, he was appointed a major-general in the new volunteer army, and took part in the operations in Porto Rico. He served in the China expedition of 1900 as a brigadier-general and in 1901 was placed on the retired list as a brigadier-general U.S.A.

WILSON, RICHARD (1714–1782), English landscape painter, was born at Penegoes, Montgomeryshire, where his father was a clergyman, on the 1st of August 1714. His early taste for art was observed by a relative of his mother, Sir George Wynne, who in 1729 sent him to London to study under Thomas Wright, a little-known portrait painter of the time, by whom he was instructed for six years. He then started on his own account, and was soon in a good practice. Among his commissions was a full-length of the prince of Wales and the duke of York, painted for their tutor, the bishop of Norwich. Examples of his portraits may be studied in Greenwich Hospital, in the Garrick Club, and in various private collections. In 1749 Wilson visited Italy, where he spent six years. He had previously executed some landscapes, but it was now that the advice of Zuccarelli and Joseph Vernet decided him to adopt this department of art exclusively. He studied Claude and Poussin, but retained his own individuality, and produced some admirable views of Rome and the Campagna. In 1755 he returned to England, and became one of the first of English landscape painters. "Niobe," one of his most powerful works, was exhibited at the Society of Artists in 1760. On the establishment of the Royal Academy in 1768 he was appointed one of the original members, and he was a regular contributor to its exhibitions till 1780. He frequently executed replicas of his more important subjects, repeating some of them several times; in the figures which he introduced in his landscapes he was occasionally assisted by Mortimer and Hayman. During his lifetime his landscapes were never widely popular; his temper was consequently embittered by neglect, and so impoverished was he that he was obliged to seclude himself in an obscure, half-furnished room in Tottenham Court Road, London. In 1776, however, he obtained the post of librarian to the Academy; and by the death of a brother he acquired a small property near Llanferras, Denbighshire, to which he retired to spend his last days, and where he died suddenly in May 1782. After his death his fame increased, and in 1814 about seventy of his works were exhibited in the British Institution. The National Gallery, London, contains nine of his landscapes.

The works of Wilson are skilled and learned compositions rather than direct transcripts from nature. His landscapes are treated with great breadth, and with a power of generalization which occasionally led to a disregard of detail. They are full of classical feeling and poetic sentiment; they possess noble qualities of colour, and of delicate silvern tone; and their handling is vigorous and easy, the work of a painter who was thoroughly master of his materials.

See *Studies and Designs by Richard Wilson, done at Rome in the year 1752* (Oxford, 1811); T. Wright, *Some Account of the Life of Richard Wilson* (London, 1824); Thomas Hastings, *Etchings from the Works of Richard Wilson, with some Memoirs of his Life* (London, 1825). Many of Wilson's best works were reproduced by Woollett and other engravers of the time.

WILSON, ROBERT (d. 1600), English actor and playwright, was a comedian in the earl of Leicester's company, beginning with its establishment in 1574, and from 1583 to 1588 in the Queen's and afterwards in Lord Strange's company. He wrote several morality plays. In his *Three Ladies of London* (1584) he has the episode of the attempt of the Jew to recover his debt, afterwards adapted by Shakespeare in *The Merchant of Venice*. Another Robert Wilson (1579–1610), probably his son, was one of Henslowe's dramatic hack-writers.

WILSON, SIR ROBERT THOMAS (1777–1849), British general, was a son of the painter Benjamin Wilson (1721–1788), and obtained a commission in the 15th light dragoons in 1794, taking part in the famous charge at Villers-en-Cauchies. He was one of eight officers who received the emperor's commemoration medal (of which only nine were struck), the order of Maria Theresa and the dignity of Freiherr of the Empire. In the campaigns of Tourcoing and Tournay and in the retreat through Holland, Wilson repeatedly distinguished himself. In 1796 he became captain by purchase, in 1798 he served as a brigade-major during the suppression of the Irish Rebellion, and in 1799 was with the 15th in the Helder expedition. Having in 1800 purchased a majority in a regiment serving in the Mediterranean he was sent on a military mission to Vienna in that year, but returned to take part in the battle of Alexandria. In 1802 he published an account of the expedition to Egypt, which was shortly afterwards translated into French, and created a considerable impression by its strictures upon French officers' barbarity. Wilson shortly afterwards produced a translation of General Regnier's work on the same campaign, with comments. Shortly afterwards Wilson published a work on the defects of the British army system which is remembered as the first protest against flogging. In 1804 he bought the colonelcy of the 19th light dragoons, in 1805 exchanged into the 20th, and in 1806 served with the 20th in the Cape of Good Hope expedition. In 1807 he was employed as military attaché of a mission to the king of Prussia, and so was present at Eylau, Heilsberg and Friedland, of which battles he published an account in 1810. Returning to England with despatches from St Petersburg he reached London before the Russian declaration of war and so gave the admiralty twenty-four hours' start in the operation at sea. In the early part of the Peninsular War Wilson raised and commanded the Lusitanian Legion, an irregular Portuguese corps which did good service in 1808 and 1809 and formed the starting-point of the new Portuguese army organized by Beresford in 1810. His services were rewarded by knighthood, a colonelcy in the British army and the Portuguese order of the Tower and Sword. In 1811, with the rank of brigadier-general, he went to Turkey, and in 1812 he travelled thence to Russia, where he was attached to Kutúzov's headquarters during the pursuit of the retreating French, being present at Malo-Jaroslavietz, Vyazma and Krasnoye. His account of the campaign, published in 1860, is one of the most valuable works on these events. He continued to serve with the Russian army during 1813 and distinguished himself at Lützen and Bautzen, the emperor Alexander decorating him with the knighthood of the St George order on the battlefield. He was promoted major-general in the British army about the same time. He was at Dresden, Kulm and Leipzig, and distinguished himself at the last great battle so much that Schwarzenberg writing to the British ambassador at Vienna attributed to Wilson's skill a large part in the successful issue of the battle. But his services in the counsels of the Allies were still more important on account of the confidence reposed in him personally by the allied sovereigns. But Castlereagh, treating Wilson as a political opponent, removed him to the minor theatre of Italy, in spite of the protests of the British ambassador. With the Austrian Army of Italy he served through the campaign of 1814. In 1816 after Waterloo he contrived the escape of one of Napoleon's supporters, condemned to death by the Restoration government, and was imprisoned for three months with his comrade in this adventure, Captain Hely-Hutchinson (3rd earl of Donoughmore), and censured by the commander-in-chief in a general order. In 1817 he published *The Military and Political Power of Russia*, in 1818 he became member of parliament for Southwark and in 1821 he interposed between the mob and the troops on the occasion of Queen Caroline's funeral, for which his political opponents secured his dismissal from the army, without compensation for the price of his commissions. He took an active part in politics on the opposition side, and also spent some time in Spain during the wars of 1822–23. On the accession of William IV., his political services in the formation of the Canning ministry of 1827 were rewarded by reinstatement in the army with the rank of lieutenant-general. But, disapproving of the Reform bill, he resigned his place in the Commons. He was promoted general in 1841 and appointed governor of Gibraltar in 1842. He died in Lond[illegible] 9th of May 1849.

[illegible] mentioned above, Wilson left a diary of his [illegible] 1812–1814, published in 1861, and an [illegible] published two years later.

[illegible]–1581), English statesman and [illegible] of Strubby, in Lincolnshire, was born about 1525. He was educated at Eton and King's College, Cambridge, where he joined the school of Hellenists to which Cheke, Thomas Smith, Walter Haddon and others belonged. He graduated B.A. in 1546 and M.A. in 1549. In 1551 he produced, in conjunction with Walter Haddon, a Latin life of Henry and Charles Brandon, dukes of Suffolk. His earliest work of importance was *The Rule of Reason, conteinynge the Arte of Logique set forth in Englishe* (1551), which was frequently reprinted. It has been maintained that the book on which Wilson's fame mainly rests, *The Arte of Rhetorique*, was printed about the same time, but this is probably an error: the first edition extant is dated January 1553. It is the earliest systematic work of literary criticism existing in the English language. Wilson threw in his lot with the Dudley family, and when they fell, he fled to the Continent. He was with Sir John Cheke in Padua in 1555–1557, and afterwards at Rome, whither in 1558 Queen Mary wrote, ordering him to return to England to stand his trial as a heretic. He refused to come, but was arrested by the Roman Inquisition and tortured. He escaped, and fled to Ferrara, but in 1560 he was once more in London. Wilson became Master of St Katherine's Hospital in the Tower, and entered parliament in January 1563. In 1570 he published a translation, the first attempted in English, of the *Olynthiacs* and *Philippics* of Demosthenes, on which he had been engaged since 1556. His *Discourse upon Usury* appeared in 1572. From 1574 to 1577, Wilson, who had now become a prominent person in the diplomatic world, was principally engaged on embassies to the Low Countries, and on his return to England he was made a privy councillor and sworn secretary of state; Walsingham was his colleague. In 1580, although he was not in holy orders, Queen Elizabeth made Wilson dean of Durham. He died at St Katherine's Hospital on the 16th of June 1581, and was buried next day, "without charge or pomp," at his express wish. *The Arte of Rhetorique* gives Wilson a high place among the earliest artificers of English style; and it is interesting to see that he was opposed to pedantry of phrase, and above all to a revival of uncouth medieval forms of speech, and encouraged a simpler manner of prose writing than was generally appreciated in the middle of the 16th century.

WILSON, THOMAS (1663–1755), English bishop, was born at Burton, Cheshire, and educated at Trinity College, Dublin. He was ordained in 1686, and became curate at Newchurch Kenyon, Lancashire. In 1692 he was appointed chaplain to the 9th earl of Derby, who in 1697 offered him the bishopric of Sodor and Man. He was consecrated bishop in 1698. His episcopate was marked by a number of reforms in the Isle of Man. New churches were built, libraries founded and books were printed in Manx, his *Principles and Duties of Christianity* (London, 1707) being the first book published in that language. He also encouraged farming, and set the example of planting fruit and forest trees. In order to restore discipline in the island he drew up in 1704 his well-known *Ecclesiastical Constitutions*. The judgments of his courts often brought him into conflict with the governors of the island, and in 1722 he was even imprisoned for a time in Castle Rushen. In 1737, however, the jurisdiction of the civil and spiritual courts was better defined by new statutes, the lordship of the island having passed in 1736 to James Murray, 2nd duke of Atholl, with whom Wilson had no personal difficulties. In 1749 on Zinzendorf's invitation he accepted the title of Antistes—a synonym for bishop—in the Moravian Church.

A life of Wilson, by John Keble, was published with his *Works* (Oxford, 1847–1863) The Sodor and Man Theological School in the Isle of Man is called in his memory the Bishop Wilson School.

WILSON, SIR WILLIAM JAMES ERASMUS, generally known as Sir Erasmus Wilson (1809–1884), British surgeon and philanthropist, was born in London on the 25th of November 1809, studied at St Bartholomew's Hospital in London, and at Aberdeen, and early in life became known as a skilful operator and dissector. It was his sympathy with the poor of London and a suggestion from Thomas Wakley of the *Lancet*, of which Wilson acted for a time as sub-editor, which first led him to take up skin diseases as a special study. The horrible cases of scrofula, anaemia and blood-poisoning which he saw made him set to work to alleviate the sufferings of persons so afflicted, and he quickly established a reputation for treating this class of patient. It was said that he cured the rich by ordering them to give up luxuries; the poor, by prescribing for them proper nourishment, which was often provided out of his own pocket. In the opinion of one of his biographers, we owe to Wilson in great measure the habit of the daily bath, and he helped very much to bring the Turkish bath into use in Great Britain. He wrote much upon the diseases which specially occupied his attention, and his books, *A Healthy Skin* and *Student's Book of Diseases of the Skin*, though they were not received without criticism at the time of their appearance, long remained text-books of their subject. He visited the East in order to study leprosy, Switzerland that he might investigate the causes of goitre, and Italy with the purpose of adding to his knowledge of the skin diseases affecting an ill-nourished peasantry. He made a large fortune by his successful practice and by skilful investments, and, since he had no family, he devoted a great deal of his money to charitable and educational purposes. He founded in 1869 the chair and museum of dermatology in the Royal College of Surgeons, of which he was chosen president in 1881, and which just before his death awarded him its honorary gold medal, founded in 1800 and only six times previously awarded. He also founded a professorship of pathology at Aberdeen University. After the death of his wife the bulk of his property, some £200,000, went to the Royal College of Surgeons. In 1878 he earned the thanks of the nation, upon different grounds, by defraying the expense of bringing the Egyptian obelisk called Cleopatra's Needle from Alexandria to London, where it was erected on the Thames Embankment. The British government had not thought it worth the expense of transportation. He was knighted by Queen Victoria in 1881, and died at Westgate-on-Sea on the 7th of August 1884.

WILSON, WOODROW (1856-), American educationist, was born in Staunton, Virginia, on the 28th of December 1856. He graduated at Princeton in 1879, studied law at the University of Virginia in 1879–1880, practised law in Atlanta in 1882–1883, and received the degree of Ph.D. at Johns Hopkins University in 1886, his thesis being on *Congressional Government* (1885; and often reprinted). He was associate professor of history and political economy at Bryn Mawr in 1885–1888 and at Wesleyan University in 1888–1890; professor of jurisprudence and political economy at Princeton in 1890–1895, of jurisprudence in 1895–1897, and subsequently of jurisprudence and politics; and in 1902 he became president of Princeton University, being the first layman to hold that office. He retired in 1910, and was elected Democratic governor of New Jersey. His administration of the University was marked by the introduction of the "preceptorial" system, by the provision of dormitories and college eating-halls for members of the lower classes, and by the development of the graduate school.

He wrote: *The State: Elements of Historical and Practical Politics, Sketch of Institutional History and Administration* (1889); *The State and Federal Government of the United States* (1891); *Division and Reunion, 1829–1889* (1893) in the "Epochs of American History" series; *An Old Master and Other Political Essays* (1893); *Mere Literature and Other Essays* (1893); *George Washington* (1896), an excellent biography; the popular *History of the American People* (1902); *Constitutional Government in the United States* (1908), being Columbia University Lectures; and in the seventh volume of the *Cambridge Modern History* the chapter on "State Rights, 1850–1860."

WILTON, a market town and municipal borough in the Wilton parliamentary division of Wiltshire, England, 86 m. W. by S. of London, on the London & South-Western and Great Western railways. Pop. (1901) 2203. It lies among the pastures beside the rivers Nadder and Wylye. The church of St Mary and St Nicholas was built in 1844 by Lord Herbert of Lea, in a Romanesque style, richly adorned with marbles and mosaics. The central entrance is upheld by twisted columns based upon stone lions. The belfry is detached. Wilton House, a little to the south, was founded by William Herbert, first earl of Pembroke by the second creation, on the estates of the dissolved convent, which were granted him by Henry VIII.

Tradition says that Shakespeare and his company played here before James I. in 1603, and the house is rich in memories of Sir Philip Sidney the poet and soldier, of the artists Holbein and Vandyck, of the dramatists Jonson and Massinger, whose father was steward here, and of Inigo Jones the architect. The first folio edition of Shakespeare was dedicated, seven years after the poet's death, to the third earl and his brother. In style Wilton House is Italian of the 16th century, with a porch added by Holbein. The garden front was rebuilt and other changes made by the advice of Charles I., a frequent visitor; and many subsequent alterations were made. The art collections include the marbles gathered together by the eighth earl.

Carpet-making forms the main industry of Wilton; the most famous fabrics being those known as Wilton carpets; Saxony carpets made of short-staple wool; and the rich and durable Axminsters, long woven by hand at Axminster in Devonshire. It is also an important centre for the sale of sheep. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 1915 acres.

A chantry was founded here about A.D. 800, afterwards changed into a priory of Benedictine sisters, and refounded by Alfred. In 968 Wulftrude, a mistress of King Edgar, became abbess; and the same office was declined by her daughter Edith, who died at twenty-three. Miracles, it was said, were worked by Edith's remains, and she became patron saint of the convent, which afterwards gave shelter to many noble ladies and survived until the Dissolution. Its abbess was a baroness of England. Antiquaries have seen in Wilton the capital of a British kingdom. It was certainly the chief town of the Wilsaetas, or men of Wilts, whom Cynric the Saxon leader crushed in 556. It afterwards became a residence of the Wessex kings; and here, in 871, Alfred was severely defeated by the Danes. Wilton was burned in 1003 by Sweyn, the Danish king. After the Conquest it ranked among the richest of royal boroughs. In 1141 Queen Matilda celebrated Easter here with great pomp, and two years later Stephen, who came to found a castle, was driven off by her adherents. The prosperity of Wilton began to fail when Icknield Street, the great highway of commerce, was diverted to pass through Salisbury in 1224; and its decline was hastened by the plague, by which a third of the townsfolk were swept away in 1349.

Wilton (*Wylton*, *Wiltune*) was a seat of the West Saxon kings and a prosperous town until the removal thence in 1075 of the seat of the bishop of Sherborne to Sarum. The excessive number of markets held at the latter town in the 13th century caused its further decline into a poor and unimportant place. Sweyn burnt and sacked it in 1003, consequently under Edward the Confessor it rendered only £22. However, Domesday presents it as a valuable royal borough held in farm by the burgesses for £50. From 1204 onwards Wilton figures in various grants. Richard, earl of Cornwall, obtained it from Henry III., and William, earl of Pembroke, finally from Elizabeth. The first charter given by Henry I. (probably in 1101) granted franchises to the burgesses of the merchant gild and company of Wilton as enjoyed by London and Winchester, and was confirmed by succeeding monarchs from Henry II. to Henry VI. The corporation consisted in 1350 of a mayor, recorder, 5 aldermen, 3 capital burgesses, 11 common councilmen and other officers, the mayor being the returning officer. Two members were returned to parliament from 1293 to 1832 and one from 1832 to 1885, at which date Wilton lost its separate representation.

In 1414 Henry V. granted a fair on July 21 and 22. This was cancelled in 1416 and another substituted on July 22 and the three preceding days. Two yearly fairs were obtained by the burgesses from Henry VII. for four days from April 23 and September 1. In 1792 the fair days were November 13, September 12 and May 4, the two latter are still held, that in September being one of the largest sheep fairs in the west of England. Henry III. granted three markets weekly on Monday, Wednesday and Friday, and Henry VI., in 1433, one on Wednesday. The latter was still held in 1825, but had ceased in 1888.

WILTSHIRE [Wilts], a south-western county of England, bounded N.W. and N. by Gloucestershire, N.E. and E. by Berkshire, S.E. by Hampshire, S.W. and S. by Dorsetshire, and W. by Somersetshire. The area is 1374·9 sq. m. A great upland covers two-thirds of the county, comprising, in the north-east, Marlborough Downs, with Savernake Forest; in the centre, the broad undulating sweep of Salisbury Plain; and in the south, the more varied hills and dales of the Nadder watershed, the vale of Chalk and Cranborne Chase. Large tracts of the Chalk are over 600 ft. above the sea, rising in many parts into steep and picturesque escarpments. Several peaks attain an altitude of 900 ft., and Inkpen Beacon, on the borders of Berkshire, Wiltshire and Hampshire, reaches 1011 ft. Scattered in thousands over the downs lie huge blocks of silicious Tertiary grits, called sarsen stones or grey wethers, which were used by the primitive builders of Stonehenge and Avebury. The underlying Greensand is exposed in the deeper valleys of the Chalk, such as the vale of Pewsey, dividing Salisbury Plain from Marlborough Downs, and the vale of Chalk, dividing the Nadder westward from the heights of Cranborne Chase. One of the most charming features of the county is its fertile and well-wooded valleys. Three ancient forests remain: Cranborne Chase, which extends into Dorset, was a royal deer-park as early as the reign of John, and, like Savernake Forest, contains many noble old oaks and beeches. The main part of the New Forest belongs to Hampshire; but No Man's Land and Hampworth Common, its outlying heaths and coppices, encroach upon the south-eastern corner of Wilts. Bentley Wood, 5 m. E. of Salisbury, and the Great Ridge and Grovely Woods between the Nadder and Wylye, are fine uplands parks. There is no great sheet of water, but the reservoir near Swindon, and the lakes of Longleat, Stourton and Fonthill in the south-west of Earl Stoke near Westbury, and of Bowood, Corsham and Seagry near Chippenham, deserve mention for the beauty of their scenery. The upper reaches of the Thames skirt the north-eastern border, and three other considerable rivers drain the Wiltshire Downs. The Kennet, rising west of Marlborough, winds eastward into Berkshire and meets the Thames at Reading. The Lower or Bristol Avon flows from its source among the Cotteswolds in southern Gloucestershire, past Malmesbury, Chippenham, Melksham and Bradford, where it curves north-eastward into Somerset, finally falling into the Bristol Channel. Besides many lesser tributaries it receives from the south the Frome, which forms for about 5 m. the boundary between Wilts and Somerset. The East or Christchurch Avon, which rises near Bishops Cannings in the centre of the county, flows east and south into Hampshire, and enters the sea at Christchurch. Close to Salisbury it is joined by the united streams of the Nadder and the Wylye; by the Ebble, which drains the vale of Chalk; and by the Bourne, which flows south by west from its head near Ludgershall.

Geology.—As has been said, about two-thirds of the surface of Wilts is occupied by a great Chalk upland. Cropping out from beneath the Chalk is a fringe of the Selbornian—Upper Greensand and Gault—the former is well exposed in the vale of Pewsey, west of Devizes, and along the margins of the vale of Wardour; it forms a broad, hilly tract from Mere through Stourton to Warminster. The Gault Clay runs regularly at the foot of the Upper Greensand; it is excavated in several places for brick-making. The Lower Greensand, which oversteps the underlying formations, appears from beneath the Gault at Poulshot and follows the same line of outcrop northwards; a small outlier at Seend is worked for the iron it contains. About one-third of the county lying on the north-west side of the Chalk downs, including a portion of the vale of the White Horse, is occupied by Jurassic rocks. The Upper Lias—the oldest formation in the county—forms the floor of the valley near Box; it is followed by the overlying Inferior Oolite and Fuller's Earth. Then succeeds the Great Oolite Series, which includes the famous building-stones of Bath, quarried at Winsley Down, near Bradford, and at Box, Corsham Down and other places in the neighbourhood. Above the freestones near Bradford comes the Bradford clay, with the well-known fossil *Apiocrinus* or pear-encrinite [illegible] by the Forest Marble limestones [illegible] crops at Westwood, Trowb[illegible] lies the outcrop of Oxford[illegible] beds and overlying Oxfo[illegible] tract in which stand [illegible] Cricklade. Rising up from the eastern margin of the Oxfordian vale is the irregular scarp formed by the Corallian oolitic limestones and marls. The iron ores of Westbury are obtained in this formation. Another clay-bottomed vale lies on the eastern side of the Corallian ground, from near Calne to Swindon, where it is exploited for bricks. It appears also between Seend, Coulston and Westbury; also between Mere and Semley. About the former place it is brought into apposition with Cretaceous rocks through the agency of an east to west fault. At Tisbury and near Potterne are small outcrops of Portlandian rocks which yield the familiar building-stones of Tisbury and Chilmark. Limestones and clays of Purbeck age lie in the vale of Wardour about Teffont Evias. At Dinton in the same vale the Wealden formation just makes its appearance.

In the south-eastern corner of the county there are tracts of Tertiary Reading Beds and London Clay east of Downton and on the Clarendon Hills; these are covered by Bagshot Beds at Alderbury and Grinstead, also on Hampworth Common. Outliers of Reading Beds and London Clay occur about Great Bedwin; the sarsen stones previously referred to represent the last remnants of a mantle of Tertiary rocks which formerly covered the district. Here and there drift gravels and brick earths, besides low-level river gravels, rest upon the older rocks.

Agriculture.—Some five-sixths of the total area, a high proportion, is under cultivation, but a large amount of this is in permanent pasture. The soil, a heavy reddish loam, with a subsoil of broken stones, in the north-west, but lighter in the chalk region, is essentially that of a pastoral country, although there are wide tracts of richer land, suitable for wheat and beans. Oats, however, are the largest grain crop. There is a small acreage classified as hill pasture. The green crops consist mainly of turnips, mangolds and swedes. Bacon-curing is carried on. Large numbers of sheep are bred on the downs, and dairy-farming is practised in the north-west. There are manufactures of condensed milk. An agricultural college is established at Downton.

Manufactures.—A majority of the hands employed in factories and workshops are occupied in the locomotive works of the Great Western railway at Swindon. There are also large engineering works at Devizes. Cloth is still woven, though in greatly diminished quantities, at Trowbridge, Melksham, Chippenham and other places where water-power is available. Carpets are woven at Wilton, haircloth and coco-nut fibre at Melksham, silk at Malmesbury, Mere and Warminster. Portland and Bath stone are quarried for building purposes, while iron ore from mines near Westbury is smelted in that town.

Communications.—Three great railway lines traverse Wiltshire from E. to W., throwing out a number of branch lines to the larger towns. In the N. the Great Western main line passes through Swindon on its way from London to Bath. A second line of the same system runs also to Bath from Hungerford, by way of Devizes. South of Salisbury Plain the South-Western main line goes through Salisbury and the southern quarter of Wilts on its way into Somerset. The chief branch line is that between Salisbury and Westbury on the Great Western. The Midland & South-Western Junction railway runs north from Andover by Swindon, Cricklade and Cirencester. Swindon, Salisbury and Westbury are the three centres of railway traffic. The Avon is navigable as far as Salisbury, and goods are carried on the Thames & Severn Canal in the N.E., and on the Kennet & Avon Canal across Salisbury Plain. These waterways were formerly connected by a branch of the Berks & Wilts Canal, which runs S.W. from Berkshire, through Swindon and Melksham, but was closed in 1899.

The area of the ancient county is 879,943 acres, with a population in 1891 of 264,997 and in 1901 of 273,869. The area of the administrative county is 864,105 acres. The county contains 29 hundreds. The municipal boroughs are—Calne (pop. 3457), Chippenham (5074), Devizes (6532), Malmesbury (2854), Marlborough (3887), Salisbury, a city and the county town (17,117), Swindon (45,006), Wilton (2203). The urban districts are—Bradford-on-Avon (4514), Melksham (2450), Trowbridge (11,526), Warminster (5547), Westbury (3305). Other small towns are Cricklade (1517), Downton (1786), Highworth (2047), Mere (1977), Pewsey (1722), Wootton Bassett (2258). The county is in the western circuit, and assizes are held at Salisbury and Devizes. It has one court of quarter sessions, and is divided into 16 petty sessional divisions. The boroughs of Devizes and Salisbury have separate courts of quarter sessions and commissions of the peace, and the borough of Marlborough has a separate commission of the peace. There are 335 civil parishes. Wiltshire is mainly in the diocese of Salisbury, but a considerable part is in that of Bristol, and small parts in those of Gloucester, Oxford and Winchester. It contains 322 ecclesiastical parishes or districts, wholly or in part. The county is divided into five parliamentary divisions, each returning one member—Northern or Cricklade, North-western or Chippenham, Western or Westbury, Eastern or Devizes and Southern or Wilton. It also contains the parliamentary borough of Salisbury, returning one member.

History.—The English conquest of the district now known as Wiltshire began in 552 with the victory of Cynric at Old Sarum, by which the way was opened to Salisbury Plain. Four years later, pushing his way through the vale of Pewsey, Cynric extended the limits of the West Saxon kingdom to the Marlborough Downs by a victory at Barbury Hill At this period the district south of the Avon and the Nadder was occupied by dense woodland, the relics of which survive in Cranborne Chase, and the first wave of West Saxon colonization was chiefly confined to the valleys of the Avon and the Wylye, the little township of Wilton which arose in the latter giving the name of Wilsaetan to the new settlers. By the 9th century the district had acquired a definite administrative and territorial organization, Walstan, ealdorman of the Wilsaetan, being mentioned as early as 800 as repelling an attempted invasion of the Mercians. Moreover, "Wiltunscire" is mentioned by Asser in 878, in which year the Danes established their headquarters at Chippenham and remained there a year, plundering the surrounding country. In the time of Æthelstan mints existed at Old Sarum, Malmesbury, Wilton, Cricklade and Marlborough. Wilton and Salisbury were destroyed by the Danish invaders under Sweyn in 1003, and in 1015 the district was harried by Canute.

With the redistribution of estates after the Conquest more than two-fifths of the county fell into the hands of the church; the possessions of the crown covered one-fifth; while among the chief lay proprietors were Edward of Salisbury, William, count of Ewe, Ralph de Mortimer, Aubrey de Vere, Robert Fitzgerald, Miles Crispin, Robert d'Oily and Osbern Giffard. The first earl of Wiltshire after the Conquest was William le Scrope, who received the honour in 1397. The title subsequently passed to Sir James Butler in 1449, Sir John Strafford in 1470, Sir Thomas Boleyn in 1529, and in 1550 to the Paulett family. The Benedictine foundations at Wilton, Malmesbury and Amesbury existed before the Conquest; the Augustinian house at Bradenstoke was founded by Walter d'Evreux in 1142; that at Lacock by Ela, countess of Salisbury, in 1232; that at Longleat by Sir John Vernon before 1272. The Cluniac priory of Monkton Farleigh was founded by Humphrey de Bohun in 1125; the Cistercian house at Kingswood by William de Berkeley in 1139; and that of Stanley by the Empress Maud in 1154.

Of the forty Wiltshire hundreds mentioned in the Domesday Survey, Selkley, Ramsbury, Bradford, Melksham, Calne, Whorwellsdown, Westbury, Warminster, Heytesbury, Kinwardstone, Ambresbury, Underditch, Furstfield, Alderbury and Downton remain to the present day practically unaltered in name and extent; Thorngrave, Dunelawe and Cepeham hundreds form the modern hundred of Chippenham; Malmesbury hundred represents the Domesday hundreds of Cicemethorn and Sterchelee, which were held at farm by the abbot of Malmesbury; Highworth represents the Domesday hundreds of Crechelade, Scipe, Wurde and Staple; Kingbridge the hundreds of Chingbridge, Blachegrave and Thornhylle; Swanborough the hundreds of Rugeberge, Stodfæd and Swaneberg; Branch the hundreds of Branchesberge and Dolesfeld; Cawden the hundreds of Cawdon and Cadworth. A noticeable feature in the 14th century is the aggregation of church manors into distinct hundreds, at the court of which their ecclesiastical owners required their tenants to do suit and service. Thus the bishop of Winchester had a separate hundred called Kurwel Bishop, afterwards absorbed in Downton hundred; the abbot of Damerham had that of Damerham; and the prior of St Swithin's that of Elstub, under each of which were included manors situate in different parts of the county.

The meeting-place of Swanborough hundred was at Swanborough Tump, a hillock in the parish of Manningford Abbots identified as the moot-place mentioned in the will of King Alfred; that of Malmesbury was at Colepark; that of Bradford at Bradford Leigh; that of Warminster at Iley Oak, about 2 m. south of Warminster, near Southleigh Wood. The shire court for Wiltshire was held at Wilton, and until 1446 the shrievalty was enjoyed ex officio by the castellans of Old Sarum. Edward of Salisbury was sheriff at the time of the Domesday Survey, and the office remained hereditary in his family, descending to William Longespee by his marriage with Ela, great-granddaughter of Edward. In the 13th century the assizes were held at Wilton, Malmesbury and New Sarum.

On the division of the West Saxon see in 703 Wiltshire was included in the diocese of Sherborne, but in 905 a separate diocese of Wilton was founded, the see being fixed alternately at Ramsbury, Wilton and Sunning in Berkshire. Shortly before the Conquest Wilton was reunited to the Sherborne diocese, and by the synod of 1075–1076 the see was transferred to Salisbury. The archdeaconries of Wiltshire and Salisbury are mentioned in 1180; in 1291 the former included the deaneries of Avebury, Malmesbury, Marlborough and Cricklade within this county, and the latter the deaneries of Amesbury, Potterne, Wilton, Chalke and Wylye. In 1535 the archdeaconry of Salisbury included the additional deanery of Salisbury, while Potterne deanery had been transferred to the archdeaconry of Wiltshire. The deaneries of the archdeaconry of Salisbury have remained unaltered; Wiltshire archdeaconry now includes the deaneries of Avebury, Marlborough and Potterne; and the deaneries of Chippenham, Cricklade and Malmesbury form part of the archdeaconry and diocese of Bristol.

The inhabitants of Wiltshire have always been addicted to industrial rather than warlike pursuits, and the political history of the county is not remarkable. In 1086, after the completion of the Domesday Survey, Salisbury was the scene of a great council, in which all the landholders took oaths of allegiance to the king, and a council for the same purpose assembled at Salisbury in 1116. At Clarendon in 1166 was drawn up the assize which remodelled the provincial administration of justice. Parliaments were held at Marlborough in 1267 and at Salisbury in 1328 and 1384. During the wars of Stephen's reign Salisbury, Devizes and Malmesbury were garrisoned by Roger, bishop of Salisbury, for the empress, but in 1138 Stephen seized the bishop and captured Devizes Castle. In 1216 Marlborough Castle was surrendered to Louis by Hugh de Nevile. Hubert de Burgh escaped in 1233 from Devizes Castle, where he had been imprisoned in the previous year. In the Civil War of the 17th century Wiltshire actively supported the parliamentary cause, displaying a spirit of violent anti-Catholicism, and the efforts of the marquess of Hertford and of Lord Seymour to raise a party for the king met with vigorous resistance from the inhabitants. The Royalists, however, made some progress in the early stage of the struggle, Marlborough being captured for the king in 1642, while in 1643 the forces of the earl of Essex were routed by Charles I. and Prince Rupert at Aldbourne, and in the same year Waller, after failing to capture Devizes, was defeated in a skirmish at Roundway Down. The year 1645 saw the rise of the "Clubmen" of Dorset and Wiltshire, whose sole object was peace; they systematically punished any member of either party discovered in acts of plunder. Devizes, the last stronghold of the Royalists, was captured by Cromwell in 1645. In 1655 a rising organized on behalf of the king at Salisbury was dispersed in the same year.

At the time of the Domesday Survey the industrial pursuits of Wiltshire were almost exclusively agricultural; 390 mills are mentioned, and vineyards at Tollard and Lacock. In the succeeding centuries sheep-farming was vigorously pursued, and the Cistercian monasteries of Kingswood and Stanlegh exported wool to the Florentine and Flemish markets in the 13th and 14th centuries. Wiltshire at this time was already reckoned among the chief of the clothing counties, the principal centres of the industry being Bradford, Malmesbury, Trowbridge, Devizes and Chippenham. In the 16th century Devizes was noted for its blankets, Warminster had a famous corn-market, and cheese was extensively made in north Wiltshire. Amesbury was famous for its tobacco pipes in the 16th century. The clothing trade went through a period of great depression in the

17th century, partly owing to the constant outbreaks of plague. Linen, cotton, gloves and cutlery were also manufactured in the county, silk at Malmesbury and carpets at Wilton.

In 1295 Wiltshire was represented by no less than twenty-eight members in parliament, the shire returning two knights, and the boroughs of Bedwin, Bradford, Calne, Chippenham, Cricklade, Devizes, Downton, Ludgershall, Malmesbury, Marlborough, Old Sarum, Salisbury and Wilton, two burgesses each, but the boroughs for the most part made very irregular returns. Hindon, Heytesbury and Wootton Bassett were enfranchised in the 15th century, and at the time of the Reform Act of 1832 the county with sixteen boroughs returned a total of thirty-four members. Under the latter act Great Bedwin, Downton, Heytesbury, Hindon, Ludgershall, Old Sarum and Wootton Bassett were disfranchised, and Calne, Malmesbury, Westbury and Wilton lost one member each. Under the act of 1868 the county returned two members in two divisions, and Chippenham, Devizes and Marlborough lost one member each. Under the act of 1885 the county returned five members in five divisions; Cricklade, Calne, Chippenham, Devizes, Malmesbury, Marlborough, Westbury and Wilton were disfranchised; and Salisbury lost one member.

Antiquities.—Wiltshire is extraordinarily rich in prehistoric antiquities. The stone age is represented by a number of flint and stone implements, preserved in the unsurpassed collection at Salisbury Museum. Stonehenge, with its circles of giant stones, and Avebury, with its avenues of monoliths leading to what was once a stone circle, surrounded by an earthwork, and enclosing two lesser circles, are the largest and most famous megalithic works in England. A valley near Avebury is filled with immense sarsen blocks, resembling a river of stone, and perhaps laid there by prehistoric architects. There are also menhirs, dolmens and cromlechs. Surrounded as they were by forests and marshy hollows, it is clear that the downs were densely peopled at a very early period. Circles, formed by a ditch within a bank, are common, as are grave-mounds or barrows. These have been classified according to their shape as bell-barrows, bowl-barrows and long barrows. Bones, ashes, tools, weapons and ornaments have been dug up from such mounds, many of which contain kistvaens or chambers of stone. The "lynchets" or terraces which score some of the hillsides are said to be the work of primitive agriculturists. Ancient strongholds are scattered over the county. Among the most remarkable are Vespasian's Camp, near Amesbury; Silbury Hill, the largest artificial mound in Europe, near Avebury; the mounds of Marlborough and Old Sarum; the camps of Battlesbury and Scratchbury, near Warminster; Yarnbury, to the N. of Wylye, in very perfect preservation; Casterley, on a ridgeway about 7 m. E.S.E. of Devizes; Whitesheet and Winkelbury, overlooking the vale of Chalk; Chisbury, near Savernake; Sidbury, near Ludgershall; and Figbury Ring, 3 m. N.E. of Salisbury. Ogbury, 6 m. N. of Salisbury, is an undoubted British enclosure. Durrington Walls, N. of Amesbury, are probably the remains of a British village, and there are vestiges of others on Salisbury Plain and Marlborough Downs.

There are many signs of the Roman rule. Wans Dyke or Woden's Dyke, one of the largest extant entrenchments, runs west for about 60 m. from a point east of Savernake, nearly as far as the Bristol Channel, and is almost unaltered for several miles along the Marlborough Downs. Its date is uncertain; but the work has been proved, wherever excavated, to be Roman or Romano-British. It consists of a bank, with a trench on the north side, and was clearly meant for defence, not as a boundary. Forts strengthened it at intervals. Bokerly Dyke, which forms a part of the boundary between Wilts and Dorset, is the largest among several similar entrenchments, and has also a ditch north of the rampart.

Chief among the few monastic buildings of which any vestiges remain are the ruined abbeys of Malmesbury and of Lacock near Melksham. There are some traces of the hospital for leprous women afterwards converted into an Austin priory at Maiden Bradley. Monkton Farleigh, farther north along the Somerset border, had its Cluniac priory, founded as a cell of Lewes in the 13th century, and represented by some outbuildings of the manor-house. A college for a dean and 12 prebendaries, afterwards a monastery of Bonhommes, was founded in 1347 at Edington. The church, Decorated and Perpendicular, resembles a cathedral in size and stately beauty. The 14th century buildings of Bradenstoke Priory or Cleck Abbey, founded near Chippenham for Austin canons, are incorporated in a farmhouse. The finest churches of Wiltshire, generally Perpendicular, were built in the districts where good stone could be obtained, while the architecture is more simple in the Chalk region, where flint was used perforce. Small wooden steeples and pyramidal bell-turrets are not uncommon; and the churches [illegible] 3½ m. N.W. of Swindon, and Wanborough, 3 m. S.E. [illegible] two steeples, one in the centre, one at the west [illegible] church at Bradford-on-Avon is one of the [illegible] ecclesiastical buildings in England; and elsewhere there are fragments of Saxon work imbedded in later masonry. Such are three arches in the nave of Britford church, within a mile of Salisbury; the east end of the chancel at Burcombe, near Wilton; and parts of the churches at Bremhill, and at Manningford Bruce or Braose in the vale of Pewsey. St John's at Devizes retains its original Norman tower and has Norman masonry in its chancel; while the chancel of St Mary's, in the same town, is also Norman, and the porch has characteristic Norman mouldings. The churches of Preshute, near Marlborough, Ditteridge or Ditcheridge, near Box, and Nether Avon, near Amesbury, preserve sundry Norman features. Early English is illustrated by Salisbury Cathedral, its purest and most beautiful example; and, on a smaller scale, at Amesbury, Bishops Cannings, Boyton in the vale of the Wylye, Collingbourne Kingston, east of Salisbury Plain, Downton and Potterne, near Devizes. Bishopstone, in the vale of Chalk, has the finest Decorated church in the county, with a curious external cloister, and unique south chancel doorway, recessed beneath a stone canopy. Mere, close to the borders of Dorset and Somerset, is interesting not only for its Perpendicular church, but for a medieval chantry, used as a schoolhouse by Barnes, the Dorsetshire poet, and for its 14th-century dwelling-houses.

The castles of Wiltshire have been almost entirely swept away. At Old Sarum, Marlborough and Devizes only a few vestiges are left in walls and vaults. Castle Combe and Trowbridge castle have long been demolished, and of Ludgershall castle only a small fragment survives. The ruins of Wardour castle, standing in a richly wooded park near Tisbury, date from the 14th century, and consist of a hexagonal outer wall of great height, enclosing an open court. Two towers overlook the entrance. The 18th-century castle, one mile distant, across the park, is noteworthy for its collection of paintings, and, among other curiosities, for the "Glastonbury Cup," said to be fashioned out of a branch of the celebrated thorn-tree at Glastonbury. The number of old country houses is a marked feature in Wilts. Few parishes, especially in the N.W., are without their old manor-house, usually converted into a farm, but preserving its flagged roof, stone-mullioned windows, gabled front, two-storeyed porch and oak-panelled interior. Place House, in Tisbury, and Barton Farm, at Bradford, date from the 14th century. Fifteenth-century work is best exemplified in the manor-houses of Norrington, in the vale of Chalk; Teffont Evias, in the vale of Nadder; Potterne; and Great Chaldfield, near Monkton Farleigh. At South Wraxall the hall of a very beautiful house of the same period is celebrated in local tradition as the spot where tobacco was first smoked in England by Sir Walter Raleigh and his host, Sir Walter Long. Later styles are represented by Longford Castle, near Salisbury, where the picture galleries are of great interest; by Heytesbury Park; by Wilton House at Wilton, Kingston House at Bradford, Bowood near Calne, Longleat near Warminster, Corsham Court, Littlecote near Ramsbury, Charlton House near Malmesbury, Compton Chamberlayne in the Nadder valley, Grittleton House and the modern Castle Combe, both near Chippenham and Stourhead, on the borders of Dorset and Somerset. Each of these is noteworthy for its architecture, its art treasures or the beauty of its surroundings.

See *Victoria County History, Wiltshire*; Sir R. C. Hoare, *The Ancient History of Wiltshire* (2 vols., London, 1812–1821), *The History of Modern Wiltshire* (14 pts., London, 1822–1844); Aubrey's *Collections for Wiltshire*, edited by Sir T. Phillipps, pts. 1, 2 (London, 1821); Leland's *Journey through Wiltshire, A.D. 1540–1542*, with notes by J. E. Jackson (Devizes, 1875); W. H. Jones, *Domesday for Wiltshire* (Bath, 1865); John Britton, *The Beauties of Wiltshire* (3 vols., London, 1801–1825); J. E. Jackson, *The Sheriff's Tourn, Co. Wilts, A.D. 1439* (Devizes, 1872); see also *Proceedings* of the Wiltshire Archaeological and Natural History Society.

WIMBLEDON, a municipal borough and western residential suburb of London, in the Wimbledon parliamentary division of Surrey, England, adjoining the metropolitan borough of Wandsworth, 8 m. S.W. of Charing Cross. Pop. (1891), 25,777; (1901) 41,652. Wimbledon Common, to the north-west of the district, forms a continuation of Putney Heath and a pleasant recreation ground. It was the meeting-place of the Rifle Association from its foundation in 1860 till 1888. The parish church of St Mary is supposed to date from Saxon times; but, after it had undergone various restorations and reconstructions, it was rebuilt in 1843 in the Perpendicular style. There are various other [illegible] and chapels, all modern. A free library was [illegible] ions are numerous. The [illegible], and 18 coun- [illegible] been the scene of [illegible], and Æthelberht, [illegible], and an earthwork [illegible] marked the site. At

Coombe's Hill and elsewhere British relics have been found. At Domesday Wimbledon formed part of the manor of Mortlake, held by the archbishops of Canterbury. Afterwards the name was sometimes used interchangeably with Mortlake, and in 1327 it is described as a grange or farm belonging to Mortlake. On the impeachment of Arundel, archbishop of Canterbury, in 1398, it was confiscated. In the reign of Henry VIII. Cromwell, earl of Essex, held the manor of Wimbledon, with Bristow Park as an appendage. On the confiscation of Cromwell's estates in 1540 it again fell to the crown, and by Henry VIII. it was settled on Catherine Parr for life. By Queen Mary it was granted to Cardinal Pole. In 1574 Elizabeth bestowed the manor-house, while retaining the manor, on Sir Christopher Hatton, who sold it the same year to Sir Thomas Cecil. In 1588 Elizabeth transferred the manor to his son Sir Edward Cecil, in exchange for an estate in Lincolnshire. At the time of the Civil War the manor was sold to Adam Baynes, a Yorkshireman who shortly afterwards sold it to General Lambert; and at the Restoration it was granted to the queen dowager, Henrietta Maria, who sold it in 1661 to George Digby, earl of Bristol. On his death in 1676 it was sold by his widow to the lord-treasurer Danby. Some years after Danby's death it was purchased by Sarah, duchess of Marlborough, who bequeathed it to her grandson, John Spencer. It was sold by the fifth Earl Spencer in 1877. Wimbledon House, built by Sir Thomas Cecil in 1588, was replaced by another building in 1735 by the duchess of Marlborough; this was destroyed by fire in 1785, and a new house, called Wimbledon Park House, was erected about 1801. Wimbledon was incorporated in 1905.

WIMBORNE (WIMBORNE MINSTER), a market town, in the eastern parliamentary division of Dorsetshire, England, 111½ m. S.W. by W. from London by the London & South-Western railway; served also by the Somerset and Dorset railway. Pop. of urban district (1901) 3696. It is situated on a gentle slope above the river Allen near its confluence with the Stour. The church or minster of St Cuthberga is a fine cruciform structure of various styles from Early Norman to Perpendicular, and consists of a central lantern tower, nave and choir with aisles, transepts without aisles, western or bell tower, north and south porches, crypt and vestry or sacristy, with the library over it. It contains a large number of interesting monuments, including a brass with the date 873 (supposed to mark the resting-place of King Æthelred I.), a lunar orrery of the 14th century and an octagonal Norman font of Purbeck marble. There is a church dedicated to St John the Evangelist. The free grammar school occupies modern buildings in the Elizabethan style. Near Wimborne is Canford Manor, the seat of Lord Wimborne, a mansion in the Tudor style, built by Blore in 1826, and improved from designs of Sir Charles Barry. The town depends chiefly on agriculture; but the manufacture of hose is carried on to a small extent, and there are also coachbuilding works.

Although Wimborne (*Wimburn*) has been identified with the *Vindogladia* of the Antonine Itinerary, the first undoubted evidence of settlement is the entry of the Anglo-Saxon Chronicle, under the date 718, that Cuthburh, sister of King Ine, founded the abbey here and became the first abbess; the house is also mentioned in a somewhat doubtful epistle of St Aldhelm in 705. The importance of the foundation made it the burial-place of King Æthelred in 871, and of King Sifferth in 962. Æthelwald seized and fortified Wimborne in his revolt in 901 against Edward the Elder. The early abbey was probably destroyed by the Danes in the reign of Æthelred the Unready (978–1015), for in 1043 Edward the Confessor founded here a college of secular canons. The college remained unaltered until 1496, when Margaret, countess of Richmond, obtained letters patent from her son, Henry VII., to found a chantry, in connexion with [illegible] established a school. The continuance of this was [illegible]ded by the commissioners of 1547, and in 1562 Eliza[illegible]d a great part of the property of the former college [illegible] corporation of twelve governors, who had charge of [illegible]. New charters for the school were obtained from [illegible] 1562 and from Charles I. At the conquest Wimborne was a royal borough, ancient demesne of the crown, and part of the manor of Kingston Lacy, which Henry I. gave to Robert Mellent, earl of Leicester. From him it descended by marriage to the earls of Lincoln, and, then passing by marriage to Earl Thomas of Lancaster, it became parcel of the county and later of the duchy of Lancaster; an inquisition of 1352 found that Henry, duke of Lancaster, had 77s. 3d. rent of assize in the borough of Wimborne. The borough is again mentioned in 1487–1488, when John Plecy held six messuages in free burgage of the king as of his borough of Wimborne, but it seems to have been entirely prescriptive, and was never a parliamentary borough. The town was governed until the 19th century by two bailiffs, chosen annually at a court leet of the royal manor of Wimborne borough, part of the manor of Kingston Lacy. The market held here on Friday of each week is not mentioned in Domesday Book, but seems to be of early origin. Wimborne carried on considerable manufactures of linen and woollen goods until the time of Charles II., when they declined, their place being taken by the stocking-knitting industry of the 18th century.

See John Hutchins, *The History and Antiquities of the County of Dorset* (3rd edition, Westminster, 1861); Anon., *History of Wimborne Minster* (London, 1860).

WIMPFFEN, EMMANUEL FELIX DE (1811–1884), French soldier. Entering the army from the military school of St Cyr, he saw considerable active service in Algeria, and in 1840 became captain, in 1847 *chef de bataillon*. He first earned marked distinction in the Crimean War as colonel of a Turco regiment, and his conduct at the storm of the Mamelon won him the grade of general of brigade. In the campaign of 1859 he was with General MacMahon at Magenta at the head of a brigade of Guard Infantry, and again won promotion on the field of battle. Between this campaign and that of 1870 he was mainly employed in Algeria, and was not at first given a command in the ill-fated "Army of the Rhine." But when the earlier battles revealed incapacity in the commander of the 5th corps, De Wimpffen was ordered to take it over, and was given a dormant commission appointing him to command the Army of Châlons in case of Marshal MacMahon's disablement. He only arrived at the front in time to rally the fugitives of the 5th corps, beaten at Beaumont, and to march them to Sedan. In the disastrous battle of the 1st of September, MacMahon was soon wounded, and the senior officer, General Ducrot, assumed the command. Ducrot was beginning to withdraw the troops when Wimpffen produced his commission and countermanded the orders. In consequence it fell to him to negotiate the surrender of the whole French army. After his release from captivity, he lived in retirement at Algiers, and died at Paris in 1884. His later years were occupied with polemical discussions on the surrender of Sedan, the responsibility for which was laid upon him.

He wrote, amongst other works, *Sedan* (1871), *La Situation de la France, et les réformes nécessaires* (1873) and *La Nation armée* (1875).

WINBURG, a town in the Orange Free State, 90 m. N.E. by rail of Bloemfontein. Pop. (1904) 2762, of whom 1003 were whites. It is built by the banks of a tributary of the Vet affluent of the Vaal, and is a trading centre for a large grain and pastoral district. It is joined to the trunk railway from Port Elizabeth to the Transvaal by a branch line from Smaldeel, 28 m. N.W. The town was founded in 1837 by Commandant H. Potgieter, one of the voortrekers, and was named by him in commemoration of a victory gained over the Matabele chief Mosilikatze. It became the capital of a quasi-independent Boer state, which included considerable areas north of the Vaal. In 1848 the town and district were annexed to Great Britain and thereafter followed the fortunes of the Orange river sovereignty (see ORANGE FREE STATE). In the Boer War of 1899–1902 Winburg was one of the Boer centres in the guerrilla fighting which followed the fall of Pretoria.

WINCHCOMB, a market town in the northern parliamentary division of Gloucestershire, England, 7 m. N.E. of Cheltenham. Pop. (1901) 2864. It is picturesquely situated among the Cotteswold Hills, in the narrow valley of the Isbourne stream. The Perpendicular church of St Peter, cruciform, with a central tower, is a good example of its period. In the vicinity is Sudeley Castle, originally built by Thomas Boteler, Lord Sudeley (d. 1398). By gift of Edward VI. it came into the hands of Sir Thomas Seymour, fourth husband of Catherine Parr; this queen died here and was buried in the chapel. The castle suffered severely at the hands of the parliamentarians in 1644, and remained ruinous until 1837, when a careful restoration was begun. There are a tower of the 14th century, and considerable remains of the 15th, the inhabited portion being mainly of Tudor date. There are flour mills, paper-works and tanneries at Winchcomb.

Excavations prove that there were both British and Roman settlements at Winchcomb (*Wincelcumbe, Winchelcumbe*). It owed its growth to the foundation of religious houses by Offa and Coenwulf of Mercia in the 8th century. It became a borough in Saxon times, was the chief town of a shire to which it gave its name, and was the seat of government of the Mercian kings. Witenagemots were held there in 771 and 942. Harold, earl of Wessex, was the first overlord. It had become a royal borough by 1087, and was granted by a charter of 1224 to the abbots of St Mary's to be held of the king by a rent of £50. Winchcomb never received a charter and was not incorporated, but as a borough by prescription it was governed by 2 bailiffs and 10 chief burgesses until the corporate body was dissolved by act of parliament in 1883. It was never represented in parliament except by its mitred abbots before the dissolution of the monasteries. There is no trace of the original grant of a fair on July 17 (now held on July 28), but it is mentioned as already existing in a charter of 1221, which changed the market day from Sunday to Saturday. Elizabeth granted another fair on April 25 by charter in 1575. A Tuesday market was also granted under this charter, but the Saturday market only is now held. Both the modern fairs are horse and cattle fairs, but in the middle ages they were centres of the cloth manufacture. Tanning has been a local industry since the beginning of the 19th century, and paper and silk factories were introduced about 1830. Winchcomb took the side of the king in the Civil War and was twice plundered.

See *Victoria County History, Gloucestershire*; Emma Dent, *Annals of Winchecombe* (1877); David Royce, *Winchecombe Cartulary* (1892).

WINCHELSEA, ANNE FINCH, COUNTESS OF (1661–1720), English author, daughter of Sir William Kingsmill of Sidmonton, near Southampton, was born in April 1661. Five months later her father died, and her mother married in 1662 Sir Thomas Ogle. Lady Ogle died in 1664, and nothing is heard of her daughter Anne until 1683, when she is mentioned as one of the maids of honour of Mary of Modena, duchess of York. She married in May 1684 Colonel Heneage Finch, who was attached to the duke of York's household. To him she addressed poems and versified epistles, in which he figures as Daphnis and she as Ardelia. At the Revolution Heneage Finch refused the oath of allegiance to William and Mary, and he and his wife had no fixed home until they were invited in 1690 to Eastwell Park, Kent, by Finch's nephew Charles, 4th earl of Winchelsea, on whose death in 1712 Heneage Finch succeeded to the earldom. The countess of Winchelsea died in London on the 5th of August 1720, leaving no issue, her husband surviving until 1726.

Lady Winchelsea's poems contain many copies of verse addressed to her friends and contemporaries. She was to some extent a follower of the "matchless Orinda" in the fervour of her friendships. During her lifetime she published her poem "The Spleen" in *Gildon's Miscellany* (1701) and a volume of *Poems* in 1713 which included a tragedy called *Aristomenes*. With Alexander Pope she was on friendly terms, and one of the seven commendatory poems printed with the 1717 edition of his works was by her. But in the farce *Three Hours after Marriage* (1717) attributed to Gay, but really the work of Pope, Arbuthnot and Gay, she is ridiculed as the learned lady, Phoebe [illegible] a character assigned to Pope's hand. Lady Winchelsea's [illegible] were almost forgotten when Wordsworth in the "Essay, [illegible] mentary to the Preface" of his *Poems* (1815), dre[illegible] to her nature-poetry, asserting that with the exception of Pope's "Windsor Forest" and her "Nocturnal Reverie," English poetry between *Paradise Lost* and Thomson's *Seasons* did not present "a single new image of external nature." Wordsworth sent at Christmas 1819 a MS. of extracts from Lady Winchelsea and other writers to Lady Mary Lowther, and his correspondence with Alexander Dyce contains some minute criticism and appreciation of her poetry.

Mr Edmund Gosse wrote a notice of her poems for T. H. Ward's *English Poets* (vol. iii., 1880), and in 1884 came into possession of a MS. volume of her poems. A complete edition of her verse, *The Poems of Anne, Countess of Winchelsea*, was edited by Myra Reynolds (Chicago, 1903) with an exhaustive essay. See also E. Gosse, *Gossip in a Library* (1891), and E. Dowden, *Essays, Modern and Elizabethan*. Wordsworth's anthology for Lady Mary Lowther was first printed in 1905 (Oxford). Some of her work remains in MS. in the possession of Professor Dowden.

WINCHELSEA, ROBERT (d. 1313), archbishop of Canterbury, was probably born at Old Winchelsea. He studied and then taught at the universities of Paris and Oxford, where he attained celebrity as a scholar, and became rector of the former, and subsequently chancellor of the latter university. He held prebendal stalls in the cathedrals of Lincoln and St Paul's, and was made archdeacon of Essex about 1283. In December 1292 John Peckham, archbishop of Canterbury, died, and early in the following year Winchelsea was elected as his successor. His consecration, which took place at Aquila in September 1294, was delayed owing to the vacancy in the papacy, but he found no difficulty in obtaining the temporalities of the see from King Edward I. Winchelsea is chiefly renowned as a strenuous upholder of the privileges of the clergy and the authority of the pope, and as a fearless opponent of Edward I. Strengthened by the issue of the papal bull *Clericis laicos* in 1296, he stimulated the clergy to refuse pecuniary assistance to Edward in 1297; but after the king had pronounced sentence of outlawry against the delinquents he instructed each clerk to decide this question for himself. Personally the archbishop still declined to make any contribution towards the expenses of the French war, and his lands were seized and held by Edward until July 1297, when a somewhat ostentatious reconciliation between king and prelate took place at Westminster. He took some part in the movement which led to the confirmation of the charters by Edward later in the same year, but the struggle with the king did not exhaust his energies. He asserted his authority over his suffragans to the full; quarrelled with Pope Boniface VIII. over the presentation to a Sussex living, and was excommunicated by one of the pope's minions; and vigorously contested the claim of the archbishop of York to carry his cross erect in the province of Canterbury. Before these events, however, the quarrel with Edward had been renewed, although Winchelsea officiated in 1299 at the king's marriage with Margaret, daughter of Philip III., king of France. Joining the barons in demanding certain reforms from Edward at the parliament of Lincoln in 1301, he compelled the king to give way on the main issues; but the indignation which followed the claim of Pope Boniface to be the protector of Scotland, a claim which was supported by Winchelsea, led to the rupture of this alliance. It is probable that one of the reasons which led the archbishop to join in these proceedings was his hostility to Edward's adviser, Walter Langton, bishop of Lichfield, whom he sought to disgrace both in England and at Rome. The king cherished his indignation until his friend Clement V. became pope in 1305, when he made his final move against Winchelsea. Listening to Edward's envoys, Langton and Henry [illegible] of Lincoln, Clement suspended the archbi[illegible] vainly imploring the intercession of the [illegible] journeyed to the papal court [illegible]

[illegible] was [illegible] sera" [illegible] struggle with Edward II. by a frequent use of spiritual weapons, and took part in the proceedings against the Templars. He died at Otford on the 11th of May 1313. Miracles were said to have been worked at his tomb in Canterbury cathedral, but efforts to procure his canonization were unavailing. Although a secular priest Winchelsea was somewhat ascetic, and his private life was distinguished for sanctity and generosity. As an ecclesiastic, however, he was haughty and fond of power; and he has been not inappropriately described as "the greatest churchman of the time."

See *Chronicles of the Reigns of Edward I. and Edward II.*, edited with introduction by W. Stubbs (London, 1882–1883); S. Birchington, in the *Anglia sacra*, edited by H. Wharton (London; 1691); and W. Stubbs, *Constitutional History*, vol. ii. (Oxford, 1896).

WINCHELSEA, a village in the Rye parliamentary division of Sussex, England, 9 m. N.E. by E. from Hastings by the South Eastern and Chatham railways. Pop. (1901) 670. It stands on an abrupt hill-spur rising above flat lowlands which form a southward continuation of Romney marsh. This was within historic times a great inlet of the English Channel, and Winchelsea was a famous seaport until the 15th century. Two gates, the one of the time of Edward I., the other erected early in the 15th century, overlook the marshes; a third stands at a considerable distance west of the town, its position pointing the contrast between the extent of the ancient town and that of the shrunken village of to-day. The town was laid out by Edward I. with regular streets intersecting at right angles; the form is preserved, and in a picturesque open space in the centre stands the church of St Thomas à Becket. This comprises only the chancel and aisles of a building which, if entire, would rank as one of the finest parish churches in England. As it stands it is of the highest interest, showing remarkable Decorated work, with windows of beautiful and unusual design, and a magnificent series of canopied tombs. In the grounds of the residence called the Friars stands the shell of the apsidal choir of a Decorated chapel which belonged to a Franciscan house. Of a Dominican convent and other religious foundations and churches there are no remains.

The town of which the relics have been described was not the first of its name. On a site supposed to be about 3 m. S.E., and now therefore about 1½ m. out in the English Channel, a seaport had grown up on a low peninsula. In 1236 and at various subsequent dates in the same century this town suffered severely from encroachments of the sea, and in 1266 it paid the penalty for its adherence to the cause of Simon de Montfort. The waves finally obliterated the site in 1288, and Edward I. thereafter planted the new town in a safe position. In the 14th and 15th centuries Winchelsea was frequently attacked by the French, and in 1350 Edward III. defeated the Spaniards in a naval action close by.

In the time of the Confessor Winchelsea (*Winchenesel, Winchelese, Wynchelse*) was included in Rameslie which was granted by him to the abbey of Fécamp. The town remained under the lordship of the abbey until it was resumed by Henry III. Its early importance was due to its harbour, and by 1066 it was probably already a port of some consequence. By the reign of Henry II., if not before, Winchelsea was practically added to the Cinque Ports and shared their liberties. After the destruction of Old Winchelsea, New Winchelsea, a walled town, flourished for about a hundred years and provided a large proportion of [illegible] furnished by the Cinque Ports to the crown; but the [illegible] of the French destroyed it, its walls were broken down, [illegible] decay of the harbour, owing to the recession of the sea, [illegible] any later return of its prosperity. The corporation, [illegible] 1298 [illegible] mayor, barons and bailiffs, was dissolved

[illegible] Port was summoned to parliament in [illegible] members from 1366 till 1832, when it [illegible] of Fécamp seems to have originally [illegible] a market was held on Saturdays and a [illegible] but no market or fair now exists. Ship-[illegible] carried on in the 13th and 14th centuries. [illegible] became a great resort for smugglers, and [illegible] for the Gascon wine trade were [illegible] goods.

WINCHESTER, EARLS AND MARQUESSES OF. The title of earl of Winchester was first borne by Saier, or Seer, de Quincy, who was endowed by King John on the 13th of March 1207, with the earldom of Winchester, or the county of Southampton. Saier de Quincy was one of the twenty-five barons named to enforce the observance of the Great Charter. He served in the Crusades at the siege of Damietta in 1219, and died soon afterwards, probably on the 3rd of November of that year. His second son Roger de Quincy (*c.* 1195–1264), who is said to have usurped the earldom during the absence of his elder brother Robert in the Holy Land, took part in the struggle between Henry III. and the barons. He died without male issue in April 1264, and the earldom reverted to the crown. It was revived in 1322 in favour of Hugh le Despenser, favourite of King Edward II., and was forfeited when he was put to death by the barons as a traitor in 1326. In 1472 the title, together with a pension of £200 a year from the customs of Southampton, but not the right of sitting in parliament, was given by King Edward IV. to a Burgundian, Louis de Bruges, lord of Gruthuyse and prince of Steenhuyse, as a reward for services rendered to himself while an exile on the continent. Louis de Bruges surrendered his patent to Henry VII. in 1499.

The marquessate of Winchester was created in 1551 in favour of William Paulet, or Pawlet, K.G., a successful courtier during four reigns, who died on the 10th of March 1572. It has descended in the male line of his family to the sixteenth possessor. John Paulet, 2nd marquess (*c.* 1517–1576), was summoned to parliament as Baron St John during the life of his father, a distinction which was shared by his three immediate successors—William Paulet (*c.* 1535–1598), William Paulet (*c.* 1560–1628) and John Paulet (*c.* 1598–1674). Charles Paulet, son and heir of John Paulet, the eighth marquess, was created duke of Bolton, on the 9th of April 1689, and the marquessate of Winchester remained in connexion with the duchy of Bolton (*q.v.*) till the death of Harry Paulet, sixth duke and eleventh marquess, without male issue in December 1794. There being no male representative of the dukes of Bolton this title lapsed, but the marquessate of Winchester was inherited by George Paulet (1722–1800), great-grandson of Lord Henry Paulet (d. 1672), second son of William, the fourth marquess. On George's death on the 22nd of April 1800 he was succeeded by his son Charles Ingoldesby Burroughs-Paulet (1764–1843), who, in 1839, prefixed the name of Burroughs to his own by royal licence. Upon his death on the 29th of November 1843, the title passed to his son John Paulet (1801–1887), fourteenth marquess, who was succeeded, on the 4th of July 1887, by his son, Augustus John Henry Beaumont (1858–1899), officer in the Guards, who was killed at Magersfontein during the Boer War on the 11th of December 1899, and was followed in the peerage by his brother, Henry William Montague Paulet (b. 1862).

Three of the marquesses of Winchester were men of note. It is recorded of the founder of the family, William Paulet, that when asked how he had contrived to live through a long period of troubled times during four reigns, he replied that he came of the willow and not of the oak, *ortus sum e salice non ex quercu*. This saying, repeated by Sir Robert Naunton in his *Fragmenta regalia*, may possibly not have been due to the marquess himself, but if not it was well invented of a man who passed through many dangers and always contrived to keep, or to improve, his places. He was the son of Sir John Paulet of Basing, near Basingstoke in Hampshire, and his wife Alice or Elizabeth, daughter of Sir William Paulet of Hinton St George, Somerset. The year of his birth has been variously given as 1474 and 1485. Between 1512 and 1527 he was several times sheriff of Hampshire. He was knighted before 1525, and in that year became privy councillor. He was, henceforth, continually employed in the royal household and on the council, but his only military service was in the easy suppression of the Pilgrimage of Grace in 1536. In 1525 he was named master of the wards and keeper of the king's widows and idiots, that is to say he had the lucrative charge of persons of property who were wards in chivalry. He was a member of the House of Commons which co-operated with the king in carrying out the separation of the Church from Rome between 1529 and 1536. He served on the courts which tried Sir Thomas More and Anne Boleyn, and he was employed to tell Catharine of Aragon that she and her daughter were degraded from their rank. It is characteristic of the type of man that he did his work gently, and with a constant recollection of the changes of fortune. His personal kindness to Anne Boleyn, which she acknowledged, no doubt stood him in good stead on the accession of her daughter Queen Elizabeth. In 1538 he was created Lord St John, and he was enriched by a grant of the lands of Netley Abbey, near Southampton. He was appointed lord steward of the household, and lord chamberlain, and became a knight of the garter in 1543. Henry VIII. named him one of the council of regency for his son Edward VI. During the reign of Edward VI., St John kept the favour both of the Protector Somerset, who made him lord keeper of the great seal, and of Somerset's enemy, the duke of Northumberland, who kept him in office. He was created earl of Wiltshire in 1550, and marquess of Winchester in 1551. On the death of Edward VI., he trimmed cleverly between the parties of Lady Jane Grey, and Mary Tudor till he saw which was going to win, and then threw himself on the winning side. He opposed Queen Mary's marriage to Philip, prince of Spain (Philip II.), till he saw she was set on it, and then gave his approval, for it was his wise rule to show just as much independence as enhanced the merit of his obedience. He was lord treasurer under Mary, and kept his place under Elizabeth, to whose ecclesiastical policy he gave his usual discreet opposition and final obedience. Winchester died at his house of Basing on the 10th of March 1572. He had built it on so grand a scale that his descendants are said to have found it necessary to pull down a part. He married, first Elizabeth, daughter of Sir William Capel, Lord Mayor of London, by whom he had four sons and four daughters, and then Winifred, daughter of Sir John Bruges, alderman of London, and widow of Sir Richard Sackville, by whom he had no children. It is said that one hundred and three of his descendants were alive at the date of his death.

His grandson, William Paulet, third marquess (*c.* 1535–1598) was one of the judges of Mary, queen of Scots, and author of a book called *The Lord Marquesses Idleness* which contains a Latin acrostic of extreme ingenuity on the words *Regina nostra Angliae.*

The fifth marquess, John Paulet (1628–1674), was a Roman Catholic. He lived much in retirement in order to be able to pay off debts left by his father. He is remembered by the ardour and sincerity of his loyalty to King Charles I. It is said that he caused the words "Aimez Loyauté" to be engraved on every pane of glass in his house of Basing. During the first Civil War it was fortified for the king, and stood a succession of sieges by the parliamentary forces between 1643 and 1645. On the 14th of October 1645, it was stormed by Oliver Cromwell. The marquess, who fought valiantly, told Hugh Peters, chaplain of the New Model Army of the parliament, who had the vulgarity to crow over him, "That if the king had no more ground in England but Basing House, he would adventure as he did, and so maintain it to the utmost," for "that Basing House was called Loyalty." The house caught fire during the storm and was burnt down, the very ruins being carried away by order of the parliament. The marquess was imprisoned in the Tower of London, but was finally allowed to compound for his estate; after the restoration of King Charles II. he was promised compensation for his losses, but nothing was given to him. He died in Englefield Park on the 5th of March 1674. He was three times married, first to Jane, daughter of Viscount Savage, by whom he had one son; then to Honora de Burgh, daughter of Richard, earl of St Albans and Clanricarde, by whom he had four sons; and then to Isabella Howard, daughter of Viscount Stafford.

See Doyle, *Official Baronage* (London, 1886); and J. A. Froude, *History of England* (London, 1856–1870), for the first marquess; J. P. Collier, *Bibliographical Account of Early English Literature* (London, 1865), for the second marquess; and Clarendon, *History of the Rebellion* (Oxford, 1886), for the fifth marquess.

WINCHESTER, a city and municipal and parliamentary borough of Hampshire, England, 66½ m. S.W. by W. from London by the London & South-Western railway; served also by the Southampton branch of the Great Western railway, with a separate station. Pop. (1901) 20,929. It occupies a hilly and picturesque site in and above the valley of the Itchen, lying principally on the left bank. The surrounding hills are chalk downs, but the valley is well wooded.

Setting aside for the present the legends which place the foundation of a great Christian church at Winchester in the 2nd century, the erection of Winchester into an episcopal see may be placed early in the second half of the 7th century, though it cannot be dated exactly. The West Saxon see was removed hither from Dorchester on the Thame, and the first bishop of Winchester was Hedda (d. 705). The modern diocese includes nearly the whole of Hampshire, part of Surrey and very small portions of Wiltshire, Dorsetshire and Sussex. St Swithin (852–862), well known through the connexion of his feast day (15th July) with the superstition that weather-conditions thereon determine those of the next forty days, is considered to have enlarged the cathedral, as are Æthelwold (963–984) and Alphege (984–1005). The history of the Saxon building, however, is very slight, and as usual, its place was taken by a Norman one, erected by Bishop Walkelin (1070–1098). The cathedral church of St Swithin lies in the lower part of the city in a wide and beautiful walled close. It is not very conspicuous from a distance, a low central tower alone rising above the general level of the roof. It consists of a nave, transepts, choir and retrochoir, all with aisles, and a lady-chapel forms the eastward termination. The work of the exterior, of whatever date, is severely plain. The cathedral, however, is the longest in England, and indeed exceeds any other church of its character in length, which is close upon 556 ft. Within, the effect of this feature is very fine. The magnificent Perpendicular nave is the work of Bishop Edington (1346–1366) and the famous William of Wykeham (1367–1404), by whom only the skeleton of Walkelin's work was retained. The massive Norman work of the original building, however, remains comparatively intact in both transepts. The central tower is Norman, but later than Walkelin's structure, which fell in 1107, a mishap which was readily attributed to divine wrath because King William II., who fell to the arrow in the neighbouring New Forest, had been buried here seven years earlier, in spite of his unchristian life. The tomb believed to be his is in the choir, but its identity has been widely disputed, and even an examination of the remains has failed to establish the truth. The choir is largely Edington's work, though the clerestory is later, and the eastern part of the cathedral shows construction of several dates. Here appears the fine Early English construction of Bishop de Lucy (1189–1204), in the retrochoir and the lady-chapel, though this was considerably altered later. Beneath the cathedral east of the choir there are three crypts, connected together. The western and the central chambers are Norman, and have apsidal terminations, while the eastern is Early English. The cathedral contains many objects of interest. The square font of black marble is a fine example of Norman art, its sides sculptured with scenes from the life of St Nicholas of Myra. The magnificent reredos behind the high altar must have been erected late in the 15th century; it consists of a lofty wall, the full width of the choir, pierced by two processional doors, and covered with tiers of rich canopied niches, the statues in which are modern. A cross of plain ashlar stone in the centre shows where an immense silver crucifix was once attached; and a plain rectangular recess above [illegible] once contained a massive silver-gilt retable, covered [illegible] and repoussé statuettes and reliefs. A second [illegible] placed at the interval of one bay behind [illegible] served to enclose the small chapel in [illegible] studded with jewels, the gift of [illegible] the body of St Swithin. Und[illegible] and choir are a number of [illegible] containing the tomb [illegible] recumbent [illegible] the most notable are the monuments of Bishops Edington, Wykeham, Waynflete, Cardinal Beaufort, Langton and Fox. The door of iron grills, of beautiful design, now in the north nave aisle, is considered to be the oldest work of its character in England; its date is placed in the 11th or 12th century. The mortuary chests in the presbytery contain the bones of Saxon kings who were buried here. The remains were collected in this manner by Bishop Henry de Blois (1129–1171), and again after they had been scattered by the soldiers of Cromwell. The choir stalls furnish a magnificent example of Decorated woodwork, and much stained glass of the Decorated and Perpendicular periods remains in fragmentary form. The library contains a Vulgate of the 12th century, a finely ornamented MS. on vellum.

In 1905 serious signs of weakness were manifested in the fabric of the cathedral, and it was found that a large part of the foundation was insecure, being laid on piles, or tree-trunks set flat, in soft and watery soil. Extensive works of restoration, including the underpinning of the foundations with cement concrete (which necessitated the employment of divers), were undertaken under the direction of Mr T. G. Jackson.

Relics of the monastic buildings are slight, and there are Early English arches and Perpendicular work in the deanery. Other old houses in the Close are very picturesque. Here formerly stood the house which Charles II. desired of Ken for Nell Gwyn. Ken refused it, but the king bore no malice, settling Nell Gwyn in another house near by, and afterwards raising Ken to the bishopric of Bath and Wells.

King Alfred founded a minster immediately north of the present site of the cathedral, and here he and other Saxon kings were buried. The house, known as Hyde Abbey, was removed (as was Alfred's body) to a point outside the walls considerably north of the cathedral, during the reign of Henry I. Here foundations may be traced, and a gateway remains. To the east of the cathedral are ruins of Wolvesey Castle, a foundation of Henry de Blois, where the bishops resided. On the southern outskirts of the city, in a pleasant meadow by the Itchen, is the Hospital of St Cross. This also was founded by Henry de Blois, in 1136, whose wish was to provide board and lodging for 13 poor men and a daily dinner for 100 others. It was reformed by William of Wykeham, and enlarged and mostly rebuilt by Cardinal Beaufort (1405–1447). The buildings form three sides of a quadrangle, with a lawn and sun-dial in its midst; while the fourth side is partly open, and partly formed by the magnificent cruciform church. The earliest parts of this building are late or transitional Norman, but other parts are Early English or Decorated. The work throughout is very rich and massive. St Cross is a unique example of a medieval almshouse, and its picturesqueness is enhanced by the curious costume of its inmates. It is still customary to provide a dole of bread and beer to all who desire it. The parish churches of Winchester are not of special interest, but the church of St Swithin is curious as occupying the upper part of the King's Gate. This gate and the West Gate alone remain of the gates in the walls which formerly surrounded the city. The West Gate is a fine structure of the 13th century. In the High Street stands the graceful Perpendicular city cross. The county hall embodies remains of the Norman castle, and in it is preserved the so-called King Arthur's round table. This is supposed to date actually from the time of King Stephen, but the painted designs upon it are of the Tudor period.

[illegible] is famous as an educational centre, and in addition [illegible] College there are several modern preparatory [illegible] the College of St Mary, lying to the south of the [illegible] is one of the greatest of English public schools. [illegible] existence here from very early [illegible] by William of Wykeham, [illegible] embraced this foundation [illegible] the members on the founda- [illegible]s, 3 chaplains, 70 scholars [illegible]s were completed about [illegible]e fine chapel, tower, hall and cloister are noteworthy, and there are extensive modern buildings.

The principal public buildings of the city are the gild-hall, public library and art school, museum, market house, mechanics' institution and barracks. The parliamentary borough returns one member and falls within the Andover division of the county. The corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 1931 acres.

History.—The history of the earliest Winchester (*Winton*, *Wynton*) is lost in legend; tradition ascribes its foundation to Ludor Rous Hudibras and dates it ninety-nine years before the first building of Rome; earthworks and relics show that the Itchen valley was occupied by Celts, and it is certain from its position at the centre of six Roman roads and from the Roman relics found there that the Caer Gwent (White City) of the Celts was, under the name of *Venta Belgarum*, an important Romano-British country town. Hardly any traces of this survive, but mosaic pavements, coins, &c., have been discovered on the south side of High Street. The name of Winchester is indissolubly linked with that of King Arthur and his knights, but its historical greatness begins when, after the conquest of the present Hampshire by the Gewissas, it became the capital of Wessex. Its importance was increased by the introduction of Christianity, although it was not at first the seat of a bishop, because, according to the later Winchester chronicler, King Cynegils wished for time to build a worthy church in the royal city; his son Cenwalh is said to have built the old minster. When the kings of Wessex became kings of all England, Winchester became, in a sense, the capital of England, though it always had a formidable rival in London, which was more central in position and possessed greater commercial advantages. The parallel position of the two cities in Anglo-Saxon times is illustrated by the law of Edgar, ordaining that the standard of weights and measures for the whole kingdom should be "such as is observed at London and at Winchester." Under Alfred it became a centre of learning and education, to which distinguished strangers, such as St Grimbald and Asser the Welshman, resorted. It was the seat of Canute's government; many of the kings, including Ecgberht, Alfred, Edward the Elder and Canute, were buried there, and, in 1043, Edward the Confessor was crowned in the old minster. The city was sometimes granted as part of the dowry of a queen consort, and it was the home of Emma, the wife of Æthelred the Unready and of Canute, and later of Edith, the wife of the Confessor.

Winchester was very prosperous in the years succeeding the Conquest, and its omission, together with London, from Domesday Book is probably an indication of its peculiar position and importance; its proximity to the New Forest commended it to the Norman kings, and Southampton, only 12 m. distant, was one of the chief ports for the continent. The Conqueror wore his crown in state at Winchester every Easter, as he wore it at Westminster at Whitsuntide and at Gloucester at Christmas. The royal treasure continued to be stored there as it had been in Anglo-Saxon times, and was there seized by William Rufus, who, after his father's death, "rode to Winchester and opened the Treasure House." In the reign of Stephen and again in the reign of Henry II. the Court of Exchequer was held at Winchester, and the charter of John promises that the exchequer and the mint shall ever remain in the city; the mint was an important one, and when in 1125 all the coiners of England were tried for false coining those of Winchester alone were acquitted with honour.

Under the Norman kings Winchester was of great commercial importance; it was one of the earliest seats of the woollen trade, which in its different branches was the chief industry of the town, although the evidence furnished by the *Liber Winton* (*temp.* Henry I. and Stephen) indicates also a varied industrial life. As early as the reign of Henry I. the gild of weavers is mentioned, and the millers at the same date render their account to the exchequer.

The gild merchant of Winchester claims an Anglo-Saxon origin, but the first authentic reference to it is in one of the charters granted to the city by Henry II. The *Liber Winton* speaks of a "cnihts' gild," which certainly existed in the time of the Confessor. The prosperity of Winchester was increased by the St Giles's Fair, originally granted by Rufus to Bishop Walkelin. It was held on St Giles's Hill up to the 19th century, and in the middle ages was one of the chief commercial events of the year. While it lasted St Giles's Hill was covered by a busy town, and no trade was permitted to be done outside the fair within seven leagues, or at Southampton; the jurisdiction of the mayor and bailiffs of the city was in abeyance, that of the bishop's officials taking its place.

From the time of the Conqueror until their expulsion by Edward I., Winchester was the home of a large colony of Jews, whose quarter in the city is marked to the present day by Jewry Street; Winchester is called by Richard of Devizes "the Jerusalem of England" on account of its kind treatment of its Jews, and there alone no anti-Jewish riots broke out after the coronation of Richard I. The corporation of Winchester claims to be one of the oldest in England, but the earliest existing charters are two given by Henry II., one merely granting to "my citizens of Winchester, who are of the gild merchant with their goods, freedom from toll, passage and custom," the other confirming to them all liberties and customs which they enjoyed in the time of Henry I.; further charters, amplified and confirmed by succeeding sovereigns, were granted by Richard I. and John. The governing charter till 1835 was that of 1587, incorporating the city under the title of the "Mayor, Bailiffs and Commonalty of the City of Winchester"; this is the first charter which mentions a mayor, but it says that such an officer had existed "time out of mind," and as early as 897 the town was governed by a wicgerefa, by name Beornwulf, whose death is recorded in the Anglo-Saxon Chronicle. There is a doubtful reference to a mayor in 1194, and the office certainly existed early in the 13th century. Until 1832 the liberty of the soke encompassing the city on almost every side was outside the jurisdiction of the city magistrates, being under the seignioralty of the bishop of Winchester.

Winchester seems to have reached its zenith of prosperity at the beginning of the 12th century; the first check was given during the civil wars of Stephen's reign, when the city was burned. However, the last entry concerning it in the Anglo-Saxon Chronicle says that Henry Plantagenet, after the treaty of Wallingford, was received with "great worship" in Winchester and London, thus recognizing the equality of the two cities; but the latter was rising at Winchester's expense, and at the second coronation of Richard I. (1294) the citizens of Winchester had the significant mortification of seeing in their own city the citizens of London take their place as cupbearers to the king. The loss of Normandy further favoured the rise of London by depriving Winchester of the advantages it had enjoyed from its convenient position with regard to the continent. Moreover, it suffered severely at the hands of Simon de Montfort the Younger (1265), although it still continued to be an occasional royal residence, and the Statute of Winchester (1285) was passed in a council held there. Meanwhile the woollen trade had drifted in great measure to the east of England; and an attempt made to revive the prosperity of Winchester in the 14th century by making it one of the staple towns proved unsuccessful. The wine trade, which had been considerable, was ruined by the sack of Southampton (1338); a few years later the city was devastated by the black death, and the charter of Elizabeth speaks of "our city of Winchester now fallen into great ruin, decay and poverty." During the Civil War the city suffered much for its loyalty to Charles I. and lost its ancient castle founded by William I. After the Restoration a scheme was started to restore trade by making the Itchen navigable to Southampton, but neither then nor when revived in the 19th century was it successful. Charles II., intending to [illegible] Winchester again a royal residence, began a palace [illegible] being unfinished at his death was used eventually [illegible] It was burnt down in 1894 and rebuilt in 190[illegible] Southgate were pulled down in 1781, East[illegible] Westgate still stands at the top of the High Street. The guard-room was formerly used as a debtors' prison, now as a museum. The two weekly markets, still held in the Corn Exchange of Wednesday and Saturday, were confirmed by Elizabeth's charter; the latter dates from a grant of Henry VI. abolishing the Sunday market, which had existed from early times. The same grant established three fairs—one on October 13 (the day of the translation of St Edward, king and confessor), one on the Monday and Tuesday of the first week in Lent, and another on St Swithin's day; the former two are still held. Winchester sent two members to parliament from 1295 to 1885, when the representation was reduced to one.

WINCHESTER, a town and the county-seat of Clark county, Kentucky, U.S.A., in the E. part of the Blue Grass region of the state, about 18 m. E. by S. of Lexington. Pop. (1890) 4519; (1900) 5964, including 3128 negroes; (1910) 7156. It is served by the Louisville & Nashville, the Chesapeake & Ohio and the Lexington & Eastern railways, the last being a short road (from Lexington to Jackson) extending into the mineral and timber region of Eastern Kentucky. The town is the seat of the Kentucky Wesleyan College (co-educational; Methodist Episcopal, South), opened in 1866, and of the Winchester Trades and Industrial School (1900). Winchester is in an agricultural, lumbering and stock-raising region, and has various manufactures. It was first incorporated in 1792.

WINCHESTER, a township of Middlesex county, Massachusetts, U.S.A., about 8 m. W. of Boston at the head of Upper Mystic Pond, one of the sources of the Mystic river. Pop. (1900) 7248, of whom 1968 were foreign-born and 140 were negroes; (1910) 9309. Area, 6 sq. m. Winchester is served by the southern division of the Boston & Maine railway, and is connected with Boston, Arlington, Medford, Stoneham and Woburn by electric lines. It is chiefly a residential suburb of Boston. Through the centre of the township winds the Aberjona river, which empties into Mystic Pond, in Winchester township, both favourite resorts for canoeing, &c. Wedge Pond and Winter Pond, in the centre of the township, are clear and beautiful sheets of water. The streets of Winchester are heavily shaded, the view as presented from the neighbouring hills being that of a continuous forest stretching from the beautiful Mystic Valley parkway (of the Metropolitan park system), of which more than one-half (50·2 acres) is in the southern part of the township, to the Middlesex Fells Reservation (another Metropolitan park) of which 261·9 acres are in the eastern part; and there are a large public playground and a common. Horn Pond Mountain and Indian Hill are about 320 ft. above sea-level. One of the pleasantest residential districts is Rangely, a restricted private park. The town-hall and library building is a fine structure; the library contains about 20,000 volumes, and the museum and collections of the Winchester Historical and Genealogical Society. The principal manufactures are leather and felt goods.

Winchester was originally within the limits of Charlestown. In 1638 allotments of land between the Mystic Pond and the present Woburn were made to various Charlestown settlers, including John Harvard and Increase Nowell (1590–1655), secretary of the Massachusetts Bay Colony in 1644–1649, and the new settlement was called Waterfield. Most of this territory in 1642 was incorporated in Woburn and was called South Woburn. In 1850 Winchester was separately incorporated, parts of Arlington (then West Cambridge) and Medford going to make up its area, and was named in honour of Colonel W. P. Winchester of Watertown, who left to the township a legacy for municipal works.

WINCHESTER, [illegible] city and the county-seat of Frederick [illegible] U.S.A., [illegible] m. by rail W.N.W. of W[illegible] including 1105 negro[illegible] more & [illegible] antly [illegible] ft. above [illegible] the site [illegible] Valley [illegible] Handley library

(1910), a memorial to John Handley, a part of whose estate was bequeathed to establish industrial schools for the poor of Winchester, and an auditorium are owned by the municipality. The United States National Military Cemetery at Winchester contains the graves of 4480 Union soldiers, 2382 of them unknown, and adjoining it is the Confederate Stonewall Cemetery, with about 8000 graves. The manufacture of gloves is the leading industry; among the other manufactures are woollen and knit goods, flour, leather, lumber, paper and bricks. Electricity, generated at the Shenandoah river, is used for power in many of the factories.

A settlement was established in this vicinity as early as 1732. In 1752 the present name was adopted and the town was established by act of the colonial legislature. In 1756, during the Seven Years' War, George Washington, in command of the provincial troops of Virginia, established his headquarters here and built Fort Loudoun. The town was incorporated in 1779. The *Virginia Gazette and Winchester Advertiser*, the first newspaper published in the Shenandoah Valley, was established here in 1787. In the Civil War, Winchester, because of its position in the lower Shenandoah Valley, played a great part, and was several times the scene of engagements between the Union and Confederate forces—in 1862, Jackson's actions of Kernstown and Winchester; in the Gettysburg campaign, the capture of a Union garrison by Ewell (14-15 June 1863); and in Sheridan's campaign of 1864 the battle of Winchester or Opequon (Sept. 19, 1864), for all of which see SHENANDOAH VALLEY CAMPAIGNS. Winchester was chartered as a city in 1852 and in 1906 the corporate limits were enlarged.

See J. E. Norris (ed.), *History of the Lower Shenandoah Valley* (Chicago, 1890), and T. K. Cartmell, *Shenandoah Valley Pioneers* (Winchester, 1909).

WINCKELMANN, JOHANN JOACHIM (1717-1768), German archaeologist, was born at Stendal in Brandenburg on the 9th of December 1717, the son of a poor shoemaker. He attended a gymnasium at Berlin and the school at Salzwedel, and in 1738 was induced to go as a student of theology to Halle. But he was no theologian, and he soon devoted himself with enthusiasm to Greek art and literature. With the intention of becoming a physician he attended medical classes at Jena; but means were insufficient and he was obliged to accept a tutorship near Magdeburg. From 1743 to 1748 he was associate-rector of a school at Seehausen in the Altmark. He then went to Nöthenitz near Dresden as librarian to Count Henry von Bünau, for whose history of the Holy Roman empire he collected materials. The treasures in the Dresden gallery awakened an intense interest in art, which was deepened by association with various artists, and especially with A. F. Oeser, who afterwards exercised so powerful an influence over Goethe. Winckelmann's study of ancient literature had inspired him with a desire to visit Rome, and he became librarian to Cardinal Passionei in 1754. This compelled him reluctantly to join the Roman Catholic Church.

In 1755, before leaving for Rome, Winckelmann published his *Gedanken über die Nachahmung der griechischen Werke in Malerei und Bildhauerkunst* ("Thoughts on the Imitation of Greek Works in Painting and Sculpture"), followed by a pretended attack on the work, and a defence of its principles, nominally by an impartial critic. The *Gedanken* contains the first statement of the doctrines he afterwards developed, and was warmly admired not only for the ideas it contained but for its style. Augustus III., elector of Saxony and king of Poland, granted him a pension of 200 thalers, that he might prosecute his studies in Rome. He arrived in Rome in November 1755, became librarian to Cardinal Archinto, and received much kindness from Cardinal Passionei. After their deaths he was received [illegible] librarian and as a friend into the house of Cardinal [illegible] was forming his magnificent collection at Porta [illegible]63, while retaining this position, Winckelmann [illegible]ect of antiquities.

[illegible] himself earnestly, at first with the aid of his friend [illegible] to the study of Roman antiquities, and gradually [illegible] unrivalled knowledge of ancient art. In 1760 appeared his *Description des pierres gravées du feu Baron de Stosch*; in 1762 his *Anmerkungen über die Baukunst der Alten* ("Observations on the Architecture of the Ancients"), including an account of the temples at Paestum. In 1758 and 1762 he visited Naples, and from his *Sendschreiben von den herculanischen Entdeckungen* (1762) and his *Nachricht von den neuesten herculanischen Entdeckungen* (1764) scholars obtained their first real information about the treasures excavated at Pompeii and Herculaneum. Winckelmann again visited Naples in 1765 and 1767, and wrote for the use of the electoral prince and princess of Saxony his *Briefe an Bianconi*, which were published, eleven years after his death, in the *Antologia romana*. His masterpiece, the *Geschichte der Kunst des Alterthums* ("History of Ancient Art"), issued in 1764, was soon recognized as a permanent contribution to European literature. In this work Winckelmann sets forth both the history of Greek art and the principles on which it seemed to him to be based. He also presents a glowing picture of the conditions, political, social and intellectual, which tended to foster creative activity in ancient Greece. The fundamental idea of his theory is that the end of art is beauty, and that this end can be attained only when individual and characteristic features are strictly subordinated to the artist's general scheme. The true artist, selecting from nature the phenomena fitted for his purpose, and combining them through the imagination, creates an ideal type marked in action by "noble simplicity and calm greatness"—an ideal type in which normal proportions are maintained, particular parts, such as muscles and veins, not being permitted to break the harmony of the general outlines. In the historical portion he used not only the works of art he himself had studied but the scattered notices on the subject to be found in ancient writers; and his wide knowledge and active imagination enabled him to offer many fruitful suggestions as to periods about which he had little direct information. Many of his conclusions based on the inadequate evidence of Roman copies have been modified or reversed by subsequent research, but the fine enthusiasm of the work, its strong and yet graceful style, and its vivid descriptions of works of art give it enduring value and interest. It marked an epoch by indicating the spirit in which the study of Greek art should be approached, and the methods by which investigators might hope to attain to solid results. To Winckelmann's contemporaries it came as a revelation, and exercised a profound influence on the best minds of the age. It was read with intense interest by Lessing, who had found in the earliest of Winckelmann's works the starting-point for his *Laocoon*.

Winckelmann contributed various admirable essays to the *Bibliothek der schönen Wissenschaften*; and in 1766 he published his *Versuch einer Allegorie*, which, although containing the results of much thought and reading, is not conceived in a thoroughly critical spirit. Of far greater importance was the splendid work entitled *Monumenti antichi inediti* (1767–1768), prefaced by a *Trattato preliminare*, presenting a general sketch of the history of art. The plates in this work are representations of objects which had either been falsely explained or not explained at all. Winckelmann's explanations were of the highest service to archaeology, by showing that in the case of many works of art supposed to be connected with Roman history the ultimate sources of inspiration were to be found in Homer.

In 1768 Winckelmann went to Vienna, where he was received with honour by Maria Theresa. At Trieste on his way back he was murdered in an hotel by a man named Arcangeli to whom he had shown some coins presented by Maria Theresa (June 8th, 1768). He was buried in the churchyard of the cathedral of St Giusto at Trieste.

An edition of his works was begun by Fernow in 1808 and completed by Meyer and Schulze (1808–1820). There are admirable studies of his character and work in Goethe's *Winckelmann und sein Jahrhundert* (1805), to which contributions were made by Meyer and Wolf, and in Walter Pater's *Renaissance* (1902). The best biography of Winckelmann is by Justi, *Winckelmann und seine Zeitgenossen* (2nd ed., 3 vols., Leipzig, 1898). A collection of letters, *Briefe an seine Züricher Freunde*, was published by Blümner (Freiburg, 1882).

(J. Si.; J. M. M.)

WIND (a common Teut. word, cognate with Skt. *vatas*, Lat. *ventus*, cf. "weather," to be of course distinguished from to "wind," to coil or twist, O.Eng. *windan*, cf. "wander," "wend," &c.), a natural motion of the air, a current of air coming from any particular direction or with any degree of velocity. For the general account of winds, their causes, &c., see METEOROLOGY. Winds may be classified according to the strength or velocity with which they blow, varying from a calm, a breeze to a gale, storm or hurricane; for the varying scale of velocity per hour of these see BEAUFORT SCALE, and for the measurement ANEMOMETER. Another classification divides them into "regular" or "constant" winds, such as the "trade winds" (*q.v.*), and "periodic" winds, such as the "monsoon" (*q.v.*). There are many special winds, such as the "Föhn," "chinook," "mistral," "harmattan," "sirocco," which are treated under their individual names. For the group of musical instruments known by the generic name of WIND INSTRUMENTS see that heading.

WINDAU (Russian *Vindava*, Lettish *Ventspils*), a seaport and sea-bathing resort of western Russia, in the government of Courland, at the mouth of the Windau, on the Baltic Sea, 110 m. by rail N.W. of Riga. Pop. (1897), 7132. It has a castle built in 1290. The harbour, 20 and 25 ft. deep, is free from ice all the year round. Timber, grain and other commodities are exported to the annual value of two to three millions sterling; the imports range between three-quarters and one million sterling.

WIND BRACES, in architecture, diagonal braces to tie the rafters of a roof together and prevent "racking." In the better sort of medieval roofs they are arched, and run from the principal rafters to catch the purlins.

WINDEBANK, SIR FRANCIS (1582–1646), English secretary of state, was the only son of Sir Thomas Windebank of Hougham, Lincs., who owed his advancement to the Cecil family. Francis entered St John's College, Oxford, in 1599, coming there under the influence of Laud. After a few years' continental travel (1605–1608), he was employed for many years in minor public offices, and became clerk of the council. In June 1032 he was appointed by Charles I. secretary of state in succession to Lord Dorchester, his senior colleague being Sir John Coke, and he was knighted. His appointment was mainly due to his Spanish and Roman Catholic sympathies. The first earl of Portland, Francis, Lord Cottington, and Windebank formed an inner group in the council, and with their aid the king carried on various secret negotiations, especially with Spain. In December 1634 Windebank was appointed to discuss with the papal agent Gregorio Panzani the possibility of a union between the Anglican and Roman Churches, and expressed the opinion that the Puritan opposition might be crippled by sending their leaders to the war in the Netherlands. Windebank's efforts as treasury commissioner in 1635 to shield some of those guilty of corruption led to a breach with Archbishop Laud, and the next year he was for a time disgraced for issuing an order for the conveyance of Spanish money to pay the Spanish troops in the Netherlands. In July 1638 he urged upon the king instant war with the Scots, and in 1640, when tumults were breaking out in England, he sent an appeal from the queen to the pope for money and men. He was elected in March 1640 member of the Short Parliament for Oxford University, and he entered the Long Parliament in October as member for Corfe. In December the House learnt that he had signed letters of grace to recusant priests and Jesuits, and summoned him to answer the charge, but with the king's connivance he fled to France. From Calais he wrote to the first Lord Hatton, defending his integrity, and affirming his belief that the church of England was the purest and nearest the primitive Church. He remained in Paris until his death on the 1st of September 1646, shortly after he had been received into the Roman communion.

WINDERMERE, the largest lake in [illegible] eastern part of the Lake District (*q.v.*). [illegible] Westmorland, the boundary with [illegible] the head southward along the [illegible] and northward along about [illegible] It forms a narrow trough with a slightly curved axis of 10½ m. The width at right angles to the axis never reaches 1 m. The area is 5·69 sq. m. The shores are generally steep, beautifully wooded and fretted with numerous little sheltered bays. The hills immediately surrounding the lake rarely reach 1000 ft., but the distant views of the mountains to the north and west contrast finely with the sylvan beauty of the lake itself. The middle of the lake, immediately opposite Bowness, is especially beautiful, for here a group of islands (Belle Isle, Thompson's Holme, the Lilies and others) divide the lake into two basins, the water about them seldom exceeding 50 ft. in depth. On the other hand, the greatest depth sounded in the northern basin is 219 ft., and in the southern 134. The lake receives the Rothay and Brathay streams at the head; Trout Beck also flows into the north basin, and Cunsey Beck from Esthwaite into the south. The lake is drained by the Leven. Steamers belonging to the Furness Railway Company ply regularly on Windermere, the chief stations being Lakeside, the terminus of a branch railway, beautifully situated at the foot, Ferry on the west shore below the islands, Bowness on the east and Waterhead, at the head, for Ambleside. The lake contains perch, pike, trout and char; there are several large hotels at Bowness and elsewhere on its shores.

The town of WINDERMERE, above the eastern shore adjacent to Bowness (*q.v.*), is in the Appleby parliamentary division of Westmorland, and is the terminus of a branch of the London and North-Western railway from Oxenholme junction. Numerous mansions and villas have grown up in the vicinity. Here, from Orrest Head, in the grounds of Elleray, where lived Professor Wilson (Christopher North), superb views over the whole lake and its surroundings are obtained. In 1905 Bowness and Windermere were united as a single urban district.

WINDHAM, WILLIAM (1750–1810), English politician, came from an ancient family long resident at Felbrigg, near Cromer in Norfolk. His father, Colonel William Windham (1717–1761), was an adventurous soldier with a taste for languages, both ancient and modern; his son was born in Golden Square, London, on the 3rd of May 1750. He went to Eton, which he quitted in 1766 for the university of Glasgow, where he acquired the taste for mathematics which always distinguished him. In 1767 he matriculated as gentleman commoner at University College, Oxford, where he remained until 1771. He never took the degree of B.A., but qualified as M.A. on the 7th of October 1782, and received the degree of D.C.L. on the 3rd of July 1793. He made a tour in Norway in 1773 and visited Switzerland and Italy between 1778 and 1780. His maiden speech on the political platform was delivered at Norwich on the 28th of January 1778, when he vehemently opposed the prosecution of the American war. His entrance into public life took place in April 1783, when he went to Ireland as chief secretary to Lord Northington, the lord-lieutenant in the coalition ministry of Fox and Lord North. Windham was his own keenest critic, his distrust in his own powers and his disappointment at his own achievements being conspicuous on every page of his *Diary*. Sickness compelled his return to England early in July 1783, and he resigned his position in August; but change of scene and constant exercise restored him to health before the end of that year. In April 1784 he was returned to parliament as member for Norwich by a majority of 64 votes, thus scoring one of the few triumphs attained by the adherents of the coalition cabinet. This seat he retained until 1802, when he was beaten on account of his hostility to the peace of that year.

Though [illegible] opposed all proposals for parliamentary [illegible] which most of the Whigs were deeply committed, [illegible] that party until after the [illegible] he and several [illegible] secretary-at-war was [illegible] at the same time [illegible] seat in the cabinet. [illegible] with unflagging zeal, [illegible] ameliorating the [illegible]. In the autumn of

1794 he was despatched to the duke of York's camp in Flanders with the views of his ministerial colleagues, but their advice could not counteract the military incapacity of the royal duke. When Pitt was frustrated in his intention of freeing the Roman Catholics from their political disabilities, Windham, who in religious matters always inclined to liberal opinions, was one of the ministers who retired from office in February 1801. He was a constant opponent of all negotiations for peace with France, preferring to prosecute the campaign at whatever cost until some decisive victory had been gained, and the temporary peace of Amiens, which was carried through under Addington's administration, did not meet with his approval. When he was ousted from the representation of Norwich in June 1802, a seat for the pocket borough of St Mawes in Cornwall was found for him. He declined a place in Pitt's new cabinet (May 1804) on the ground that the exclusion of Fox prevented the formation of an administration sufficiently strong in parliament and the country to cope with the dangers which threatened the safety of the nation, and he offered a general opposition to the measures which the prime minister proposed. On Pitt's death in January 1806 the ministry of "All the Talents" was formed under the leadership of Lord Grenville, and Windham accepted the seals as secretary of state for war and the colonies. Fox's death necessitated several official changes; and a peerage was proposed for Windham, but he declined the proffered honour, and remained in office as long as the ministry existed. A general election took place in November 1806 and Windham was elected for the county of Norfolk; but the election was declared void on petition, and he was compelled to sit for the borough of New Romney, for which he had also been elected. In 1807, when parliament was dissolved under the influence of the "No Popery" cry of Spencer Perceval, a seat was found for Windham at Higham Ferrers. Liberty of religious opinion he uniformly supported at all periods of his life, and with equal consistency he opposed all outbreaks of religious fanaticism; hence with these convictions in his mind few of the domestic measures of the new ministers met with his approbation. Moreover, he disapproved of the expedition to the Scheldt, and thought the charges brought against the Duke of York, as commander-in-chief, required his retirement from office. At the same time he actively opposed the bill of Sir Samuel Romilly, his colleague on most political questions, for reducing the number of offences visited with the punishment of death. In July 1809 he received a blow on the hip whilst rendering assistance at a fire, which he thought little of at the time; but a tumour subsequently formed on the spot and an operation became necessary. This brought on a fever, and Windham rapidly sank. He died on the 4th of June 1810, and was buried in the family vault at Felbrigg.

His speeches were published in three volumes in 1806, with a memoir by Thomas Amyot, his private secretary while he was in office in 1806, and his *Diary* was edited by Mrs Henry Baring in 1866. The passages in the latter work relative to Dr Johnson's declining days have been of considerable use to the later editors of Boswell.

WIND INSTRUMENTS (Fr. *instruments à vent*, Ger. *Blasinstrumente*, Ital. *strumenti da fiato*), a numerous and powerful section of the orchestra, classified according to the acoustic properties of the instruments and to certain important structural features. The first great natural subdivision is that of (A) mouth blown, and (B) mechanically blown, instruments.

Section A falls into the classes of (1) wood wind, (2) brass wind, with their numerous subdivisions.

1. (*a*) *Wood Wind.*—Pipes without embouchure or mouthpiece, such as the ancient Egyptian *nay*, a long flute with narrow bore held obliquely, and the *syrinx* or pan-pipes, both of which are blown by [illegible]ecting the breath not *into* the pipe but *across* the open end, so [illegible] impinges against the sharp edge of the rim. (*b*) Pipes with [illegible] but no mouthpiece, such as the transverse flute, piccolo [illegible] see FLUTE and MOUTHPIECE. (*c*) Pipes with whistle [illegible], an ancient contrivance, extensively used by primitive [illegible] ages, which finds application at the present day in the [illegible] whistle, and in organ pipes known as the flue-work. [illegible] of medieval instruments, widely diffused but now [illegible] known as recorders, beak or fipple-flutes, *flûtes à bec*, *flûtes anglaises* (Fr.), *Plock* or *Blockflöten*, *Schnabelflöten* (Ger.). (*d*) Reed instruments, by which are to be understood not reed pipes but instruments with reed mouthpieces, which subdivide again into two families owing to the very different acoustic conditions produced by the combination of a reed mouthpiece with (1) a cylindrical pipe and (2) a conical pipe. These combinations influence not only the timbre, but principally the harmonics obtained by overblowing and used to supplement the fundamental scale given out as the lateral holes are uncovered one by one; the practical difference to the performer may be summed up as one of fingering. (*d*1) comprises pipes with cylindrical bore with either single or double reed mouthpiece, such as the clarinet family, the obsolete batyphone (*q.v.*) and the family of cromornes (*q.v.*). To these we may add the aulos and tibia of ancient Greece and Rome, which at different times had single and double reed mouthpieces. These pipes all overblow a twelfth. (*d*2) Pipes with conical bore and either single or double reed mouthpiece. This class comprises the important members of the oboe family (with double reed) derived from the Schalmey and Pommer of the middle ages, the *Sckryari*, an instrument which had an ephemeral existence at the end of the 16th century and consisted of an inverted cone with a double reed placed within a *pirouette* or capsule, which had the result of restricting the compass of the instrument to the fundamental scale, for harmonics can only be produced when the reed is controlled by the lips (see REED INSTRUMENTS). The modern family of saxophones with single reed mouthpiece, intended to replace the clarinets in military bands, may be classed with the wood wind, although actually made of brass for durability. The same may be said of the sarrusophones, a family of brass oboes with double reed, invented by M. Sarrus to replace the oboe in military bands. To these we may add the *Cheng* (*q.v.*) or Chinese organ, consisting of a set of pipes arranged in a hollow gourd and sounded by means of free-reeds, the air being fed to the pipes in the reservoir by the mouth through a pipe shaped like the spout of a tea-pot. The Cheng is important, as embodying the principle of the harmonium. (*e*) Wooden tubes of conical bore having lateral holes and sometimes from one to three keys, played by means of a cup or funnel mouthpiece, such as the obsolete *cornet* (*q.v.*) or Zinke, which enjoyed such widespread popularity during the 16th and 17th centuries, and their bass the serpent. The bagpipe and its drones and chaunter are indirectly mouthblown, with the exception of the Union or Irish and of the Border bagpipes, and of the French bagpipe known as musette, in which the bag is fed with air by means of bellows, instead of through an insufflation pipe.

2. The *Brass Wind* consists of the following classes: (*a*) Tubes of fixed length, such as the natural trumpet and French horn, all medieval horns and trumpets, including the busine, the tuba, the oliphant, the hunting horn and the bugle, the classical buccina, cornu, lituus and tuba. The compass of all these was restricted to the few notes of the harmonic series obtained by overblowing. (*b*) Tubes of which the length is varied by a slide, such as the sackbut family, the slide trombone and slide trumpet. When the slide is drawn out the column of air is lengthened and the pitch proportionally lowered. Each position or shift of the slide enables the performer to overblow the harmonic series a semitone lower. (*c*) Tubes of which the length is varied by lateral holes and keys. To this class belong the keyed bugle and its bass the ophicleide, the obsolete keyed trumpet and the bass horns and Russian bassoon, which immediately preceded the invention of valves. The saxophones and sarrusophones might also be classed with these (see above, 1 *d*2). (*d*) Tubes of which the length is varied by valves or pistons. This class is the most modern of all, dating from the invention of valves in 1815, which revolutionized the technique and scoring for brass instruments. A rational subdivision of valve instruments is made in Germany into whole and half instruments (see BOMBARDON and VALVES), according as to whether the whole length of tubing comes into practical use or only half, or from the performer's point of view whether the fundamental note of the harmonic series can be produced, or whether the series begins with the second member, an octave above the first, in which case it is obvious that half the tubing is of no practical value. The principal piston instruments are: the *whole* instruments—contrabass and bass tubas, bombardons or helicons; the euphonium or tenor tuba; the *half* instruments—saxhorns, Flügelhorns, tenor horns, cornets, the valve trombone, valve trumpet and valve horn (French horn), and the Wagner tubas, which are really the basses of the French horn and are played with funnel-shaped mouthpieces. The brass wind is further divided according to the shape of the mouthpiece used. (*a*) With funnel-shaped mouthpiece, such as the French horn, tenor horn and Wagner tubas; and (*b*) with cup-shaped mouthpiece, comprising all the other brass wind instruments except the bugle, of which the mouthpiece is a hybrid, neither true funnel nor true cup.

Section B: Mechanically Blown Instruments.—This section consists mainly of instruments having the air supply fed by means of bellows; it comprises the two classes: (1) with keyboard, (2) without keyboard.

1. This includes all kinds of organs: the ancient hydraulic organ or hydraulus, differing from the pneumatic only in that water pressure was used to compress the air supply instead of the bellows

being weighted by means of the root and body of the performer at first and later by means of weights; the reed organ, consisting of pipes furnished with beating reeds, known also as the reed work when incorporated with the large church organ; the medieval portative and positive organs; the large modern church organ. To this class also belong the accordion and concertina and the numerous instruments of the harmonium type which have *free* instead of *beating* reeds, a difference which confers upon them the power of dynamic expression denied to all organs fitted with flue pipes or pipes having beating reeds. The complex instruments known as organized pianos also come within this category.

2. This comprises the bagpipes known as musette, and the Union or Irish and the Border bagpipes having a wind supply fed by bellows instead of by the insufflation pipe proper to the bagpipe; the barrel organ having instead of a keyboard a barrel studded with nails, which lift the valves admitting air to the flue pipes generally hidden within the case. (K. S.)

WINDISCHGRÄTZ, PRINCE ALFRED (1787–1862), Austrian field-marshal, entered the Austrian army in 1804, participated in all the wars against Napoleon and fought with distinction at Leipzig and in the campaign of 1814. In the following years of peace he held successive commands in Prague, being appointed head of the army in Bohemia in 1840. Having gained a reputation as a champion of energetic measures against revolution he was called upon to suppress the insurrection of March 1848 in Vienna, but finding himself ill-supported by the ministers he speedily threw up his post. Having returned to Prague he there showed firmness in quelling an armed outbreak of the Czech separatists (June 1848). Upon the recrudescence of revolt in Vienna he was summoned at the head of a large army and reduced the city by a formal siege (Oct. 20–29). Appointed to the chief command against the Hungarian rebels he gained some early successes and reoccupied Budapest (Jan. 1849), but by his slowness in pursuit he allowed the enemy to rally in superior numbers and to prevent an effective concentration of the Austrian forces. In April 1849 he was relieved of his command and henceforth rarely appeared again in public life.

See *Fürst Windischgrätz. Eine Lebens-Skizze. Aus den Papieren eines Zeitgenossen der Sturm-Jahre 1848 und 1849* (2nd ed., Leipzig, 1898).

WINDMILL, a term used, in the widest sense, for a machine by which the energy of the wind is applied to useful purposes. Windmills were certainly used as early as the 12th century and are still largely employed in Holland in draining the polders and grinding trass. They are somewhat extensively used in America for pumping and driving agricultural machinery. In spite of the competition of more powerful and tractable motors, they are serviceable, especially in new countries, where fuel is scarce and where work can be done intermittently. An inquiry was made in India in 1879 as to the possibility of using windmills for irrigation (*Professional Papers on Indian Engineering*, July 1879), with the result that it was concluded their usefulness would be very limited.

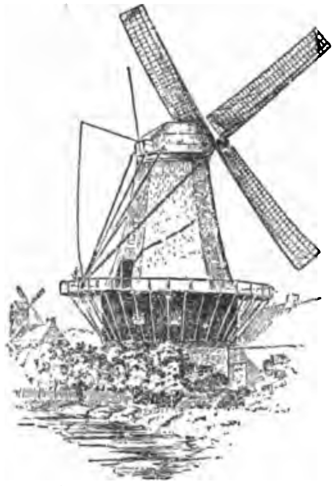
FIG. 1—Windmill near Delft.

A windmill is not in any case a very powerful or efficient motor, and its work is variable and intermittent. In favourable positions, it will run on an average for eight hours out of the twenty-four. For pumping on a small scale, the intermittent action is least an objection, because there is generally a tank or storage reservoir regulating the delivery of the water. For driving dynamos windmills are least suitable, on account of the variation of speed, though some attempts to generate electricity by wind power have been made, special arrangements being adopted for automatically regulating the speed.

European Windmills.—In all the older windmills a shaft, called the wind shaft, carried four to six arms or whips on which long rectangular narrow sails were spread. The wind shaft was placed at an inclination of 10° or 15° with the horizontal, to enable the sails to clear the lower part of the mill. The whip carrying the sail was often 30 to 40 ft. in length, so that the tips of the sails described a circle 60 to 80 ft. in diameter. The sails were rectangular, 5 to 6 ft. wide, and occupying five-sixths of the length of the whip. A triangular leading sail was sometimes added. Sometimes the sails consisted of a sail-cloth spread on a framework; at other times narrow boards were used. The oldest mill was no doubt the *post* mill, the whole structure being carried on a post; to bring the sails to face the wind, the structure was turned round by a long lever. The post mill was succeeded by the *tower*, *smock* or *frock* mill, in which the mill itself consisted of a stationary tower, and the wind shaft and sails were carried in a revolving cap rotating on the top of the tower. Andrew Meikle introduced in 1750 an auxiliary rotating fan at right angles to the principal sails, which came into action whenever the wind was oblique to the axis of the sails, automatically *veering* the sails or placing them normal to the wind. For safety, the sails must be *reefed* in high winds. In 1807, Sir W. Cubitt introduced automatic reefing arrangements. The sails were made of thin boards held up to the wind by weights. If the force of the wind exceeded a certain value the boards were pressed back and exposed little surface.

American Windmills.—These generally have the sails, 18 or more in number, arranged in an annulus or disk. The sails consist of narrow boards or slats arranged radially, each board having a constant or variable inclination to the wind's direction. An American mill presents a larger surface for a given length of sail than the older type, and consequently the construction is lighter. To turn the mill face to the wind a rudder is sometimes used projecting backward in a plane at right angles to the plane of rotation of the sails. Various arrangements are adopted for reefing the sails automatically. (*a*) In some an action equivalent to reefing is obtained by turning the sail disk oblique to the wind. The pressure on a side vane in the plane of rotation, controlled by a weight, turns the sail disk edgeways to the wind if the pressure exceeds a safe amount. (*b*) In centrifugal governor mills the slats forming the sails are connected in sets of six or eight, each set being fixed to a bar at the middle of its length. By rotating this bar the slats are brought end on to the wind, the action being analogous to shutting an umbrella. The slats are held up to the wind by a weight. A centrifugal governor lifts the weight if the speed becomes excessive and the sails are partially or completely furled. Many of the veering and reefing arrangements are very ingenious and too complicated to be described without detailed drawings. A description of some of these arrangements will be found in a paper by J. A. Griffiths (*Proc. Inst. Civ. Eng.*, 119, p. 321) and in a "Report on Trials of Wind Pumping Engines at Park Royal in 1903" (*Journ. Roy. Agric., Soc.*, 64, p. 174).

Warner's Annular Sail Windmill.—Messrs Warner of London make a windmill somewhat similar to American mills. The shutters or vanes consist of a frame covered with canvas, and these are pivoted between two angle-iron rings so as to form an annular sail. The vanes are connected with spiral springs, which keep them up to the best angle of weather for light winds. If the strength of the wind increases, the vanes give to the wind, forcing back the springs, and thus the area on which the wind acts diminishes. In addition, there are a striking lever and tackle for setting the vanes edgeways to the wind when the mill is stopped or a storm is expected. The wheel is kept face to the wind by a rudder in small mills; in large mills a subsidiary fan and gear are used. Fig. 2 shows a large mill of this kind, erected in a similar manner to a tower mill. The tower is a framework of iron, and carries a revolving cap, on which the wind shaft is fixed. Behind is the subsidiary fan with its gearing acting on a toothed wheel fixed to the cap.

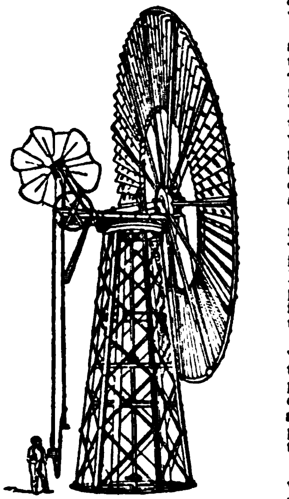

Fig. 2.—Warner's Annular Sail Windmill.

It is important that a wind-mill should control itself so that it works efficiently in moderately strong winds and at the same time runs in very light winds, which are much more prevalent. It should also, by reefing or otherwise, secure safety in storms.

Table I. gives the mean velocity of the wind in miles per hour for an inland station, Kew, and a very exposed station, Scilly, for each month during the period 1890–1899.

The pressure of the wind on a plane normal to its direction, composed partly of an excess front pressure and negative back pressure, is given by the relation

$$p = 0{\cdot}003\, v^2,$$

where p is in pounds per square foot and v the velocity of the wind in miles per hour. It varies a little with the form and size of the surface, but for the present purpose this variation may be disregarded. (See experiments by Dr Stanton at the National Physical Laboratory, *Proc. Inst. Civ. Eng.* 156, p. 78.) For velocities of 5, 10 and 20 m. per hour the pressures on a plane normal to the wind would be about 0·075, 0·3 and 1·2 lb per sq. ft. respectively, and these may be taken to be ordinary working velocities for windmills. In storms the pressures are much greater, and must be reckoned with in considering the stability of the mill. A favourable wind velocity for windmills is 15 m. per hour.

Table I.

	Jan.	Feb.	March.	April.	May.	June.
Kew .	8·0	8·5	8·5	7·5	7·5	7·0
Scilly .	20·6	19·5	18·4	16·1	14·1	12·9
	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Kew .	7·0	7·0	6·0	6·5	7·0	8·0
Scilly .	12·4	13·9	14·6	17·2	19·3	22·0

Pressure on Surfaces oblique to the Wind.—Let fig. 3 represent a plane at rest on which a wind current impinges in the direction YY, making an angle θ with the normal Oa to the plane. Then the pressure n normal to the plane is given very approximately by Duchemin's rule

$$n = p\frac{2\cos\theta}{1+\cos^2\theta} \text{ lb per sq. ft.}$$

where p is the pressure in pounds per square foot on a plane struck normally by the same wind.

In fig. 3 let AB be part of a windmill sail or vane at rest, XX being the plane of rotation and YY the direction of the wind. The angle θ is termed the weather of the sail. This is generally a constant angle for the sail, but in some cases varies from a small angle at the outer end to a larger angle near the axis of rotation. In mills of the European type, $\theta = 12°$ to $18°$, and the speed of the tips of the sails is 2½ to 3 times the velocity of the wind. In mills of the American type, $\theta = 28°$ to $40°$, and the speed of the tips of the vanes is ¾ to 1 time that of the wind. Then if O$a = n$ be the normal pressure on the sail or vane per square foot, $ba = t$ is the effective component of pressure in the direction of rotation and

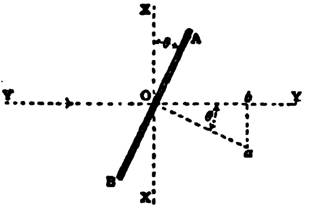

Fig. 3.

$$t = n \sin\theta = p\frac{2\sin\theta\cos\theta}{1+\cos^2\theta}.$$

When the sail is rotating in a plane at right angles to the wind direction the conditions are more complicated. In fig. 4 let XX be the plane of rotation of the vane and YY the direction of the wind. Let Oa be the normal to the vane, θ being the weather of the vane. Let O$v = v$ be the velocity of the wind, O$u = u$ the velocity of the vane. Completing the parallelogram, O$v_r = v_r$ is the velocity and direction of the wind relatively to the vane.

$$v_r = \sqrt{(v^2+u^2)} = v\sec\phi,$$
$$\tan\phi = u/v,$$

and the angle between the relative direction of wind and normal to the vane is $\theta+\phi$. It is clear that $\theta+\phi$ cannot be greater than 90°, or the vane would press on the wind instead of the wind on the vane. Substituting these values in the equations already given, the normal pressure on the oblique moving vane is

$$n = {\cdot}003\, v^2 \sec^2\phi \frac{2\cos(\theta+\phi)}{1+\cos^2(\theta+\phi)}.$$

The component of this pressure in the direction of motion of the vane is

$$t = {\cdot}003\, v^2 \sec^2\phi \frac{2\sin(\theta+\phi)\cos(\theta+\phi)}{1+\cos^2(\theta+\phi)}$$

and the work done in driving the vane is

$$tu = tv \tan\phi$$
$$= {\cdot}003\, v^3 \sec^2\phi \tan\phi \frac{2\sin(\theta+\phi)\cos(\theta+\phi)}{1+\cos^2(\theta+\phi)}$$

foot lb per sq. ft. of vane per sec., where v is taken in miles per hour. For such angles and velocities as are usual in windmills this would give for a square foot of vane, near the tip about $0{\cdot}003\, v^3$ ft. lb per sec. But parts of the vane or sail nearer the axis of rotation are less effective, and there are mechanical friction and other causes of inefficiency. An old rule based on experiments by Coulomb on mills of the European type gave for the average effective work in foot lb per sec. per sq. ft. of sail

$$W = 0{\cdot}0011\, v^3.$$

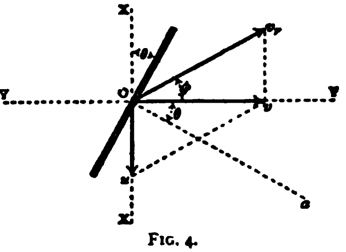

Fig. 4.

Table II.—*In 150 Working Hours.*

	I.	II.	III.	IV.	V.	VI.
Revolutions of wheel	208,000	308,000	264,000	322,000	222,000	202,000
Double strokes of pump . . .	40,000	122,000	264,000	160,000	78,000	202 000
Gallons lifted	78,000	40,000	46,000	40,000	36,000	48,000
Average effective horse-power . .	0·53	0·27	0·31	0·27	0·24	0·32

I. Goold Shapley and Muir, Ontario; wheel 16 ft. diameter, 18 vanes, 131 sq. ft. area (first prize). II. Thomas & Son (second prize). III. J. W. Titt. IV. R. Warner. V. J. W. Titt. VI. H. Sykes.

Some data given by Wolff on mills of the American type gave for the same quantity

$$W = 0{\cdot}00045v^3.$$

From some of the data of experiments by Griffiths on mills of the American type used in pumping, the effective work in pumping when the mill was working in the best conditions amounted to from $0{\cdot}0005v^3$ to $0{\cdot}0003v^3$ ft. lb per sec. per sq. ft.

In 1903 trials of wind-pumping engines were carried out at Park Royal by the Royal Agricultural Society (*Journ. Roy. Agric. Soc.* lxiv. 174). The mills were run for two months altogether, pumping against a head of 200 ft. The final results on six of the best mills are given in Table II.

A valuable paper by J. A. Griffiths (*Proc. Inst. Civ. Eng.* cxix. 321) contains details of a number of windmills of American type used for pumping and the results of a series of trials. Table III. contains an abstract of the results of his observations on six types of windmills used for pumping:—

TABLE III.

	I.		II.		III.	IV.	V.	VI.
Diameter of wheel, feet	22·3		11·5		16·0	14·2	10·2	9·8
Sail area, square feet	392		104		201	157	81	80
Weather angle, outer ends	18° 47′		43°		36°	30°	28°	50°
,, ,, inner ends	38° 20′		43°		36°	30°	28°	14°
Pitch of vanes, outer ends, feet	23·8		33·7		36·5	25·7	17·0	22·4
,, ,, inner ends, feet	20·6		13·1		13·7	8·2	6·4	7·2
Height of lift, feet	25	100	29·2	61·2	39·0	66·3	38·7	30·7
Velocity of wind at maximum efficiency, miles per hour	4·3	7·0	5·8	6·5	6·0	7·0	8·5	6·0
Ratio of velocity of tips of vanes to velocity of wind	·93	·77	·92	·82	·65	·91	·87	·73
Revolutions of mill, per minute	5·0	6·8	13·0	13·3	7·5	12·6	20·5	12·5
Actual horse-power	0·018	0·098	0·011	0·025	0·024	0·065	0·028	0·012
In 100 average hours in a calm locality—								
Quantity of water lifted, gallons per hour	495	306	153	135	259	267	115	145
In 100 average hours in a windy locality—								
Quantity of water lifted, gallons per hour	816	629	287	271	525	540	237	270

I. Toowoomba; conical sail wheel with reefing vane. II. Stover; solid sail wheel with rudder; hand control. III. Perkins; solid wheel, automatic rudder. IV. and V. Althouse; folding sail wheel, rudderless. VI. Carlyle; special type, automatic rudder.

Table IV. gives the horse-power which may be expected, according to Wolff, for an average of 8 hours per day for wheels of the American type.

Diameter of Wheel in Feet.	Velocity of Wind in Miles per Hour.	Horse-power of Mill.	Revolutions of Wheel per Minute.
8½	16	0·04	70–75
10	16	0·12	60–65
12	16	0·21	55–60
14	16	0·28	50–55
16	16	0·41	45–50
18	16	0·61	40–45
20	16	0·78	35–40
25	16	1·34	30–35

Further information will be found in Rankine, *The Steam Engine and other Prime Movers*; Weisbach, *The Mechanics of Engineering*; and Wolff, *The Windmill as a Prime Mover*. (W. C. U.)

WINDOW (properly "wind eye"), the term applied in architecture (Ital. *fenestra*, Fr. *fenêtre*, Span. *ventana*, Ger. *Fenster*) to an aperture or opening in a wall for the admission of light and air to the interior of a hall or room.

The earliest windows are those which constituted the clerestory windows of the Great Hall of Columns at Karnak; they were filled with vertical slabs of masonry pierced with narrow slits. Other Egyptian temples were lighted in the same way. In one at Der el Medinet at Thebes the window was divided by miniature columns with lotus capitals. Some of the small ivory carvings found at Nimroud by Layard, now in the British Museum, are evidently of Egyptian workmanship, as they have lotus columns forming a balustrade in the lower part of the window; and such features are shown in the Assyrian bas-reliefs as windows in the towers. Dr Arthur Evans's discoveries at Cnossus have revealed, in the eastern portion of the palace, rectangular openings which were certainly windows, with raised sills and stone benches inside, and the representations of the ordinary houses at Cnossus on a series of plaques show that they were in two or three storeys with openings in the upper storeys filled with windows framed in timber with transoms and mullions. It was at one time thought that there were no windows in Greek temples, and those of the west front of the Erechtheum are known now to be later reconstructions of the Roman period, but the remains of two windows placed on either side of the eastern doorway of the Erechtheum, which formed part of the original building of 430 B.C., have lately been found; they were rectangular windows with moulded and enriched architrave, resting on a sill and crowned with the cymatium moulding. Of later date, at Ephesus, remains of similar windows have been discovered. Of Roman windows many examples have been found, those of the Tabularium being the oldest known. A coin of Tiberius representing the temple of Concord shows features in the side wings which might be windows, but as statues are shown in them they are possibly only niches. Over the door of the Pantheon is an open bronze grating, which is thought to be the prototype of the windows which lighted the large halls of the Thermae, as it was absolutely necessary that these should be closed so as to retain the heat, the openings in the gratings being filled with glass. In some cases window openings were closed with thin slabs of marble, of which there are examples still existing in the churches of S. Martino and the Quattro Santi Incoronati at Rome. Similar slabs exist in the upper storey of the amphitheatre at Pola; it still remains, however, an open question as to the lighting of some of the temples in Rome, in which were placed all the magnificent statues from Greece, so as to enable them to be seen properly. The Pantheon was lighted by a circular opening in the dome 30 ft. in diameter; the rain therefore fell in at times, and consequently the pavement had a convex contour, there being also holes under the hypaethral opening in connexion with drains beneath the pavement. There was a window at the south end of the tepidarium of the Forum baths at Pompeii, said to have been filled with a bronze frame with glass in it, half an inch thick. Although no window frames have been found in Pompeii, the openings in the walls show that some of the rooms were lighted by windows; one of them in the house of Diomede takes the form of a bow window with three lights in it.

In the later styles the windows assume much greater importance, and in Gothic cathedrals almost govern the whole design. Already, however, in the earliest Byzantine church, Sta Sophia at Constantinople, the windows constituted one of the chief features of the church; the forty windows round the base of the cupola giving an exceptional lightness to the structure; besides, there are windows in the larger and smaller apses and in the north and south walls. The windows in the latter, which are of great size, are subdivided by marble mullions with pierced lattices between of transparent marbles.

In the later Byzantine churches the windows were of smaller dimensions, but always filled with marble screens, sometimes pierced, and the grouping of two or three under a single arch is the prevailing design.

In the Romanesque styles the windows are universally round-headed, with infinite variety of design in the mouldings and their enrichment, greater importance being sometimes given by having two or more rings of arches, the outer ones carried by small columns; this is varied in Norman work by dividing them with a shaft into two or more lights placed in shallow recesses under an arched head. Circular windows occur occasionally, as in the eastern transept of Canterbury, at Iffley church, Oxford, Barfreston and Patricksbourne in Kent. In all these early windows, which are usually small, greater light is obtained by splaying the jambs inside with a scoinson arch over them. The coupling together of two or more windows under a single arch, and the piercing of the tympanum above, led to the development of plate and rib tracery (see TRACERY); also to that of the circular or rose windows, which throughout the Romanesque and Gothic periods constituted very important features in the church, being placed high up in the west front over the porch or in the transepts; sometimes, and more particularly in French churches, they occupied the whole of the upper portion of the windows, having vertical lights under them, but the junction was never quite satisfactory.

Although the employment of tracery continued long after the classic revival, the examples generally are poor in design, and even in those that are more elaborate (as those of the period of Henry II. in the church at Le Grand Andely) the introduction of classic details in the ordinary and rose windows was of too capricious a character to make them worthy of much attention. The early Renaissance architects in France in some cases, and notably in the apsidal chapels of St Pierre at Caen (1520), seemed to feel that the stained glass was too much cut up by the tracery and mullions, and omitted them altogether, trusting to the iron stanchions and cross-bars to carry their glass, so that a return was made to the simple semicircular-headed window of Roman times, retaining only the mouldings of the late Flamboyant period for the jambs and arch-moulds. Windows of this description, however, would be out of place in domestic architecture, so that the mullion window was there retained with two or three transoms, all moulded and with square heads; in the Tudor period cusping was introduced in the upper lights and occasionally in those below, and this custom lingered for a long time in the collegiate buildings of Oxford and Cambridge and in various houses throughout England. In France, square-headed windows were almost always employed, owing to the earlier introduction there of the Renaissance style, when the decoration of the mullions, generally consisting of classic pilasters, required some kind of architrave, frieze and cornice, to render the order complete; eventually the mullion and transom disappear, and in the earlier work of the Louvre the windows are simple rectangular openings, fitted with wooden framework, and, like those in Rome, Milan and Genoa, depend for their architectural effect on the moulded classic jambs, and the lintel, frieze and small cornice over; and in cases where more importance was required, with small semicircular columns or pilasters carrying the usual entablature, with small pediments sometimes angular and sometimes semicircular, repeating in fact an ancient Roman design, of which almost the only examples known are the blank windows and niches which decorated some of the enclosure walls of the Roman thermae. In Florence and Siena the early windows of the Renaissance often had semicircular heads and were coupled together, there being two lights to the window divided by shafts, thus continuing the tradition of those of the earlier Tuscan palaces; the same treatment was followed in Venice, Verona and other towns in the north-east, where the Gothic influence of the palaces in Venice created a transition; thus the mouldings of the windows of the Vendramini and Corner Spinelli palaces follow closely those of the Ducal Palace, but the arches are semicircular instead of being either pointed or ogee in form. Another type peculiar to Venice is a lofty window with semicircular head enclosed in a rectangular panel and crowned with a small entablature and pediment.

The only new combination of the 16th century in Italy, which was largely adopted in England by Inigo Jones and his followers in the 17th and 18th centuries, is the so-called Venetian or Palladian window, the finest example of which is that found in the Sala della Ragione or the basilica at Vicenza; it is true that it was here employed by Palladio to light an open gallery, but the composition was so generally approved that it led to its constant adoption for a window of more importance than the ordinary simple rectangular form. It consists of a central light with semicircular arch over, carried on an impost consisting of a small entablature, under which, and enclosing two other lights, one on each side, are pilasters. In the library at Venice, Sansovino varied the design by substituting columns for the two inner pilasters. The Palladian window was introduced by Inigo Jones in the centre of the garden front at Wilton, by Lord Burlington in the centres of the wings of the Royal Academy, and good examples exist in Holkham House, Norfolk, by Kent, and in Worcester College, Oxford. There do not seem to be any examples in either Germany, France or Spain. Circular and oval windows, lighting a mezzanine or the upper part of a hall, are found in Italy, France and England, sometimes over ordinary rectangular windows when the main front is decorated with semi-detached columns as in Hampton Court Palace. (R. P. S.)

WINDOW CORNICE, an ornamental framework of wood or composition to which window curtains are attached by rods with rings or hooks. Cornices are often gilded and of elaborate design, but they are less fashionable in the 20th century than before it had been discovered that elaborate draperies harbour dust and microbes. Like other pieces of furniture, they have reflected taste as it passed, and many of the carefully constructed examples of the latter part of the 18th century are still in use in the rooms for which they were made. Chippendale provided a famous series still *in situ* for the gallery at Harewood House, the valances of which are, like the cornices themselves, of carved and painted wood.

WINDOW SEAT, a miniature sofa without a back, intended to fill the recess of a window. In the latter part of the 18th century, when tall narrow sash windows were almost universal, the window seat was in high favour, and was no doubt in keeping with the formalism of Georgian interiors. It differed much in decorative detail, but little in form. It stood as high from the floor as a chair; the two ends were identical, with a roll-over curve, more or less pronounced. The seats and ends were usually upholstered in rich fabrics which in many cases have remained intact. The legs followed the fashion in chairs and were square and tapered, or, somewhat later, round and reeded. Hepplewhite and the brothers Adam designed many graceful window seats, but they were produced by all the cabinet-makers of the period.

WINDOW TAX, a tax first levied in England in the year 1697 for the purpose of defraying the expenses and making up the deficiency arising from clipped and defaced coin in the recoinage of silver during the reign of William III. It was an assessed tax on the rental value of the house, levied according to the number of windows and openings on houses having more than six windows and worth more than £5 per annum. Owing to the method of assessment the tax fell with peculiar hardship on the middle classes, and to this day traces of the endeavours to lighten its burden may be seen in numerous bricked-up windows.

The revenue derived from the tax in the first year of its levy amounted to £1,200,000. The tax was increased no fewer than six times between 1747 and 1808, but was reduced in 1823. There was a strong agitation in favour of the abolition of the tax during the winter of 1850–1851, and it was accordingly repealed on the 24th of July 1851, and a tax on inhabited houses substituted. The tax contributed £1,856,000 to the imperial revenue the year before its repeal. There were in England in that year about 6000 houses having fifty windows and upwards; about 275,000 having ten windows and upwards, and about 725,000 having seven windows or less.

In France there is still a tax on doors and windows, and this forms an appreciable amount of the revenue.

WINDPIPE, the trachea (Gr. *τραχεῖα, sc. ἀρτηρία,* literally, rough artery), the air tube which leads from the larynx to the bronchi and lungs (see RESPIRATORY SYSTEM).

WINDSOR, a city and port of entry of Essex county, Ontario, Canada, on the left bank of the Detroit river, opposite the city of Detroit. Pop. (1901) 12,153. It is on the Grand Trunk, Canadian Pacific, Pere Marquette and Michigan Central railways, which connect at this point with the railways of the United States by means of large and powerful car-ferries. It is the centre of an important agricultural and fruit-growing district, in which tobacco is also produced. Salt works, flour mills, canning factories, and the manufacture of type-setting machines are the principal industries. During the season of navigation it is the centre of a large coasting trade on the Great Lakes.

WINDSOR, a township of Hartford county, Connecticut, U.S.A., on the Connecticut and Farmington rivers, adjoining the city of Hartford on the N. Pop. (1890) 2954; (1900) 3614, 596 being foreign-born; (1910) 4178. Area about 27 sq. m. It is served by the New York, New Haven & Hartford railway and by electric lines to Hartford and to Springfield, Massachusetts. Among the buildings are the Congregational Church, built in 1794 (the church itself was organized in 1630 in England), the Protestant Episcopal Church (1864) and the Roger Ludlow School. In Windsor are the Campbell School (for girls) and a public library (1888). The Loomis Institute (incorporated 1874 and 1905) for the gratuitous education of persons between 12 and 20 years of age has been heavily endowed by gifts of the Loomis family. Tobacco and market vegetables are raised in Windsor, and among its manufactures are paper, canned goods, knit and woollen goods, cigars and electrical supplies.[1]

In 1633 Captain William Holmes, of the Plymouth Colony, established near the mouth of the Farmington river a trading post, the first settlement by Englishmen in Connecticut; a more important and a permanent settlement (until 1637 called New Dorchester) was made in 1635 by immigrants from Dorchester, Massachusetts, led by the Rev. John Wareham, Roger Ludlow and others. In 1639 representatives from Windsor, with those from Wethersfield and Hartford, organized the Connecticut Colony. Among the original land-holders were Matthew Grant and Thomas Dewey, ancestors respectively of General

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[1] In the township of Windsor Locks (pop 1910, 3715), immediately north, cotton yarn and thread, silk, paper, steel and machinery are manufactured.

U. S. Grant and Admiral George Dewey; and Captain John Mason (1600–1672), the friend of Miles Standish, was one of its early citizens. It was the birthplace of Roger Wolcott, of the older Oliver Wolcott (1726–1797), of Oliver Ellsworth (whose home is now a historical museum), and of Edward Rowland Sill. Windsor has been called "The Mother of Towns"; it originally included the territory now constituting the present township, and the townships of East Windsor (1768), Ellington (1786), South Windsor (1845), Simsbury (1670), Granby (1786), East Granby (1858), Bloomfield (1835) and Windsor Locks (1854).

See H. R. Stiles, *Ancient Windsor* (2 vols., New York, 1891; revised edition).

WINDSOR (properly New Windsor), a municipal borough of Berkshire, England, and a parliamentary borough extending into Buckinghamshire. Pop. (1901) 14,130. The town, which is famous for its royal castle, lies on the west (right) bank of the Thames, 21½ m. W. of London by the Great Western railway, which serves it with a branch line from Slough. It is also the terminus of a branch of the London & South-Western railway. Here the Thames, from an easterly course, sweeps first nearly northward and then south-eastward.

Windsor Castle.

The castle lies at the north-eastern edge of the town, on a slight but commanding eminence, while the massive round tower in the centre, on its artificial mound, is conspicuous from far over the flat land to the east, north and west. The site of the castle is an irregular parallelogram measuring about 630 yds. by 180. On the west the walls enclosing the "lower ward," with the Clewer, Garter, Salisbury and Henry III. towers, overlook Thames Street and High Street, from which the "hundred steps" give access to the ward on the north, and the Henry VIII. gateway, opening from Castle Hill, on the south. This ward contains St George's Chapel in the centre, with the Albert Memorial Chapel on the east and the Horseshoe Cloisters on the west. To the north are the deanery and the canon's residences, for the foundation attached to the royal chapel has the privileges of a "royal peculiar," the dean being exempt from episcopal jurisdiction. To the south are the guard-room and the houses of the military knights, or pensioners. The round tower occupies the "middle ward"; on its flag-turret the Union Jack or the Royal Standard is hoisted according as the sovereign is absent or present. The buildings in the "upper ward," east of this, form three sides of a square; the state apartments on the north, the private apartments on the east and the visitors' apartments on the south. Along the north side of the castle extends the north terrace, commanding, from its position above a steep slope, splendid views across the river to Eton on the Buckinghamshire side, and far over the valley. The east terrace, continuing the north, overlooks the gardens in front of the private apartments, and the south terrace continues farther, as far as the George IV. gateway. The Home Park lies adjacent to the castle on the south, east and north. The Great Park extends south of Windsor, where the land, rising gently, is magnificently timbered with the remnant of the old royal forest. The village of Old Windsor (in distinction from which the name of New Windsor is given to the borough) lies by the river, south of the Home Park. To the west of Windsor itself the village of Clewer has become a suburb of the town.

As early as the time of the Heptarchy a stronghold of some importance existed at Windsor, the great mound, which is moated, circular and about 125 ft. in diameter, being a remnant of this period. William the Conqueror was attracted by the forest as a hunting preserve, and obtained the land by exchange from Westminster Abbey, to which Edward the Confessor had given it. Thereafter the castle became what it remains, the chief residence of the English sovereigns. The Conqueror replaced the primitive wooden enclosure by a stone circuit-wall, and the first complete round tower was built by Henry III. about 1272, but Edward III. wholly reconstructed it on a more massive scale, [illegible] form a meeting-place for his newly established [illegible] the Garter. He selected this spot because, [illegible] quoted by the chronicler Froissart, it [illegible] of the mound that King Arthur used to sit surrounded by his Knights of the Round Table. The bulk of the existing round tower is of Edward's time, but its walls were heightened and the tall flag-turret added by the court architect, Sir Jeffrey Wyatville, in the reign of George IV. In addition to the Round Tower, Henry III. had constructed long lines of circuit-walls, crowned at intervals with smaller towers. He also built a great hall (the present chapter library) and other apartments, together with a chapel, which was afterwards pulled down to make room for the chapel of St George. The beautiful little dean's cloister preserves a portion of Henry's work in the south wall, a contemporary portrait of the king appearing in distemper on one of the arches. Another chapel was built by him and dedicated to his favourite saint, Edward the Confessor. This graceful building, with an eastern apse, is now called the Albert Memorial Chapel; some of Henry III.'s work still exists in the lower part of its walls, but the upper part was rebuilt in 1501–1503 by Henry VII., who intended it as a burial-place for himself and his line, before he began the chapel which bears his name and contains his tomb at Westminster Abbey. Some years later the unfinished chapel was given by Henry VIII. to Cardinal Wolsey, and for long after it was known as "Wolsey's tomb-house." Wolsey engaged a Florentine sculptor named Benedetto, probably a son or nephew of Benedetto da Maiano (d. 1497), also a Florentine artist, to make him a costly tomb of marble and gilt bronze, with a recumbent effigy at the top, no doubt similar in design to Torrigiano's tomb of Henry VII. at Westminster. The rich bronze work of Wolsey's tomb was torn off and melted by order of the Commonwealth in 1642, and the metal was sold for the then large sum of £600. In 1805 the black marble sarcophagus, stripped of its bronze ornaments, was moved from Windsor and used as a monument over Nelson's grave in the crypt of St Paul's. Though Wolsey's tomb-house was roofed in and used for mass by James II., the stone vaulting was not completed until the whole chapel was fitted by Sir Gilbert Scott as a memorial to Albert, Prince Consort. Its internal walls were then lined with rich marbles, and decorated with reliefs by Baron Triqueti. The cenotaph of the Prince Consort stands before the altar, with the tombs of Prince Leopold, duke of Albany, and the duke of Clarence, the last erected by King Edward VII., who was himself buried here in May 1910. In a vault beneath the chapel George III. and members of his family are buried.

The chapel of St George is one of the finest examples of Perpendicular architecture in England, comparable with two other royal chapels, that of King's College at Cambridge and that of Henry VII. at Westminster, which are a little later in date. The building was begun by Edward IV., who in 1473 pulled down almost the whole of the earlier chapel, which had been completed and filled with stained glass by Edward III. in 1363. The nave of St George's was vaulted about the year 1490, but the choir groining was not finished till 1507; the hanging pendants from the fan vaulting of the choir mark a later development of style, which contrasts strongly with the simpler lines of the earlier nave vault. In 1516 the lantern and the rood-screen were completed, but the stalls and other fittings were not finished till after 1519. The chapel ranks next to Westminster Abbey as a royal mausoleum, though no king was buried there before Edward IV., who left directions in his will that a splendid tomb was to be erected with an effigy of himself in silver. Nothing remains of this except part of the wrought iron grille which surrounded the tomb, one of the most elaborate and skilfully wrought pieces of iron-work in the world, said to be the work of Quintin Matsys. The next sovereign buried here was Henry VIII., who directed that his body should be laid beside that of Jane Seymour, in a magnificent bronze and marble tomb. The tomb was never completed, and what existed of its metal-work was probably melted down by the Commonwealth. No trace of it remains. Charles I. was buried here without service in 1649. Above the dark oak stalls hang the historic insignia of the Knights of the Garter, their swords, helmets and banners. On the stalls themselves appear a remarkable series of enamelled brass plates commemorating knights of the order. Many tombs and memorials are seen in the chantry chapels.

The deanery, adjoining the dean's cloister, is dated 1500, but the Winchester tower to the north-east of it is the work of the famous prelate and architect William of Wykeham, who was employed by Edward III. on the greater part of this extension and alteration of Henry III.'s work. The Horseshoe cloisters were restored in Tudor style by Sir Gilbert Scott. The Norman gate on the north side of the round tower was rebuilt by Wykeham.

The site of the upper ward was built upon by Henry II., and, to a greater extent, by Edward III., but only in the foundations and lowest storey are remains of so early a period to be found. The buildings were wanting in homogeneity until their reconstruction was undertaken by Sir Jeffrey Wyatville under the direction of George IV., for Charles II. was unable to carry out a similar intention, perhaps fortunately, as Sir Christopher Wren proposed drastic alterations. Charles, however, completed the so-called Star Building, named from the representation of the star of the Order of the Garter on the north front. Here the state apartments are situated. They include the throne room, St George's Hall, where meetings of the Order of the Garter are held, the audience and presence chambers, and the grand reception room, adorned with Gobelins tapestries, and the guard-room with armour. All these chambers contain also splendid pictures and other objects of art; but more notable in this connexion are the picture gallery, the Rubens room or king's drawing-room, and the magnificent Van Dyck room. The ceilings of several of the chambers were decorated by Antonio Verrio, under the direction of Charles II. In the royal library, which is included among the private apartments, is a fine collection of drawings by the old masters, including three volumes from the hand of Leonardo da Vinci. Here is also a magnificent series of eighty-seven portraits by Holbein, highly finished in sepia and chalk, representing the chief personages of the court of Henry VIII. There are, moreover, examples by Michelangelo and Raphael, though the series attributed to these masters are not accepted as genuine in their entirety.

The parks.

South of the castle, beside the Home Park, is the Royal Mews. Within the bounds of the park is Frogmore (*q.v.*), with the Royal Mausoleum and that of the duchess of Kent, and the royal gardens. An oak-tree marks the supposed site of Herne's Oak, said to be haunted by the ghost of "Herne the hunter," a forest-ranger who hanged himself here, having fallen under the displeasure of Queen Elizabeth (Shakespeare, *Merry Wives of Windsor*, Act iv. sc. 4). A splendid avenue, the Long Walk, laid out in the time of Charles II. and William III., leads from George IV.'s gate on the south side of the castle straight into the heart of the Great Park, a distance of 3 m. Another fine and still longer straight avenue is Queen Anne's Ride, planted in 1707. Among various buildings within the park is Cumberland Lodge, built by Charles II. and taking name from the duke of Cumberland, who commanded the victorious royal troops at the battle of Culloden in 1746, and resided here as chief ranger. At the southern boundary of the park is a beautiful artificial lake called Virginia Water, formed by the duke. Windsor Forest formerly extended far over the south of Berkshire, and into the adjacent county of Surrey, and even in 1790 still covered nearly 60,000 acres. It was disafforested by an act of 1813.

Windsor town.

A few old houses remain in the town of Windsor, but the greater part is modernized. The church of St John the Baptist was rebuilt in 1822, but contains some fine examples of Grinling Gibbons's wood-carving. There are statues of Queen Victoria, unveiled in the first Jubilee year, 1887, and of Prince Albert (1890). The town hall was built in 1686 by Sir Christopher Wren, who represented the borough in parliament. The town was formerly celebrated for the number of its inns, of which there were seventy in 1650. The most famous were the "Garter" and the "White Hart," the first of which was the favourite of Shakespeare's Sir John Falstaff, and is frequently mentioned in *The Merry Wives of Windsor*. The borough is under a mayor, 6 aldermen and 18 councillors. Area, 2717 acres.

History.—Windsor (*Wyndeshour, Wyndsore, Windlesore*) was probably the site of a Roman settlement, two Roman tombs having been discovered at Tyle-Place Farm in 1865, while a Roman camp and various antiquities were unearthed at St Leonard's Hill in 1705. The early history of Windsor centres round the now unimportant village of Old Windsor, which was a royal residence under Edward the Confessor; and Robert of Gloucester relates that it was at a fair feast which the king held there in 1053 that Earl Godwin met with his tragic end. By the Confessor it was granted to Westminster Abbey, but was recovered in exchange for two other manors by William I., who erected the castle about 2 m. north-west of the village and within the manor of Clewer, round which the later important town of New Windsor was to grow up. The earliest existing charter of New Windsor is that from Edward I. in 1277, which was confirmed by Edward II. in 1315–1316 and by Edward III. in 1328. This constituted it a free borough and granted to it a gild merchant and other privileges. The same king later leased it as fee farm to the burgesses on condition that they "did justice to merchants, denizen and alien and to the poor." The town does not seem to have been prosperous, and the fee-farm rent was reduced by several succeeding sovereigns. In 1439 extensive privileges were accorded to the burgesses by Henry VI., and Edward IV. in 1467 granted a charter of incorporation under the title of the "mayor, bailiffs and burgesses." Further confirmations of existing privileges were granted by Edward IV. in 1477, by Henry VII. in 1499, by Henry VIII. in 1515 and by Edward VI. in 1549. A fresh charter was granted by James I. in 1603, and the renewal of this by Charles II. in 1664 incorporating the town under the title of the "mayor, bailiffs and burgesses of the borough of New Windsor," remained the governing charter until 1835. By the charter of Edward I. the county gaol was fixed at Windsor, but on the petition of the men of Berkshire it was removed thence to a more central town in the reign of Edward II. New Windsor sent two members to parliament from 1302 to 1335 and again from 1446 to 1865, omitting the parliaments of 1654 and 1656; by the act of 1867 it lost one member. The market is of ancient date, and in 1273 the abbess of Burnham is said to hold markets at Burnham and Beaconsfield to the prejudice of the market at Windsor. Edward IV. in 1467 granted a fair on the feast of St Edward the Confessor, and the charter of 1603 mentions a Saturday market and three yearly fairs. No fairs are now held, but the Saturday market is still maintained. Windsor bridge is mentioned in the reign of Edward I.; the present structure dates from 1822. The town has never had an important industry, but has depended almost entirely upon the castle and court.

The political history of Windsor centres round the castle, at which the Norman kings held their courts and assembled their witan. Robert Mowbray was imprisoned in its dungeons in 1095, and at the Christmas court celebrated at Windsor in 1127 David of Scotland swore allegiance to the empress Maud. In 1175 it was the scene of the ratification of the treaty of Windsor. The castle was bestowed by Richard I. on Hugh, bishop of Durham, but in the next year was treacherously seized by Prince John and only surrendered after a siege. In 1217 Ingelram de Achie with a garrison of sixty men gallantly held the fortress against a French force under the count de Nevers. It was a centre of activity in the Barons' War, and the meeting-place of the parliament summoned by Henry in 1261 in rivalry to that of the barons at St Albans; two years later, however, it surrendered to Simon de Montfort. The appeal of high treason against Thomas Mowbray, duke of Norfolk, was heard by Richard II. in Windsor Castle in 1398. During the Civil War of the 17th century the castle was garrisoned for the parliament, and in 1648 became the prison of Charles, who spent his last Christmas within its walls.

See J. E. Tighe, *Annals of Windsor* (1858); *Victoria County History: Berkshire.*

WINDTHORST, LUDWIG (1812–1891), German politician, was born on the 17th of January 1812 at Kaldenhof, a country house near Osnabrück. He sprang from a Roman Catholic family which for some generations had held important posts in the Hanoverian civil service. He was educated at the Carolinum, an endowed school at Osnabrück, and studied at the universities of Göttingen and Heidelberg. In 1836 he settled down as an advocate in Osnabrück: his abilities soon procured him a considerable practice, and he was appointed president of the Catholic Consistorium. In 1848 he received an appointment at the supreme court of appeal for the kingdom of Hanover, which sat at Celle. In the next year the revolution opened for him, as for so many of his contemporaries, the way to public life, and he was elected as representative for his native district in the second chamber of the reformed Hanoverian parliament. He belonged to what was called the Great German party, and opposed the project of reconstituting Germany under the leadership of Prussia; he defended the government against the liberal and democratic opposition; at this time he began the struggle against the secularization of schools, which continued throughout his life. In 1851 he was elected president of the chamber, and in the same year minister of justice, being the first Catholic who had held so high an office in Hanover. As minister he carried through an important judicial reform which had been prepared by his predecessor, but had to retire from office because he was opposed to the reactionary measures for restoring the influence and privileges of the nobility. Though he was always an enemy to liberalism, his natural independence of character prevented him from acquiescing in the reactionary measures of the king. In 1862 he again was appointed minister, but with others of his colleagues he resigned when the king refused his assent to a measure for extending the franchise. Windthorst took no part in the critical events of 1866; contrary to the opinion of many of his friends, after the annexation of Hanover by Prussia he accepted the *fait accompli*, took the oath of allegiance, and was elected a member both of the Prussian parliament and of the North German diet. At Berlin he found a wider field for his abilities. He acted as representative of his exiled king in the negotiations with the Prussian government concerning his private property and opposed the sequestration, thus for the first time being placed in a position of hostility to Bismarck. He was recognized as the leader of the Hanoverians and of all those who opposed the "revolution from above." He took a leading part in the formation of the party of the Centre in 1870–1871, but he did not become a member of it, fearing that his reputation as a follower of the king of Hanover would injure the party, until he was formally requested to join them by the leaders.

After the death of Hermann von Mallinckrodt (1821–1874) in 1874, Windthorst became leader of the party, and maintained that position till his death. It was chiefly owing to his skill and courage as a parliamentary debater and his tact as a leader that the party held its own and constantly increased in numbers during the great struggle with the Prussian government. He was especially exposed to the attacks of Bismarck, who attempted personally to discredit him and to separate him from the rest of the party. And he was far the ablest and most dangerous critic of Bismarck's policy. The change of policy in 1879 led to a great alteration in his position: he was reconciled to Bismarck, and even sometimes attended receptions at his house. Never, however, was his position so difficult as during the negotiations which led to a repeal of the May laws. In 1887 Bismarck appealed to the pope to use his authority to order the Centre to support the military proposals of the government. Windthorst took the responsibility of keeping the papal instructions secret from the rest of his party and of disobeying them. In a great meeting at Cologne in March 1887 he defended and justified his action, and claimed for the Centre full independence of action in all purely political questions. In the social reform he supported Bismarck, and as the undisputed leader of the largest party in the Reichstag he was able to exercise influence over the action of the government after Bismarck's retirement. His relations with the emperor William II. became very cordial, and in 1891 he achieved a great parliamentary triumph by defeating the School bill and compelling Gossler to resign. A few days afterwards he died, on the 14th of March 1891, at Berlin. He was buried in the Marienkirche in Hanover, which had been erected from the money subscribed as a testimonial to himself. His funeral was a most remarkable display of public esteem, in which nearly all the ruling princes of Germany joined, and was a striking sign of the position to which, after twenty years of incessant struggle, he had raised his party. Windthorst was undoubtedly one of the greatest of German parliamentary leaders: no one equalled him in his readiness as a debater, his defective eyesight compelling him to depend entirely upon his memory. It was his misfortune that nearly all his life was spent in opposition, and he had no opportunity of showing his abilities as an administrator. He enjoyed unbounded popularity and confidence among the German Catholics, but he was in no way an ecclesiastic: he was at first opposed to the Vatican decrees of 1870, but quickly accepted them after they had been proclaimed. He was a very agreeable companion and a thorough man of the world, singularly free from arrogance and pomposity; owing to his small stature, he was often known as "die kleine Excellenz." He married in 1839. Of his three children, two died before him; his wife survived him only a few months.

—Windthorst's *Ausgewählte Reden* were published in three volumes (Osnabrück, 1901-1902). See also J. N. Knopp, *Ludwig Windthorst: ein Lebensbild* (Dresden; 1898); and Hüsgen, *Ludwig Windthorst* (Cologne, 1907). (J. W. He.)

WINDWARD ISLANDS, a group and colony in the West Indies. They consist of the British island of St Lucia, St Vincent and Grenada, with a chain of small islands, the Grenadines, between the two latter islands. They are not a single colony, but a confederation of three separate colonies with a common governor-in-chief, who resides at St George's, Grenada. Each island retains its own institutions, and they have neither legislature, laws, revenue nor tariff in common. There is, however, a common court of appeal for the group as well as for Barbados, composed of the chief justices of the respective islands, and there is also a common audit system, while the islands unite in maintaining certain institutions of general utility. The Windward Islands, which, as a geographical division, properly include Barbados, derive their name from the fact that they are the most exposed of the Lesser Antilles to the N.E. Trade, the prevailing wind throughout the West Indies.

WINE (Lat. *vinum*, Gr. οἶνος), a term which when used in its modern sense without qualification designates the fermented product of grape juice. The fermented juices of other fruits or plants, such as the date, ginger, plum, &c., are also termed wine, but the material from which the wine is derived is in such cases also added in qualification. The present article deals solely with wine derived from the grape (see Vine).

Historical.—The art of viticulture or wine-making is a very ancient one. In the East it dates back almost as far as we have historical records of any kind. In Egypt and in Greece the introduction of wine was ascribed to gods; in Greece to Dionysus; in Egypt to Osiris. The Hebrews ascribed the art of wine-making to Noah. It is probable that the discovery that an intoxicating and pleasant beverage could be made from grape juice was purely accidental, and that it arose from observations made in connexion with crushed or bruised wild grapes, much as the manufacture of beer, or in its earliest form, mead, may be traced back to the accidental fermentation of wild honey. In ancient times the cultivation of the vine indicated a relatively settled and stable form of civilization, inasmuch as the vine requires a considerable maturation period. It is probable, therefore, that viticulture was introduced subsequent to the raising of cereal crops. The Nabataeans were forbidden to cultivate the vine, the object being to prevent any departure from their traditional nomadic habits. The earliest examples of specific wines of which we have any record are the Chalybon wine, produced near Damascus, in which the Phoenicians traded in the time of Ezekiel (xxvii. 18), and which at a later date was much appreciated by the Persian kings; and the wines from the Greek islands (Chios, Lesbos, Cos). With regard to the introduction of the vine into other parts of Europe, it appears that it was brought to Spain by the Phoenicians, and to Italy and southern Gaul from Greece. In the earliest Roman times the vine was very little cultivated in Italy, but gradually Rome and Italy generally became a great wine country. At a later date the republic sought to stimulate its home industry by prohibiting the importation of wine, and by restricting its cultivation in the colonies, thus preserving the latter as a useful market for Italian wines. According to Pliny, Spanish, Gallic and Greek wines were all consumed in Rome during the 1st century of the Christian era, but in Gaul the production of wine appears to have been limited to certain districts on the Rhone and Gironde. The cultivation of the vine in more northern parts (*i.e.* on the Seine and Moselle) was not commenced until after the death of Probus. Owing no doubt to the difficulties of transportation, wine was, in the middle ages, made in the south of England, and in parts of Germany, where it is now no longer produced (cf. Hehn, *Culturpflanzen*, &c., and Mommsen, *Römische Geschichte*, v 98 et seq.). We know very little of the ancient methods of cultivating the vine, but the Romans—no doubt owing to the luxuriant ease with which the vine grows in Italy—appear to have trained it on trees, trellis work, palisades, &c. The dwarf form of cultivation now common in northern Europe does not appear to have obtained to any extent. It seems likely that the quality of the wine produced in ancient times was scarcely comparable to that of the modern product, inasmuch as the addition of resin, salts and spices to wine was a common practice With regard to the actual making of the wine, this does not appear to have differed very much in principle from the methods obtaining at the present day. Plastering appears to have been known at an early date, and when the juice of the grapes was too thin for the production of a good wine, it was occasionally boiled down with a view to concentration. The first wine receptacles were made of skins or hides, treated with oil or resin to make them impervious. Later, earthenware vessels were employed, but the wooden cask—not to mention the glass bottle—was not generally known until a much later period.

Production.—The total wine production of the world, which, of course, fluctuates considerably from year to year, amounts to roughly 3000 million gallons. France and Italy are the chief wine-producing countries, the former generally producing rather more than the latter. During the phylloxera period Italy in some years had the greater output (*e.g.* 1886–1888 and 1890–1892). The average production of the chief wine-producing countries will be gathered from the following table:—

Wine Production. Average Annual Production in Millions of Gallons for Quinquennial Periods

Country.	Period.		
	1891–1895.	1896–1900.	1901–1905.
France	770	988	1126
Italy	674	689	840
Spain	521	412	390
Portugal	74	123	105
Austria-Hungary	113	120	178
Germany	49	64	74

The United States produces roughly 50, Bulgaria and Rumania each 40 and Servia 10 million gallons. The United Kingdom produces no wine, but the Cape and the Australian Commonwealth each produce some 5 million gallons.

The variation from year to year in the quantity of wine produced in individual countries is, of course, far greater than that observed in the case of beer or spirits. Thus, owing to purely climatic vagaries, the quantity of wine produced in Germany in 1891 was only 16 million gallons, whereas in 1896 it amounted to 111 millions. Similarly the French production, which was 587 million gallons in 1895, amounted to no less than 1482 millions in 1900. In the same way the Italian production has varied between 583 million gallons (1895) and 793 millions (1901), and the Spanish between 331 million gallons in 1896 and 656 millions in 1892.

Consumption.—It is only natural that the consumption of wine should be greatest in the countries where it is produced on the largest scale, but the discrepancy between the consumption of different countries is little short of astonishing. Thus, at the present time, the consumption per head in France is practically a hundred times that of the United Kingdom and twenty times that of Germany—the latter, it must be remembered, being itself an important wine-producing area.

The following table will give some idea of the relative consumption of wine in different countries:—

Average Consumption of Wine per Head of Population.

Country.	Period		
	1891–1895	1896–1900	1901–1905.
	Gallons.	Gallons.	Gallons.
France	23·0	28·8	30·8
Italy	20·6	20·0	25·1
Spain	21·1	16·4	18·5
Portugal	11·0	20·3	17·1
Austria-Hungary	2·9	3·2	3·9
Germany	1·19	1·38	1·45
United States	0·30	0·32	0·43
British Empire—			
United Kingdom	0·37	0·40	0·32
Australia	1·09	1·12	1·30
Cape[1]	..	..	..

[1] Has varied between 1·9 and 3·7.

The whole of the wine consumed in the United Kingdom is imported. On the average somewhat more than one-third of the wine imported is derived from France, and about a quarter from Spain and Portugal respectively.

Wines imported into the United Kingdom in 1906.

From	Nature of Wines.	Quantity.	Value.
		(Gallons).	£
France	Claret, burgundy, champagne, &c.	4,105,302	2,221,423
Portugal	Chiefly port	3,707,377[1]	1,099,727
Spain	Sherry, tarragona, &c.	2,808,751	397,840
Germany[2] Netherlands	Hock, Moselle	1,268,662	729,002
Italy	..	243,247	42,513
Total for foreign countries	..	12,356,425	4,094,672
Australia	..	622,836	100,161
Total British possessions	..	777,689	123,891

[1] The quantity of port received was exceptionally large. The average quantity is rather under 3 million gallons and the value about £850,000.

[2] A considerable proportion of the German wines come to the United Kingdom via the Netherlands.

Of the wines imported from France, about one-quarter was Champagne and Saumur the remainder consisting almost entirely of still wines, such as claret and burgundy.

VITICULTURE AND WINE-MAKING

General Considerations.—Although the wine is cultivated in practically every part of the world possessing an appropriate climate and soil, from California in the West to Persia in the East, and from Germany in the North to the Cape of Good Hope and some of the South American republics in the South, yet, as is the case also with the cereal crops and many fruits and vegetables, the wines produced in countries possessing temperate climates are—when the vintage is successful—finer than those made in hot or semi-tropical regions. Although, for instance, the wines of Italy, Greece, the Cape, &c., possess great body and strength, they cannot compare as regards elegance of flavour and bouquet with the wines of France and Germany. On the other hand, of course, the vagaries of the temperate climate of northern Europe frequently lead to a partial or complete failure of the vintage, whereas the wines produced in relatively hot countries, although they undoubtedly vary in quality from year to year, are rarely, if ever, total failures. The character of a wine depends mainly (*a*) on the nature of the soil; (*b*) on the general type of the climate; (*c*) on the variety of vine cultivated. The quality, as distinct from general character, depends almost entirely on the vintage, *i.e.* on the weather conditions preceding and during the gathering of the grapes and the subsequent fermentation Of all these factors, that of the nature of the soil on which the vine is grown is perhaps the most important The same vine, exposed to practically identical conditions of climate, will produce markedly different wines if planted in different soils. On the other hand, different varieties of the vine, provided they are otherwise not unsuitable, may, if planted in the same soil, after a time produce wines which may not differ seriously in character Thus the planting of French and German vines in other countries (*e.g.* Australia, the Cape) has not led to the production of directly comparable wines, although there may at first have been some general resemblance in character. On the other hand, the replanting of some of the French vineyards (after the ravages due to the phylloxera) with American vines, or, as was more generally the case, the grafting of the old French stock on the hardy American roots, resulted, after a time, in many cases, in the production of wines practically indistinguishable from those formerly made.

Wine-making.—The art of wine-making is, compared with the manufacture of beer or spirits, both in principle and in practice a relatively simple operation. When the grapes have attained to maturity they are collected by hand and then transferred in baskets or carts to the press house. After the stalks have been removed either by hand or by a simple apparatus the juice is expressed either—as is still the case in many quarters—by trampling under foot or by means of a simple lever or screw press or by rollers. In the case of red wines the skins are not removed, inasmuch as it is from the latter that the colour of the wine is derived. The must, as the expressed juice of the grape is termed, is now exposed to the process of fermentation, which consists essentially in the conversion of the sugar of the must into alcohol and various subsidiary products. The fermenting operations in wine-making differ radically from those obtaining in the case of beer or of spirits in that (if we except certain special cases) no yeast is added from without. Fermentation is induced spontaneously by the yeast cells which are always present in large numbers in the grape itself. The result is that—as compared with beer or spirits—the fermentation at first is relatively slow, but it rapidly increases in intensity and continues until practically the whole of the sugar is converted. In the case of the production of certain sweet wines (such as the sweet Sauternes, Port and Tokay) the fermentation only proceeds up to a certain extent. It then either stops naturally, owing to the fact that the yeast cells will not work rapidly in a liquid containing more than a certain percentage of alcohol, or it is stopped artificially either by the addition of spirit or by other means which will be referred to below. As the character of a wine depends to a considerable extent on the nature of the yeast (see **Fermentation**), many attempts have been made of late years to improve the character of inferior wines by adding to the unfermented must a pure culture of yeast derived from a superior wine. If pure yeast is added in this manner in relatively large quantities, it will tend to predominate, inasmuch as the number of yeast cells derived from the grapes is at the commencement of fermentation relatively small. In this way, by making pure cultures derived from some of the finest French and German wines it has been possible to lend something of their character to the inferior growths of, for instance, California and Australia. It is not possible, however, by this method to entirely reproduce the character of the wine from which the yeast is derived inasmuch as this depends on other factors as well, particularly the constitution of the grape juice, conditions of climate, &c. The other micro-organisms naturally present in the must which is pitched with the pure culture are not without their influence on the result. If it were possible to sterilize the must prior to pitching with pure yeast no doubt better results might be obtained, but this appears to be out of the question inasmuch as the heating of the must which sterilization involves is not a practicable operation. After the main fermentation is finished, the young wine is transferred to casks or vats. The general method followed is to fill the casks to the bung-hole and to keep them full by an occasional addition of wine. The secondary fermentation proceeds slowly and the carbonic acid formed is allowed to escape by way of the bung-hole, which in order to prevent undue access of air is kept lightly covered or is fitted with a water seal, which permits gas to pass out of the cask, but prevents any return flow of air. During this secondary fermentation the wine gradually throws down a deposit which forms a coherent crust, known as *argol* or *lees*. This consists chiefly of cream of tartar (bitartrate of potash), tartrate of lime, yeast cells and of albuminous and colouring matters. At the end of some four to five months this primary deposition is practically finished and the wine more or less bright. At this stage it receives its first *racking*. Racking consists merely in separating the bright wine from the deposit. The wine is racked into clean casks, and this operation is repeated at intervals of some months, in all three to four times. As a general rule, it is not possible by racking alone to obtain the wine in an absolutely bright condition. In order to bring this about, a further operation, namely that of *fining*, is necessary This consists, in most cases, in adding to the wine proteid matter in a finely divided state. For this purpose isinglass, gelatin or, in the case of high-class red wines, white of egg is employed. The proteid matter combines with a part of the tannin in the wine, forming an insoluble tannate, and this gradually subsides to the bottom of the cask, dragging with it the mechanically suspended matters which are the main cause of the wine's turbidity. In some cases purely mechanical means such as the use of Spanish clay or filtration are employed for fining purposes. Some wines, particularly those which lack acid or tannin, are very difficult to fine. The greatest care is necessary to ensure the cleanliness and asepticity of the casks in which wine is stored or into which it is racked. The most common method of ensuring cask cleanliness is the operation known as "sulphuring." This consists in burning a portion of a sulphur "match" (*i.e.* a flat wick which has been steeped in melted sulphur, or simply a stick of melted sulphur) in the interior of the cask. The sulphurous acid evolved destroys such micro-organisms as may be in the cask, and in addition, as it reduces the supply of oxygen, renders the wine less prone to acidulous fermentation. Sweet wines, which are liable to fret, are more highly and frequently sulphured than dry wines. After the wine has been sufficiently racked and fined, and when it has reached a certain stage of maturation—varying according to the type of wine from, as a rule, two to four years—the wine is ready for bottling. Certain wines, however, such as some of the varieties of port, are not bottled, but are kept in the wood, at any rate for a considerable number of years. Wines so preserved, however, develop an entirely different character from those placed in bottle.

Chemistry of Wine

Maturation of the Grape.—The processes which take place in the grape during its growth and maturation are of considerable interest. E. Mach has made some interesting observations on this point. At first—*i.e.* at the beginning of July when the berries have attained to an appreciable size—the specific gravity of the juice is very low; it contains very little sugar, but a good deal of acid, chiefly free tartaric acid and malic acid. The juice at this period contains an appreciable amount of tannin. As the berry grows the amount of sugar gradually increases, and the same up to a certain point applies to the acidity. The character of the acidity, however, changes, the free tartaric acid gradually disappearing, forming bitartrate of potash and being otherwise broken up. On the other hand, the free malic acid increases and the tannin decreases. When the grape is ripe, the sugar has attained to a maximum and the acidity is very much reduced; the tannin has entirely disappeared.

The following figures obtained by Mach afford an interesting illustration of these processes:—

At first the sugar in the juice consists entirely of dextrose, but later fructose (laevulose) is formed. The sugar in ripe grape juice is practically invert sugar, *i.e.* consists of practically equal parts of dextrose and fructose. The proportion of sugar present in the juice of ripe grapes varies considerably according to the type of grape, the locality and the harvest. In temperate climates it varies as a rule between 15 and 20%, but in the case of hot climates or where the grapes are treated in a special manner, it may rise as high as 35% and more.

Fermentation.—The fermentation of grape juice, *i.e.* the must, is, as we have seen, a relatively simple operation, consisting as it does in exposing it to the spontaneous action of the micro-organisms contained in it. The main products formed are, as in all cases of

Constitution of Grape Juice at Various Periods of Maturation.
(E. Mach.)

	Date of Analysis of Juice.			
	6th July.	12th Aug.	9th Sept.	12th Oct
Specific gravity .	1·010	1·029	1·083	1·093
	Per cent.	Per cent.	Per cent.	Per cent.
Sugar . . .	0·86	2·02	18·52	23·17
Total acid (as tartaric acid) .	2·66	3·46	0·87	0·71
Tartar . . .	0·67	0·55	0·54	0·55
Malic acid . .	1·16	2·47	0·55	0·42
Tannin . . .	0·106	0·012	..	..

alcoholic fermentation, ethylic alcohol, water and carbonic acid. At the same time various subsidiary products such as glycerin, succinic acid, small quantities of higher alcohols, volatile acids and compound esters are produced. In the case of red wines colouring matter is dissolved from the skins and a certain amount of mineral matter and tannin is extracted. It is to these subsidiary matters that the flavour and bouquet in wine are particularly due, at any rate in the first stages of maturation, although some of the substances originally present in the grape, such as ready formed esters, essential oils, fat and so on, also play a rôle in this regard. In view of the fact that fresh grape juice contains innumerable bacteria and moulds, in addition to the yeast cells which bring about the alcoholic fermentation, and that the means which are adopted by the brewer and the distiller for checking the action of these undesirable organisms cannot be employed by the wine-maker, it is no doubt remarkable that the natural wine yeast so seldom fails to assert a preponderating action, particularly as the number of yeast cells at the beginning of fermentation is relatively small. The fact is that the constitution of average grape juice and the temperatures of fermentation which generally prevail are particularly well suited to the life action of wine yeast, and are inimical to the development of the other organisms. When these conditions fail, as is, for instance, the case when the must is lacking in acidity, or when the weather during the fermentation period is very hot and means are not at hand to cool the must, bacterial side fermentations may, and do, often take place. The most suitable temperature for fermentation varies according to the type of wine. In the case of Rhine wines it is between 20 and 25° C. If the temperatures rise above this, the fermentation is liable to be too rapid, too much alcohol is formed at a relatively early stage, and the result is that the fermentation ceases before the whole of the sugar has been transformed. Wines which have received a check of this description during the main fermentation are very liable to bacterial troubles and frets. In the case of wines made in more southerly latitudes temperatures between 25 and 30° are not excessive, but temperatures appreciably over 30° frequently lead to mischief. The young wine immediately after the cessation of the main fermentation is very differently constituted from the must from which it was derived. The sugar, as we have seen, has disappeared, and alcohol, glycerin and other substances have been formed. At the same time the acidity is markedly reduced. This reduction of acidity is partly due to the deposition of various salts of tartaric acid, which are less soluble in a dilute alcoholic medium than in water, and partly to the action of micro-organisms. Young wines differ very widely in their composition according to class and vintage. The alcohol in naturally fermented wines may vary between 7 and 16 %, although these are not the outside limits. The acidity may vary between 0·3 and 1 % according to circumstances. The normal proportion of glycerin varies between 7 and 14 parts for every 100 parts of alcohol in the wine, but even these limits are frequently not reached or exceeded. The total solid matter or "extract," as it is called, will vary between 1·5 and 3·5 % for dry wines, and the mineral matter or ash generally amounts to about one-tenth of the "extract." The tannin in young red wines may amount to as much as 0·4 or 0·5 %, but in white wines it is much less. The amount of volatile acid should be very small, and, except in special cases, a percentage of volatile acid exceeding 0·1 to 0 15 %, according to the class of wine, will indicate that an abnormal or undesirable fermentation has taken place. As the wine matures the most noticeable feature in the first instance is the reduction in the acidity, which is mainly due to a deposition of tartar, and the disappearance of tannin and colouring matter, due to fining and the action of oxygen.

The taste and bouquet of wines in the earlier stages of their development, or within the first four or five years of the vintage, are almost entirely dependent upon constituents derived from the must, either directly or as a result of the main fermentation. In the case of dry wines, the quality which is known as "body" (palate-fulness) is mainly dependent on the solid, *i.e.* non-volatile, constituents These comprise gummy and albuminous matters, acid, salts, glycerin and other matters of which we have so far little knowledge. The apparent "body" of the wine, however, is not merely dependent upon the absolute quantity of solid—non-volatile—matters it contains, but is influenced also by the relative proportions in which the various constituents exist. For instance, a wine which under favourable conditions would seem full and round may appear harsh or rough, merely owing to the fact that it contains a small quantity of suspended tartar, the latter causing temporary hyper-acidity and apparent "greenness." It has been found by experience also that wines which are normally constituted as regards the relative proportions of their various constituents, provided that the quantities of these do not fall below certain limits, are likely to develop well, whereas wines which, although perfectly sound, show an abnormal constitution, will rarely turn out successful. The bouquet of young wines is due principally to the compound esters which exist in the juice or are formed by the primary fermentation. It was at one time thought that the quality of the bouquet was dependent upon the absolute quantity of these compound esters present, but the author and others have plainly shown that this is not the case. Among the characteristic esters present in wine is the well-known "oenanthic ether," which consists principally of ethylic pelargonate. It does not follow that a wine which shows a pretty bouquet in the primary stages will turn out well. On the contrary, it is frequently the case that the most successful wines in after years are those which at first show very little bouquet. The maturation of wine, whether it be in bottle or in cask, is an exceedingly interesting operation. The wines which remain for a long period in cask gradually lose alcohol and water by evaporation, and therefore become in time extremely concentrated as regards the solid and relatively non-volatile matters contained in them. As a rule, wines which are kept for many years in cask become very dry, and the loss of alcohol by evaporation—particularly in the case of light wines—has as a result the production of acidity by oxidation. Although these old wines may contain absolutely a very large quantity of acid, they may not appear acid to the palate inasmuch as the other constituents, particularly the glycerin and gummy matters, will have likewise increased in relative quantity to such an extent as to hide the acid flavour. In the case of maturation in bottle the most prominent features are the mellowing of the somewhat hard taste associated with new wine and the development of the secondary bouquet. The softening effect of age is due to the deposition of a part of the tartar together with a part of the tannin and some of the colouring matter. The mechanism of the development of the secondary bouquet appears to be dependent firstly on purely chemical processes, principally that of oxidation, and secondly on the life activity of certain micro-organisms. L. Pasteur filled glass tubes entirely with new wine and then sealed them up. It was found that wine so treated remained unchanged in taste and flavour for years. On the other hand, he filled some other tubes partly with wine, the remaining space being occupied by air. In this case the wine gradually matured and acquired the properties which were associated with age. Wortmann examined a number of old wines and found that in all cases in which the wine was still in good condition or of fine character a small number of living organisms (yeast cells, &c.) were still present. He also found that in the case of old wines which had frankly deteriorated, the presence of micro-organisms could not be detected. It is, however, not absolutely clear whether the improvement observed on maturation is actually due to the action of these micro-organisms. It may be that the conditions which are favourable to the improvement of the wine are also favourable to the continued existence of the micro-organisms, and that their disappearance is coincident with, and not the cause of, a wine's deterioration. It is frequently assumed that a wine is necessarily good because it is old, and that the quality of a wine increases indefinitely with age. This is, however, a very mistaken idea. There is a period in the life history of every wine at which it attains its maximum of quality. This period as a rule is short, and it then commences "to go back" or deteriorate. The age at which a wine is at its best is by no means so great as is popularly supposed. This age naturally depends upon the character of the wine and on the vintage. Highly alcoholic wines, such as port and sherry, will improve and remain good for a much longer period than relatively light wines, such as claret, champagne or Moselle. As regards the latter, indeed, it is nowadays held that it is at its best within a very short period of the vintage, and that when the characteristic slight "prickling" taste due to carbonic acid derived from the secondary fermentation has disappeared, the wine has lost its attraction for the modern palate. In the same way champagne rarely, if ever, improves after twelve to fourteen years. With regard to claret it may be said that as a general rule the wine will not improve after twenty-five to thirty years, and that after this time it will commence to deteriorate. At the same time there are exceptional cases in which claret may be found in very fine condition after a lapse of as much as forty years, but even in such cases it will be found that for every bottle that is good there may be one which is distinctly inferior.

Diseases

Diseases of the Vine.—The vine is subject to a number of diseases some of which are due to micro-organisms (moulds, bacteria), others to insect life. The most destructive of all these diseases is that of the phylloxera. The *Phylloxera vastatrix* is an insect belonging to the green fly tribe, which destroys the roots and leaves of the growing plant by forming galls and nodosities. Practically every wine-growing country has been afflicted with this disease at one time or another. The great epidemic in the French vineyards in the years 1882 to 1885 led to a reduction of the yield of about 50%. Many remedies for this disease have been suggested, including total submersion of the vineyards, the use of carbon bisulphide for spraying, and of copper salts, but there appears to be little doubt that a really serious epidemic can only be dealt with by systematic destruction of the vines, followed by replanting with resistant varieties. This, of course, naturally leads to the production of a wine somewhat different in character to that produced before the epidemic, but this difficulty may be overcome to some extent, as it was in the Bordeaux vineyards, by grafting ancient stock on the roots of new and resistant vines. *Oidium* or *mildew* is only second in importance to the phylloxera. It is caused by a species of mould which lives on the green part of the plant. The leaves shrivel, the plant ceases to grow, and the grapes that are formed also shrivel and die. The most effective cure, short of destruction and replantation, appears to be spraying with finely divided sulphur. Another evil, which is caused by unseasonable weather during and shortly after the flowering, is known as *coulure*. This causes the flowers, or at a later period the young fruit, to fall off the growing plant in large numbers.

Diseases of Wine.—These are numerous, and may be derived either directly from the vine, from an abnormal constitution of the grape juice, or to subsequent infection. Thus the disease known as *tourne* or *casse* is generally caused by the wine having been made or partly made from grapes affected by mildew. The micro-organism giving rise to this disease generally appears in the form of small jointed rods and tangled masses under the microscope. Wine which is affected by this disease loses its colour and flavour. The colour in the case of red wines is first altered from red to brown, and in bad cases disappears altogether, leaving an almost colourless solution. This disease is also caused by the wine lacking alcohol, acid and tannin, and to the presence of an excess of albuminous matters. The most common disease to which wine is subject by infection is that caused by a micro-organism termed *mycoderma-vini* (French *fleurs de vin*). This micro-organism, which resembles ordinary yeast cells in appearance, forms a pellicle on the surface of wine, particularly when the latter is exposed to the air more than it should be, and its development is favoured by lack of alcohol. The micro-organism splits up the alcohol of the wine and some of the other constituents, forming carbonic acid and water. This process indicates a very intensive form of oxidation inasmuch as no intermediary acid is formed. One of the most common diseases, namely that producing acetous fermentation, differs from the disease caused by *M. vini* in that the alcohol is transformed into acetic acid. It is caused by a micro-organism termed *Mycoderma aceti*, which occurs in wine in small groups and chaplets of round cells. It is principally due to a lack of alcohol in the wine or to lack of acidity in the must. The micro-organism which causes the disease of *bitterness* (amer) forms longish branched filaments in the wine. Hand in hand with the development of a disagreeable bitter taste there is a precipitation of colouring matter and the formation of certain disagreeable secondary constituents. This disease is generally caused by infection and is favoured by a lack of alcohol, acid and tannin. Another disease which generally occurs only in white wines is that which converts the wine into a thick stringy liquid. It is the *viscous* or *graisse* disease. As a rule this disease is due to a lack of tannin (hence its more frequent occurrence in white wines). The *mannitic* disease, which is due to high temperatures during fermentation and lack of acid in the must, is rarely of serious consequence in temperate countries. The micro-organism splits up the laevulose in the must, forming mannitol and different acids, particularly volatile acid. The wine becomes turbid and acquires a peculiarly bitter sweet taste, and if the disease goes further becomes quite undrinkable. It would appear from the researches of the author and others that the mannitol ferment is more generally present in wines than is supposed to be the case. Thus the author found in some very old and fine wines very appreciable quantities of mannitol. In these cases the mannitic fermentation had obviously not developed to any extent, and small quantities of mannitol appear to exercise no prejudicial effect on flavour.

Treatment of Diseases.—It was found by Pasteur that by heating wine out of contact with air to about 66° C. the various germs causing wine maladies could be checked in their action or destroyed. The one disadvantage of this method is that unless very carefully applied the normal development of the wine may be seriously retarded. In the case of cheap wines or of wines which are already more or less mature, this is not a matter of any great importance, but in the case of the finer wines it may be a serious consideration. Pasteurizing alone, however, will only avail in cases where the disease has not gone beyond the initial stages, inasmuch as it cannot restore colour, taste or flavour where those have already been affected. In such cases, and also in others where pasteurizing is not applicable, some direct treatment with a view to eliminating or adding constituents which are in excess or lacking is indicated. In this regard it is somewhat difficult to draw the line between that which is a [illegible] scientific method for preventing waste of good material [illegible] and simple. It appears to the author, how[illegible] methods are employed merely with a view to [illegible] and there is no intention of increasing the quantity of the wine for purposes of gain, or of giving it a fictitious appearance of quality, these operations are perfectly justifiable and may be compared to the modifications of procedure which are forced upon the brewer or distiller who has to deal with somewhat abnormal raw material. It has been found, for instance, that in the case of the mannitic disease the action of the micro-organism may be checked, or prevented altogether, by bringing the acidity of the must up to a certain level by the addition of a small quantity of tartaric acid. Again, it is well known that in the case of the viscous disease the difficulty may be overcome by the addition of a small quantity of tannin. In the same way the disease caused by the mildew organism may be counteracted by a slight addition of alcohol and tannin. One method of assisting nature in wine-making, which is, in the opinion of the author, not justifiable if the resulting product is sold as wine or in such a manner as to indicate that it is natural wine, is the process termed "gallisizing," so called from its inventor H. L. L. Gall, which has been largely practised, particularly on the Rhine. The process of Gall consists in adding sugar and water in sufficient quantity to establish the percentages of free acid and sugar which are characteristic of the best years in the must obtained in inferior years. Although there is no objection to this product from a purely hygienic point of view, it is not natural wine, and the products present in the must other than sugar and acid are by this process seriously affected. Another method of dealing with inferior must, due to J. A. C. Chaptal, consists in neutralizing excessive acid by means of powdered marble, and bringing up the sugar to normal proportions by adding appropriate amounts of this substance in a solid form. There is less objection to this process than to the former, inasmuch as it does not result in a dilution of the wine. It is scarcely necessary to say that the indiscriminate addition of alcohol and water, or of either to must or to wine, must be regarded as a reprehensible operation.

Plastering.—In some countries, particularly in Italy, Spain and Portugal, it has been and still is a common practice to add a small quantity of gypsum to the fermenting must or to dust it over the grapes prior to pressing. It is said that wines treated in this manner mature more quickly, and that they are more stable and of better colour. It certainly appears to be the case that musts which are plastered rarely suffer from abnormal fermentation, and that the wines which result very rarely turn acid. The main result of plastering is that the soluble tartrates in the wine are decomposed, forming insoluble tartrate of lime and soluble sulphate of potash. It is held that an excess of the latter is undesirable in wine, but unless the quantity appreciably exceeds two grams per litre, no reasonable objection can be raised.

Basis Wines.—Wines which are made not from fresh grape juice but from raisins or concentrated must, or similar material, are generally termed basis wines. They are prepared by adding water to the concentrated saccharine matter and subsequently pitching with wine yeast at an appropriate temperature. Frequently alcohol, tannin, glycerin, and similar wine constituents are also added. If carefully prepared there is no objection to these basis wines from a hygienic point of view, although they have not the delicate qualities and stimulating effects of natural wines; unfortunately, however, these wines have in the past been vended on a large scale in a manner calculated to deceive the consumer as to their real nature, but energetic measures, which have of late been taken in most countries affected by this trade, have done much to mitigate the evil.

WINES OF FRANCE

It may be safely said that there is no other country in which the general conditions are so favourable for the production of wine of high quality and on a large scale as is the case in France. The climate is essentially of a moderate character; the winters are rarely very cold, and the summers are seldom of the intensely hot and dry nature which is characteristic of most southerly wine countries. There are large tracts of gently undulating or relatively flat country which is, inasmuch as it ensures effective exposal of the vines to the sun, of a type particularly suited to viticulture. There is almost everywhere an efficient supply of water, and lastly the character of the soil is in many parts an ideal one for the production of wine high in quality and abundant in quantity. It may here be stated that a rich soil such as is suitable for the growth of cereal crops or vegetables is not, as a rule, an ideal one for the production of fine wines. The ideal soil for vine-growing is that which possesses a sufficiency, but not an excess, of nutriment for the plant, and which is so constituted that it will afford good drainage. The most important qualification, however, is that it should be so constituted as to preserve and store up during the relatively cold weather the heat which it has derived from the atmosphere during the summer. In this respect the famous Bordeaux or Gironde district is, perhaps, more fortunate than any other part of the world. The thrifty and methodical habits of the French peasantry, and also the system of small holdings which prevails in France, have, there is little doubt, done much to raise the French wine industry to the pre-eminent position which it holds. There is perhaps no branch of agriculture which requires more minute attention or for which a system of small holdings is more suitable than wine culture. At the present day, wine is produced in no less than 77 departments in France, the average total yield during the past ten years being roughly 1000 million gallons. This is considerably more than the average produced previous to the phylloxera period (1882–1887). The highest production on record was in the year 1875, when roughly 1840 million gallons were produced. Although France produces such enormous quantities of wine it is a remarkable fact that more wine is imported into France than is exported from that country. The average imports are in the neighbourhood of 120 million gallons, of which rather more than one-half comes from Algeria. The exports amount to roughly 40 million gallons. Of recent years (1896–1907) the only vintages which have been deficient as regards quantity are those of 1897, 1898, 1902 and 1903, but even in the most unfavourable of these years (1898) the quantity exceeded 700 million gallons. The greatest yield in this same period was in 1900, when over 1470 million gallons were produced. The number of different varieties of wines produced in France is remarkable. The red wines include the elegant and delicate (though not unstable) wines of the Gironde, and again the full, though not coarse, wines of the Burgundy district. Among the white wines we have the full sweet Sauternes, the relatively dry and elegant Graves and Chablis, and the light white wines which produce champagne and brandy.

Gironde (Bordeaux) Wines.—If France is the wine-growing country, *par excellence*, the Bordeaux district may be regarded as the heart and centre of the French wine industry. Although other parts of France produce excellent wines, the Gironde is easily first if high and stable character, elegance and delicacy, variety and quantity are considered together. The total area of the departments of the Gironde is about 2½ million acres, and roughly one-fifth of this is under the vine. It forms a tract of country some 90 m. long by 60 m. broad, in which the chief watersheds are those of the Garonne, Dordogne, and their confluent the Gironde. The soil varies very considerably in its character, and it is due to these variations that so many different types of wine are produced in this district. It generally consists of limestone, or of mixed limestone and clay, or of sand and clay, or of gravel, with here and there flint and rolled quartz. The subsoil is either of clay, of limestone, or mixed sand and clay, gravel, or of a peculiar kind of pudding stone which exists in a hard and a soft variety. It is formed of sand or fine gravel cemented by infiltrated oxide of iron. This stone is known locally under the name of *alios*. It is generally found at a depth of about 2 ft. under the better growths of the Médoc and Graves. The subsoils of some of the other districts (Côtes and St Emilion) contain much stone in the shape of flint and quartz. The finest wines of the Médoc and Graves are largely grown on a mixture of gravel, quartz and sand with a subsoil of *alios* or clay. The Gironde viticultural region is divided into six main districts, namely, Médoc, Sauternes, Graves, Côtes, Entre-deux-Mers and Palus. Although properly belonging to the Côtes, the St Emilion district is sometimes classified separately, as indeed, having regard to the excellence and variety of its wines, it has a right to be.

Médoc.—The most important subdivision of the Gironde district is that of the Médoc. It is here that the wine which is known to us as claret is produced in greatest excellence and variety. The Médoc consists of a tongue of land to the north of Bordeaux, bounded by the Garonne and Gironde on the east, and by the sea on the west and north. It is, roughly, 59 m. long by 6 to 10 m. broad. The soil varies considerably in nature, but consists mostly of gravel, quartz, limestone and sand on the surface, and of clay and *alios* beneath. The principal vines grown in the Médoc are the Cabernet-Sauvignon, which is the most important, the Gros Cabernet, the Merlot, the Carmenère, the Malbec, and the Verdot. All these produce red wines. Very little white wine is made in the Médoc proper. The method of vine cultivation is peculiar and characteristic. The vines are kept very low, and as a rule only two branches or arms, which are trained at right angles to the stem, are permitted to form. This dwarf system of culture gives the Médoc vineyards at a distance the appearance of a sea of small bushes, thereby producing an effect entirely different from, for instance, that seen on the Rhine with its high basket-shaped plants. The methods of making the wine in the Médoc are of the simplest description. The vintage generally takes place towards the end of September or the beginning of October. The grapes from which the stalks are partly or wholly (and occasionally not at all) removed are crushed by treading or some other simple method, but sometimes even this is omitted, the juice being expressed by the weight of the grapes themselves, or by the pressure caused by incipient fermentation. Presses are not used in the case of red wines until after fermentation, when they are employed in order to separate the wine from the murk. As a rule the fermentation occupies from 6 to 10 days; by this time the must has practically lost the whole of its sugar, and the young wine is drawn off and filled into hogsheads. The secondary fermentation proper is generally finished at the end of about six weeks to two months, and the first racking takes place, as a rule, in February or March. Subsequent rackings are made about June and November of the same year, but in the following years, until bottling, two rackings a year suffice.

The Médoc is divided into a number of communes (such as St Julien, Margaux, Pauillac, &c.), and in these communes are situated the different vineyards from which the actual name of the wine is derived. Unlike the products of the different vineyards of most other districts, which are purchased by the merchants and vatted to supply a general wine for commerce, the yield of the principal estates of the Médoc are kept distinct and reach the consumer as the products of a particular growth and of a particular year. This practice is almost without exception resorted to with what are known as the "classed growths" and the superior "bourgeois" wines, whilst in seasons in which the wines are of good quality it is continued down to the lower grades. This classification of the Médoc growths became necessary owing to the great variety of qualities produced and the distinct characteristic excellence of the individual vintages. There are four main classes or *crus* (literally growths, but more correctly types or qualities), namely, the "grands crus classés" or "classed growths" and the bourgeois, artisan and peasant growths. The "classed growths," which include all the most famous wines of the Médoc, are themselves subdivided into five sections or growths. This general classification, which was made by a conference of brokers in 1855 as a result of many years of observation dating back to the 18th century, is still very fairly descriptive of the average merit of the wines classified. The following is a list of the classed red wines of the Médoc (*i.e.* claret) together with the names of the communes in which they are situated.

Classed Growths of the Médoc (Claret)

First Growths.

Château Lafite, Pauillac.
,, Margaux, Margaux.
,, Latour, Pauillac.

Second Growths.

Château Mouton-Rothschild, Pauillac.
,, Rauzan-Ségla, Margaux.
,, Rauzan-Gassies, Margaux.
,, Léoville-Lascases, St Julien.
,, Léoville-Poyferré, St Julien.
,, Léoville-Barton, St Julien.
,, Durfort-Vivens, Margaux.
,, Lascombes, Margaux.
,, Gruaud-Larose-Sarget, St Julien.
,, Gruaud Larose, St Julien.
,, Brane-Cantenac, Cantenac.
,, Pichon-Longueville, Pauillac.
,, Pichon-Longueville-Lalande, Pauillac.
,, Ducru-Beaucaillou, St Julien.
Cos d'Estournel, St Estèphe.
Château Montrose, St Estèphe.

Third Growths.

Château Kirwan, Cantenac.
,, D'Issan, Cantenac.
,, Lagrange, St Julien.
,, Langoa, St Julien.
,, Giscours, Labarde.
,, Malescot, Margaux.
,, Brown Cantenac, Cantenac.
,, Palmer, Cantenac.
,, La Lagune, Ludon.
,, Desmirail, Margaux.
,, Calon-Ségur, St Estèphe.
,, Ferrière, Margaux.
,, Becker, Margaux.

Fourth Growths.

Château Saint-Pierre, St Julien.
,, Branaire-Duluc, St Julien.
,, Talbot, St Julien.
,, Duhart-Milon, Pauillac.
,, Poujet, Cantenac.
,, La Tour Carnet, St Laurent.
,, Rochet, St Estèphe.
,, Beychevelle, St Julien.
Le Prieuré, Cantenac.
Marquis de Terme, Margaux.

Fifth Growths.

Château Pontet-Canet, Pauillac.
„ Batailley, Pauillac.
Grand-Puy-Lacoste, Pauillac.
Ducasse-Grand-Puy, Pauillac.
Château Lynch-Bages, Pauillac.
„ Lynch-Moussas, Pauillac.
„ Dauzac, Labarde.
„ Mouton-d'Armailhacq, Pauillac.
„ Le Tertre, Arsac.
„ Haut-Bages, Pauillac.
„ Pédesclaux, Pauillac.
„ Belgrave, St Laurent.
„ Camensac, St Laurent.
Cos-Labory, St Estèphe.
Château Clerc-Milon, Pauillac.
„ Croizet-Bages, Pauillac.
„ Cantemerle, Macau.

The quality of the Médoc red wines (and this applies also to some of the finer growths of the other Bordeaux districts) is radically different from that of wines similar in type grown in other parts of the world. The Gironde red wines have sufficient body and alcohol to ensure stability without being heavy or fiery. At the same time, their acidity is very low and their bouquet characteristically delicate and elegant. It is to this relatively large amount of body and absence of an excess of acid and of tannin that the peculiarly soft effect of the Bordeaux wines on the palate is due. It has been said that chemistry is of little avail in determining the value of a wine, and this is undoubtedly true as regards the bouquet and flavour, but there is no gainsaying the fact that many hundreds of analyses of the wines of the Gironde have shown that they are, as a class, distinctly different in the particulars referred to from wines of the claret type produced, for instance, in Spain, Australia or the Cape. The quality of the wines naturally varies considerably with the vintage; but it is almost invariably the case that the wines of successful vintages will contain practically the same relative proportions of their various constituents, although the absolute amounts present of these constituents may differ widely. It is the author's experience also that where a wine displays some abnormality as regards one or more constituents, that although it may be sound, it is rarely a wine of the highest class. The tables below will give a fair idea of the variations which occur in the same wine as a result of different vintages, and the variations due to differences of "growth" in the same vintage. These figures are selected from among a number published by the author in the *Journal of the Institute of Brewing*, April 1907.

Analyses of Château Lafite of Different Vintages.[1]

Vintage.	Description.	Alcohol Per Cent. by Vol.	Total Acidity.	Extract (Solid Matter).	Ash.	Total Tartaric Acid.	Glycerin.	Sugar.
1865	Château Lafite	11·26	4·17	26·83	2·18	2·28	7·99	1·10
1875	„	10·31	3·67	..	..	..	7·25	..
1892	„	11·00	4·38	25·92	2·42	2·11	4·60	1·25
1896	„	11·05	3·51	26·08	2·68	1·71	8·64	1·69
1899	„	11·47	3·49	27·91	3·01	1·78	7·11	1·74
1905	„	10·75	3·02	25·34	2·42	2·42	7·52	2·12

Analyses of Different Clarets of the Same Vintage.[1]

Vintage.	Description.	Alcohol Per Cent. by Vol.	Total Acidity.	Extract (Solid Matter).	Ash.	Total Tartaric Acid.	Glycerin.	Sugar.
1900	Ch. Margaux	12·14	3·06	26·32	2·58	1·50	8·76	1·93
	Ch. Mouton-Rothschild	11·82	2·97	28·98	2·69	1·23	7·53	2·56
	Ch. Larose	12·06	3·23	29·01	2·29	1·50	8·02	3·97
	Ch. Batailley	12·14	3·15	26·54	2·39	1·48	8·45	2·27
	Ch. Palmer (Margaux)	11·73	3·19	28·64	2·72	1·52	8·23	2·27
	Ch. Smith-Haut-Lafite	13·76	3·10	27·48	2·10	1·56	7·48	2·32
	Second growth	10·91	3·32	29·44	2·84	1·75	6·99	1·72
	Bourgeois growth	12·71	3·32	29·57	2·16	1·56	9·01	2·49
	Peasant growth	11·47	3·58	20·97	1·71	2·50	7·18	1·20

[1] Results (excepting alcohol) are expressed in grams per litre, *i.e.* roughly *parts per thousand.*

The annual output of the Gironde during the last few years has been roughly 70 to 100 million gallons. In the decade 1876 to 1886 the average amount was barely 30 million gallons owing to the small yields of the years 1881 to 1885. In the years 1874 and 1875 the yield exceeded 100 million gallons. The output of the classed growths varies considerably according to the vintage, but is on the average, owing to the great care exercised in the vineyards, greater than that of the lower-grade areas. Thus within recent years the [illegible] was at a minimum in 1903 when only [illegible] of claret = 46 gallons) were produced, and at a maximum in 1907, when close on 1000 hogsheads were obtained. Similarly, the Château Margaux, which yielded 1120 hogsheads in 1900, produced 280 hogsheads in 1903. The prices of the wines also are subject to great fluctuation, but in fair years will vary, according to class and quality, from £10 to £30 per hogshead for the better growths.

The principal claret vintages of modern times have been those of 1858, 1864, 1869, 1870, 1874, 1875, 1877, 1878, 1888, 1893, 1896, 1899 and 1900, while it was thought probable that many of the wines of 1904 to 1907 inclusive would turn out well. From 1882 to 1886 inclusive, the vintages were almost total failures owing to mildew. In 1887 to 1895 a number of fair wines were produced in each year, and the first really good vintage of the post-mildew-phylloxera period was that of 1888.

Graves.

Most of the wines grown on a purely gravelly soil are termed "Graves," but there is a specific district of Graves which lies south of Bordeaux and west of the river, and extends as far as Langon. The soil is almost a pure sandy gravel with a subsoil of varied nature, but principally *alios*, gravel, clay or sand. This district produces both red and white wines. The vines, the methods of viticulture and vinification as regards the red wines of the Graves district, are similar to those of the Médoc. The wines are, if anything, slightly fuller in body and more alcoholic than those of the latter region. They possess a characteristic flavour which differentiates them somewhat sharply from the Médoc wines. The Graves contains one vineyard, namely Château Haut-Brion, which ranks in quality together with the three first growths of the Médoc. The remainder of the red Graves are not classified, but among the more important wines may be mentioned the following: in the commune of Pessac, Château La Mission and Château Pape-Clément; in the commune of Villenave D'Ornon, Château La Ferrade; in Léognan, Château Haut-Bailly, Château Haut-Brion-Larrivet and Château Branon-Licterie; in Martillac, Château Smith-Haut-Lafite.

Sauternes.

The district of Sauternes produces the finest white wines of the Gironde, one might say of the whole of France. Whereas the white wines of the Graves are on the whole fairly dry and light in character, the white wines of Sauternes are full and sweet, with a very fine characteristic bouquet. The district of Sauternes covers the communes of Sauternes, Bommes and a part of Barsac, Preignac, Fargues and St Pierre-de-Mons. The general configuration of the country is markedly different from that of the Médoc, consisting of a series of low hills rising easily from the river. The soil consists chiefly of mixed clay and gravel, or clay and limestone, and the vines chiefly used are the Sauvignon, the Semillon and the Muscatelle. The wines are made entirely from white grapes, and the methods of collecting the latter, and of working them up into wine, are entirely different from those prevalent in the red wine districts. The grapes are allowed to remain on the vines some three to four weeks longer than is the case in the Médoc, and the result is that they shrivel up and become over-ripe, and so contain relatively little water and a very large quantity of sugar. This alone, however, does not account for the peculiar character of the Sauternes, for during the latter period of ripening a specific micro-organism termed *Botrytis cinerea* develops on the grape, causing a peculiar condition termed *pourriture noble* (German *Edelfäule*), which appears to be responsible for the remarkable bouquet observed in the wines. When the grapes have attained the proper degree of ripeness, or rather over-ripeness, they are gathered with the greatest care, the berries being frequently cut off from the branches singly, and sorted according to their appearance. The grapes are then not crushed, but are immediately pressed, and the juice alone is subjected to fermentation. As a rule, three wines are made in the principal vineyards in three successive periods. The first wine, which is termed the *vin de tête*, is generally the sweetest and finest, the next (called the *milieu*) being somewhat drier and the last (*vin de queue*) being the least valuable. For some markets these wines are shipped separately, for others they are blended according to the prevalent taste. The musts from which the Sauternes wines are made are so concentrated that only a part of the sugar is transformed into alcohol, an appreciable portion remaining unfermented. These wines, therefore, require very careful handling in order to prevent undesirable secondary fermentations taking place at a later period. They are subjected to frequent racking, the casks into which they are racked being more highly sulphured than is the case with red wines. This is necessary, not only to prevent fermentation recommencing, but also in order to preserve the light golden colour of the wine, which, if brought into contact with an excess of air, rapidly assumes an unsightly brown shade.

The Sauternes generally are full-bodied wines, very luscious and yet delicate; they possess a special *sève*, or, in other words, that special taste which, while it remains in the mouth, leaves the palate perfectly fresh. The finer growths of the Sauternes are classified in much the same way as the red wines of the Médoc. There are two main growths, the wines being as follows:—

Classification of Sauternes

Grand First Growth.

Château Yquem, Sauternes.

First Growths.

Château La Tour Blanche, Bommes.
,, Peyraguey, Bommes.
,, Vigneau, Bommes.
,, Suduiraud, Preignac.
,, Coutet, Barsac.
,, Climens, Barsac.
,, Bayle (Guiraud), Sauternes.
,, Rieussec, Fargues.
,, Rabaud, Bommes.

Second Growths.

Château Mirat, Barsac.
,, Doisy, Barsac.
,, Peyxotto, Bommes.
,, d'Arche, Sauternes.
,, Filhot, Sauternes.
,, Broustet-Nérac, Barsac.
,, Caillou, Barsac.
,, Suau, Barsac.
,, Malle, Preignac.
,, Romer, Preignac.
,, Lamothe, Sauternes.

The production of the Sauternes vineyards is, as a rule, smaller than that of the chief red growths, and in consequence of this, and that the district is a relatively small one, the prices of the finer growths are often very high.

St Emilion.

The Côtes district consists of the slopes rising from the lower marshy regions to the east of the Garonne and the Dordogne respectively. The best of the Côtes wines are grown in the St Emilion region. This region consists of the commune of St Emilion, together with the four surrounding communes. It produces wines of a decidedly bigger type than those of the Médoc, and is frequently called the Burgundy of the Bordeaux district. The classification of the St Emilion wines is very complicated, but in principle is similar to that of the Médoc wines. Among the better known wines of the first growths are the following: Château Ausone, Château Belair, Château Clos Fourtet, Château Pavie, Château Coutet, Château Cheval-Blanc, Château Figeac. The Château Ausone is of peculiar interest, inasmuch as it is here that the poet Ausonius possessed a magnificent villa and cultivated a vineyard (A.D. 300).

Palus and Entre-deux-Mers.—The above wines are grown in the marshy regions in the immediate neighbourhood of the Garonne and Dordogne. They produce useful but rather rough wines. The Entre-deux-Mers district forms a peninsula between the Garonne and Dordogne, comprising the arrondissements of La Réole, the south of Libourne and the east of Bordeaux. This district produces both red and white wines, but their character is not comparable to that of the Médoc or of the Côtes. They are generally employed for local consumption and blending.

Champagne.

The sparkling wine known to us as champagne takes its name from the former province which is now replaced by the departments of Marne, Haute-Marne, Aube and Ardennes. The best wines, however, are grown almost exclusively in the Marne district. The cultivation of the vine in the Champagne is of very ancient date. It appears that both red and white wines were produced there in the reign of the Roman emperor, Probus (in the 3rd century A.D.), and according to Victor Rendu the *queue* of wine was already worth 19 livres in the time of Francis II., and had, in 1694, attained to the value of 1000 livres. It was at about the latter date that sparkling or effervescent wine was first made, for, according to M. Perrier, a publication of the year 1718 refers to the fact that wine of this description had then been known for some twenty years. The actual discovery of this type of wine is ascribed to Dom Pérignon, a monk who managed the cellars of the abbey of Haut Villers from 1670 to 1715. It appears also that it was this same Dom Pérignon who first used cork as a material for closing wine bottles. Up till then such primitive means as pads of hemp or cloth steeped in oil had been employed. It is very likely that the discovery of the utility of cork for stoppering led to the invention of effervescent wine, the most plausible explanation being that Dom Pérignon closed some bottles filled with partially fermented wine, with the new material, and on opening them later observed the effects produced by the confined carbonic acid gas. The art of making the wine was kept secret for some time, and many mysterious fables were circulated concerning it; *inter alia* it was believed that the Evil One had a hand in its manufacture. It does not appear, however, to have become popular or consumed on a large scale until the end of the 18th century.

The district producing the finest champagne is divided into two distinct regions, popularly known as the *river* and the *mountain* respectively. The former consists of the vineyards situated on or in the neighbourhood of the banks of the Marne. The principal vineyards in the valley, on the right bank of the river, are those at Ay, Dizy, Hautvillers and Mareuil; on the left bank, on the slopes of Epernay and parallel with the river, those at Pierry and Moussy; in the district towards the south-east, on the slopes of Avize, those of Avize, Cramant, Vertus and Mesnil. The chief vineyards in the "mountain" district are at Versy, Verzenay, Sillery, Rilly and Bouzy.

The soil in the champagne district consists on the slopes largely of chalk and in the plain of alluvial soil. It is interspersed with some clay and sand. The chief red vines of the champagne district are the Plant-doré, Franc-Pineau and the Plant vert doré. The Plant gris, or Meunier, yields grapes of a somewhat inferior quality. The chief white vine is the Pineau, also known as Chardonay. The best qualities of wine are made almost exclusively from the black grapes. For this reason it is necessary that the process of collection, separation and pressing should proceed as quickly as possible at vintage time in order that the juice may not, through incipient fermentation, dissolve any of the colouring matter from the skins. For the same reason the grapes are collected in baskets in order to avoid excessive pressure, and are transported in these to the press house. As there is no preliminary crushing, the presses used for extracting the juice have to be of a powerful character. As a rule, three qualities of wine are made from one batch of grapes, the first pressing yielding the best quality, whilst the second and third are relatively inferior. After the must has been allowed to rest for some hours in order to effect a partial clearing, it is drawn off into barrels and fermented in the latter. The first racking and fining takes place about December. The wine is allowed to rest for a further short period, and if not bright is again racked and fined. It is then ready for bottling, but previous to this operation it is necessary to ascertain whether the wine contains sufficient remanent sugar to develop the "gas" necessary for effervescence. If this is not the case, sugar is added, generally in the form of fine cane or candied sugar. The bottles employed have to be of very fine quality, as the pressure which they have to stand may be as much as 7 to 8 atmospheres or more. Formerly the loss through breakage was very great, but the art of making and selecting these bottles has greatly improved, and the loss now amounts to little more than 5%, whereas formerly 25% and even 30% was not an uncommon figure. In the spring-time, shortly after bottling, the rise in temperature produces a secondary fermentation, and this converts the sugar into alcohol and carbonic acid. This fermentation proceeds throughout the summer months, and in the meantime a sediment which adheres to the side of the bottle is gradually formed. The bottles, which up till now have been in a horizontal position, are then, in order to prepare them for the next process, namely, that known as disgorging, placed in a slanting position, neck downwards, and are daily shaken very slightly, so that by degrees the sediment works its way on to the cork. This process, which takes several weeks, is a very delicate one, and requires much skill on the part of the workman. When the whole of the sediment is on the cork, the iron clip, with which the latter is kept in position, is removed for a moment, and the force of the wine ejects the sediment and cork simultaneously. This operation also requires much skill in order to avoid an excessive escape of wine. An ingenious modification has of modern times been introduced, which consists in freezing part of the contents of the neck of the bottle. The cork may then be withdrawn and the sediment removed without any wine being lost.

After the sediment has been removed the wine is subjected to *dosage*, or liqueuring. It is by this process that the degree of sweetness required to suit the particular class of wine being made is attained. For wines exported to England very little liqueur is employed; in the case of some wines, known as *Brut* or *Nature*, none at all is added. Wines intended for consumption in France receive a moderate quantity of liqueur, but those for the Russian and South American markets, where very sweet wines are liked, receive more. This liqueur is made of fine wine, brandy and candied sugar. The liqueuring is nowadays generally carried out by means of a machine which regulates the quantity to a nicety. Champagne is not, as is the case, for instance, with the classified growths of the Gironde, the product of a single vineyard. The bulk of the wine is made in vineyards belonging to small peasant proprietors, who sell their produce to the great mercantile houses. The latter blend the wines received from the various proprietors, and the chief aim in this blending is to maintain the character of the wine which is sold under a particular trade mark or brand. Similarly, it has been said that, strictly speaking, there is no such thing as vintage champagne, for it is almost invariably the practice, in order to maintain the general character of a specific brand, to blend the new wines with some old wine or wines which have been vatted for this particular purpose. These vattings, and indeed all blendings of any particular batch of wines, are termed *cuvées*. The vintage date, therefore, which is borne by "vintage champagne," refers rather to the date of vintage prior to bottling than to the age of the wine, although the main bulk of the wine of a certain "vintage" will actually have been made in the year indicated. It is not unusual in the case of champagne to add some sugar to the must in the years in which the latter is deficient in this regard. No legitimate objection can be raised to this practice inasmuch as champagne in any case must be regarded in the light of a manufactured article rather than as a natural product. The principal centres of the champagne trade are at Reims, Epernay, Ay and Avize. The total output of the Marne district has for the past three years averaged about 9 million gallons, but it occasionally runs as high as 20 million gallons. A great part of this wine, however, is not suitable for making high-class champagne. As a rule, the supply considerably exceeds the demand, and the stock in hand at the present time amounts to roughly four years' consumption of finished wine, but to this must be added the stock existing in cask, which is considerable. For the period 1906–1907 the total number of bottles in stock amounted to over 121 millions, the bottles exported to over 23 millions, and the bottles required for internal commerce in France to something over 10 millions. There is, thus, at the present a total annual consumption of rather over 30 millions of bottles. The chief trade in champagne is with the United Kingdom, to which the finest varieties are exported. In the year 1906, 1,161,339 gallons of champagne, to the value of £1,679,611, were imported into the United Kingdom. The general composition of high-class champagnes, as supplied to the English market, will be gathered from the preceding table, which is taken from a large number of analyses published by the author and a collaborator in the *Analyst* for January 1900.

*Analyses of Champagne.**

No.	Description of Wine.	Vintage.	Alcohol per cent. by vol.	Total Acid.	Extract.	Ash.	Total Tartaric Acid.	Sugar (as invert Sugar).	Glycerin.	Carbonic Acid.
1	Champagne nature	1892	14·01	5·22	20·95	1·17	2·20	3·36	7·55	8·27
2	Brut	1892	12·57	3·23	19·78	2·53	2·76	1·32	7·64	7·79
3	Dry	1892	13·50	5·99	27·07	1·16	2·10	9·20	9·10	9·55
4	Extra sec	1893	13·53	5·01	22·95	1·10	2·18	7·84	6·50	8·12
5	Extra dry	1893	12·56	5·43	23·18	1·13	2·49	7·23	8·18	7·75
6	Dry	1893	14·44	4·80	30·33	1·05	2·04	13·86	9·05	..

* Results, excepting alcohol, are in grams per litre.

It will be seen that, compared with the dry, light red wines, the proportion of sugar, alcohol and acidity is comparatively high in champagne, and the extract (solid matter) rather low.

Saumur.

The fruitful departments watered by the Loire and its tributaries produce considerable quantities of wine. The white growths of the Loire have been known for many centuries, but up to 1834 were used only as still wines. At that date, however, it was found that the wines of Saumur (situated in the department of the Maine-et-Loire) could be successfully converted into sparkling wines, and since then a considerable trade in this class of wine has developed. At first it was chiefly used for blending with the wines of the Champagne when the vintage in this district was insufficient, but at the present time it is largely sold under its own name. The imports of sparkling Saumur into the United Kingdom in 1906 amounted to 114,234 gallons, valued at £73,984. Although the average wholesale value of Saumur is considerably less than that of champagne, it compares favourably with the lower grades of that article, and in flavour and character is similar to the latter. The successful evolution of the Saumur sparkling wine industry is largely due to the fact that the range of limestone hills, at the foot of which the town is situated, afford by excavation illimitable cellarage, easy of access and of remarkably even temperature, at a very small cost. The method of manufacture is similar to that followed in the Champagne.

Burgundy.

In the east of France, not far from the Jura, lies the oldest viticultural district of Europe, namely that of Burgundy. It is still so called, after the old French provinces, Upper and Lower Burgundy. It comprises the departments of the Yonne on the north-west, the Côte d'Or in the centre, and the Saône-et-Loire on the south. In the Yonne are made chiefly the white wines known to us as Chablis; in the Saône-et-Loire are made the red and white wines of Mâcon, and there is also, stretching into the department of the Rhône, the district producing the Beaujolais wines. The most important wines, however, the Burgundy wines proper, are made in the centre of this region on the range of low hills running north-east by south-west called the Côte d'Or, or the golden slope. The soil of the Côte d'Or is chiefly limestone, with a little clay and sand. The vineyards producing the best wines are situated about half-way up the slopes, those at the top producing somewhat inferior, and those at the foot and in the plain ordinary growths. Practically all the best vineyards (which are grown on flat terraces on the slopes, and not on the slopes themselves) face south-west and so get the full benefit of the sun's rays. The most important vine—in fact on the slopes of the Côte d'Or practically the only vine—is the Pineau or Noirien, but in the plain and in the districts of Mâcon and Beaujolais the Gamay is much cultivated. The influence of the soil on one and the same vine is interestingly illustrated by the different character of the vines grown in those districts, the Beaujolais wines having far greater distinction than those of Mâcon. The commune of Beaune must be regarded as the centre of the Burgundy district, and possesses numerous vineyards of the highest class. To the north of Beaune lie the famous vineyards of Chambertin, Clos Vougeot, Romanée, Richebourg, Nuits St Georges and Corton; to the south those of Pommard, Volnay, Monthélie and Meursault with its famous white wines.

The vinification of the Burgundy wines takes place in cuves of 500 to 2000 gallons capacity, and it has for very many years been the common practice in vintages in which the must is deficient in saccharine to ensure the stability of the wine by the addition of some sugar in the *cuve*. The first rackings generally take place in February or March, and the second in July. The practice of sugaring has ensured greater stability and keeping power to the wines, which formerly were frequently irregular in character and difficult to preserve.

There is no official classification of the Burgundy wines, but the following is a list comprising some of the finest growths in geographical order, from north to south, together with the localities in or near which they are situated.

1. *Red Wines.*

Locality.	Growth.
Fixey	Les Arvelets.
Fixin	Clos de la Perrière.
Chambertin	Chambertin, Clos de Bize, Clos St Jacques.
Morey	Clos de Tart, Les Bonnes Mares, Les Larrets.
Chambolle	Les Musigny.
Vougeot	Clos de Vougeot.
Flagey	Les Grandes Eschezeaux.
Vosne	Romanée-Conti, Les Richebourgs, La Tache, Romanée la Tache.
Nuits	Les Saint-Georges, Les Vaucrains, Les Porrets, Les Pruliers, Les Boudots, Les Thorey.
Aloxe	Le Corton, Le Clos-du-Roi-Corton.
Savigny	Les Vergelesses.
Beaune	Les Fèves, Les Grèves, Le Clos de la Mousse.
Pommard	Les Arvelets, Les Rugiens.
Volnay	Les Caillerets, Les Champans.
Santenay	Les Santenots, Le Clos-Tavannes.

2. *White Wines.*

Meursault	Les Perrières, Les Genevrières.
Puligny	Montrachet, Les Chevaliers-Montrachet, Le Batard Montrachet.

An interesting feature of the Côte d'Or is the Hospice de Beaune, a celebrated charitable institution and hospital, the revenues of which are principally derived from certain vineyards in Beaune, Corton, Volnay and Pommard. The wines of these vineyards are sold every year by auction early in November, and the prices they make serve as standards for the valuation of the other growths.

Hermitage.

To the south of Lyons, in the department of the Drôme, are made in the district of Valence the celebrated Hermitage red and white wines. The quality of some of these, particularly of the sweet white wines, is considered very fine. The quantity produced is very small. The red wines made at the present time are after the style of Burgundy and possess good keeping qualities.

Midi.

If we except the wines of Roussillon, produced in the old province of that name, in the extreme south of France, the above constitute the principal varieties of French wines known in the United Kingdom. They form, however, but a small fraction of the entire production of the country. The most prolific viticultural district of France is that known as the Midi, comprising the four departments of the Herault, Aude, Gard, and the Pyrenées-Orientales. Thus in 1901 the department of the Herault alone produced nearly 300 million gallons of wine, or approximately a quarter of the whole output of France. The average amount of wine made in the four departments for the past three years has been roughly 500 million gallons. These wines formerly were largely exported as *vin de cargaison* to South America, the United States, Australia, &c., and were also much employed for local consumption in other parts of France. Owing, however, to the fact that viticulture has made much progress in South America, in California, in Australia and particularly in Algeria, and also to the fact that the quality of these Midi wines has fallen off considerably since the phylloxera period, the outlet for them has become much reduced. These and other reasons, notably the manufacture of much fictitious wine with the aid of sugar (fortunately stopped by the rigid new wine laws), led to the grave wine crisis, which almost amounted to a revolution in the Midi in the spring and summer of 1907.

Algeria.

Viticulture has made great strides in Algeria during recent years. The first impetus to this department was given by the destruction or crippling of many of the French vineyards during the phylloxera period. The present output amounts to roughly 150 million gallons, and the acreage under the vine has increased from 107,048 hectares in 1890 to 167,657 hectares in 1905. The wines, moreover, of Algeria are on the whole of decidedly fair quality, possessing body and strength and also stability. In this regard they are superior to the wines of the Midi.

WINES OF SPAIN

The wines of Spain may be regarded as second in importance to those of France. Although the quantity produced is not so large as in Italy, the quality on the whole is decidedly superior to that of the latter country. There are three main types of wine with which consumers in the United Kingdom are familiar, namely Sherry, Tarragona (Spanish Port or Spanish Red) and wines of a claret type. The trade with the United Kingdom is of considerable proportions, the total quantity of Spanish wines imported in 1906 amounting to 1,689,049 gallons of red wine (to the value of £154,963), and white wines to the extent of 1,119,702 gallons (to the value of £242,877).

Sherry.

The most important wine produced in the province of Andalusia, which is the chief vine-growing district of Spain, is that known to us as sherry, so called from the town of Jerez de la Frontera, which is the centre of the industry. Sherry is produced in a small district bounded by San Lucar in the north-east, Jerez in the east and Port St Mary on the south. The total viticultural area amounts to about 20,000 acres. The soil is of very varying nature, and consists in some districts of the so-called *albariza* (mainly chalk with some sand and clay), in others of *barros*, which is mainly sand cemented together with chalk and clay, and of *arenas*, which consists of nearly pure sand. Most of the vineyards in the Jerez district are upon *albariza* soil, those to the north and north-east are mainly of *barros*, and those close to the seashore of *arenas*. The dominating vine is the *Palomino*, which produces *amontillados* and *finos*. Other important vines are the *Perruno* and the *Mantua Castellano*. There is also a variety of Pedro-Ximenes, which, however, is not used for making ordinary wine, but for the purpose of preparing the so-called dulce, a very sweet must or wine, made from over-ripe grapes, which, after fortification with spirit, is employed for sweetening other wines. The process of vinification is comparatively simple. The grapes are, after gathering, dusted over with plaster of Paris, and then crushed by treading in a shallow rectangular vessel termed the *lagar*. The juice, which is so obtained together with that which results from the pressing of the murk, is fermented in much the same manner as is customary in other countries. There are two main types of sherry known in the United Kingdom, namely, those of the *amontillado* and those of the *manzanilla* classes. The former are generally sweet and full-bodied, the latter light and dry. The *manzanillas* are mostly shipped in the natural state, except for the addition of a small quantity of spirit. The *amontillados* may be again divided into the *finos* and the *olorosos* the former being the more delicate. These distinctions are not of a hard and fast character, for they frequently merely represent different developments of the same wine. Thus, according to Thudicum, the regular heavy sherry from *albarisa* soil remains immature for a number of years and then becomes a *fino*. After five to eight years it may become an *amontillado*, and if it is left in cask and allowed to develop, it will, after it attains an age of nine to fourteen years, become an *oloroso*, and still later it may become a *secco*. In Jerez itself a different classification, namely that according to quality and not age, exists, which, however, is only employed locally. Thus the term *palma* is applied to fine dry wines when in their second or third years. These may be *amontillados*, but according to some they never become *olorosos*. Then there are varieties known as double and treble *palma*, and single, double and treble *palo*, the latter being the finest form of *oloroso*. Then there is the quality of wine termed *raya*. This is dry and sound, and forms a great part of the sherry exported to the United Kingdom. The sweetness of the sweet sherries is partly due to an inherent property of the wine (apart from any sugar they may contain) and partly to natural or added sugar. In some cases the fermentation of the must is stopped by the addition of spirit before the whole of the saccharine is converted, and the wines so prepared retain a proportion of the sugar naturally present in the must. In other cases dry wines are prepared and sugar is added to them in the form of *dulce* (see above). In order to prevent refermentation it is then necessary to fortify these wines with spirit. The standard of colour required for certain quantities is maintained by the addition of *color*. The latter is made by boiling wine down until it attains the consistency of a liqueur. The great bulk of sherry shipped to the United Kingdom is blended. The system of blending sherry in some respects recalls that of the blending of Scotch whiskies. Wines of the same type are stored in vats or *soleras*, and the contents of the *soleras* are kept as far as possible up to a particular style of colour, flavour and sweetness. Prior to shipment the contents of various *soleras* are blended according to the nature of the article required.

In addition to the wines described above, there are others of a similar nature grown in the vicinity, such as *montilla* (made in Cordova) and *moguer* (produced on the right bank of the Guadalquivir).

The bulk of the sherry imported into the United Kingdom still consists of the heavier, fortified wines, varying in strength from 17 to 21 % of absolute alcohol, although the fiscal change introduced in 1886, whereby wines not exceeding 30° proof (*i.e.* about 17 % of alcohol) were admitted at a duty of 1s. 3d., as against 3s. for heavier wines, naturally tended to promote the shipment of the lighter dry varieties. In this connexion it is interesting to note that the importation of sherry into the United Kingdom on a considerable scale commenced in the 15th century, and that the wine shipped at that time was of the dry variety. It seems possible that sherry was the first wine known as *sack* in this country, but it is at least doubtful whether this word is, as some contend, derived from *seck* or *sec*, *i.e.* dry. According to Morewood it is more likely to have come from the Japanese *Saké* or *Sacki* (see SAKÉ), derived in its turn from the name of the city of Osaka.

Chemically the sweet sherry differs from the natural dry light wines in that it contains relatively high proportions of alcohol, extractives, sugar and sulphates, and small quantities of acid and glycerin. This is well illustrated by the following analysis:—

Analysis of Sherry (*Fresenius*).

Alcohol per cent by vol.	Grams per Litre.					
	Extract.	Total Acid.	Ash.	Glycerin.	Sugar.	Sulphates.
19·94	48·9	3·3	4·2	4·3	30·2	3·75

Malaga.

Malaga is a sweet wine (produced in the province of that name) which is little known in England, but enjoys considerable favour on the Continent. It is generally, as exported, a blend made from *vino dulce* and *vino secco*, together with varying quantities of *vino maestro*, *vino tierno*, *arope* and *color*. The *vino dulce* and *vino secco* are both made as a rule from the Pedro Jimenez (white) grape, the former in much the same way as the *dulce* which is employed in the sherry industry, the latter by permitting fermentation to take its normal course. The *vino maestro* consists of must which has only fermented to a slight degree and which has been "killed" by the addition of about 17 % of alcohol. The *vino tierno* is made by mashing raisins (6 parts) with water (2 parts) pressing, and then adding alcohol (1 part) to the must. *Arope* is obtained by concentrating *vino dulce* to one-third, and *color* by concentrating the *arope* over a naked fire. Malaga is therefore an interesting example of a composite wine. Besides the sweet variety, a coarse dry wine is also made, but this is little known abroad.

Another well-known wine district in the south of Spain is that of Rota, where a sweet red wine, known in England as *tent* (tinto), chiefly used for ecclesiastical purposes, is produced.

Wines of the Centre and North.—While the most important Spanish wines are those grown in the southern province of Andalusia, the central and northern districts also produce wine in considerable quantity, and much of this is of very fair quality. Thus in the central district of Val de Peñas and in the Rioja region (situated between Old Castile and Navarre) in the north-east are produced red wines which in regard to vinosity, body and in some other respects resemble the heavier clarets or burgundies of France—although not possessing the delicacy and elegance of the latter. They are shipped in some quantity to the United Kingdom as Spanish "claret" or Spanish "burgundy." The most important industry, outside the southern districts, is, however, that in Catalonia, where, in the neighbourhood of the town of that name, the wine known as Tarragona or Spanish "port" is produced. The finest Tarragona (which much resembles port) is made in the Priorato region, about 15 m. inland.

WINES OF PORTUGAL

In the north-east of Portugal, not far from the town of Oporto—from which it takes its name and whence it is exported—is produced the wine, unique in its full-bodied and generous character, known as port.

Port.

Port is grown in the Alto Douro district, a rugged tract of land some 30 to 40 m. long by 10 m. wide, which commences at a point on the river Douro some 60 m. above Oporto. The character of the Alto Douro is extremely mountainous and rugged. J. L. W. Thudichum, in his *Treatise on Wines*, gives a striking and almost poetical description of it as compared with Jerez. He says: "The vineyards of Jerez are so beautiful and productive that they might well be termed the vineyards of Venus. Undulating hills, easily accessible from all sides, are covered with a luxurious growth of vines. . . . Very different is the aspect of the Alto Douro. Here all is rock, gorge, almost inaccessible mountain, precipice and torrent, while over or along all these rude features of nature are drawn countless lines of stone walls by which man makes or supports the soil in which the vines find their subsistence. . . . I thought that if Jerez was the vineyard of Venus, this Alto Douro vineyard must be termed the vineyard of Hercules." The vineyards are, in fact, situated on artificially made terraces, supported by walls on the mountain sides. If this were not the case the heavy winter rains would wash away the soil. The climate of the Alto Douro is very variable. Intense heat in summer is followed by severe cold in winter. The soil is a peculiar clay-schist, on or alternating with granite, and it is to the peculiar conditions of climate and soil that port owes its remarkable qualities of colour, body and high flavour. There appears to be no predominant and distinct type of vine, such as is the case in other viticultural districts, but a number of varieties, mostly yielding grapes of a medium size are common to the Douro vineyards. The method of cultivation is generally that of a rational low culture, and in this respect differs from that employed in other parts of the country, where the vines are either trained on trees or over trellis-work at some height from the ground.

Vinification.—The process of converting the Alto Douro grapes into wine differs in some material particulars from those employed elsewhere. The grapes are cut and then conveyed in baskets by the Gallegos (as the labourers who come specially from Galicia in Spain for this purpose are termed) to the winery. Here the stalks are removed, generally by a machine similar to the French *égrappoir*, and the grapes then placed in the *lagar*. This is a square stone vessel of considerable size made to hold up to fifteen pipes (the pipe equals 115 gallons) of wine. It is roughly 2 ft. deep and from 3 to 10 yds. wide. The grapes are first trodden for a period varying from twenty-four hours upwards, and are then allowed to ferment in the *lagar* itself. When the fermentation has reached a certain point it is generally the custom to again tread the must in order to extract as much colour as possible from the skins. In order to preserve the sweet quality of the wine, fermentation is not permitted to continue beyond a certain point. When this is reached the wine is drawn from the *lagar* over a strainer or some similar arrangement into vats yielding from five to thirty pipes. The murk remaining in the *lagar* is then pressed by means of a lever or beam press with which this vessel is fitted. In order to prevent the wine from fermenting further and so becoming dry, from 4 to 5 volumes of brandy are added to every 100 volumes of wine in the vats. The alcohol employed for this purpose is as a rule of high quality and made solely from wine. When, after the approach of the cold weather, the lees have dropped, the wines are racked and a further addition of brandy is made. The second racking takes place in March or April, and the wine is now placed in casks and sent to Oporto, where it is stored in large over-ground buildings termed *lodges*. A further addition of brandy is generally added before shipment. The great bulk of the wine is stored for many years before shipping, but this does not apply to the commoner varieties, nor to the finest wines, which, being the produce of a specific year, are shipped unblended and as a vintage wine. The most famous vintages of recent times were those of 1847, 1851, 1863, 1868, 1870, 1873, 1878, 1881, 1884 and 1887. A white port is also made in the Alto Douro, and this, although little known in England, is exported in considerable quantities to Germany and Russia. The white port is grown in vineyards which are not quite so favoured as regards position as the red port growths. White port is made from white grapes, and a peculiarity of its manufacture is that the must is frequently fermented in the presence of the skins, which is most unusual in the case of white wines. This gives a certain stringency to white port, which is characteristic of the wine.

Diseases.—The Alto Douro has from time to time been sadly ravaged by the *oidium* and *phylloxera*. The former first made its appearance about the middle of the 19th century, and reached a climax in 1856, when only about 15,000 pipes, that is, about one-sixth of the usual quantity, was vintaged. In consequence of this, the exportation of port dropped from over 40,000 pipes in 1856 to about 16,000 pipes in 1858. Since then *oidium* has reappeared from time to time, but the remedy of spraying with finely divided sulphur, which was discovered at the time of the epidemic, has enabled the wine farmers to keep it under. The *phylloxera*, which appeared in Alto Douro in about 1868, also did enormous damage, and at one time reduced the yield to about one-half of the normal. At one time the position appeared to be desperate, particularly in view of the fact that the farmers refused to believe that the trouble was due to anything other than the continuous drought of successive dry seasons, but at the present time, after much expenditure of energy and capital, the condition of affairs is once more fairly satisfactory.

Port Wine Trade.—The port wine trade is of considerable importance to the United Kingdom not only because the chief trade in this wine is with that country, but also because a very large proportion of the capital invested in the industry is English. It is probable that the English capital locked up in the port industry amounts to some 2 millions sterling. In the period preceding the 'seventies of the last century practically the whole of the wine exported from Oporto came to Great Britain. Thus in the year 1864 there were exported to Great Britain 29,942 pipes and to the rest of the world 5677 pipes. The trade with the rest of the world, however, has gradually grown since then, the figures being as follows:—

Exports of Wine from Oporto.

Year.	To Great Britain.	To Rest of the World.
	Pipes.	Pipes.
1874	35,753	20,778
1884	30,281	31,741
1898	41,093	69,932
1903	32,832	65,058
1906	34,356	80,934

The growth of the export trade from Oporto with the rest of the world is principally due to the enormous increase in the quantity of wine sent to South America, chiefly Brazil, but only a small proportion of this (probably one-eighth) is port wine proper. The bulk of it consists of wine from the Minho and Beira districts. These facts also account for the apparent anomaly that the exports from Oporto are much higher than the total production of wine in the Alto Douro. At the present time the average production of the Alto Douro is about 50,000 pipes. During the last decade it was at a maximum in 1904, when 70,000 pipes were produced, and at a minimum in 1903, when only 18,000 pipes were obtained. The value of the port taken by the United Kingdom was in the year 1906 over one million sterling, that is, rather less than half of the total value of all the French wines imported, but more than double the value of the total of Spanish wines.

The chemical features of interest in port are the relatively high proportions of alcohol (the bulk of the wine imported into the United Kingdom containing some 18 to 22% of alcohol), sugar and tannin. The sugar varies considerably according to the vintage, but as a rule amounts to from 7% to 15%.

Other Portuguese Wines.—The wines of the Alto Douro only form a small proportion of the total quantity of wine produced in Portugal. The main wine-growing district outside that of Oporto is in the neighbourhood of Lisbon. The chief varieties are those grown at Torres Vedras, which are of a coarse claret type; at Collares, where a wine of a somewhat higher quality is produced; at Carcavellos, at the mouth of the Tagus; and at Bucellas. In the latter district is produced a white wine from the Riessling grape, which is commonly known in the United Kingdom as Bucellas Hock.

Madeira.

As far as the United Kingdom is concerned, the Madeira wine industry is mainly of interest in that it was largely developed by and is still chiefly in the hands of British merchants. The shipments to the United Kingdom, however, which reached a maximum in 1820, when over half a million gallons were imported, has fallen off to one-tenth of that amount, and the consumption in these islands was barely 20,000 gallons in 1906. This falling away in the taste for Madeira is partly ascribable to fashion and partly to the temporary devastation of the vineyards by the phylloxera in the middle of last century. The re-establishment of the vineyards and the consequent development of the industry did not, however, lead to a renewal of the trade on the former scale with this country. The output in 1906 amounted to 10,000 pipes (Madeira pipe = 92 gallons) and the export to 6010 pipes, of which quantity 1951 pipes went to Germany, 1680 pipes to France, 796 pipes to Russia and 755 pipes to the United Kingdom. Madeira, like sherry and port, is a fortified wine. The method of vinification is similar to that employed in other parts of Portugal, but the method employed for hastening the maturation of the wine is peculiar and characteristic. This consists in subjecting the wine, in buildings specially designed for this purpose, to a high temperature for a period of some months. The temperature varies from 100° to 140° F. according to the quality of the wine, the lower temperature being used for the better wines. The buildings in which this process is carried out are built of stone and are divided into compartments heated by means of hot air derived from a system of stoves and flues. Much of the characteristic flavour of Madeira is due to this practice, which hastens the mellowing of the wine and also tends to check secondary fermentation inasmuch as it is, in effect, a mild kind of pasteurization.

Wines of Germany

Although the quantity of wine produced in Germany is comparatively small and subject to great variations, the quality of the finer wines is, in successful years, of a very high order. In fact Germany is the only country which produces natural (*i.e.* unfortified) wines of so high a class as to be comparable with—although of an entirely different character from—the wines of France. The finer wines possess great breed and distinction, coupled with a very fine and pronounced bouquet, and in addition they are endowed with the—in the case of lighter wines—rare quality of stability. The great inequalities observed in the different vintages and the exceptionally fine character of the wines in good years are, generally, due to the same cause, namely, to the geographical position of the vineyards. The wines of the Rhine are grown in the most northerly latitude at which viticulture is successful in Europe, and consequently, when the seasons are not too unpropitious, they display the hardiness and distinction characteristic of northern products. During the period 1891–1905 the total production of Germany has averaged roughly 62 million gallons, attaining a maximum of 111 million gallons in 1896 and a minimum of 16 million gallons in 1891. The trade with the United Kingdom is now a very considerable one, amounting in 1906 to roughly 1½ million gallons to the value of three-quarters of a million sterling.

Rhine wines.

The wines grown in the Rheingau, Rheinhessen and in parts of the Palatinate are generally known by the name of Rhine wines, although many of these are actually produced on tributaries of that river. Thus the well-known Hochheimer, from which the curious generic term "hock" employed in England for Rhine wines is derived, is made in the vicinity of the little village of that name situated on the Main, a number of miles above the junction of the latter with the Rhine. The Rheingau district proper stretches along the north bank of the Rhine from Bingen on the west to Mainz on the east. The most important wines in this region are those of the Johannisberg and of the Steinberg. The vineyards of the former are said to have been planted originally in the 11th century, but were destroyed during the Thirty Years' War. They were replanted by the abbot of Fulda in the 18th century. During the French Revolution the property passed into the hands of the prince of Orange, but after the battle of Jena, Napoleon deprived him of it and presented it to Marshal Kellermann. On the fall of Napoleon, the emperor of Austria took possession of the vineyard and gave it to Prince Metternich. At the present time the property still belongs to the descendants of the latter. The vineyards of Steinberg belong to the state of Prussia. The vineyards of these two properties are tended with extraordinary care, and the wines, of which several qualities are made in each case, fetch exceedingly high prices. The finest wines are produced in a manner somewhat similar to that employed for making the Sauternes. The grapes are allowed to become over-ripe and are then selected by hand. This process produces the so-called *Auslese* wines, which frequently fetch as much as 30s. or 40s. a bottle. The other most important wines produced in the Rheingau and its extensions are those of Marcobrunn, Geisenheim, Rüdesheim and Hochheim. The most important wines produced in Rheinhessen (on the left bank of the Rhine and south of the Rheingau) are those of Liebfraumilch, Nierstein, Oppenheim, Bodenheim, Laubenheim and Scharlachberg. In the Palatinate the most important growths are those of Forst, Deidesheim and Dürkheim.

Moselle.

The wines of the Moselle are of a somewhat different character to those of the Rhine. Whereas the Rhine wines of the finer descriptions are as a rule fairly full bodied and of marked vinosity, the Moselle wines are mostly light and of a somewhat delicate nature. While the Rhine wines generally improve in bottle for a lengthy period, the Moselles are as a rule at their best when comparatively fresh. Indeed, many connoisseurs hold that when a Moselle ceases to show signs of the somewhat prolonged secondary fermentation, characterized by the slight prickling sensation produced on the palate (caused by the presence of bubbles of carbonic acid gas in the wine), that it has passed its best. The best-known growths of the Moselle are those of Brauneberg, Bernkastel, Piesport and Zeltingen. Some of the tributaries of the Moselle also produce wines which in quality approach those of the parent river. Among these may be cited the growths of Scharzhofberg, Geisberg and Bockstein.

Large quantities of wine are produced in Alsace-Lorraine, Baden and Württemberg, but the majority of these have little interest, inasmuch as they are used only for home consumption. Among the wines, however, which are well known may be mentioned the Franconian growths, amongst which the celebrated Stein wine, which is grown at the foot of the citadel of the town of Würzburg, and in the grand duchy of Baden the celebrated growths of Affenthal (red) and Markgräfler.

Practically all the important wines of Germany are white, although there are a few red growths of some quality, for instance that of Assmannshausen in the Rheingau. The latter is produced from the black Burgundy vine, the Pineau. In the Rheingau the predominant vine is the Riessling. This plant appears to be indigenous to the Rhine valley, and the finest wines are made exclusively from its grapes. In the hope of reproducing the characteristic of the Rhine wines, the Riessling has been planted in many young wine-producing countries, such as Australia, California and the Cape, and not entirely without success. It thrives best on rocky mountain slopes freely exposed to the sun, and requires a relatively high temperature to reach perfect maturity. In the lower lands, therefore, it is customary to plant, in addition to the Riessling, vines such as Österreicher and Kleinberger, which mature more readily than the former. Other vines, such as the Orléans and the Traminer, are also found in small quantities in the Rheingau. On the Moselle the Riessling and the Kleinberger are the chief growths. The vintage on the Rhine is, in order to permit the grapes to acquire the "over-ripeness" necessary to the peculiar character of the wines, generally very late, rarely taking place before the end of October. The process of vinification is peculiar in that fermentation takes place in relatively small casks, the result being that there are frequently marked differences in the produce of the same growth and vintage.

The very great variations which are shown by the same growths of different vintages makes it impracticable in the case of the German white wines to give representative analyses of them. Comparing the fine wines of the better vintages with, for instance, the red wines of the Gironde, the main features of interest are the relatively high proportions of acid and glycerin and the low proportion of tannin which they contain.

Wines of Italy

Italy ranks second to France as regards the quantity of wine produced, but in respect to quality a comparison is scarcely possible, inasmuch as the Italian wines are on the whole of a poor character. They display many of the features characteristic of southern wines, showing either an excessive vinosity coupled with a somewhat crude bouquet, or where the alcoholic strength is not high, a decided lack of stability. The reason for this is to be sought partly in the unscientific methods of cultivation, and partly, in many districts, in the haphazard methods of vinification employed. The vines are to a great extent still trained on trees or trellis-work, or allowed to grow among the rest of the vegetation in the most casual manner. It must be stated, nevertheless, that of recent years a decided improvement has set in in some quarters owing to the lively interest which the Italian government has taken in the subject, principally owing to the important export trade to America, Switzerland and other countries. The trade with the United States, which in 1887 amounted to little over 120,000 gallons, has risen to considerably over a million gallons. The exports to the Argentine Republic amount to roughly 4 million gallons, and to Switzerland from 4 to 8 million gallons. The trade with the United Kingdom is small, amounting to little over a quarter of a million gallons annually, and of a value rather less than £50,000. The total exports of Italy are on the average not far from 40 million gallons. The wines of northern Italy are on the whole of good colour, but somewhat harsh. Among the best-known wines in Piedmont are the Barolos and the wines of Asti, which are made from a species of muscatel grapes. They are of an agreeable flavour, and this especially applies to the white descriptions. A considerable quantity of sparkling wine is manufactured in this district. Among the best-known wines of Lombardy are the Passella wines of Valtelina. In central Italy the best growths are those of Chianti, Pomino, Montalcino, Carmignano and Montepulciano. Tuscany produces the greater part of these wines, which are of good but not excessive alcoholic strength, containing as a rule some 10½% to 11½% of alcohol. The Montepulciano wines have a brilliant colour and high bouquet, and are of a sweet, luscious flavour. The wines of Chianti, near Siena, are often described as being of the claret type, but actually they are somewhat similar to the growths of Beaujolais. The best Italian wines, however, are probably those grown in the Neapolitan district. The best of these is the celebrated Lacrima Christi, which is grown on the slopes of

Vesuvius from a vine bearing the same name. It has a fine red colour, and unites delicacy and a high bouquet with a sweet elegant taste. The white muscat wines of Vesuvius are also of good quality, and the island of Capri produces some excellent wine. Perhaps the best known of Italian wines in the United Kingdom is that produced in the neighbourhood of Marsala in the island of Sicily, which bears the name of the town from which it is exported. Marsala is a fortified white wine which is grown and made with considerable care. It is somewhat similar in character to the wines of Madeira, but its character also recalls some of the sherry types. It is vatted and blended in much the same way as sherry, and there is a considerable trade in this wine with the United Kingdom. In the neighbourhood of Palermo, Muscat and Malvoisie wines of very fair quality are made. The islands of Sardinia and Elba produce considerable quantities of wine, some of which is of fair quality.

Wines of Austria-Hungary

In point of quantity Austria-Hungary takes the fourth place among the wine-producing nations. The average production for the period 1901–1905 was 178 million gallons. Of this quantity Austria is responsible for roughly three-fifths and Hungary for the remaining two-fifths. The character of the Hungarian wine is, however, much higher than that of the Austrian growths. The quality of the bulk of the Austro-Hungarian wines has been improved of late years, principally owing to the endeavours of the respective governments to introduce scientific and modern methods among the wine-farmers. Since the recovery of the Hungarian vineyards from the phylloxera considerable efforts have been made to develop an export trade, but so far the wines of Hungary are not generally known in the United Kingdom. Nevertheless, Hungary produces at least one class of wine which may be considered of international importance, namely, the famous Tokay. This is produced in the mountainous Hegyalia region in a district which has the town of Tokay for its centre. The vine from which Tokay is made is the *Furmint*. The finest varieties of Tokay are made entirely or mainly from *Furmint* grapes which have been allowed to become over-ripe in a manner somewhat similar to that obtaining in the Sauternes districts. In the case of Tokay, however, the transformation of the grape into what is practically a raisin is not brought about by the intervention of any particular micro-organism. The sun is sufficiently powerful to cause the evaporation of the water in the grape through the skin without any preliminary loosening of the latter by the action of the *botrytis cinerea* or any other micro-organism. The most precious variety ot Tokay is the so-called *essence*. This is produced by placing the finest grapes in casks and drawing off the juice which exudes naturally as a result of the weight of the material. The Tokay essence is, even after many years, still a partially fermented wine, rarely containing more than 7% to 9% of alcohol. Indeed, it may be said that the main fermentation rarely, if ever, reaches a climax. Another variety of Tokay is the so-called *szamorod*. This is produced by pressing a mixture of dried grapes and fully ripe grapes and fermenting the must so obtained. It contains up to about 14% of alcohol and relatively little sugar. The most common kind of Tokay is the so-called *Ausbruch* wine. This is obtained by extracting dried grapes with the must of ordinary grapes. According to the amount of dried grapes (*zibebs*) employed, the wine is termed 1 to 5 "buttig." The *Ausbruch* wines take from three to four years to ripen, and they may contain from 12% to 15% of alcohol and a little or a fair quantity of sugar, these factors varying according to the vintage and the number of "butts" of *zibebs* employed. Another variety of Tokay is the so-called *máslás*. The term is applied to different varieties of wines according to the district. but in the neighbourhood of Tokay it generally refers to wines obtained by treating *szamorod* or *Ausbruch* residues with dry wine. In the neighbourhood of Ménes sweet red wines produced by the *Ausbruch* system are also termed *máslás*. Hungary produces a variety of other wines both strong, such as those of central Hungary, and relatively light, such as those of Croatia and Transylvania. The wines produced at Carlowitz (on the Danube), some 40 m. north-west of Belgrade, are somewhat stronger. They have a flavour somewhat resembling port, but are coarser, and lack the fine bouquet of the latter. The other chief vine-growing countries of the empire are Dalmatia, Lower Austria and Styria. Some of the Dalmatian wines are of fair quality, and somewhat resemble Burgundy.

Wines of the United States

The cultivation of the vine has made very rapid strides in the United States during the past half-century. Whereas in 1850 the production amounted to little more than a million gallons, the output to-day is, in good years, not far short of 50 million gallons. The result has been that the domestic wines have now very largely displaced the foreign product for ordinary beverage purposes. At the same time, there is no reason to believe that the finer European wines will be entirely displaced, inasmuch as these are characterized by qualities of delicacy and breed which cannot be reproduced at will. At the same time, there is no doubt that much of the wine produced in the United States is of very fair quality, and this is largely due to the fact that the Americans have been at great pains to introduce the latest scientific methods in regard to the vine and wine-making. Thus in parts of California, where high temperatures are liable to prevail during the vintage, the system—first employed in Algeria—of cooling the must during fermentation to the proper temperature by means of a series of pipes in which iced water circulates is now largely employed. The use of pure culture yeast derived from many of the most famous European vineyards has also done much towards improving the quality. In California there are, in addition to the native growths, vines from almost every European wine-growing centre, and the produce of these goes by such names as Riesling, Hermitage, Sauternes, Chianti, &c., in accordance with the district of origin of the vine. California is the largest wine-growing state, as the Pacific slope seems particularly suitable to vine-growing. At the present time there are about 280,000 acres under the vine in California, and the number of vines is about 90 millions. The annual production is about 30 million gallons, of which rather more than one-half is dry wine. A good deal of sweet wine is also made, particularly in the Fresno district, where, however, a large proportion of the grapes is grown with a view to making raisins. Following California, New York and Ohio are the most important wine-producing states. The centre of the wine trade of Ohio is at Sandusky on the shores of Lake Erie. Here, as well as at Cleveland, "champagnes" and "clarets" and "sparkling Catawba" are the chief wines produced. The latter was first made by Nicolas Longworth of Cincinnati. The Catawba is the chief growth of the Lake Erie district; the other important vines being the Delaware and Concord. New York state, in which wine has been grown from a very early period, produces roughly three-quarters of all the domestic "champagnes." There are about 75,000 acres under the vine in this state, and roughly 5 million gallons are produced annually. The wines grown on the Pacific slope are generally of a mild and sweet character, resembling in general nature the wines of southern Europe (Italy, Spain, Portugal). In the eastern and middle states the wines produced are of a lighter type and of drier flavour, and are somewhat similar to the growths of Germany and France. At the present time America exports a considerable quantity of wine, and there is some trade in the United Kingdom in Californian "claret."

Wines of the British Empire

The production of the British empire is very small, amounting to roughly 10 million gallons, and this is produced almost entirely in the Cape of Good Hope and in the Australian Commonwealth. At present the average vintage of the Cape and of Australia is in each case roughly 5 to 6 million gallons. In 1905 New South Wales produced 831,000, Victoria 1,726,000, and South Australia 2,846,000 gallons respectively. The trade of Australia with the United Kingdom is now considerable, having increased from 168,188 gallons in 1887 to 622,836 gallons in 1906. It is possible that the trade would grow much more rapidly than it has done if it were practicable to ship the lighter varieties of wines. These, which would be suitable for ordinary beverage purposes, cannot as a rule stand the passage through the Red Sea, and it is therefore only possible to ship the heavier or fortified wines. It is doubtful, therefore, whether the products of the British Empire will ever displace European wines in the United Kingdom on a really large scale, for they cannot compete at present as regards quality with the finer wines of Europe, nor, for the reason stated, with the lighter beverage wines. The quality of the wine produced in the Cape and in Australia has improved very much of recent years, chiefly owing to the introduction of scientific methods of wine cultivation and of wine-making in much the same manner as has been the case in California. The red wines of Australia, particularly those of South Australia, somewhat resemble French wines, being intermediate between claret and burgundy as regards their principal characteristics. There are several types of white wines, some resembling French Sauternes and Chablis and others the wines of the Rhine. It has been recognized, however, that it is impossible to actually reproduce the character of the European wines, and it is now generally held to be desirable to recognize the fact that Australian and Cape wines represent distinct types, and to sell them as such without any reference to the European parent types from which they have been derived.

Other Countries

Considerable quantities of wine are produced in the Balkan states, but the bulk of this is of a coarse description and only fit for local consumption. The average yield of Bulgaria and Rumania is probably some 30 to 40 million gallons for each country, but in some years it is much larger. Thus in 1896 Rumania produced no less than 101 million gallons and Bulgaria 81 million gallons. The wine industry in Greece, which in ancient times and during the middle ages was of great importance, has now become, at any rate in point of quality, quite insignificant. At the present time a great part of the industry is devoted to the cultivation of the currant vine (*Vitis corinthiaca*). There is a considerable export of currants and raisins and concentrated wine must from this country. Many of the islands of the Mediterranean, from which the ancients drew their supplies of wine, such as Chios, Cos, Tenedos, Crete and Cyprus, still produce considerable quantities of wine, but the bulk of this is scarcely to the modern European taste. In Asia wine is produced, according to Thudichum, principally in Caucasia and Armenia. In Persia, also, wines are made, especially in the Shiraz district. Russia also produces a small quantity of wine, principally in the Crimea. (P.S.)

WINEBRENNER, JOHN (1797–1860), American clergyman, founder of the "Church of God," was born in Glade Valley, Frederick county, Maryland, on the 25th of March 1797 He studied at Dickinson College, Carlisle, Pennsylvania, was ordained in the German Reformed Church in 1820 and became a pastor at Harrisburg, Pennsylvania, where his revival preaching and his *Revival Hymn-Book* (1825) brought about a break between his followers and the Reformed Church In 1830 he founded the Church of God (whose members are commonly called Winebrennerians), he was speaker of its conference and edited its organ, *The Church Advocate*, until his death in Harrisburg on the 12th of September 1860 He wrote *Brief Views of the Church of God* (1840), *A Treatise on Regeneration* (1844), *Doctrinal and Practical Sermons* (1860), and with I B Rupp, *The History of all the Religious Denominations in the United States* (1844)

The Church of God has three sacraments baptism (by immersion), feet washing and the Lord's Supper (administered to Christians only, in a sitting posture, and in the evening), it is generally Arminian and pre-millenarian, and in government has local elders and deacons, an annual eldership composed of pastors and lay elders, and, chosen by (and from) the annual elderships, a general eldership which meets since 1905 once in four years The denomination in 1906 numbered 518 organizations and 24,356 communicants, in the following states Pennsylvania (11,157), Ohio (2980), Indiana (1999), Illinois (1555) Maryland (1204), Missouri (1053), Iowa West Virginia, Arkansas, Kansas, Oklahoma, Nebraska, Michigan, Washington, Oregon and Minnesota Under the general eldership are Findlay College, Findlay, Ohio, Fort Scott Collegiate Institute, Fort Scott, Kansas, and an academy at Barkeyville, Pennsylvania Some foreign missionary work is done in Bengal.

WINER, GEORG BENEDIKT (1789–1858), German Protestant theologian, was born at Leipzig on the 13th of April 1789. He studied theology at Leipzig, where eventually (1832) he became professor ordinarius. From 1824 to 1830 he edited with J. G. V. Engelhardt the *Neues kritisches Journal der theologischen Literatur*, and alone from 1826 to 1832 the *Zeitschrift für wissenschaftliche Theologie* He is well known as the author of a *Grammatik des neutestamentlichen Sprachidioms* (1821, 8th ed. revised by P W Schmiedel, 1894 ff), of which several translations have appeared, the latest being by W F Moulton (1870, 3rd ed 1882) He died on the 12th of May 1858.

His other works include *Komparative Darstellung des Lehrbegriffes der verschiedenen christlichen Kirchenparteien* (1824, 4th ed by P Ewald, 1882, Eng trans. 1873), *Biblisches Realwörterbuch* (1820, 3rd ed 1847–1848, 2 vols.), *Grammatik des biblischen und targumischen Chaldaismus* (1824, 3rd ed by B Fischer, *Chaldäische Grammatik für Bibel und Talmud*, 1882, Eng trans. 1845) and a useful *Handbuch der theologischen Literatur* (1820 3rd ed 1838–1840, 2 vols., supplement, 1842) Cf W Schmidt, "Zum Gedächtnis Dr G. B. Winers," in the *Beiträge zur sächsischen Kirchengeschichte*.

WINE-TABLE, a late 18th-century device for facilitating after-dinner drinking—the cabinetmakers called it a "Gentleman's Social Table " It was always narrow and of semicircular or horseshoe form, and the guests sat round the outer circumference. In the earlier and simpler shapes metal wells for bottles and ice were sunk in the surface of the table, they were fitted with brass lids. In later and more elaborate examples the tables were fitted with a revolving wine-carriage, bottle-holder or tray working upon a balanced arm which enabled the bottles to be passed to any guest without shaking The side opposite the guests was often fitted with a network bag It has been conjectured that this bag was intended to hold biscuits, but it is much more likely that its function was to prevent glasses and bottles which might be upset from falling to the floor That the wine-table might be drawn up to the fire in cold weather without inconvenience from the heat it was fitted with curtains hung upon a brass frame and running upon rings Sometimes the table was accompanied by a circular bottle-stand supported on a tripod into which the bottles were deeply sunk to preserve them from the heat of the fire. Yet another form was circular with a socket in the centre for the bottle Wine-tables followed the fashion of other tables and were often inlaid with wood or brass. They are now exceedingly scarce

WINFIELD, a city and the county-seat of Cowley county, Kansas, U.S.A., in the S. part of the state, on the Walnut river, about 40 m. S.S.E. of Wichita. Pop. (1890) 5184; (1900) 5554, of whom 203 were foreign born and 282 were negroes; (1905) 7845, (1910) 6700 It is served by the Atchison, Topeka & Santa Fé, the Missouri Pacific, and the St Louis & San Francisco railways, and is connected by electric line with Arkansas City, Arkansas. In the city are St John's Lutheran College (1893), the South-west Kansas College (Methodist Episcopal, opened in 1886), St Mary's Hospital and Training School (1898), Winfield Hospital (1900), a Lutheran orphans' home and a State School for Feeble-minded Youth Island Park (50 acres) is the meeting-place of a summer Chautauqua. Winfield is a supply and distributing point for a rich farming country, in which large quantities of wheat and alfalfa are raised. Limestone is quarried near the city, and natural gas is found in the vicinity and piped in from eastern fields for general use in the city The municipality owns and operates the waterworks and the electric-lighting plant Winfield was settled in 1870 and incorporated in 1871.

WINGATE, SIR FRANCIS REGINALD (1861–), British general and administrator in the Sudan, was born at Broadfield, Renfrewshire, on the 25th of June 1861, being the seventh son of Andrew Wingate of Glasgow and Elizabeth, daughter of Richard Turner of Dublin He was educated at the Royal Military Academy, Woolwich, and became a lieutenant in the Royal Artillery in 1880. He served in India and Aden, 1881–1883, and in the last named year joined the Egyptian army on its reorganization by Sir Evelyn Wood, and in the Gordon Relief Expedition of 1884–1885 was A.D C and military secretary to Sir Evelyn For his services he received the brevet rank of major. After holding an appointment in England for a brief period he rejoined the Egyptian army in 1886 He took part in the operations on the Sudan frontier in 1889, including the engagement at Toski and in the further operations in 1891, being present at the capture of Tokar In 1894 he was governor of Suakin His principal work was in the Intelligence branch of the service, of which he became director in 1892 A master of Arabic, his knowledge of the country, the examination of prisoners, refugees and others from the Sudan, and the study of documents captured from the Dervishes enabled him to publish in 1891 *Mahdiism and the Egyptian Sudan*, an authoritative account of the rise of the Mahdi and of subsequent events in the Sudan up to that date Largely through his instrumentality Father Ohrwalder and two nuns escaped from Omdurman in 1891 Wingate also made the arrangements which led to the escape of Slatin Pasha in 1895. The English versions of Father Ohrwalder's narrative (*Ten Years in the Mahdi's Camp*, 1892) and of Slatin's book (*Fire and Sword in the Sudan*, 1896) were from Wingate's pen, being rewritten from a rough translation of the original German.

As director of military intelligence he served in the campaigns of 1896–1898 which resulted in the reconquest of the Sudan, including the engagement at Firket, the battles of the Atbara and Omdurman and the expedition to Fashoda. In an interval (March–June 1897) he went to Abyssinia as second in command of the Rennell Rodd mission. For his services he was made colonel, an extra A.D C to Queen Victoria, received the thanks of parliament and was created K.C M.G. Wingate was in command of an expeditionary force which in November 1899 defeated the remnant of the Dervish host at Om Debreikat, Kordofan, the khalifa being among the slain. For this achievement he was made K.C.B In December of the same year, on Lord Kitchener being summoned to South Africa, Sir Reginald Wingate succeeded him as governor-general of the Sudan and sirdar of the Egyptian army His administration of the Anglo-Egyptian Sudan was conspicuously successful, the country, after the desolation of the Mahdia, rapidly regaining a measure of prosperity In 1903 he was raised to the rank of major-general and in 1908 became lieutenant-general. He was also created a pasha and in 1905 received the honorary degree of D C.L. from Oxford University In 1909, at the request of the British government, Wingate undertook a special mission to Somaliland to report on the military situation in connexion with the proposed evacuation of the interior of the protectorate

WINGFIELD, EDWARD MARIA (*c.* 1560–*c.* 1614), English colonist in America, was born at Stoneley, Huntingdonshire, about 1560. He served as a soldier both in Ireland and the Low Countries, was one of the patentees of Virginia in 1606, and in 1607 accompanied the first colonists to Jamestown. He was elected president of the Council (15th May 1607), but his arbitrary manners, the fact that he was a Roman Catholic, and the suspicion that he was friendly toward Spain led to his deposition in September He returned to England in April 1608, and died after 1613

His amplified diary, entitled "A Discourse of Virginia," was published in *Archaeologia Americana*, vol iv (Worcester, 1860), with introduction and notes by Charles Deane.

WINGFIELD, SIR RICHARD (*c* 1469–1525), English diplomatist, was one of the twelve or thirteen sons of Sir John Wingfield (d 1481) of Letheringham, Suffolk. He became a courtier during the reign of Henry VII. and was made marshal of Calais in 1511 With Sir Edward Poynings and others he was sent in 1512 to arrange a holy league between the pope, the English king and other sovereigns, and in 1514 he went to the Netherlands to try and arrange a marriage between the archduke Charles, afterwards the emperor Charles V, and Henry VIII 's daughter Mary In the intervals between these and similar errands Wingfield was occupied in discharging his duties at Calais, but in 1519 he resigned his post there and returned to England. In 1520 Sir Richard was appointed ambassador to the French court, and he helped to make the arrangements for the meeting between Henry VIII. and Francis I at the Field of the Cloth of Gold. Twice during 1521 he visited Charles V., his object being to deter him from making war on France, and he was on an errand to Spain when he died at Toledo on the 22nd of July 1525. In 1524 he had been made chancellor of the duchy of Lancaster For his services Wingfield received lands in various parts of England, including Kimbolton in Huntingdonshire, where he enlarged the castle.

Sir Richard had two brothers who attained some celebrity: Sir Robert (*c* 1464–1539), a diplomatist, and Sir Humphrey (d. 1545), speaker of the House of Commons from 1533 to 1536. An elder brother, Sir John, sheriff of Norfolk and Suffolk in 1483, had a son Sir Anthony (*c.* 1458–1552), who was present at the Field of the Cloth of Gold, and became a member of the privy council and captain of the guard. One of his grandsons, Anthony Wingfield (*c.* 1550–*c.* 1615), was public orator in the university of Cambridge, and another was Sir John Wingfield (d. 1596), a soldier who was governor of Gertruydenberg from 1587 and 1589. Another of Sir Anthony's descendants, Sir Anthony Wingfield (d. 1638), was created a baronet in 1627 Another brother of Sir Richard, Ludovic, had a son, Sir Richard Wingfield, who was governor of Portsmouth under Queen Elizabeth. He was the father of another Sir Richard Wingfield (d. 1634), who served in Ireland and was created Viscount Powerscourt in 1618. He died without issue, and his Irish estates passed to a cousin, Sir Edward Wingfield (d. 1638), whose grandson, Folliott Wingfield (d. 1717), was created Viscount Powerscourt in 1665, but the title again became extinct when he died. In 1744 his cousin, Richard Wingfield (1697–1751), was created Viscount Powerscourt, and his descendants have held this title until the present day Mervyn Wingfield (1836–1904), the 7th viscount, was created a peer of the United Kingdom as Baron Powerscourt in 1885.

See Lord Powerscourt, *Muniments of the Ancient Family of Wingfield* (1894).

WINKELMANN, EDUARD (1838–1896), German historian, was born at Danzig on the 25th of June 1838. He studied at the universities of Berlin and Göttingen, worked at the *Monumenta Germaniae historica*, and in 1869 became professor of history at the university of Bern, and four years later at Heidelberg. He also spent some time in Russia, teaching at Reval and at the university of Dorpat. He died at Heidelberg on the 10th of February 1896.

Winkelmann wrote a *Geschichte der Angelsachsen bis zum Tode König Ælfreds* (Berlin, 1883); and his residence in Russia induced him to compile a *Bibliotheca Livoniae historica* (St Petersburg, 1869–1870, and Berlin, 1878), but his chief works deal with the history of the Empire during the later middle ages. The most important of these are *Philipp von Schwaben und Otto IV von Braunschweig* (Leipzig 1873–1878) *Geschichte Kaiser Friedrichs II und seiner Reiche 1212–1235* (Berlin, 1863) and *1235–1250* (Reval, 1865), *Kaiser Friedrich II* (Leipzig, 1889–1898) and other writings on Frederick in the *Jahrbucher der deutschen Geschichte* (Leipzig, 1862 fol) He edited the *Acta imperii inedita* (Innsbruck, 1880–1885), and with J Ficker, *Die Regesten des Kaiserreichs unter Wilhelm, Alfons X und Richard* (Innsbruck, 1882, 1901) Among Winkelmann's other works are *Allgemeine Verfassungsgeschichte* (Leipzig, 1901) and the *Urkundenbuch der Universität Heidelberg* (Heidelberg, 1886)

WINKELRIED, ARNOLD VON. The incident with which this name is connected is, after the feat of William Tell, the best known and most popular in the early history of the Swiss Confederation. We are told how, at a critical moment in the great battle of Sempach, when the Swiss had failed to break the serried ranks of the Austrian knights, a man of Unterwalden, Arnold von Winkelried by name, came to the rescue. Commending his wife and children to the care of his comrades, he rushed towards the Austrians, gathered a number of their spears together against his breast, and fell pierced through and through, having opened a way into the hostile ranks for his fellow-countrymen, though at the price of his own life But the Tell and Winkelried stories stand in a very different position when looked at in the dry light of history, for, while in the former case imaginary and impossible men (bearing now and then a real historical name) do imaginary and impossible deeds at a very uncertain period, in the latter we have some solid ground to rest on, and Winkelried's act might very well have been performed, though, as yet, the amount of genuine and early evidence in support of it is very far from being sufficient

The history of the Winkelrieds of Stans from 1248 to 1534 has been minutely worked out from the original documents by Hermann von Liebenau, in a paper published in 1854, and reprinted at Aarau in 1862, with much other matter, in his book, *Arnold von Winkelried, seine Zeit und seine That.* They were a knightly family when we first hear of them about 1250, though towards the end of the 14th century they seem to have been but simple men without the honours of knighthood, and not always using their prefix "von." Among its members we find an Erni Winkelried acting as a witness to a contract of sale on the 1st of May 1367, while the same man, or perhaps another member of the family, Erni von Winkelried, is plaintiff in a suit at Stans on the 29th of September 1389, and in 1417 is the landamman (or head man) of Unterwalden, being then called Arnold Winkelriet. We have, therefore, a real man named Arnold Winkelried living at Stans about the time of the battle of Sempach. The question is thus narrowed to the points, Was he present at the battle, and did he then perform the deed commonly attributed to him? This involves a minute investigation of the history of that battle, to ascertain if there are any authentic traces of this incident, or any opportunity for it to have taken place.

1 *Evidence of Chronicles.*—The earliest known mention of the incident is found in a Zürich chronicle (discovered in 1862 by G. von Wyss), which is a copy, made in 1476, of a chronicle written in or at any rate not earlier than 1438, though it is wanting in the 16th-century transcript of another chronicle written in 1466, which up to 1389 closely agrees with the former It appears in the well-known form, but the hero is stated to be *ein getrüwer man under den Eidgenozen*, no name being given, and it seems clear that his death did not take place at that time. No other mention has been found in any of the numerous Swiss or Austrian chronicles till we come to the book *De Helvetiae origine*, written in 1538 by Rudolph Gwalther (Zwingli's son-in-law), when the hero is still nameless, being compared to Decius or Codrus, but is said to have been killed by his brave act. Finally, we read the full story in the original draft of Giles Tschudi's chronicle, where the hero is described as "a man of Unterwalden, of the Winkelried family," this being expanded in the final recension of the chronicle (1564) into "a man of Unterwalden, Arnold von Winckelried by name, a brave knight," while he is entered (in the same book, on the authority of the "Anniversary Book" of Stans, now lost) on the list of those who fell at Sempach at the head of the Nidwalden (or Stans) men as "Herr Arnold von Winckelriet, Ritter," this being in the first draft "Arnold Winckelriet."

2. *Ballads.*—There are several war songs on the battle of Sempach which have come down to us, but in one only is there mention of

Winkelried and his deed. This is a long ballad of 67 four-line stanzas, part of which (including the Winkelried section) is found in the additions made between 1531 and 1545 to Etterlin's chronicle by H. Berlinger of Basel, and the whole in Werner Steiner's chronicle (written 1532). It is agreed on all sides that the last stanza, attributing the authorship to Halbsuter of Lucerne, "as he came back from the battle," is a very late addition. Many authorities regard it as made up of three distinct songs (one of which refers to the battle and Winkelried), possibly put together by the younger Halbsuter (citizen of Lucerne in 1435, died between 1470 and 1480), though others contend that the Sempach-Winkelried section bears clear traces of having been composed after the Reformation began, that is, about 1520 or 1530. Some recent discoveries have proved that certain statements in the song usually regarded as anachronisms are quite accurate; but no nearer approach has been made towards fixing its exact date, or that of any of the three bits into which it has been cut up. In this song the story appears in its full-blown shape, the name of Winckelriet being given.

3. *Lists of those who fell at Sempach.*—We find in the "Anniversary Book" of Emmetten in Unterwalden (drawn up in 1560) the name of "der Winkelriedt" at the head of the Nidwalden men, and in a book by Horolanus, a pastor at Lucerne (about 1563), that of "Erni Winckelried" occurs some way down the list of Unterwalden men.

4. *Pictures and Drawings.*—In the MS. of the chronicle of Diebold Schilling of Bern (*c.* 1480) there is in the picture of the battle of Sempach a warrior pierced with spears falling to the ground, which may possibly be meant for Winkelried, while in that of Diebold Schilling of Lucerne (1511), though in the text no allusion is made to any such incident, there is a similar picture of a man who has accomplished Winkelried's feat, but he is dressed in the colours of Lucerne. Then there is an engraving in Stumpf's chronicle (1548), and, finally, the celebrated one by Hans Rudolf Manuel (1551), which follows the chronicle of 1476 rather than the ballad.

The story seems to have been first questioned about 1850 by Moritz von Stürler of Bern, but the public discussion of the subject originated with a lecture by O. Lorenz on *Leopold III und die Schweizer Bünde*, which he delivered in Vienna on March 21, 1860. This began the lively paper war humorously called "the second war of Sempach," in which the Swiss (with but rare exceptions) maintained the historical character of the feat against various foreigners—Austrians and others.

Most of the arguments against the genuineness of the story have been already more or less directly indicated. (1) There is the total silence of all the old Swiss and Austrian chroniclers until 1538, with the solitary exception of the Zürich chronicle of 1476 (and this while they nearly all describe the battle in more or less detail). The tale, as told in the 1476 chronicle, is clearly an interpolation, for it comes immediately after a distinct statement that "God had helped the Confederates, and that with great labour they had defeated the knights and Duke Leopold," while the passage immediately following joins on to the former quite naturally if we strike out the episode of the "true man," who is not even called Winkelried. (2) The date of the ballad is extremely uncertain, but cannot be placed earlier than at least 60 or 70 years after the battle, possibly 130 or 140, so that its claims to be regarded as embodying an oral contemporary tradition are of the slightest. (3) Similar feats have been frequently recorded, but in each case they are supported by authentic evidence which is lacking in this case. Five cases at least are known: a follower of the count of Hapsburg, in a skirmish with the Bernese in 1271; Stülinger of Ratisbon (Regensburg) in 1332, in the war of the count of Kyburg against the men of Bern and Solothurn; Conrad Royt of Lucerne, at Nancy in 1477; Heini Wolleben, at Frastanz in 1499, in the course of the Swabian War; and a man at the battle of Kappel in 1531. (4) It is argued that the course of the battle was such that there was little or no chance of such an act being performed, or, if performed, of having turned the day. This argument rests on the careful critical narrative of the fight constructed by Herr Kleissner and Herr Hartmann from the contemporary accounts which have come down to us, in which the pride of the knights, their heavy armour, the heat of the July sun, the panic which befell a sudden part of the Austrian army, added to the valour of the Swiss fully explain the complete rout. Herr Hartmann, too, points out that, even if the knights (on foot) had been ranged in serried ranks, there must have been sufficient space left between them to allow them to move their arms, and therefore that no man, however gigantic he might have been, could have seized hold of more than half a dozen spears at once.

Herr K. Bürkli (*Der wahre Winkelried,—die Taktik der alten Urschweizer*, Zürich, 1886) has put forth a theory of the battle which is, he allows, opposed to all modern accounts, but entirely agrees, he strongly maintains, with the contemporary authorities. According to this the fight was not a pitched battle but a surprise, the Austrians not having had time to form up into ranks. Assuming this, and rejecting the evidence of the 1476 chronicle as an interpolation and full of mistakes, and that of the song as not proved to have been in existence before 1531, Herr Bürkli comes to the startling conclusion that the phalanx formation of the Austrians, as well as the name and act of Winkelried, have been transferred to Sempach from the fight of Bicocca, near Milan (April 27, 1522), where a real leader of the Swiss mercenaries in the pay of France, Arnold Winkelried, really met his death in very much the way that his namesake perished according to the story. Herr Bürkli confines his criticism to the first struggle, in which alone mention is made of the driving back of the Swiss, pointing out also that the chronicle of 1476 and other later accounts attribute to the Austrians the manner of attack and the long spears which were the special characteristics of Swiss warriors, and that if Winkelried were a knight (as is asserted by Tschudi) he would have been clad in a coat of mail, or at least had a breastplate, neither of which could have been pierced by hostile lances.

Whatever may be thought of this daring theory, it seems clear that, while there is some doubt as to whether such an act as Winkelried's was possible at Sempach, taking into account the known details of the battle, there can be none as to the utter lack of any early and trustworthy evidence in support of his having performed that act in that battle. It is quite conceivable that such evidence may later come to light; for the present it is wanting.

AUTHORITIES.—See in particular Theodor von Liebenau's *Die Schlacht bei Sempach—Gedenkbuch zur fünften Säcularfeier* (1886), published at the expense of the government of Lucerne. This contains every mention or description of the battle or of anything relating to it, published or unpublished, in prose or in verse, composed within 300 years after the battle, and is a most marvellous and invaluable collection of original materials, in which all the evidence for Winkelried's deed has been brought together in a handy shape. Besides the works mentioned in the text, and the life of Winkelried by W. Oechsli in vol. liii. of the *Allgemeine deutsche Biographie*, the following are the most noteworthy publications relating to this controversy. In support of Winkelried's act: G. v. Wyss, *Über eine Zürcher-Chronik aus dem 15ten Jahrhundert* (Zürich, 1862); A. Daguet, "La Question de Winkelried," in the *Musée Neuchâtelois* for December 1883; G. H. Ochsenbein, "Die Winkelriedfrage," in the *Sonntagsblatt* of the *Bund* newspaper for January and February 1879; A. Bernoulli, *Winkelrieds That bei Sempach* (Basel, 1886); W. Oechsli, *Zur Sempacher Schlachtfeier* (Zürich, 1886); E. Secretan, *Sempach et Winkelried* (Lausanne, 1886), and the summary in K. Dändliker's larger *Geschichte der Schweiz*, i. 550-559 (3rd ed., Zürich, 1893). Against Winkelried's claims we have the remarkable study of O. Kleissner, *Die Quellen zur Sempacher Schlacht und die Winkelriedsage* (Göttingen, 1873); O. Hartmann, *Die Schlacht bei Sempach* (Frauenfeld, 1886); and the concise summary of the evidence given by M. v. Stürler (the first to suspect the story) in the *Anzeiger für Schweiz. Geschichte* (1881), 392-394.

(W. A. B. C.)

WINNIPEG, the capital of Manitoba, and chief city of Western Canada. It is situated at the junction of the Assiniboine and Red rivers in the middle of a wide plain. The river valley, being of exceptional richness, early attracted the traders, and so in the beginning of the 19th century gained the attention of Lord Selkirk, a benevolent Scottish nobleman who sent out in 1811-1815 several hundreds of Highland settlers. On the site at the junction of the two rivers where Verandreye, the first white explorer to visit the Red river, had three-quarters of a century before this time erected Fort Rouge, and where some ten years earlier in the century the Nor'-Westers of Montreal had erected Fort Gibraltar, the Hudson's Bay Company, which at the time Lord Selkirk and his friends controlled, erected Fort Douglas, bearing the family name of the colonizer. After bloodshed between the rival fur companies, and their union in 1821, Fort Garry was erected, as a trading post and settlers' depot, and with somewhat elaborate structure, with stone walls, bastions and portholes. Fort Garry (2) was erected at a considerable cost in 1835. A short distance north of this fort, about the year 1860, the first house on the plain was erected, and to the hamlet rising there was given the name of the lake 45 m. north, Winnipeg (Cree, *Win*, murky, *nipiy*, water). The name referred to the contrast between its water and that of the transparent lakes to the east. For ten years the hamlet grew—though very slowly, it being more than four hundred miles from St Paul, the nearest town in Minnesota, to the south. The fur-traders did not seek to increase its size. When the transfer of Rupert's Land took place to Canada in 1870, the governor of Assiniboia had his residence at Fort Garry, and here was the centre of government for the settlers over the area surrounding Fort Garry. Its acquisition by Canada and the influx of settlers from Eastern Canada led to the greater importance of Winnipeg, as the new town was now generally called. The establishment of Dominion government agencies, the formation of a local government, the machinery required for the government of the province, the influx of a small army of surveyors who mapped out and surveyed wide districts of the country, and the taking up of free lands in all directions by Canadian settlers, all tended to build up the hamlet of Winnipeg into a considerable town.

The following figures of population show the remarkable increase of Winnipeg: (1870) 215, (1874)[1] 1869, (1885) 19,574; (1898) 39,384, (1901) 42,340; (1905) 79,975, (1906) 90,153; (1907) 100,000 (estimated). The rapid growth of the city, the character of the soil, and the high prices of material for street construction have led to a large and expensive civic organization. The city is governed by a mayor, four controllers, and twelve aldermen. The city possesses the public utility of water, but the city street car system, gas, and private electric lighting are in the hands of a private company The city has decided to introduce electric power from Winnipeg river, at a point some 50 m. distant. The streets are in some cases macadamized and in other cases block paved, and in still others asphalted. The Parks Board is a board appointed by the city council, and has the complete administration of a fixed percentage of the city taxes. The streets are boulevarded, trees planted on them, and both of these kept by the Parks Board. A number of well-kept small parks are found throughout the city, and a large park—the Assiniboine—is being prepared and beautified. The greatest business street is Main Street, on which (north) the Great Canadian Pacific railway station and Royal Alexandra Hotel are situated, and (south) the Union station of the Canadian Northern and Grand Trunk Pacific railways are found. On or near this street (132 ft. wide) are placed the great financial institutions of the city, including eighteen chartered banks, many of which are ornaments to the city, and many loan, insurance, and real estate buildings and offices. The departmental stores and offices of the Hudson's Bay Company and its Fort Garry court, which stand on Main Street South, are worthy of that ancient company. The city hall, with park and volunteers' monument, are on the same street, while the lofty Union Bank, McIntyre, and Bon Accord blocks are here wildernesses of offices of every description. The second great street, Portage Avenue, of the same width as Main Street, runs at right angles to Main Street, and is the mercantile street of the city On this are the post office, *Free Press* office, Y.M.C.A. building, Aikins Block, T. Eaton & Co.'s enormous departmental shop, and the Ideal Building, which are worthy of note. The wholesale business street of the city is Princess, running parallel to Main Street, and the two most beautiful residential streets are Broadway and Assiniboine Avenues. All parts of the city are reached by the Winnipeg electric street railway, which runs north for 25 m. on the continuation of Main Street to the town of Selkirk, west along Portage Avenue for 12 m. to St James, Silver Heights, St Charles and Headingly, and south through Fort Rouge to River Park. At the north of the city are St John's episcopal buildings, including St John's College and boys' school. In the central part of the city are the parliament building, governor's residence, barracks, law courts, university, Manitoba College and Wesley College buildings. More than eighty churches, many of them of architectural value, are found scattered over the city, while the General Hospital, Women's Home, Children's Home, Children's Aid Shelter and Deaf and Dumb Institute speak of the benevolence of the citizens. One of the most striking features of Winnipeg is seen in the elaborate system of public schools. The buildings are not exceeded for beauty of design or for completeness of finish by any Canadian city and by few American cities.

The geographical position of Winnipeg is unique for the purposes of trade. Like Chicago it stands on the eastern border of the prairies. All western trade in Canada of the vast provinces of Manitoba, Saskatchewan, Alberta and British Columbia, must pass through the narrow belt of 100 m., lying between the international boundary line and Lake Winnipeg. Midway in this belt stands Winnipeg. The trade from the wide extent of three-quarters of a million of square miles of prairie and woodland, becoming more populous every year, must flow as through a narrow spout at Winnipeg; every railway must pass through Winnipeg. In consequence Winnipeg is already a considerable manufacturing centre. Its lumber and flour mills are its largest industries, but the following are found: aerated waters and breweries, tent makers, baking-powder manufactories, box manufacturers, brick makers, broom, brushes and carriage makers, cement blocks, manufacturing chemists, chocolate and cigar manufacturers, confectionery, copper plate, cornice makers, engine builders, gas fitters, ink manufacturers, jewelry makers, lime makers, milliners, opticians, paint makers, paper-box makers, photographers, pickle makers, planing mills, pork packers, publishers, pump makers, rubber-stamp makers, sash, door and blind factories, upholsterers, ventilating manufactory, vinegar factories, foundries, wire and fence manufactories. The area of the city is 12,700 acres.

WINNIPEG, a lake and river of Canada. The lake is in Saskatchewan, Manitoba and Keewatin, and is situated between 50° 20′ and 53° 50′ N and 96° 20′ and 99° 15′ W. It covers an area of 8555 sq. m., is at an altitude of 710 ft. above the sea, is 260 m. long, 25 to 60 m. wide, and contains several large islands, including Reindeer (70 sq m.) and Big Island (60 sq. m.). It is shallow, being nowhere more than 70 ft. in depth, and in consequence extremely stormy and dangerous. It abounds in fish, its white fish being especially celebrated. Its shores are low and on the south extremely marshy. The principal affluent rivers are: Red river, from the south; Winnipeg, Bloodvein, Berens and Poplar from the east, and the Dauphin and Saskatchewan from the west. It receives the surplus waters of lakes Manitoba and Winnipegosis, and discharges by the river Nelson into Hudson Bay. The river Winnipeg rises near Savanne station in 48° 47′ N. and 89° 57′ W, and flows in a westerly direction under the names of Savanne, Seine, and Rainy rivers to the Lake of the Woods; issuing thence as the Winnipeg, it flows N.W. with an exceedingly tortuous and turbulent course to the lake of the same name. It is navigable from the foot of the Lake of the Woods to the head of Rainy lake—with a short portage at Fort Frances falls—a distance of 208 m. Its principal tributary is English river.

WINNIPEGOSIS, a lake of Manitoba and Saskatchewan, Canada, between 51° 34′ and 53° 11′ N. and 99° 37′ and 101° 06′ W Its greatest length is 122 m., greatest width 17 m.; shoreline 570 m., and area, exclusive of islands, 2000 sq. m. Its greatest ascertained depth is 38 ft., and mean altitude 828 ft. above the sea. Mossy river from the south, draining Lake Dauphin, Swan, and Red Deer rivers are the only considerable streams that fall into it. It drains by the Waterhen river through Waterhen lake into Lake Manitoba, and thence by the Little Saskatchewan into Lake Winnipeg. It was discovered by the chevalier de la Verendrye in 1739.

WINONA, a city and the county-seat of Winona county, Minnesota, U.S.A., about 95 m. S.E. of St Paul, on the W. bank of the Mississippi river, here crossed by three steel bridges. Pop. (1880) 10,208; (1890) 18,208; (1900) 19,714, of whom 5000 were foreign-born and 30 negroes, (1910 census) 18,583. There are large German and Polish elements in the population; and German and Polish journals, besides two dailies in English, are published here. Winona is served by the Chicago, Burlington & Quincy, the Chicago Great Western, the Chicago, Milwaukee & St Paul, the Green Bay & Western, and the Chicago & North-Western railways, and by river steamboat lines. It is picturesquely situated on a broad, level terrace, slightly elevated above the river, and surmounted by steep bluffs rising to 400-500 ft. At Winona are the Winona General Hospital (1894), to which is attached a Nurses' Training School; the first State Normal School (opened in 1860), and Winona Seminary (1894) for girls, conducted by the Sisters of Saint Francis. The city has a public library (about 30,000 vols.), with a mural decoration by Kenyon Cox; a Federal building; a Masonic Temple, and several parks; and it owns its own water supply (operated by the Holly system). In 1905 the total value of the factory product was $7,850,236 (30·5% more than in 1900). The site of the city was frequently used as a landing place in the old fur-trading days, but was not permanently settled until about 1853. Winona was first chartered as a city in 1857. A large part of it was destroyed by fire in 1860. The name Winona is said to be a Sioux word meaning "first-born daughter."

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[1] Incorporated in this year as a city.

WINSFORD, an urban district in the Northwich parliamentary division of Cheshire, England, on the river Weaver, 6 m. S. of Northwich, on the London & North-Western railway and the Cheshire lines. Pop. (1901) 10,382. In the town, which is only second to Northwich in this respect, large quantities of salt are raised and conveyed to Liverpool for exportation; being shipped in flats down the Weaver, which has been rendered navigable by an elaborate system of locks. Rock-salt is procured, as well as that obtained from the brine-pools. Boat-building is an important accompanying industry, and more than half a million tons of salt are shipped annually. Owing to the pumping of the brine, large tracts of land have been submerged, and there is thus a constant danger to houses. The iron bridge across the Weaver, which was built in 1856, had to be raised thrice in the following twenty-six years. The town has received much benefit from philanthropists, Sir Joseph Verdin providing a technical school, and Sir John Brunner a guildhall and other buildings.

WINSLOW, EDWARD (1595–1655), one of the founders of the Plymouth colony in America, was born in Droitwich, Worcestershire, England, on the 18th of October 1595. In 1617 he removed to Leiden, united with John Robinson's church there, and in 1620 was one of the "pilgrims" who emigrated to New England on the "Mayflower" and founded the Plymouth colony. His wife, Elizabeth (Barker) Winslow, whom he had married in May 1618 at Leiden, having died soon after their arrival, he married, in May 1621, Mrs Susannah White, the mother of Peregrine White (1620–1704), the first white child born in New England. This was the first marriage in the New England colonies. Winslow was delegated by his associates to treat with the Indians in the vicinity and succeeded in winning the friendship of their chief, Massasoit (*c.* 1580–1661). He was one of the assistants from 1624 to 1647, except in 1633–1634, 1636–1637 and 1644–1645, when he was governor of the colony. He was also, in 1643, one of the commissioners of the United Colonies of New England. On several occasions he was sent to England to look after the interests of Plymouth and Massachusetts Bay, and defend these colonies from the attacks of such men as John Lyford, Thomas Morton (*q.v.*) and Samuel Gorton (*q.v.*). He left on his last mission as the agent of Massachusetts Bay, in October 1646, and spent nine years in England, where he held a minor office under Cromwell, and in 1654 was made a member of the commission appointed to determine the value of certain English ships destroyed by Denmark. In 1655 he was the chief of the three English commissioners whom Cromwell sent on his expedition against the West Indies to advise with its leaders Admiral Venables and Admiral William Penn, but died near Jamaica on the 8th of May 1655, and was buried at sea. Winslow's portrait, the only authentic likeness of any of the "Mayflower" "pilgrims," is in the gallery of the Pilgrim Society at Plymouth, Mass.

His writings, though fragmentary, are of the greatest value to the historian of the Plymouth colony. They include: *Good Newes from New England, or a True Relation of Things very Remarkable at the Plantation of Plimouth in New England* (1624); *Hypocrisie Unmasked; by a True Relation of the Governor and Company of Massachusetts against Samuel Gorton, a Notorious Disturber of the Peace* (1646), to which was added a chapter entitled "A Brief Narration of the True Grounds or Cause of the First Plantation of New England"; *New England's Salamander* (1647); and *The Glorious Progress of the Gospel amongst the Indians in New England* (1649). With William Bradford he also is supposed to have prepared a *Journal of the Beginning and Proceeding of the English Plantation settled at Plymouth in New England* (1622), which is generally known as "Mourt's Relation," owing to its preface having been signed by "G. Mourt." Some of his writings may be found reprinted in Alexander Young's *Chronicles of the Pilgrims* (Boston, 1841).

See J. B. Moore's *Memoirs of American Governors* (New York, 1846); David P. and Frances K. Holton's *Winslow Memorial* (New York, 1877) and J. G. Palfrey's *History of New England* (3 vols., Boston, 1858–1864). Also see a paper by W. C. Winslow, "Governor Edward Winslow, his Place and Part in Plymouth Colony," in the *Annual Report of the American Historical Association* for 1895 (Washington, 1896).

His son, Josiah Winslow (1629–1680), was educated at Harvard College. He was elected a deputy to the General Court in 1653, was an "assistant" from 1657 to 1673, and governor from June 1673 until his death. From 1658 to 1672 he was one of the commissioners of the United Colonies of New England, and in 1675, during King Philip's War, he was commander-in-chief of the united forces of New England.

WINSOR, JUSTIN (1831–1897), American writer and librarian, was born in Boston, Massachusetts, on the 2nd of January 1831. At the age of nineteen he printed a *History of Duxbury*, Mass., the home of his ancestors. He left Harvard before graduation to study in Paris and Heidelberg, but not until he had planned an extended memoir of *Garrick and his Contemporaries*, the manuscript of which, in ten folio volumes with a mass of notes, is in the library of Harvard University. In 1866 Winsor was appointed a trustee of the Boston public library, and in 1868 its superintendent. In 1877 he became librarian of Harvard University, a position he retained until his death. He greatly popularized the use of both these great collections of books. While at the Boston public library he edited a most useful catalogue of books in history, biography and travel, and compiled the first of a series of separate lists of works of historical fiction. In 1876 he began a series of monumental publications. The first was a *Bibliography of the Original Quartos and Folios of Shakespeare with Particular Reference to Copies in America.* Unfortunately, all except about a hundred copies of this work were destroyed by fire. A small volume entitled *The Reader's Handbook of the American Revolution* (1879) is the model of a reasonable bibliography. In 1880 he began the editing of the *Memorial History of Boston* (4 vols., 4to), with the co-operation of seventy writers. He so manipulated the contributions and supplemented them with notes as to give an air of unity to the whole work, and completed it in twenty-three months. He then set to work on a still larger co-operative book, *The Narrative and Critical History of America*, which was completed (1889) in eight royal octavo volumes. These great tasks had compelled Winsor to make a careful and systematic study of historical problems with the aid of contemporaneous cartography. Among the early results of this study were the *Bibliography of Ptolemy's Geography* (1884), and the *Catalogue of the Kohl Collection of Maps relating to America* (1886), published in the *Harvard Library Bulletins*. His vast knowledge took the final form of four volumes entitled *Christopher Columbus* (1891), *Cartier to Frontenac* (1894), *The Mississippi Basin* (1895), and *The Westward Movement* (1897). Besides great stores of information hitherto accessible only to the specialist, these contain many strong expressions of dissent from currently received views. Winsor served for many years on the Massachusetts Archives Commission. His careful *Report on the Maps of the Orinoco-Essequibo Region* was prepared at the request of the Venezuela Boundary Commission. He was one of the founders of both the American Library Association and the American Historical Association, and was president of both—of the former for ten years, 1876–1885, and the latter in 1886–1887. He died in Cambridge on the 22nd of October 1897.

See Horace E. Scudder's "Memoir of Justin Winsor" in the *Proceedings of the Massachusetts Historical Society* (2nd series), vol. xii. Also the *Harvard Graduates' Magazine* (December 1897). A bibliography of his writings is in Harvard College Library, *Bibliographical Contributions*, No. 54.

WINSTED, a borough in the township of Winchester, Litchfield county, Connecticut, U.S.A., on the Mad and Still rivers, in the N.W. part of the state, about 26 m. N.W. of Hartford. Pop. of the township (1890) 6183; (1900) 7763: of the borough (1900) 6804, of whom 1213 were foreign-born; (1910) 7754. The borough is served by the New York, New Haven & Hartford and the Central New England railways, and by electric railway to Torrington. Among the public institutions are the William L. Gilbert Home for friendless children and the Gilbert free high school, each endowed with more than $600,000 by William L. Gilbert, a prominent citizen; the Beardsley public library (1874), the Convent of Saint Margaret of Cortona, a Franciscan monastery, and the Litchfield County Hospital. In a park in the central part of the borough there is a tower (60 ft. high) to the memory of the soldiers of Winsted who fell in the Civil War, and another park contains a soldiers' monument and a memorial fountain. Water power is derived from the Mad river and Highland lake, which is west of the borough and is encircled by the Wakefield boulevard, a seven-mile drive, along which there are many summer cottages. The manufactures include cutlery and edge tools, clocks, silk twist, hosiery, leather, &c. Winsted was settled in 1756 and chartered as a borough in 1858. The name Winsted was coined from Winchester and Barkhamsted, the latter being the name of the township immediately east of Winchester. The township of Winchester was incorporated in 1771.

WINSTON-SALEM, two contiguous cities of Forsyth county, North Carolina, U.S.A., about 115 m. N.W. of Raleigh. Pop. of Winston (1880) 2854; (1890) 8018; (1900) 10,008 (5043 negroes); (1910) 17,167. Pop. of Salem (1890) 2711; (1900) 3642 (488 being negroes); (1910) 5533. Both cities are served by the Southern and the Norfolk & Western railways. Since July 1899, when the post office in Salem was made a sub-station of that of Winston, the cities (officially two independent municipalities) have been known by postal and railway authorities as Winston-Salem. Winston is the county-seat and a manufacturing centre. Salem is largely a residential and educational city, with many old-fashioned dwellings, but there are some important manufactories here also; it is the seat of the Salem Academy and College (Moravian) for women, opened as a boarding-school in 1802; and of the Slater Normal and Industrial School (non-sectarian) for negroes, founded from the Slater Fund in 1892. The surrounding country produces tobacco of a very superior quality, and to the tobacco industry, introduced in 1872, the growth of Winston is chiefly due; the manufacture of flat plug tobacco here is especially important. The total value of Winston's factory products increased from $4,887,649 in 1900 to $11,353,296 in 1905, or 132·3%.

Salem was founded in 1766 by Friedrich Wilhelm von Marschall (1721–1802), a friend of Zinzendorf, and the financial manager of the board controlling the Moravian purchase made in North Carolina in 1753, consisting of 100,000 acres, and called Wachovia. The town was to be the centre of this colony, where missionary work and religious liberty were to be promoted, and it remained the home of the governing board of the Moravian Church in the South. In 1849 exclusive Moravian control of Salem's industries and trades was abolished; in 1856 land was first sold to others than Moravians, and in the same year the town was incorporated. Winston was founded in 1851 as the county-seat and was named in honour of Major Joseph Winston (1746–1815), a famous Indian fighter, a soldier during the War of Independence and a representative in Congress in 1793–1795 and 1803–1807. The growth of the two cities has been rapid since 1900.

See J. H. Clewell, *History of Wachovia in North Carolina* (New York, 1902).

WINTER, JOHN STRANGE, the pen-name of Henrietta Eliza Vaughan Stannard (1856–), English novelist, who was born on the 13th of January 1856, the daughter of the Rev. H. V. Palmer, rector of St Margaret's, York. She early began to write fiction for different magazines, producing sentimental stories, chiefly of army life. Two of these, *Bootles' Baby* and *Houp-la*, which appeared originally in *The Graphic* in 1885, established her reputation, and she became a prolific novelist, producing some sixty other light and amusing books, the best of which deal with military life. An indefatigable journalist on matters affecting women, she was the first president of the Writers' Club (1892), and presided from 1901 to 1903 over the Society of Women Journalists. She married in 1884 Arthur Stannard, a civil engineer.

WINTER, PETER (*c.* 1755–1825), German dramatic composer, was born at Mannheim about 1755. He received some instruction from the Abt Vogler, but was practically self-taught. After playing in the Kapelle of the Elector Karl Theodor, at Munich, he became in 1776 director of the court theatre. When Mozart produced his *Idomeneo* at Munich in 1781, Winter, annoyed at his success, conceived a violent hatred for him; yet of more than thirty operas written by Winter between 1778 and 1820 very few were unsuccessful. His most popular work, *Das unterbrochene Opferfest*, was produced in 1796 at Vienna, where in 1797–1798 he composed *Die Pyramiden von Babylon* and *Das Labyrinth*, both written for him by Schickaneder in continuation of the story of Mozart's *Zauberflöte*. He returned to Munich in 1798. Five years later he visited London, where he produced *Calypso* in 1803, *Proserpina* in 1804, and *Zaïra* in 1805, with great success. His last opera, *Sänger und Schneider*, was produced in 1820 at Munich, where he died on the 17th of October 1825. Besides his dramatic works he composed some effective sacred music, including twenty-six masses.

WINTERFELDT, HANS KARL VON (1707–1757), Prussian general, was born on the 4th of April 1707 at Vanselow in Pomerania. His education was imperfect, and in later life he always regretted his want of familiarity with the French language. He entered the cuirassier regiment of his uncle, Major-General von Winterfeldt (now the 12th) in 1720, and was promoted cornet after two years' service. But he was fortunate enough, by his stature and soldierly bearing, to attract the notice of Frederick William I., who transferred him to the so-called giant regiment of grenadiers as a lieutenant. Before long he became a personal aide-de-camp to the king, and in 1732 he was sent with a party of selected non-commissioned officers to assist in the organization of the Russian army. While the guest of Marshal Münnich at St Petersburg, Winterfeldt fell in love with and married his cousin Julie von Maltzahn, who was the marshal's stepdaughter and a maid-of-honour to the grand-duchess Elizabeth. On returning to Prussia he became intimate with the crown prince, afterwards Frederick the Great, whom he accompanied in the Rhine campaign of 1734. This intimacy, in view of his personal relations with the king, made Winterfeldt's position very delicate and difficult, for Frederick William and his son were so far estranged that, as every one knows, the prince was sent before a court-martial by his father, on the charge of attempting to desert, and was condemned to death. Winterfeldt was the prince's constant friend through all these troubles, and on Frederick II.'s accession he was promoted major and appointed aide-de-camp to the new sovereign.

When the first Silesian War broke out Winterfeldt was sent on a mission to St Petersburg, which, however, failed. He then commanded a grenadier battalion with great distinction at Mollwitz, and won further glory in the celebrated minor combat of Rothschloss, where the Prussian hussars defeated the Austrians (May 17, 1741). One month from this day Winterfeldt was made a colonel, as also was Zieten (*q.v.*), the cavalry leader who had actually commanded at Rothschloss, though the latter, as the older in years and service, bitterly resented the rapid promotion of his junior. After this Frederick chiefly employed Winterfeldt as a confidential staff officer to represent his views to the generals, a position in which he needed extraordinary tact and knowledge of men and affairs, and as a matter of course made many enemies.

In the short peace before the outbreak of the second war he was constantly in attendance upon the king, who employed him again, when the war was resumed, in the same capacity as before, and, after he had been instrumental in winning a series of successful minor engagements, promoted him (1745) major-general, to date from January 1743.

For his great services at Hohenfriedberg Frederick gave him the captaincy of Tatiau, which carried with it a salary of 500 thalers a year. At Katholisch-Hennersdorf, where the sudden and unexpected invasion of the Austro-Saxons was checked by the vigour of Zieten, Winterfeldt arrived on the field in time to take a decisive share. Once again the rivals had to share their laurels, and Zieten actually wrote to the king in disparagement of Winterfeldt, receiving in reply a full and generous recognition of his own worth and services, coupled with the curt remark that the king intended to employ General von Winterfeldt in any way that he thought fit. During the ten years' peace that preceded the next great war, Winterfeldt was in constant attendance upon the king, except when employed on confidential missions in the provinces or abroad. In 1756 he was made a lieutenant-general and received the order of the Black Eagle.

In this year he was feverishly active in collecting information as to the coalition that was secretly preparing to crush Prussia, and in preparing for the war. He took a leading part in the discussions which eventuated in Frederick's decision to strike the first blow. He was at Pirna with the king, and advised him against absorbing the Saxon prisoners into his own army. He accompanied Schwerin in the advance on Prague in 1757 and took a conspicuous part in the battle there. After the defeat of Kolin, however, Winterfeldt, whom Frederick seems to have regarded as the only man of character whom he could trust to conduct the more delicate and difficult operations of the retreat, found himself obliged to work in close contact with the king's brother, Prince William, the duke of Brunswick-Bevern, Zieten and others of his enemies. The operations which followed may be summarized by the phrase "everything went wrong"; after an angry scene with his brother, the prince of Prussia retired from the army, and when Frederick gave Winterfeldt renewed marks of his confidence, the general animosity reached its height. As it chanced, however, Winterfeldt fell a victim to his own bravery in the skirmish of Moys near Görlitz on the 7th of September. His wound, the first serious wound he had ever received, proved fatal and he died on the 8th. The court enmities provoked by his twenty years' unbroken intimacy and influence with the king, and the denigration of less gifted or less fortunate soldiers, followed him beyond death. Prince William expressed the bitterness of his hatred in almost his last words, and Prince Henry's memoirs give a wholly incredible portrait of Winterfeldt's arrogance, dishonesty, immorality and incapacity. Frederick, however, was not apt to encourage incompetence in his most trusted officers, and as for the rest, Winterfeldt stood first amongst the very few to whom the king gave his friendship and his entire confidence. On hearing of Winterfeldt's death he said, "Einen Winterfeldt finde ich nie wieder," and a little later, "Er war ein guter Mensch, ein Seelenmensch, er war mein Freund." Winterfeldt was buried at his estate of Barschau, whence, a hundred years later, his body was transferred to the Invaliden Kirchhof at Berlin. A statue was erected to his memory, which stands in the Wilhelmsplatz there, and another forms part of the memorial to Frederick the Great in Unter den Linden.

See *Hans Karl v. Winterfeldt und der Tag von Moys* (Görlitz, 1857); and K. W. v. Schöning, *Winterfeldts Beisetzung; eine biographische Skizze* (Berlin, 1857).

WINTERGREEN, known botanically as *Gaultheria procumbens*, a member of the heath family (*Ericaceae*), is a small creeping, evergreen shrub with numerous short erect branches bearing in the upper part shortly-stalked oval, thick, smooth shining leaves with sharp-toothed edge. The flowers are borne singly in the leaf axels and are pendulous, with a pale pink waxy-looking urn-shaped corolla. The bright crimson-red sub-globular, berry-like fruit consists of the much-enlarged fleshy calyx which surrounds the small thin-walled many-seeded capsule. The plant is a native of shady woods on sandy soil, especially in mountainous districts, in southern Canada and the northern United States; it is quite hardy in England. The leaves are sharply astringent and have a peculiar aromatic smell and taste due to a volatile oil known as oil of winter green, used in medicine in the treatment of muscular rheumatism (for the therapeutic action see SALICYLIC ACID). An infusion of the leaves is used, under the name mountain or Salvador tea, in some parts of North America as a substitute for tea; and the fruits are eaten under the name of partridge or deer berries. Other names for the plant are tea-berry, checker-berry, box-berry, jersey tea, spice-berry and ground holly.

See Bentley and Trimen, *Medicinal Plants*, t. 164.

WINTER'S BARK, the bark of *Drimys Winteri*, an evergreen tree belonging to the Magnolia family. It was formerly officinal in Europe, and is still held in esteem in Brazil and other parts of South America as a popular remedy for scurvy and other diseases. The plant is a native of the mountains and highlands from Mexico to the Straits of Magellan.

WINTERTHUR, a flourishing industrial town in the Töss valley, canton of Zürich, Switzerland, and by rail 17 m. N.E. of Zürich. It is 1450 ft. above sea-level, and has a rapidly increasing population (in 1870, 9317; in 1880, 13,502; in 1888, 15,805; and in 1900, 22,335), all German-speaking and nearly all Protestants. It is the point of junction of seven lines of railway, and is therefore of considerable commercial importance. Its main industries are cambric-weaving, cotton-printing, the manufacture of machinery, and wine-growing, Stadtberg being the best variety of wine grown in the neighbourhood of the town. It is a modern, well-built town, with a fine town-hall and well-arranged school buildings. It suffered severely from the disastrous financial enterprise of the National Railway of Switzerland which it promoted. In 1878 it had to sell its property in that line, and from 1881 to 1885 it was in great difficulties in the matter of a loan of nine million francs guaranteed in 1874 by the town, together with three others in Aargau, to that ill-fated railway. As the three co-guarantor towns were unable to pay their share, the whole burden fell on Winterthur, which struggled valiantly to meet its liabilities, and was helped by large loans from the cantonal and federal governments.

The Roman settlement of *Vitudurum* [Celtic *dur*, water] was a little north-east of the present town, at the place now known as Ober Winterthur. It was there that in 919 Burkhard II., duke of Alamannia, defeated Rudolf II., king of Transjuran Burgundy. It was refounded in the valley in 1180 by the counts of Kyburg (their castle rises on a hill, 4 m. to the south of the town), who granted it great liberties and privileges, making it the seat of their district court for the Thurgau. In 1264 the town passed with the rest of the Kyburg inheritance to the Habsburgs, who showed very great favour to it, and thus secured its unswerving loyalty. In 1292 the men of Zürich were beaten back in an attempt to take the town. For a short time after the outlawry of Duke Frederick of Austria, it became a free imperial city (1415–1442); but after the conquest of the Thurgau by the Swiss Confederates (1460–1461) Winterthur, which had gallantly stood a nine-weeks' siege, was isolated in the midst of non-Austrian territory. Hence it was sold by the duke to the town of Zürich in 1467, its rights and liberties being reserved, and its history since then has been that of the other lands ruled by Zürich. In 1717–1726 Zürich tried hard by means of heavy dues to crush the rival silk and cotton industries at Winterthur, which, however, on the whole very successfully maintained its ancient rights and liberties against the encroachments of Zürich.

See H. Glitsch, *Beiträge z. ältern Winterthurer Verfassungsgeschichte* (Winterthur, 1906); J. C. Troll, *Geschichte d. Stadt Winterthur* (8 vols., 1840–1850). (W. A. B. C.)

WINTHER, CHRISTIAN (1796–1876), Danish lyrical poet, was born on the 29th of July 1796 at Fensmark, in the province of Praestö, where his father was priest. He went to the university of Copenhagen in 1815, and studied theology, taking his degree in 1824. He began to publish verses in 1819, but no collected volume appeared until 1828. Meanwhile, from 1824 to 1830, Winther was supporting himself as a tutor, and with so much success that in the latter year he was able to go to Italy on his savings. In 1835 a second volume of lyrics appeared, and in 1838 a third. In 1841 King Christian VIII. appointed Winther to travel to Mecklenburg to instruct the princess Caroline, on the occasion of her betrothal to the Crown Prince of Denmark, in the Danish language. Further collections of lyrics appeared in 1842, 1848, 1850, 1853, 1865 and 1872. When he was past his fiftieth year Winther married. In 1851 he received a pension from the state as a poet, and for the next quarter of a century he resided mainly in Paris. Besides the nine or ten volumes of lyrical verse mentioned above, Winther published *The Stag's Flight*, an epical romance in verse (1855); *In the Year of Grace*, a novel (1874); and other works in prose. He died in Paris on the 30th of December 1876, but the body was brought to Denmark, and was buried in the heart of the woods. In the verse of

Christian Winther the scenery of Denmark, its beechwoods, lakes and meadows, its violet-scented dingles, its hollows perfumed by wild strawberries, found such a loving and masterly painter as they are never likely to find again. He is the most spontaneous of lyrists; his little poems are steeped in the dew and light and odour of a cool, sunshiny morning in May. His melodies are artless, but full of variety and delicate harmony. When he was forty-seven he fell in love, and at that mature age startled his admirers by publishing for the first time a cycle of love-songs. They were what were to be expected from a spirit so unfaded; they still stand alone for tender homage and simple sweetness of passion. The technical perfection of Winther's verse, in its extreme simplicity, makes him the first song-writer of Denmark. (E. G.)

WINTHROP, JOHN (1588–1649), a Puritan leader and governor of Massachusetts, was born in Edwardston, Suffolk, on the 12th of January (O.S.) 1588, the son of Adam Winthrop of Groton Manor, and Anne (Browne) Winthrop. In December 1602 he matriculated at Trinity College, Cambridge, but he did not graduate. The years after his brief course at the university were devoted to the practice of law, in which he achieved considerable success, being appointed, about 1623, an attorney in the Court of Wards and Liveries, and also being engaged in the drafting of parliamentary bills. Though his residence was at Groton Manor, much of his time was spent in London. Meanwhile he passed through the deep spiritual experiences characteristic of Puritanism, and made wide acquaintance among the leaders of the Puritan party. On the 26th of August 1629 he joined in the "Cambridge Agreement," by which he, and his associates, pledged themselves to remove to New England, provided the government and patent of the Massachusetts colony should be removed thither. On the 20th of October following he was chosen governor of the "Governor and Company of the Massachusetts Bay in New England," and sailed in the "Arbella" in March 1630, reaching Salem (Mass.) on the 12th of June (O.S.), accompanied by a large party of Puritan immigrants. After a brief sojourn in Charlestown, Winthrop and many of his immediate associates settled in Boston in the autumn of 1630. He shared in the formation of a church at Charlestown (afterwards the First Church in Boston) on the 30th of July 1630, of which he was thenceforth a member. At Boston he erected a large house, and there he lived till his death on the 26th of March (O.S.) 1649.

Winthrop's history in New England was very largely that of the Massachusetts colony, of which he was twelve times chosen governor by annual election, serving in 1629–1634, 1637–1640, in 1642–1644, and in 1646–1649, and dying in office. To the service of the colony he gave not merely unwearied devotion; but in its interests consumed strength and fortune. His own temper of mind was conservative and somewhat aristocratic, but he guided political development, often under circumstances of great difficulty, with singular fairness and conspicuous magnanimity. In 1634–1635 he was a leader in putting the colony in a state of defence against possible coercion by the English government. He opposed the majority of his fellow-townsmen in the so-called "Antinomian controversy" of 1636–1637, taking a strongly conservative attitude towards the questions in dispute. He was the first president of the Commissioners of the United Colonies of New England, organized in 1643. He defended Massachusetts against threatened parliamentary interference once more in 1645–1646. That the colony successfully weathered its early perils was due more to Winthrop's skill and wisdom than to the services of any other of its citizens.

Winthrop was four times married. His first wife, to whom he was united on the 16th of April 1605, was Mary Forth, daughter of John Forth, of Great Stambridge, Essex. She bore him six children, of whom the eldest was John Winthrop, Jr. (*q.v.*). She was buried in Groton on the 26th of June 1615. On the 6th of December 1615 he married Thomasine Clopton, daughter of William Clopton of Castleins, near Groton. She died in childbirth about a year later. He married, on the 29th of April 1618, Margaret Tyndal, daughter of Sir John Tyndal, of Great Maplested, Essex. She followed him to New England in 1631, bore him eight children, and died on the 14th of June 1647. Late in 1647 or early in 1648 he married Mrs Martha Coytmore, widow of Thomas Coytmore, who survived him, and by whom he had one son.

Winthrop's *Journal*, an invaluable record of early Massachusetts history, was printed in part in Hartford in 1790; the whole in Boston, edited by James Savage, as *The History of New England from 1630 to 1649*, in 1825–1826, and again in 1853; and in New York, edited by James K. Hosmer, in 1908. His biography has been written by Robert C. Winthrop, *Life and Letters of John Winthrop* (2 vols., Boston, 1864, 1867; new ed. 1869); and by Joseph H. Twichell, *John Winthrop* (New York, 1891). See also Mrs Alice M. Earle, *Margaret Winthrop* (New York, 1895). (W. Wr.)

WINTHROP, JOHN (1606–1676), generally known as John Winthrop the Younger, son of the preceding, born at Groton, England, on the 12th of February 1606. He was educated at the Bury St Edmunds grammar school and at Trinity College, Dublin, studied law for a short time after 1624 at the Inner Temple, London, accompanied the ill-fated expedition of the duke of Buckingham for the relief of the Protestants of La Rochelle, and then travelled in Italy and the Levant, returning to England in 1629. In 1631 he followed his father to Massachusetts, and was one of the "assistants" in 1635, 1640 and 1641, and from 1644 to 1649. He was the chief founder of Agawam (now Ipswich), Mass., in 1633, went to England in 1634, and in the following year returned as governor, for one year, of Connecticut, under the Saye and Sele patent, sending out the party which built the fort at Saybrook, at the mouth of the Connecticut river. He then lived for a time in Massachusetts, where he devoted himself to the study of science and attempted to interest the settlers in the development of the colony's mineral resources. He was again in England in 1641–1643, and on his return established iron-works at Lynn and Braintree, Mass. In 1645 he obtained a title to lands in south-eastern Connecticut, and founded there in 1646 what is now New London, whither he removed in 1650. He became one of the magistrates of Connecticut in 1651; in 1657–1658 was governor of the colony; and in 1659 again became governor, being annually re-elected until his death. In 1662 he obtained in England the charter by which the colonies of Connecticut and New Haven were united. Besides being governor of Connecticut, he was also in 1675 one of the commissioners of the United Colonies of New England. While in England he was elected to membership in the newly organized Royal Society, to whose *Philosophical Transactions* he contributed two papers, "Some Natural Curiosities from New England," and "Description, Culture and Use of Maize." He died on the 5th of April 1676 in Boston, whither he had gone to attend a meeting of the commissioners of the United Colonies of New England.

His correspondence with the Royal Society was published in series 1, vol. xvi. of the *Massachusetts Historical Society's Proceedings*. See T. F. Waters's *Sketch of the Life of John Winthrop the Younger* (Ipswich, Mass., 1899).

Winthrop's son, Fitz-John Winthrop (1638–1707), was educated at Harvard, though he did not take a degree; served in the parliamentary army in Scotland under Monck, whom he accompanied on his march to London, and returned to Connecticut in 1663. As major-general he commanded the unsuccessful expedition of the New York and Connecticut forces against Canada in 1690; from 1693 to 1697 he was the agent of Connecticut in London; and from 1698 until his death he was governor of Connecticut.

WINTHROP, ROBERT CHARLES (1809–1894), American orator and statesman, a descendant of Governor John Winthrop (1588–1649), was born in Boston, Massachusetts, on the 12th of May 1809. He graduated at Harvard in 1828, studied law with Daniel Webster and in 1831 was admitted to the bar. He was a member of the Massachusetts House of Representatives in 1834–1840—for the last three years as speaker,—and in 1840 was elected to the national House of Representatives as a Whig, serving from December 1840 to 1850 (with a short intermission, April-December 1842). He soon became prominent and was speaker of the Thirtieth Congress (1847–1849), though his conservatism on slavery and kindred questions displeased extremists, North and South, who prevented his re-election as speaker of the Thirty-first Congress. On the resignation of Daniel Webster to become secretary of state, Winthrop was appointed to the Senate (July 1850), but was defeated in the Massachusetts legislature for the short term (Jan. 30, 1851) and for the long term (April 24, 1851) by a coalition of Democrats and Free Soilers and served only until February 1851. In the same year he received a plurality of the votes cast for governor, but as the constitution required a majority vote, the election was thrown into the legislature, where he was defeated by the same coalition. Thereafter, he was never a candidate for political office. With the breaking up of the Whig party he became an independent and supported Millard Fillmore in 1856, John Bell in 1860, and General G. B. McClellan in 1864. He was president of the Massachusetts Historical Society from 1855 to 1885, and for the last twenty-seven years of his life was president of the Peabody Trust for the advancement of education in the Southern States. Among his noteworthy orations of a patriotic character were those delivered at Boston in 1876, at Yorktown in 1881, and in Washington on the completion of the Washington Monument in 1885. He died in Boston on the 16th of November 1894.

Among his publications were *Addresses and Speeches* (Boston, 1852–1886); *Life and Letters of John Winthrop* (2 vols., Boston, 1864–1867); and *Washington, Bowdoin and Franklin* (Boston, 1876). See R. C. Winthrop, Jr., *Memoir of R. C. Winthrop* (Boston, 1897).

WINTHROP, a township and a summer resort of Suffolk county, Massachusetts, U.S.A., occupying a peninsula jutting out into Massachusetts Bay about 5 m. N.E. of Boston and 3 m. S.E. of Chelsea, and forming part of the north-eastern boundary of Boston Harbour. Pop. (1900) 6058, of whom 1437 were foreign-born and 43 were negroes; (1910, U.S. census) 10,132. Between May and October the population is estimated to be between 14,000 and 16,000. Area, 1·6 sq. m. Winthrop is served by the Winthrop branch of the Boston, Revere Beach & Lynn railway, and by electric railway from Orient Heights to Revere, Chelsea, East Boston, Lynn and Boston. The township contains several villages connected by a railway loop; there are nine stations in its 5·3 m. of track. The peninsula has about 8 m. of water front on the ocean and the harbour. The northern part nearest the narrow neck connecting with the mainland is a high bluff, known as Winthrop Highlands, having its north-eastern terminus in Grover's Cliff, a bold headland which forms the north-easternmost point of the peninsula. On Grover's Cliff is Fort Heath, a battery of three powerful long-range guns. At the western end of the Highlands is Fort Banks (a part of Boston's harbour defence), consisting of a masked battery of sixteen 12 in. mortars, each able to drop a 600 ℔ shell on a ship 6 m. at sea. From Grover's Cliff a fine sandy beach facing the open ocean leads to Great Head, the highest elevation on the peninsula. Winthrop Shore Drive (16·73 acres), one of the reservations of the Metropolitan park system, is a public parkway along the shore. From Great Head, a long sandy spit curves away southward, ending in Point Shirley, a hillock and flat sandy plain, separated by Shirley Gut, a narrow channel of deep water, from Deer Island, on which are the Boston House of Correction and City Prison. At Point Shirley is the Point Shirley Club house; at the western foot of Great Head, on Crystal Bay, is the Winthrop Yacht Club house and anchorage; and at Winthrop Center on the west side are the Town Hall, the High School, the Public Library, the Masonic Hall, College Park Yacht Club and Ingleside Park. There are several large summer hotels.

Winthrop, first known as "Pullen Poynt" (Pulling Point) because the tide made hard pulling here for boatmen, was originally a part of Boston; it was part of Chelsea from 1739 until 1846, when with Rumney Marsh it was separately incorporated as North Chelsea, from which it was set off as a township in 1852 under its present name, in honour of Deane Winthrop (1623–1704), who was a son of Governor John Winthrop, the elder, and whose house is still standing. Point Shirley takes its name from Governor William Shirley who helped to establish a cod fishery there in 1753. Before [illegible] Winthrop was a favourite [illegible] prominent families, including [illegible] Emersons, Lorings and [illegible] The community was a secluded [illegible] tion of the railway in 1876 [illegible]

See C. W. Hall, *Historic Winthrop*, [illegible]

WINWOOD, SIR RALPH (c. [illegible]) was born at Aynhoe in Northamptonshire [illegible] John's College, Oxford. In 1599 he became [illegible] Henry Neville (c. 1564–1615), the English ambassador [illegible] and he succeeded Neville in this position two years [illegible] taining it until 1603. In this year Winwood was sent to the Hague as agent to the States-General of the United Provinces, and according to custom he became a member of the [illegible] council of state. His hearty dislike of Spain coloured all his actions in Holland; he was anxious to see a continuance of the war between Spain and the United Netherlands, and he expressed both his own views and those of the English government at the time when he wrote, "how convenient this war would be for the good of His Majesty's realms, if it might be maintained without his charge." In June 1608 Winwood signed the league between England and the United Provinces, and he was in Holland when the trouble over the succession to the duchies of Jülich and Cleves threatened to cause a European war. In this matter he negotiated with the Protestant princes of Germany on behalf of James I. Having returned to England Sir Ralph became secretary of state in March 1614 and a member of parliament. In the House of Commons he defended the king's right to levy impositions, and other events of his secretaryship were the inquiry into the murder of Sir Thomas Overbury and the release of Raleigh in 1616. Raleigh was urged by Winwood to attack the Spanish fleet and the Spanish settlements in South America, and the secretary's share in this undertaking was the subject of complaints on the part of the representatives of Spain. In the midst of this he died in London on the 27th of October 1617. "It can hardly be doubted," says Gardiner, "that, if he had lived till the following summer, he would have shared in Raleigh's ruin." One of Winwood's daughters, Anne (d. 1643), married Edward Montagu, 2nd Baron Montagu of Boughton, and their son was Ralph Montagu, 1st duke of Montagu.

Winwood's official correspondence and other papers passed to the duke of Montagu, and are now in the possession of the duke of Buccleuch. They are calendared in the Report of the Historical Manuscripts Commission on the manuscripts of the duke of Buccleuch. See the *Introduction* to this *Report* (1899); and also S. R. Gardiner, *History of England*, vols. ii. and iii. (1904–1907).

WINZET, NINIAN (1518–1592), Scottish polemical writer, was born in Renfrew, and was probably educated at the university of Glasgow. He was ordained priest in 1540, and in 1552 was appointed master of the grammar school of Linlithgow, from which town he was later "expellit and schott out" by the partisans of Dean Patrick Kinlochy, "preacher" there. He had also enjoyed the office of Provost of the Collegiate Church of St Michael in that town. He retired to Edinburgh, where the return of Queen Mary had given heart to the Catholics. There he took part in the pamphlet war which then raged, and entered into conflict with Knox and other leading reformers. He appears to have acted for a time as confessor to the queen. In July 1562, when engaged in the printing of his *Last Blast*, he narrowly escaped the vengeance of his opponents, who had by that time gained the upper hand in the capital, and he fled, on the 3rd of September, with the nuncio Gouda to Louvain. He reached Paris in 1565 and became a member of the "German Nation" of the university. At Queen Mary's request he joined Bishop Leslie on his embassy to Queen Elizabeth in 1571, and remained with the bishop after his removal by Elizabeth's orders to ward at Fenny Staunton, Huntingdonshire. When further suspicion fell on Leslie and he was committed to the Tower, Winzet was permitted to return to Paris. There he continued his studies, and in 1574 left for Douai, where in the following year he became a licentiate. He was in residence at Rome from 1575 to 1577, and was then appointed by Pope

WIRKSWORTH, a market town in the western parliamentary division of Derbyshire, England, 14 m. N.N.W. of Derby, on a branch of the Midland railway. Pop. of urban district (1901) 3807. It is picturesquely situated at the head of the valley of a small tributary of the Derwent, at an elevation exceeding 500 ft., and is almost encircled by sharply rising hills. The cruciform church of St Mary, with a central tower and short spire, is in great part Early English, with Perpendicular additions; but considerable traces of a Norman building were revealed during a modern restoration. There is a manufacture of tape in the town, and lead-mining and stone-quarrying are carried on in the neighbourhood; relics of the Roman working of the lead mines have been discovered. A large brass vessel used as a standard measure for the lead ore, and dating from the time of Henry VIII., is preserved.

WISBECH, a municipal borough, market town, and port in the Wisbech parliamentary division of Cambridgeshire, England, 38 m. N. by W. of Cambridge, on the Great Eastern and the Great Northern and Midland joint railways. It lies in the flat fen country, on the river Nene (mainly on the east bank), 11 m. from its outlet on the Wash. By the Wisbech canal it has communication with the Ouse. The church of St Peter and St Paul has a double nave, with aisles, the north arcade being Norman; but the rest of the building is mainly Decorated and Perpendicular. There are remains of a Norman west tower; the Perpendicular tower stands on the north side. The museum contains a valuable library and various collections, including antiquities and objects of art and natural history. Other institutions include a grammar school founded in the middle of the 16th century and provided for by a charter of Edward VI., the Cambridgeshire hospital, a custom-house, a cattle-market, and an important corn-exchange, for Wisbech has a large trade in grain. A Gothic monument commemorates Thomas Clarkson (1760–1846), a powerful opponent of the slave-trade, and a native of the town. The shipping trade is carried on both at the town itself and at Sutton Bridge, 8 m. lower down the river. The chief imports are coal, timber and iron, and the exports grain and other agricultural products and salt. Foreign trade is chiefly with the Russian Baltic ports. In the neighbourhood large quantities of fruit are grown, including apples, pears, plums, gooseberries, and strawberries. Potatoes, asparagus, and other vegetables are also grown for the London market. The town possesses agricultural implement works, coach-building works, breweries, ropeworks, planing and sawing mills, and corn and oil-cake mills. The borough is under a mayor, 6 aldermen, and 18 councillors. Area, 6476 acres.

Wisbech (*Wisebec*, *i.e. Ousebec*) is near a Roman embankment and tumuli. About 940 the manor is said to have been given to the abbey of Ely by Oswy and Leoflede; the abbot held it in 1086; and it became attached to the see of Ely with the other possessions of the monastery. The castle is alleged to have been built by William I., and was converted from a fortress in the fens into an episcopal palace between 1471 and 1473. The growth of Wisbech depended on its position and episcopal patronage. In 1190 tenants of Wisbech Barton acquired an exemption from tolls throughout England, confirmed by John, Henry IV. and Henry V. The Gild of the Holy Trinity is mentioned in 1379, and grew rich and powerful. After its dissolution the townsmen became, in 1549, a corporation holding of the king, by a charter which transferred to them the property and duties of the gild, and was renewed in 1610 and 1669. By the Municipal Corporations Act of 1835 a mayor, aldermen and a council replaced the capital burgesses, the older governing body. The borough returned a member only to the parliament of 1658; its elected member, Secretary Thurloe, chose then to represent another constituency. A fair of twenty days from the vigil of Holy Trinity was granted to the bishop of Ely in 1327. The mart still occupies by custom the interval between Lynn mart, of which it is probably an offshoot, and Stamford fair in mid-Lent. A pleasure fair, called the Statute Fair, takes place shortly before Michaelmas. Importance attaches to the horse fair, the week before Whitsuntide and now on the second Thursday in May and on July 25, and to the cattle fair in the beginning of August. Saturday was market day in 1792; a corn market is now held on Saturday, a cattle market on Thursday and Saturday. In 1086 eels were prolific in Wisbech water. The port was noteworthy until a diversion of the Ouse, before 1292, rendered it hardly accessible. Drainage restored trade before 1634, and the act of 1773 for making Kinderley's Cut was the beginning of prosperity. From 1783 to 1825 agricultural produce was exported and coal imported. Hemp and flax had an importance, lost between 1827 and 1849, but responsible in 1792 for fairs on Saturday and Monday before Palm Sunday.

See W. Watson, *History of Wisbech* (Wisbech, 1827); N. Walker and C. Thomas, *History of Wisbech* (Wisbech, 1849); *History of Wisbech* (Wisbech and London, 1833).

WISCONSIN (known as "the Badger[1] state"), one of the North Central states of the United States of America. It is bounded on the E. by Lake Michigan, on the N. by the Upper Peninsula of Michigan and Lake Superior, on the W. by Minnesota and Iowa, and on the S. by Illinois. Its greatest length from N. to S. (42° 30′ N. Lat. to 47° 3′ N. Lat.) is 300 m., and its greatest breadth (86° 49′ W. Long. to 92° 54′ W. Long.) is 250 m. The greater part of the western boundary separating the state from Minnesota and Iowa consists of the Mississippi and St Croix rivers flowing S. and the Saint Louis river flowing into Lake Superior. The Menominee and Montreal rivers form a considerable part of the boundary line on the N. and E., separating it from the Upper Peninsula of Michigan. The state's lake shore boundary is more than 550 m. long. Included in Wisconsin are the Apostle Islands in Lake Superior, and Washington Island and a group of smaller islands at the entrance to Green Bay on the Lake Michigan side. The state occupies a total area of 56,066 sq. m.,[2] 810 of which are water surface. Roughly speaking, it divides the Great Lakes region from the upper valley of the Mississippi.

Physical Features.—Wisconsin forms part of the inner margin of an ancient coastal plain and the oldland of crystalline rocks about which the plain sediments were deposited. The plain and the oldland were well worn down by erosion and then were uplifted; were dissected by stream valleys, and were glaciated. The surface is generally rolling and undulating, comprising, with the Upper Peninsula of Michigan, a swelling elevation of land between the three depressions represented by Lakes Michigan and Superior and the Mississippi and the St Croix rivers. The lowest elevations are in the southern and central portions of the state, where the altitude averages between 580 and 600 ft. above sea-level. The highest points in the state are residual masses of relatively resistant rock rising above the erosion surface; such are: Rib Hill (1940 ft.) in Marathon county, in the north-central part, and some of the peaks of the Penokee Range in the N. part of the state, which are about 1800 ft. high. From the N. highland two heights of land (1200 to 1600 ft.) extend southward well into the central portions of the state, dividing the greater part of its area into two natural drainage basins. The westernmost of these elevations separates the valleys of the Mississippi, and the St Croix from that of the Wisconsin river. The eastern elevation is a ridge or cuesta formed by an outcropping hard layer of the ancient coastal plain; and it separates the Wisconsin river basin from the Fox River Valley and the streams flowing into Lake Michigan. Along the Mississippi and the Wisconsin runs a chain of bluffs varying in height from 200 to 300 ft., and in the E. a rocky limestone ridge or cuesta some 30 m. back from Lake Michigan extends from the Door county peninsula, E. of Lake Winnebago and as far south as the Illinois line. There are no large rivers flowing into Lake Superior and very little drainage in that direction, as from a point some 30 m. S. of the lake all the streams flow in a southerly direction. The Mississippi is the drainage basin for a greater part of the state. The St Croix river rises in the S.W. part of the Penokee Range and flows W. and S., forming the western boundary of the state for 135 m. before it joins the Mississippi 20 m. below St Paul. Before it is joined by the Wisconsin, the Mississippi

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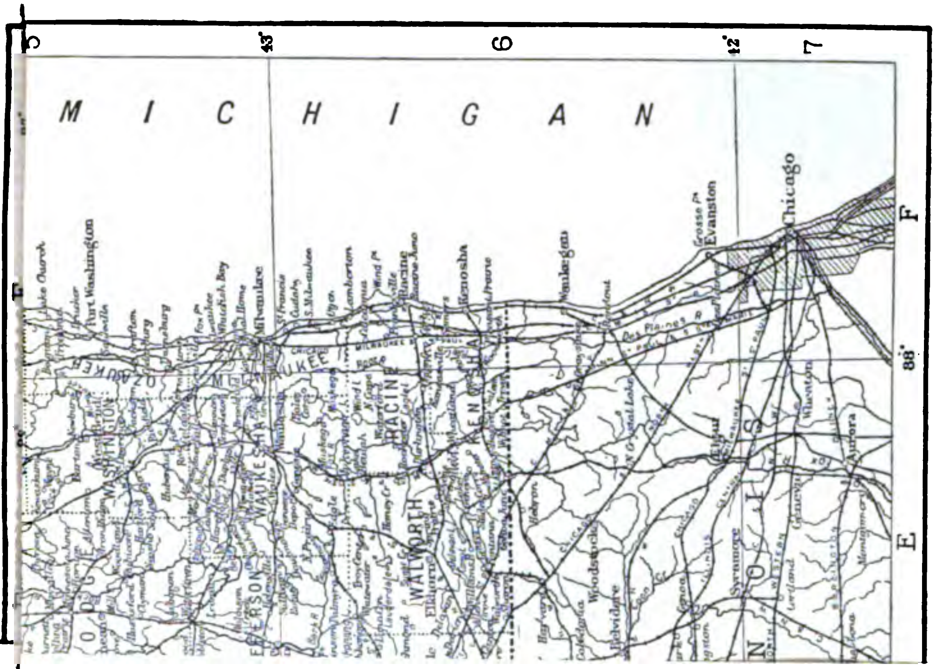
[1] The badger is not found in the state, and the name probably originated as a nickname for those lead miners N. of the Illinois line who came from the East, who lived in dug-outs like the hillside burrows of the badger, and who did not go home in winter like the miners from southern Illinois and farther south, who were called "suckers," a name borrowed from the migrating fish in the Rock, Illinois and other rivers flowing south. The name "suckers" was applied generally to all the people of Illinois, and the name "badgers" to the people of Wisconsin and "badger state" to the state.

[2] Besides the area as given here, the state has jurisdiction over approximately 7500 sq. m. of Lake Michigan and 2378 sq. m. of Lake Superior.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M I C H I G A N
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receives several rivers of considerable length, the most important of which are the Chippewa and the Black. The Wisconsin river rises on the Upper Michigan border and flows S. and W. for 600 m., joining the Mississippi near Prairie du Chien. It is navigable as far as Portage, some 200 m. from its mouth. The Fox river (more than 260 m. long) rises in the south central portion of the state, flows N. and E. by a circuitous route through Lake Winnebago, and thence N. into Green Bay, and is the longest and most important stream draining into Lake Michigan. The Wolf river is its most important tributary, joining it from the N., in its upper course. Besides the Fox several smaller streams drain into the Lake Michigan basin. Among these are the Menominee and Oconto, which flow into Green Bay; an arm of Lake Michigan, and the Sheboygan and Milwaukee rivers emptying directly into the lake. The southern portion of the state is drained by several streams flowing across the Illinois boundary and finding their way eventually through other rivers into the Mississippi. The largest of these are the Rock, Des Plaines, Fox (of the Illinois), or Pishtaka, and the Pecatonica rivers. On account of glacial disturbance of the drainage, Wisconsin's many streams provide water-powers of great value that have contributed much to the industrial prosperity of the state. The most valuable of these are the Fox, the Rock and the upper Wisconsin and its tributaries. Wisconsin has more than 2500 lakes, mostly in the glaciated N. and E. parts of the state. Of these the largest is Lake Winnebago, between Calumet, Outagamie, Fond du Lac and Winnebago counties, with an extreme length of 30 m. and a breadth of 10 m., and one of the largest bodies of water lying wholly within any state in the Union. On its banks are the important manufacturing cities of Oshkosh, Fond du Lac, Neenah and Menasha, and through it flows the Fox river. In the S. and E. portions of the state the lakes are beautiful clear bodies of water with sandy or gravelled shores, and, as a rule, high banks heavily wooded. Many of them are famous as summer resorts, notably Lake Geneva, Green Lake, the lakes in Waukesha county and the famous "four lakes" near Madison.

Flora and Fauna.—Wisconsin was originally the native home of most of the wild fowl and animals found in the other North Central states. Deer were found in large numbers in all sections of the state, bear were common in the central and northern parts, bison were found in the south-west, wolves, lynx ("wild cats"), and foxes and other smaller animals particularly of fur-bearing varieties. The streams abounded in fish. The abundance of game made the region between the lakes and the Mississippi a favourite hunting ground of the Indians, and later a productive field for the trapper and fur trader. Bear, deer and lynx are still to be found in the less settled forest regions of the N. parts, and the fisheries are still important.

The *avi-faunal* life of Wisconsin is exceedingly varied; C. B. Cory (see BIBLIOGRAPHY) enumerates 398 species for Wisconsin and Illinois, and of these probably not less than 350 occur in Wisconsin. The more characteristic and useful birds include many species of the sparrow, such as the song, swamp, Lincoln's chipping and field sparrow; the bank, barn, cliff, white-bellied and rough-winged swallow, as well as the purple martin and the chimney swift; ten or more species of fly-catchers, including the least, arcadian, phoebe, wood pewee, olive-sided and king bird; about ten species of woodpeckers, of which the more common are the downy, hairy, yellow-bellied and golden-winged (flicker); about thirty species of warblers, including the parula, cerulean, Blackburnian, prothonotary, yellow Nashville, red-start, worm-eating and chestnut-sided; and four or five species of vireos. The song-birds are well represented in the hermit thrush, wood thrush, Wilson's thrush (or veery), brown thrasher, robin, blue bird, bobolink, meadow lark, gold finch, &c. Among the game birds are the ruffed grouse (partridge), quail, prairie hen and wild turkey. The birds of prey include the red-shouldered, red-tailed, broad-winged, Cooper's, sharp-shinned and sparrow hawk and the bald eagle; the great horned, barred, barn, snowy, short-eared and screech owls. The ducks include the mallard, black duck, canvas-back and red-head; the Canadian goose, the snowy goose and the blue goose also appear during the migrating seasons.

Originally the greater portion of what is now Wisconsin was covered with forests, although in the S. and W. there were considerable tracts of rolling prairie lands. In the S. portion the predominating trees were hickory, elm, oak and poplar. Along the shore of Lake Michigan, and extending inland a quarter of the distance across the state and northward through the Fox River Valley, there was a heavy belt of oak, maple, birch, ash, hickory, elm and some pine. From the N. shores of Green Bay there stretched away to the N. and W. an enormous and unbroken forest of pines, hemlocks and spruce.

Climate.—The climate of the whole state is influenced by the storms which move eastward along the Canadian border and by those which move northward up the Mississippi Valley, and that of the eastern and northern sections is moderated by the Great Lakes. The winters, especially in the central and north-western sections, are long and severe, and the summers in the central and south-western sections are very warm; but the air is so dry that cold and heat are less felt here than they are in some humid climates with less extreme temperatures. The mean annual temperature for the state is 44° F. July, with an average temperature for the state of 70°, is the warmest month, and February, with an average of 15°, is the coldest. Within a period of thirty-eight years, from 1870 to 1908, extremes at Milwaukee ranged from 100° to − 25°, while at La Crosse, on the western border and less than 60 m. farther north, they ranged during the same period from 104° to − 43°. The greatest extremes recorded at regular observing stations range from 111° at Brodhead, in Green county and near the southern border, on the 21st of July 1901 to − 48° at Barron, in Barron county in the north-western part of the state, on the 10th of February 1889. The average annual precipitation for the state is 31·5 in. Two-thirds of this comes in the six growing months from April to September inclusive, and the rainfall is well distributed over all sections. There is an annual snowfall of 53 in. in the northern section, 40 in. in the southern section and 36 in. in the central section, which is quite evenly distributed through the months of December, January, February and March. In the northern section the heavy snowfall is caused by the cyclonic storms along the Canadian border, and in the southern section the snowfall is increased by the storms which ascend the Mississippi Valley. All sections of the state are subject to tornadoes. They occur more frequently in the western portion than in the eastern portion, but one of the most destructive in the history of the state occurred at Racine on the 18th of May 1883. This storm killed 25 persons, injured 100, and destroyed considerable property.

Agriculture.—Hay and grain are the most important crops. In 1909 the acreage of hay was 2,369,000 and the value of the crop $34,800,000. In the production of the hardy cereals, barley, rye and buckwheat, Wisconsin ranks high among the states of the Union; but oats and Indian corn are the largest cereal crops in the state. The crop of oats was 79,800,000 bushels (raised on 2,280,000 acres and valued at $31,122,000) in 1909; of Indian corn, 50,589,000 bushels (raised on 1,533,000 acres and valued at $30,353,000); of barley, 24,248,000 bushels (raised on 866,000 acres and valued at $13,579,000—a crop exceeded only by that of California and that of Minnesota); of wheat, 3,484,000 bushels (raised on 179,000 acres and valued at $3,345,000); of rye, 4,727,000 bushels (raised on 290,000 acres and valued at $3,214,000—a crop exceeded only by that of Pennsylvania and that of Michigan); and of buckwheat, 221,000 bushels (grown on 18,000 acres and valued at $172,000). The potato crop is large, 26,724,000 bushels being raised in 1909 on 262,000 acres, a crop exceeded only in New York, Michigan and Maine. Tobacco also is a valuable crop: in 1909 37,170,000 lb, valued at $3,419,640, were grown on 31,500 acres. In 1909 14,000 acres of sugar beets were harvested and 34,340,000 lb of sugar were manufactured in the four beet sugar factories in the state. In the south-central part of the state there are valuable cranberry marshes. Orchard fruits, especially apples, are of increasing importance.

The raising of live-stock, particularly of dairy cows, is an important industry. In 1910, out of a total of 2,587,000 neat cattle, there were 1,506,000 milch cows. The total number of horses in the state was 669,000 in 1910, when they were valued at $80,949,000. There were 1,034,000 sheep, and 1,651,000 swine.

Manufactures.—The growth of manufacturing has been rapid: in 1850 the value of the manufactures was $9,293,068; in 1860, $27,849,467; in 1870, $77,214,326; in 1880, $128,255,480; in 1890, $248,546,164; and in 1900, $360,818,942. The product under the factory system, excluding hand trades and neighbourhood industries, was $326,752,878 in 1900 and $411,139,681 in 1905. The most important of the state's manufactures in 1900 and in 1905 were lumber and timber products, valued in the latter year at $44,395,766 (Wisconsin being second in rank to the state of Washington). About 60% (both in quantity and value) of the lumber sawed in 1905 was white pine; next in importance were hemlock (more than one-fourth in quantity), basswood (nearly 4%) and, in smaller quantities, birch, oak, elm, maple, ash, tamarack, Norway pine, cedar and spruce. The value of the product of planing mills was $11,210,205 in 1905; and other important manufactures based on raw materials from forests were paper and wood pulp ($17,844,174) and furniture (11,569,591). Second in value in 1905 were cheese, butter and condensed milk ($20,994,791), in the product of which Wisconsin ranked second to New York in 1900 and 1905. In 1905 Wisconsin ranked first of all the states in the value of butter, second in the value of cheese and fifth in the value of condensed milk; the dairy product of Wisconsin in this year was 17·8% (by value) of that of the entire country. Foundry and machine-shop products ranked third in value in 1905, when they were valued at $29,908,001, and when iron and steel manufactures were valued at $10,453,750.

Among the other important manufactures in 1905 were: malt liquors ($28,692,340) and malt ($8,740,103, being 113·7% more than in 1900); flour and grist-mill products ($28,352,237; about 60% was wheat flour); leather ($25,845,123); wholesale slaughtering and meat-packing ($16,060,423); agricultural implements ($10,076,760); carriages and wagons ($7,511,392); men's clothing ($6,525,276); boots and shoes ($6,513,563); steam railway cars, constructed and repaired ($6,511,731); hosiery and knit goods ($4,941,744); cigars ($4,372,139); mattresses and spring beds ($3,527,587); and electrical machinery, apparatus and supplies ($3,194,132).

In 1905, out of a total factory product of $411,139,681, $259,420,044 was the value of goods made in factories in the twenty-two municipalities of the state, with a population (1900) of at least 8000; but only 36·3% of the total number of factories were in urban districts. More than one-third of the value of factory products was that of the manufactures of Milwaukee ($138,881,545). Racine ranked second with a factory product valued at $16,458,965. The manufacture of furniture in Wisconsin is centralized especially in Sheboygan, where in 1905 was manufactured about one-third of the furniture made in the state.

Mines and Quarries.—The lead mines of south-western Wisconsin played an important part in the early development of the state (see § *History*). When the main deposits had been worked down to the water level, mining (up to that time principally of lead) stopped and did not start again until about 1900, when the high price of zinc stimulated renewed working of these deposits. The principal ores are galena, sphalerite or zinc blende and smithsonite or zinc carbonate, which is locally called "dry bone" and which was the first zinc ore mined in the state. In 1908 the lead product was valued at $347,592 and the zinc product at $1,711,364, Wisconsin ranking fourth among the zinc-mining states. The production of iron ore in the Gogebic and Menominee ranges on the upper Michigan border is important. Red haematite was mined in Dodge county before 1854; in 1877 the deposits in Florence county were first worked, and in 1882 276,017 tons were shipped from that county; and about 1884 began the development of the Gogebic deposits in Iron and Ashland counties. The maximum output was in 1890, being 948,965 long tons; in 1902 it was 783,996 long tons (79% from Iron county); and in 1908, 733,993 tons. The output is almost entirely haematite. There are large deposits of stratified clay along the shores of Lake Michigan, from which is made a cream-coloured brick, so largely used in Milwaukee that that city has been called the "cream city"; the total value of clay products in 1907 was $1,127,819 and in 1908 $958,395. By far the most valuable mineral output is building stone, which was valued in 1908 at $2,850,920, including granite ($1,529,781), limestone ($1,102,009) and sandstone ($219,130). In 1907 and 1908 the state ranked fifth among the states of the country in the value of granite quarried; in 1902 it ranked fifteenth. The industry began in 1880, when the first quarry (at Granite Heights, Marathon county) was opened. The principal quarries are in Dodge, Green Lake (a blackish granite is quarried at Utley and a pinkish rhyolite at Berlin), Marathon, Marinette, Marquette, Sauk, Waupaca and Waushara counties. Wisconsin granite is especially suitable for monumental work. Limestone is found in a broad belt in the east, south and west; more than 40% of the total output in 1908, which was valued at $1,102,009, was used for road-making and more than one-sixth in the manufacture of concrete. In 1907 and 1908 Wisconsin ranked seventh among the states in the value of limestone quarried. The first limestone quarries were opened at Genesee, Waukesha county, in 1848; at Wauwatosa, near Milwaukee, in 1855; and near Bridgeport in 1856. Freshwater pearls are found in many of the streams; and in 1907 and 1908 Wisconsin ranked first among the states in the value of mineral waters sold, with a value of $1,526,703 in 1907 and $1,413,107 in 1908, although in both years the quantity sold in Wisconsin was less than in Minnesota or in New York. The most famous of these springs are in Waukesha county, whence White Rock, Bethesda, Clysmic and other waters are shipped.

Forests.—In 1890 and in 1900 (when the wooded area was estimated at 31,750 sq. m., or 58% of the total area of the state) Wisconsin was the foremost state in the Union in the production of lumber and timber. In 1905 the value of the lumber and timber product was exceeded by that of Washington; but as late as 1908 Wisconsin was the chief source of the white pine supply. Next to white pine (used largely in shipbuilding) in value in 1908 were red or Norway pine (used in house building), hemlock (used for lumber and wood pulp) and white spruce, a very valuable lumber tree. In 1908 the area of the state forest reserve lands under a state board of forestry (chiefly in Oneida, Forest, Iron, Price and Vilas counties) was 253,573 acres. Forest fires have been numerous and exceedingly destructive in Wisconsin; the loss of timber and other property from this cause in 1908 was about $9,000,000.

Fisheries.—The fisheries of Wisconsin are of considerable importance; the catch in 1908 was valued at $1,067,170, lake trout and herring being the most valuable. There is a state board of commissioners of fisheries (see below, § *Government*), which distributed in 1908 149,338,069 eggs, fry and fingerlings, including 112,075,000 wall-eyed pike and about 12,000,000 each of lake trout and whitefish. There are state hatcheries at Madison (for brook and rainbow trout), Bayfield (brook, rainbow and lake trout and whitefish), Oshkosh (lake trout, whitefish and wall-eyed pike), Minocqua (pike, bass and muskallonge), Delafield (black bass and wall-eyed pike) and Wild Rose (brook trout).

Transportation and Commerce.—Railway building in Wisconsin began in 1851, when a track was laid from Milwaukee to Waukesha (20 m.), which was extended westward in 1854 to Madison and in 1857 to the Mississippi at Prairie du Chien. This line was the forerunner of the great Chicago, Milwaukee & St Paul system, which now crosses the southern half of the state with two trunk lines and with one line parallels the shore of Lake Michigan. The Chicago & North-Western and the Chicago, St Paul, Minneapolis & Omaha, which it controls, are together known as "The North-Western Line." The tracks of the Chicago & North-Western (built to Janesville in 1855 and to Fond du Lac in 1858) form a network in the eastern part of the state, affording direct connexions with Chicago. The Chicago, St Paul, Minneapolis & Omaha extends into the western part of the state, where it connects with the trans-Mississippi lines of the Chicago & North-Western. The Chicago, Burlington & Quincy (owned by the Great Northern and the Northern Pacific railways) traverses the state along its western boundary and gives it access to a third great railway system with transcontinental service. The Minneapolis, St Paul & Sault Ste. Marie, in which has been absorbed the old Wisconsin Central, crosses the state and extends into the Canadian North-West, sharing in the heavy grain traffic of that section, and, like the Duluth, South Shore & Atlantic, which runs along the Lake Superior shore, is a link in the transcontinental system of the Canadian Pacific, which controls both these roads. The Northern Pacific enters Wisconsin in its north western corner and extends to the Lake Superior country. The Green Bay & Western railway between Winona and Kewaunee has ferry connexion across Lake Michigan. In 1900 there were 6538 m. of track, and on the 1st of January 1909 7512 m. Characteristic of the commerce of the state is the shipment by the Great Lakes of bulky freight, chiefly iron ore, grain and flour and lumber. The return freight movement to the Wisconsin lake ports is made up chiefly of coal from the Lake Erie shipping points for the coalfields of Pennsylvania and West Virginia. Milwaukee is one of the leading lake ports, and is the only port of entry in the state; its imports were valued at $796,285 in 1899 and at $4,493,635 in 1909, and its exports at $2726 in 1899 and at $244,890 in 1909.

To connect the upper Mississippi river and the Great Lakes, between 1840 and 1850 a canal was begun between the Fox, flowing into Green Bay, an arm of Lake Michigan and the Wisconsin river, flowing into the Mississippi,[1] and improvement of navigation on these rivers was undertaken by the state with the assistance of the Federal government; in 1853 the work came into the hands of a private corporation which in 1856 opened the canal. In 1872 it was taken over by the United States. In 1887 the route through the Wisconsin river was abandoned, and thereafter only the Fox river was improved. Up to June 1909 $3,810,421 had been spent by the Federal government on this improvement. Green Bay has communication with Lake Michigan, not only by way of its natural entrance, but by a government ship canal (built 1872–1881 by a private company; taken over by the Federal government in 1893; maximum draft in 1909, 20 ft.; projected channel depth, 21 ft.) at Sturgeon Bay, an arm of Green Bay, which cuts across the Door county peninsula. In 1908 there passed through this canal 2307 vessels carrying cargoes of an estimated value of $18,261,455·15.

Population.—The population of Wisconsin in 1890 was 1,686,880 (exclusive of 6450 persons specially enumerated); in 1900 the total was 2,069,042—an increase of 22·2% on the basis of the total at each enumeration; and in 1910 it reached a total of 2,333,860.[2] The density of the population in 1910 was 42.2 to the square mile. Of the total population in 1900, 1,553,071, or 75·1%, were native-born, the increase in native-born since 1890 having been 32·3%, while there was a decrease of foreign-born of 0·6%. The falling off in foreign immigration in the decade 1890–1900 contrasts strongly with the increase of 28·1% in the number of foreign-born in 1880–1890. Of the native-born population in 1900, 84%, or 1,304,918, were born within the state. Of the foreign-born 242,777 were Germans, 61,575 were Norwegians, 26,196 were Swedes, 25,607 were natives of German Poland, 23,860 were English-Canadians and 23,544 were Irish. Of the total population 1,472,327 persons, or more than seven-tenths (71·2%), were of foreign parentage—*i.e.* either one or both parents were foreign-born—and 576,746 were of German, 134,293 of Norwegian, 76,593 of Irish and 70,585 of Polish parentage, both on the father's and on the mother's side. At the census of 1840, with the exception of a few thousand French-Canadians, the population was made up of American-born pioneers from the Eastern states, and in the southern portion of the territory of a sprinkling of men from Kentucky, Virginia and farther south. Before the next census was taken the revolutionary movement of 1848 in Germany led to the emigration of thousands from that country to Wisconsin, and there was an increase of 886·9% in the population from 1840 to 1850. Norwegians and other Scandinavians, Irish, Poles, Dutch, Belgians and Swiss followed. Germans and Irish are now scattered throughout the state; but the German element predominates markedly in Milwaukee. Norwegians, Danes and Swedes are more numerous in the western and northern counties. There are Finns in Douglas county and Icelanders on Washington Island, in Green Bay. Poles are chiefly in Milwaukee, Manitowoc and Portage counties, Belgians and Dutch in Brown and Door counties, German Swiss in Green, Fond du Lac, Winnebago, Buffalo and Pierce counties, and Bohemians in Kewaunee county, where they form almost 50% of the population. Some Italians are massed in Vernon and Florence counties, and there are French Canadians in the north. There were 8372 Indians, of whom 1657 were not taxed, 2542 negroes, 212 Chinese and 5 Japanese in the state in 1900. The Indians include representatives of the Menominee (1487 in 1909), Stockbridge and Munsee (582) tribes under the Keshena School, Chippewa under the Lac du Flambeau School (705) and the La Pointe School (4453), Oneida (2259) under the Oneida

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[1] The Fox and Wisconsin rivers are separated at Portage by a distance of only 2 m.

[2] At each preceding census the population was as follows: (1840) 30,945, (1850) 305,391, (1860) 775,881, (1870) 1,054,670. By the state census of 1905 it was 2,228,949.

School, Winnebago (1094) under the Wittenberg School and Potawatomi (440) not under an agent. The civilized Brotherton and Stockbridge Indians live principally in Calumet county. Among religious denominations the Roman Catholics, with 505,264 members in 1906, had 50·5% of the total communicants or church members in the state. The Lutheran bodies ranked next with 284,286 members (including 153,690 of the Evangelical church, 49,535 of the United Norwegian church, 23,927 of the Synod for the Norwegian Evangelical church 15,471 of the Evangelical Lutheran Joint Synod of Ohio, 15,220 of the Evangelical Lutheran Synod of Iowa and 8695 of the General Council). Only one other state (Pennsylvania) had a larger percentage of the total membership of this denomination. There were 57,473 Methodists (chiefly of the Methodist Episcopal Church), 26,163 Congregationalists and 21,716 Baptists.

Government.—The original constitution of the state, adopted in 1848, and amended in 1869, 1870, 1874, 1877, 1881, 1882, 1902 and 1908, is still in force. An amendment may be proposed by either house of the legislature, and if passed by two successive legislatures by a majority of the members elected to each house must be submitted to the people for ratification by a majority vote. A constitutional convention may be called on the recommendation of a majority of the Senate and Assembly if this proposal receives a majority vote at the next election for members of the legislature. Suffrage was originally granted to every male[1] twenty-one years of age or upwards resident in the state for one year preceding any election—if he were a white citizen of the United States, or a white of foreign birth who had declared his intention to be naturalized, or an Indian declared by Congress a citizen of the United States, or a civilized person of Indian descent not a member of any tribe; and the constitution provided that the legislature might by law give suffrage to others than those enumerated if such an act of legislature were approved by a majority of the popular vote at a general election. By an amendment of 1882 the word "white" was omitted and by an amendment of 1908 it was provided that those foreign-born and unnaturalized in order to become electors must have declared their intentions to become citizens before the 1st of December 1908, and that "the rights hereby granted to such persons shall cease on the first day of December A.D. 1912." The amendment of 1908 also permits the legislature to provide for the registration of electors in incorporated cities and villages.

The official ballot is of the blanket type, with names of candidates in party columns, but with no candidate's name repeated on the ballot and with no emblems to mark the party columns. In 1909 an act was passed permitting county boards to adopt a "coupon" ballot.[2] Since 1905 there has been a direct nomination system of primaries for all officers except delegates to national nominating conventions.

Executive power is vested in a governor and a lieutenant-governor, elected for two years. The governor's salary (since 1869) is $5000 a year and the lieutenant-governor's $1000. Candidates for either office must be citizens of the United States and qualified electors of the state. The lieutenant-governor is president of the Senate with a casting vote only. A bill vetoed by the governor becomes a law if it is approved by two-thirds of the members present in each house; and a bill not returned by the governor within six days (excepting Sunday; before 1908 the constitutional limit was three days) after its presentation to him becomes a law unless the return of the bill is prevented by the adjournment of the legislature. The governor has power to grant reprieves, commutations and pardons, except for treason—he may suspend execution of sentence for treason until action is taken by the legislature—and in cases of impeachment.

The administrative officers, a secretary of state, a treasurer and an attorney-general, are elected for two years and act as commissioners of public lands. The secretary of state is *ex-officio* auditor; and he acts as governor if the regularly elected governor and lieutenant-governor die, are removed from office or are absent from the state. A state superintendent of public instruction is chosen by popular vote for a four-year term. Other administrative officers are a commissioner of insurance (from 1867 to 1878 the secretary of the state was commissioner of insurance; the office became elective in 1881); a commissioner of labour and industrial statistics; three railroad commissioners,[3] who have jurisdiction over all public utilities, including telegraph and telephone; a commissioner of banking; a dairy and food commissioner; a state superintendent of public property; three tax commissioners who act (since 1901) as a state board of assessment; commissioners of fisheries (established 1874); a state board of agriculture (1897); and a state board of forestry (1905, succeeding a department created in 1903).

The legislature consists of a Senate and an Assembly and meets biennially, and when called in special session by the governor to transact special business definitely named in the governor's call. The number of assemblymen cannot be less than 54 or more than 100, and the number of senators must be not more than one-third or less than one-fourth the number of members of the Assembly. In 1910 there were 33 senators and 100 assemblymen. Elections to the Senate and Assembly are biennial[4] and the term of members of the Assembly is two years, but the senatorial term is four years and only one-half of the members are elected each two years. A candidate for either house must have resided in the state at least one year, must be a qualified elector in the district from which he is chosen, and may not be a member of Congress or hold any military or civil office under the United States. Since 1855 a state census has been taken every ten years, and on the basis of these censuses the legislature re-apportions the Senate and Assembly districts. Each member of the legislature receives $500 a year and 10 cents a mile for mileage. Any bill may originate in either house, and either house may amend a bill passed by the other. Special legislation of several specified kinds is forbidden, especially by amendments of 1871 and 1892; and the constitution as adopted in 1848 prohibited the legislature's authorizing any lottery or granting any divorce. The Assembly may impeach civil officers by a majority of all elected members, and the Senate to try impeachments; for conviction a two-thirds vote of all members present is required.

The judicial power of the state is vested: in a supreme court[5] of seven members (salary $6000 a year; elected for a term of ten years; the senior justice is chief justice) with appellate jurisdiction throughout the state, general superintendence over all inferior courts, power to issue, hear and determine writs of *habeas corpus*, *mandamus*, injunction, *quo warranto*, *certiorari* and other original and remedial writs; nineteen (only five under the constitution of 1848) circuit courts, of one judge each except in the second circuit (including Milwaukee) in which there are four judges, elected (at a spring election, and not at the general state election) by the voters of the circuit district; probate judges, one elected (for two years) in each county, except where the legislature confers probate powers on inferior courts; and in towns, cities and villages, justices of the peace, elected for two years.

Local Government.—Wisconsin has the mixed or township-county system of local government. Each township (or "town," as it is commonly called) elects at its annual town meeting on the first Tuesday in April three supervisors, a clerk, a treasurer, one or more assessors, two justices of the peace, from one to three constables, and, if the town has a library, a librarian. Justices of the peace hold office for two years, other town officers for one year only, except that in a county having a population of 100,000 or more (Milwaukee county), town meetings are biennial and all officers are elected for two years. For other than school purposes rates must not exceed 2% of the assessed valuation of the taxable property in the town. The chairmen of the several town boards of supervisors, with the supervisor of each ward of a city and the supervisor of each village in the county, constitute the county board of supervisors, and each county elects biennially, at the general election in November, a clerk, a treasurer, a sheriff, a coroner, a clerk of the circuit court, a district-attorney, a register of deeds and a surveyor. The county board represents the county, is entrusted with the care of the county property and the management of the county business, appoints a supervisor of assessments and levies the taxes necessary to defray the county expenses. The county board also elects a county highway commissioner for a term of three years, is required to designate a system of prospective county highways, and may levy a special tax and borrow money for the development of the system. Cities are chartered according to population,[1] with a mayor, a single legislative chamber known as the board of aldermen or city council and the usual administrative officers and boards. The mayor, aldermen, treasurer, comptroller, justices of the peace and supervisors must be elected by the people, but the other offices are filled as the council of each city directs. An act of 1909 provides for the adoption of government by commission in any city of the second, third or fourth class which votes for this form of government at an election called by a petition signed by 25 % of the voters at the preceding election for mayor.

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[1] Excepting persons under guardianship, those weak-minded or insane, those convicted (without restoration to civil rights) of treason or felony, and those who have engaged (directly or indirectly) in a duel.

[2] The coupon ballot was proposed for use throughout the state, but was defeated by popular vote in April 1906. The ticket is made up of as many coloured sheets as there are party organizations (plus one for independent nominations), and the name of each candidate is on a perforated slip, which must be detached if it is to be voted.

[3] The office of railroad commissioner was created in 1874, became elective in 1881 and was replaced under an act of 1905 by a commission of three members, which received jurisdiction over other public service corporations in 1907.

[4] Until 1881 elections to the legislature were held annually, and the term of assemblymen was one year and of senators two years.

[5] Not separately organized until 1853, the judges of the circuit court acted as justices of the supreme court.

Miscellaneous Laws.—A married woman may manage her separate property as if she were single. A widow is entitled to a dower in one-third of her husband's real estate, and a widower is life tenant by courtesy of all the real estate of which his wife died seized and not disposed of by her last will, unless she leaves issue by a former husband, to whom the estate might descend, in which case her estate passes immediately to such issue. If either husband or wife dies intestate and leaves no issue the surviving spouse is entitled to the entire estate of the deceased, both real and personal. The causes for an absolute divorce are adultery, impotency, sentence to imprisonment for a term of three years or more, wilful desertion for one year, cruel or inhuman treatment, habitual drunkenness and voluntary separation for five years. For any other cause than adultery an action for a divorce cannot be brought unless one of the parties has been a resident of the state for two years immediately preceding the suit. Neither party is permitted to marry a third party until one year after the divorce has been obtained. Adultery is punishable by imprisonment in the state prison for not more than three years nor less than one year, or by a fine not exceeding $1000 nor less than $200. A husband who wilfully abandons his wife, leaving her destitute, or who refuses to support her when he is able to do so, may be punished by imprisonment in the state prison not exceeding one year or in the county jail or workhouse not more than six months nor less than fifteen days, and for ten days, in the discretion of the judge, he may be kept on a bread and water diet. A homestead owned and occupied by any resident of the state and consisting of not more than 40 acres of agricultural land outside the limits of a city or village, or one-fourth of an acre within a city or village, together with the dwelling-house and other appurtenances, is exempt from liability for debts other than labourers', mechanics' and purchase-money liens, mortgages and taxes. If the homestead is sold the proceeds from the sale, to an amount not exceeding $5000, are likewise exempt for a period of two years, provided they are held for the purpose of procuring another homestead. If the owner is a married man his homestead cannot be sold or mortgaged without his wife's consent. The employment of children under fourteen years of age in any factory, workshop, mine, bowling alley or beer garden is forbidden, and their employment at any gainful occupation is permitted only during the vacation of the public school. A child between fourteen and sixteen years of age may be employed at a gainful occupation only upon the recommendation of the school principal or clerk of the board of education. No child under sixteen years of age may be employed longer than fifty-five hours in any one week, more than ten hours in any one day, more than six days in any one week, or between 6·0 p.m. and 7·0 a.m.

Other radical legislation, especially in regard to railways, has included: the Porter Law, regulating rates, which was enacted in 1874 during the "Granger Movement," was modified from time to time, and was displaced by a law of 1905 (in 1908 declared constitutional so long as stockholders receive a "reasonable compensation" on investments) creating a state railway commission, and providing for the physical valuation of railways on an *ad valorem* basis for taxation; a law (1907) making 2 cents a mile the maximum fare; an anti-tipping law (1905); a law forbidding the sale of cigarettes; an act (1907) forbidding insurance companies to do both participating and non-participating business; and an eight-hour labour law in effect on the 1st of January 1908.

Finance.—Revenue for state purposes is derived principally from taxes on corporations, from an inheritance tax and from departmental and institutional fees and charges; that for counties, towns, villages and cities from a general property tax. The general property tax has long been employed almost wholly for educational purposes only. The state tax on railways and other public service corporations is levied on an *ad valorem* basis; but telephone companies are taxed by collecting a percentage of the gross receipts. Insurance companies are taxed on premiums and income. In 1908 the constitution was amended to permit a graduated tax on incomes, privileges and occupations. A poll tax is levied for highway purposes in towns and villages, but the general charter law does not provide for the collection of poll taxes in cities. The proceeds from corporation taxes increased from $1,711,387 in 1899 to $3,969,771 in 1908. The state receipts from all sources increased from $4,070,316 for the year ending September 30, 1899, to $8,299,982 for the year ending June 30, 1908; the disbursements in the latter year were $7,762,771 or $537,211 less than the receipts.

As a result of the failure of "wildcat" banks during the Territorial period, a clause was inserted in the state constitution forbidding the legislature to charter a bank or pass a general banking law until the people had voted in favour of banks, and providing further that no bank charter or general banking law should be of any force until a majority of the voters at a general election had approved of it. The people gave their approval to a general banking law in 1852, and state banks were incorporated under it. Private banks and one savings bank were also chartered. In 1903 a state banking department was created under the management of a commissioner of banking appointed by the governor with the concurrence of the Senate for a term of five years. Under this law private banks became state banks, and all except national banks are examined by the commissioner, his deputy or some person appointed by the commissioner, at least once a year. When satisfied that a bank has become insolvent, the commissioner may take possession of it and wind up its affairs. In 1909 there were 470 state banks and 3 savings banks with total resources amounting to $140,155,455.

To prevent such extravagant expenditures for internal improvements as had brought disaster to Michigan and other states, the framers of the constitution of Wisconsin inserted a clause limiting its aggregate indebtedness to $100,000 for all purposes other than to repel an invasion, to suppress an insurrection or for defence in time of war, and the state is free from debt with the exception of that contracted on account of the Civil War. This war debt, although amounting to $2,251,000, is held by four state educational funds. A constitutional amendment, adopted in 1874, limits the indebtedness of each county, city, town, village and school district to 5 % of the value of its taxable property.

Education.—Wisconsin has an excellent free public school system, which was established in 1848 and which provides a graded system of instruction in country district and city schools, high schools and normal schools and the University of Wisconsin (incorporated 1848; see WISCONSIN, UNIVERSITY OF). By a law of 1907 school attendance (24 weeks per annum in the country—a law of 1903 had required only 20 weeks—32 weeks in cities) was made compulsory for children between seven and fourteen years of age who do not live more than 2 m. from school by the nearest travelled public highway. In 1907–1908 27·2% of those between seven and fourteen years of age in the state attended no school. The total public school enrolment in 1909 1910 was 466,554. In 1901 a law was enacted providing for state graded schools of two classes, which must be opened for at least nine months each year; graded schools of the first class (of three or more departments) receive $300 a year each from the state, and graded schools of the second class (of two departments only) receive $200 a year each from the state. About 1906 rural graded schools, outside of villages, were first organized. There are twenty-two day schools for the deaf. There are a few township high schools (28 out of 285 in 1909), and these receive from the state one-half of the total annually paid for teachers' salaries; for free high schools the first state provision was made in 1875. There are special kindergarten training departments in the Milwaukee and Superior schools, departments for manual training at Oshkosh and Platteville, and a training department in domestic science at the Stevens Point school. The first kindergarten officially connected with any American state normal school was opened at Oshkosh in 1880. The state normal schools are supported largely from the interest ($89,137 in 1908) of a fund ($1,957,230 in 1908) created in 1865 from the sale of swamp and overflowed lands, and from an annual state tax ($230,000 in 1908). In addition to the state university the state maintains at Platteville a school of mines, opened in 1908. Under state control there is a system of teachers' and farmers' institutes. A Free Library Commission of five members created in 1895 maintains about 650 circulating free public libraries comprising more than 40,000 volumes. In 1907 there were about 960,000 volumes in public township libraries for which a law of 1887 had made provision; since 1895 the formation of such libraries has been mandatory, and books, chosen by the county superintendent, are bought from a fund of 10 cents for every person of school age in towns, villages and cities of the fourth class. An act of 1901 permits county boards to establish county systems of travelling libraries. In 1908 the total expenditure for public education in the state was $12,547,574; of this sum $10,604,294 was spent for common schools, high schools and graded schools, $1,091,135 for the university, and $547,661 for normal schools. The total income for schools in 1907–1908 was $1,773,659, of which $1,379,410 was from the seven-tenths-of-a-mill tax, $200,000 was from licence fees and taxes upon corporations (for salaries of rural school inspectors) and $194,249 the income from the common school fund which in that year amounted to $3,845,929.

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[1] The first class comprises cities having a population of 150,000 or more (Milwaukee); the second class those having a population between 40,000 and 150,000; the third class those having a population between 10,000 and 40,000; the fourth class those having a population les

Educational institutions of collegiate rank are Beloit College (1846; originally Congregational, now undenominational) at Beloit; Carroll College (1846, Presbyterian), at Waukesha; Lawrence College (1847; Methodist Episcopal), at Appleton; Concordia College (1881; Lutheran), Marquette University (1864, Roman Catholic), and Milwaukee-Downer College (1895; non-sectarian, for women; an outgrowth of Downer College, Congregational and Presbyterian, founded at Fox Lake in 1853), all at Milwaukee; Milton College (1867; Seventh Day Baptist), at Milton; North-western University (1865; Lutheran) at Watertown; Ripon College (1851; originally under Presbyterian and Congregational control, now non-sectarian), at Ripon; Wayland University (1855; co-educational; Baptist), at Beaver Dam; and the following Roman Catholic schools: St Clara Academy (1847; Dominican) at Sinsiniwa, St Francis Seminary (1853) at St Francis, and St Lawrence College (1861, Capuchin) at Mt Calvary. There are also many private academies and trade or technical schools, and six industrial schools for Indians.

Charitable and Penal Institutions.—In the number and equipment of its reformatory, charitable and penal institutions, Wisconsin stands high. These institutions are under the general direction of a state board of control (established in 1905) of five members (one a woman), appointed by the governor for a term of five years. This board has charge of the following institutions: a State Hospital for the Insane (1860) at Mendota; the Northern Hospital for the Insane (1873) at Winnebago, 4 m. N. of Oshkosh; a School for the Deaf (1852) at Delavan, Walworth county, in which the teaching is principally oral and which includes a high school; a School for the Blind (1849; taken over by the state in 1850) at Janesville; an Industrial School for Boys (opened in 1860, as a House of Refuge) at Waukesha, with a farm of 404 acres; the State Prison (1853) at Waupun; State Public School for Dependent and Neglected Children (1886) at Sparta, with a farm of 234 acres; Wisconsin Home for Feeble Minded (1896) at Chippewa Falls; Wisconsin State Reformatory (1898), near Green Bay; and Wisconsin State Tuberculosis Sanatorium (1907) at Wales, Waukesha county. In addition the board has partial control over the Wisconsin Workshop for the Blind (1903) at Milwaukee, where there is a willow ware factory, and the Wisconsin Industrial School for Girls (1875) also at Milwaukee. Its powers of inspection extend over 5 semi-state institutions, 33 county insane asylums, 69 gaols, 48 poor-houses, 50 private benevolent institutions and 206 police stations and lockups. The board has also power of visitation and inspection over the Wisconsin Veterans' Home at Waupaca, founded in 1887 by the state department of the Grand Army of the Republic. In the state's treatment of the insane, chronic cases are separated and sent to the county asylums. The labour of convicts in the state prison is leased; until 1878 the state itself supervised manufacturing in the prison; then for twenty-five years the convicts were employed in making shoes for a Chicago firm; and since 1903 the state has received 65 cents a day for the labour of each convict, and at least 300 convicts are employed in the manufacture of socks and stockings, from which in 1906–1908 (two years) the income to the state was $156,890. In 1910 a binding twine factory was established in the prison. In the state reformatory the labour of some inmates is leased to tailors, and the others make brooms or bricks, or work in a cabinet shop or on the farm. Since 1907 a parole law has been in force for prisoners with a good record at the state prison. By a law of 1909 certain offenders are placed under probation under the supervision of the State Board of Control.

History.—Politically Wisconsin has been under French domination (from 1634 to 1760); under British domination (from 1760, formally 1763, to 1783); and under that of the United States since 1783. But the British influence on the community was negligible, and British rule was never more than nominal and was confined to the military posts. When American troops occupied the posts at Green Bay and Prairie du Chien in 1816, thirty-three years after it had become a part of the territory of the United States, the region was still almost exclusively French in manners, customs and population; and so it remained for nearly two decades.

The region comprised in the present state of Wisconsin, when first explored by Europeans, was a favourite hunting-ground for the Indians who constantly crossed this region between the Great Lakes and the upper Mississippi. The Indian population of Wisconsin in the first half of the 17th century was probably larger than that of any region of similar size east of the Mississippi. Among the many different tribes were the Sioux, Chippewa, Kickapoo, Menominee, Mascoutin, Potawatomi, Winnebago, and Sauk and Foxes. In the eastern and southern portions of the region there are still numerous mounds, the relics of an earlier Indian civilization.[1] In the lead regions in the S.W., with the help of Pawnee slaves, the Indians worked the lead diggings in a rough way. The whole course of the early history of Wisconsin was profoundly influenced by these racial and geographic considerations. The French adventurers, bent on finding either a "North-west passage" or some land route to the Pacific (which they believed to be no farther west than the Mississippi), naturally went west by the water routes of Wisconsin; as a fine field for their bartering and trading with water-courses by which they could convey their pelts and skins back to Montreal, the region attracted the *coureurs de bois* and fur traders; and it seemed promising also to the zealous French Catholic missionaries. The impelling influences on the French settlement of the region were the love of exploration and adventure, the commercial instinct and religious zeal.

Jean Nicolet, an experienced explorer, was sent west by Samuel de Champlain, the governor-general of New France, in the summer of 1634 to investigate mysterious rumours of a people known as "the men of the sea" who were thought by some to be Tatars or Chinese.[2] After a long and difficult journey into a region which he seems to have been the first white man to enter, Nicolet landed on the soil of Wisconsin at a point on Green Bay about 10 m. below the present city of Green Bay. Near what is now known as Red Banks there was a populous village of Winnebago, which welcomed and entertained him. He made a treaty with the Indians, went up the Fox river to a point somewhere near the present city of Berlin (Green Lake county) where he found another large village, and returned to Green Bay and thence to his post on Lake Huron.

Twenty years later Pierre Esprit, Sieur de Radisson, and Medard Chouart, Sieur des Groseilliers, started (1654) from Quebec, crossed Lakes Huron and Michigan, wintered in Wisconsin, ascended the Fox, crossed to the Wisconsin and possibly reached the Mississippi river eighteen years before Jacques Marquette and Louis Joliet. In 1659–1660 they were again in the West, but the opposition of the French authorities prevented their further explorations.

The first of the missionary pioneers was the Jesuit, Father René Ménard, who in 1661 lost his life on the upper Wisconsin river. In 1665 Father Claude Allouez established the first permanent mission in Wisconsin on the shores of Chequamegon Bay, near the first trading post established by Radisson and Groseilliers. In 1669 he was succeeded by Father Jacques Marquette (*q.v.*) and went to the Fox River Valley; there he established the mission of St Francis Xavier at the first rapids[3] on the Fox river near a populous Indian village. About this mission, one of the most successful established by the Jesuits in the West, gathered a group of traders who formed a settlement that for many years existed as a transient post and store-house for trappers.

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[1] One of the most famous of these mounds is the so-called Elephant Mound, 4 m. S. of Wyalusing, in Grant county in the S.W. corner of the state, near the Mississippi river; it is an effigy mound, and a drifting of earth changed its original shape, that of a bear, so that it roughly resembled an elephant; see pp. 91-93 of the *Twelfth Annual Report* (1894), Bureau of American Ethnology.

[2] These "gens de mer" were the Winnebago Indians; the name "ouinipegou," meaning "men of the fetid water," was interpreted by the French to apply to salt water, whereas it probably referred to sulphur springs near Lake Winnipeg, from which the Winnebago came to Green Bay.

[3] It was from these "rapides des pères" (rapids of the fathers) that De Pere was named.

Father Marquette, forced in 1671 by Indian wars to abandon his post on Chequamegon Bay, settled with the Huron at the Straits of Mackinac, whence in May 1673 accompanied by Louis Joliet he set out for the Mississippi river. They halted at De Pere, set off down the Fox-Wisconsin route, followed the Wisconsin to its mouth and came out upon the Mississippi near the site of the present city of Prairie du Chien, on July 17th, exactly two months after they left St Ignace mission on Mackinac Island. After descending the Mississippi to the mouth of the Arkansas they returned by way of the Des Plaines portage, paddled along the western shore of Lake Michigan, and arrived at De Pere. In September 1679 Robert Cavelier, Sieur de la Salle, and Henri de Tonty entered the mouth of the Fox river in the "Griffon," the first ship to sail the Great Lakes. In the same year Daniel Greysolon Du Luth, a *coureur de bois*, explored the upper Mississippi and the Wisconsin and Black rivers. In 1680 Father Louis Hennepin, a Recollet Franciscan who had accompanied La Salle, followed the Mississippi northward from the mouth of the Illinois along the western border of Wisconsin to the site of the present city of St Paul. The same course was followed by the fur-trader, Pierre Charles Le Sueur, in 1683.

In 1671 Simon François Daumont Saint-Lusson at Sault Ste Marie had taken formal possession of the region in the name of the king of France; in 1685 Nicolas Perrot (1644–*c.* 1700), a trader who had first visited the wilds of Wisconsin probably as early as 1665, was appointed "commandant of the West," and this event closes the period of exploration and begins that of actual occupation. Traders had begun to swarm into the country in increasing numbers, and to protect them from the Indians and to control properly the licensed fur-trade a military force was necessary. Perrot built a chain of forts along the Mississippi and a post (the present Galena, Illinois) near the southern boundary of the state, where he discovered and worked a lead mine. In 1712 the slaughter of a band of Foxes near Detroit was the signal for hostilities which lasted almost continuously until 1740,[1] and in which every tribe in the Wisconsin country was sooner or later involved either in alliance with the Foxes or with the French; the Chippewa, always hostile to the Foxes, the Potawatomi and the Menominee sided with the French. This war seriously interfered with the French plans of trade development and exploitation, and by rendering difficult the maintenance of a chain of settlements which might have connected Canada and Louisiana was a contributing cause of the final overthrow of French dominion. In this period permanent military posts were established at Green Bay and Chequamegon (1718); in 1718 it was reported that traders had settled at Green Bay and De Pere; in 1727 a post was established on Lake Pepin.

Wisconsin was little disturbed by the Seven Years' War. Yet the French and Indians of Wisconsin contributed their quota to the French armies—a force of half-breeds and Indians under a half-breed, Charles Michel de Langlade (1729–1800). After the fall of Montreal (Sept. 1760) Robert Rogers, who had been sent to Detroit to occupy the French posts in the West, dispatched Captain Henry Balfour with a force of British and Colonial troops to garrison Mackinac and the Wisconsin posts which had been dismantled and were almost deserted. He arrived at La Baye (Green Bay) in October 1761, and left there a garrison under Lieut. James Gorrell of the 60th (Royal American Foot) Regiment. The traders who accompanied them were the nucleus of the first English-speaking colony on Wisconsin soil. The French fort was rechristened Fort Edward Augustus. The period of British occupation was brief. On the outbreak of the conspiracy of Pontiac Lieut. Gorrell was compelled (in July 1763) to evacuate the fort, and make his way to Montreal.[2] When the conspiracy was crushed in 1765, Wisconsin was reopened for traders, and not only French but American merchants and travellers flocked into the region. Among these were Alexander Henry (1739–1824), who as early as 1760 had visited the site of Milwaukee, and who now obtained a monopoly of the Lake Superior trade, and Jonathan Carver (*q.v.*), who in 1766 reached Green Bay on his way to the Mississippi.

In 1774 was passed the Quebec Act for the government of the Province of Quebec into which the Wisconsin region was incorporated by this act, but it had little effect on the French settlements west of Lake Michigan, which remained throughout the entire British period a group of detached and periodically self-governing communities. Little as they cared for their British rulers the Wisconsin *voyageurs* and *habitans*, influenced probably by their cupidity and by actual money payments, for the most part adhered to the British cause during the War of Independence. De Langlade led his French and Indian forces against the American frontier communities west of the Alleghanies. This pro-British spirit, however, did not dominate the whole Wisconsin region, and while De Langlade was harassing the Pennsylvania and Virginia frontier, Godefrey de Linctot, a trader of Prairie du Chien, acting as agent for George Rogers Clark, detached several western tribes from the British adherence, and personally led a band of French settlers to his aid. The close of the war, although it conveyed the region to the sovereignty of the United States, was not followed by American occupation. In this period, however, the fur-trade assumed proportions of greater importance, and trading posts were established by the North-west Company (Canadian). In 1786 a more systematic attempt was made to work the lead mines by Julien Dubuque, who obtained the privilege from the Indians. In 1787 Wisconsin became part of the North-west Territory, but it was not until after the ratification of Jay's treaty that in 1796 the western posts were evacuated by the British. Before the actual military occupation (1816) by the United States, American traders had begun to enter into a sharp rivalry for the Indian trade. In 1800 Wisconsin was included in the newly organized Indiana Territory; and in 1809 on the admission of Indiana as a state it was attached to Illinois. During the second war with Great Britain, the Wisconsin Indians and French settlers generally sided with the British, and in 1814 many of them participated in Major William McKay's expedition against Fort Shelby at Prairie du Chien. In 1816 Fort Howard was built at Green Bay, and Fort Crawford at Prairie du Chien. In the same year was confirmed the treaty negotiated in 1804 by William Henry Harrison, by the terms of which the Indian title to the lead region was extinguished. In 1810 the product of lead had been about 400,000 ℔, largely mined and smelted by Indians, but the output was now increased enormously by the American miners who introduced new machinery and new methods, and by 1820 there were several thousand miners in the region, including negro slaves who had been brought north by Southern prospectors from Kentucky and Missouri. In 1818 Illinois was admitted to the Union and Wisconsin was incorporated in Michigan Territory, and at that time American civil government in the Wisconsin region was first established on an orderly and permanent basis. Wisconsin then comprised two counties, Brown (east) and Crawford (west), with county seats at Green Bay and Prairie du Chien. Until 1830 the fur-trade, controlled largely by John Jacob Astor's American Fur Company, continued to be the predominating interest in the Wisconsin region, but then the growing lead mining industry began to overshadow the fur-trade, and in the mining region towns and smelting furnaces were rapidly built. Indian miners were soon driven out of business and were nearly crowded out of their homes. Friction between the settlers and the Indians could not long be avoided, and in 1827 Red Bird and his band of Winnebago attacked the whites, but after some bloodshed they were defeated by Major William Whistler (1780–1863) of Fort Howard. Five years later occurred a more serious revolt, the Black Hawk War (see Black Hawk), which also grew out of the dispute over the mineral lands.

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[1] In that year the Foxes were scattered or forced to surrender by Pierre Paul le Perrière, sieur Marin, who had been appointed commandant of the West in 1729.

[2] It was not until 1814 that a British force again occupied a Wisc

The Black Hawk War not merely settled the Indian question so far as Wisconsin was concerned, but made the region better known, and gave an appreciable impetus to its growth. A series of Indian treaties in 1829, 1831, 1832 and 1833 extinguished the Indian titles and opened up to settlement a vast area of new land. The first newspaper, the Green Bay *Intelligencer*, began publication in 1833. In 1834 two land offices were opened, and by 1836, 878,014 acres of land had been sold to settlers and speculators. A special census showed a population of more than 11,000 in 1836. The new growth started a movement for a separate Territorial organization for that part of Michigan lying west of Lake Michigan, but this was not finally accomplished until 1836, when Michigan entered the Union. The new Territory of Wisconsin comprised not only the area included in the present state, but the present Iowa and Minnesota and a considerable portion of North and South Dakota.[1] Henry Dodge (1782–1867) was appointed its first governor by President Jackson The first Territorial Council met in 1836 at Old Belmont, now Leslie, Lafayette county, but in December of that year Madison was selected as the capital, after a contest in which Fond du Lac, Milwaukee, Racine, Green Bay, Portage and other places were considered, and in which James Duane Doty, later governor, owner of the Madison town plat, was charged with bribing legislators with town lots in Madison. In 1838 the Territory of Iowa was erected out of all that part of Wisconsin lying west of the Mississippi. The movement for the admission of Wisconsin to the Union was taken up in earnest soon after 1840, and after several years' agitation, in which Governor Doty took a leading part, on the 10th of August 1846 an Enabling Act introduced in Congress by Morgan L. Martin, the Territorial delegate, received the approval of President Polk. Meanwhile the Territorial legislature had passed favourably on the matter, and in April the act was ratified by a popular vote of 12,334 to 2487. The first constitution drafted was rejected (5th April 1847) owing to the articles relating to the rights of married women, exemptions, the elective judiciary, &c. A second convention, thought to be more conservative than the first, drafted another constitution, which on the 13th of March 1848 was adopted by 16,799 ayes and 6394 noes. The constitution was approved by Congress and signed by the president on the 29th of May 1848; the first state election had already been held on the 8th of May, and Governor Nelson Dewey and other state officers were sworn into office on the 7th of June. In the same year the free public school system was established, and the great stream of German immigration set in. Railway construction began in 1851. Wisconsin was a strong anti-slavery state. In 1854 one of the first steps in the organization of the Republican party (*q.v.*) was taken at Ripon. In the same year a fugitive slave named Glover was seized at Racine and was afterward rescued by an anti-slavery mob from Milwaukee; the State Supreme Court rendered a decision which declared the Fugitive Slave Law to be null and void in Wisconsin.

In 1856 a contested election for the governorship between Governor William A. Barstow (1813–1865), a candidate for re-election, and his Republican opponent, Coles Bashford (1816–1878), threatened to result in civil war. But the courts threw out "supplementary returns" (possibly forged by the canvassers) and decided in favour of Bashford, who was the first Republican to hold an office; with two exceptions Wisconsin has elected Republican governors ever since. The state gave its electoral vote for Lincoln in 1860 and supported the administration during the Civil War. The policy of the state to keep its regiments full rather than send new regiments to the front made the strength of a Wisconsin regiment, according to General W. T. Sherman, frequently equal to a brigade. The whole number of troops furnished by Wisconsin during the war was 91,379. In January 1874 a Democratic Liberal Reform administration came into power in the state with William R. Taylor as governor. At the legislative session which followed, the Potter law, one of the first attempts to regulate railway rates, was passed. The railways determined to evade the law, but Taylor promptly brought suit in the State Supreme Court and an injunction was issued restraining the companies from disobedience. In 1876, however, the Republicans regained control of the state government and the law was modified. In 1889 the passage of the Bennett law, providing for the enforcement of the teaching of English in all public and parochial schools, had a wide political effect. The Germans, usually Republicans, roused for the defence of their schools, voted the Democratic state ticket at the next state election (1890), with the result that George Wilbur Peck,[2] the Democratic nominee, was chosen governor by 30,000 plurality. The Bennett law was at once repealed, but not until 1895 did the Republicans regain control of the administration. It was accomplished then after a Democratic gerrymander had been twice overthrown in the courts. Since that time, however, the Republican party has grown more secure, and it has placed on the statute books a series of radical and progressive enactments in regard to railway rate legislation and taxation, publicity of campaign expenditures and a state-wide direct primary law (1905). In all these reforms a leading part was taken by Governor Robert M. LaFollette (b. 1855), who was elected to the United States Senate in 1905. Opposition to his political programme resulted in a serious split in the Republican ranks, the opposition taking the old name of "Stalwarts" and his followers came to be known as "Halfbreeds." Governor LaFollette, however, could draw enough support from the Democrats to maintain the control of the state by the Republicans. Wisconsin had several times been visited by disastrous forest fires. One in the north-eastern counties (Oconto, Brown, Door, Shawano, Manitowoc and Kewaunee) in 1871 resulted in the loss of more than a thousand lives. Another serious fire occurred in the north-west in July 1894.

GOVERNORS OF WISCONSIN

Territorial.		
Henry Dodge	Democrat	1836–1841
James Duane Doty	Whig	1841–1844
Nathaniel P. Tallmadge	„	1844–1845
Henry Dodge	Democrat	1845–1848
State.		
Nelson Dewey	Democrat	1848–1852
Leonard J. Farwell	„	1852–1854
William A. Barstow	„	1854–1856
Arthur McArthur[3]	Republican	1856
Coles Bashford	„	1856–1858
Alex. W. Randall	„	1858–1862
Louis P. Harvey	„	1862
Edward Salomon	„	1862–1864
James T. Lewis	„	1864–1866
Lucius Fairchild	„	1866–1872
C. C. Washburn	„	1872–1874
William R. Taylor	Democrat	1874–1876
Harrison Ludington	Republican	1876–1878
William E. Smith	„	1878–1882
Jeremiah M. Rusk	„	1882–1889
William D. Hoard	„	1889–1891
George W. Peck	Democrat	1891–1895
William H. Upham	Republican	1895–1897
Edward Scofield	„	1897–1901
Robert M. LaFollette[4]	„	1901–1906
James O. Davidson	„	1906–1911
F. E. McGovern	„	1911–

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[1] Wisconsin, as the last state to be created wholly out of the old North-West Territory, was the loser in boundary disputes with neighbouring states. As originally planned, Wisconsin would have included that part of Illinois west of a line running across the southern end of Lake Michigan; and the inhabitants of this tract actually voted to join Wisconsin, but Congress paid no attention to their demands, and this strip of land, including Chicago, became a part of Illinois. After the Toledo War (see TOLEDO, OHIO), to recompense Michigan for her losses to Ohio the northern peninsula, geographically a part of the Wisconsin region, was given to Michigan. Finally a larger tract of land E. of the Mississippi, which include St Paul, part of Minneapolis and Duluth, was cut off from Wisconsin on her admission to the Union to form with other land farther west the new Territory of Minnesota. See "The Boundaries of Wisconsin" in vol. xi. of *Wisconsin Historical Collections.*

[2] Peck (b. 1840) was a printer and then a journalist, founded in 1874 at La Crosse the *Sun*, which in 1878 he removed to Milwaukee, and was the author of many humorous sketches, notably a series of volumes of which the hero is "Peck's Bad Boy."

[3] Lieut.-Governor; succeeded Barstow, who resigned during a contest with Bashford.

[4] Resigned to become a member of the United States Senate.

[5] Lieut.-Governor: elected governor in 1906 and 1908.

Bibliography.—For physical description and natural resources see the *Reports* (biennial) and the *Bulletins* (Madison) of the Wisconsin Geological and Natural History Survey, especially important for economic geology, hydrography and agriculture, and the *Annual Reports* of the Wisconsin State Board of Agriculture; the *Reports* (biennial) of the State Forester, the Reports of the U.S. Census, and the *Mineral Resources of the United States*, published annually by the U.S. Geological Survey. A good school manual is E. C. Case's *Wisconsin, its Geology and Physical Geography* (Milwaukee, 1907). C. B. Cory, *The Birds of Illinois and Wisconsin*, Field Museum of Natural History, Publication No. 131 (Chicago, 1909), and L. Kumlien and N. Hollister, "The Birds of Wisconsin," in vol. iii., new series, of the *Bulletin* (Milwaukee) of the Wisconsin Natural History Society, are valuable. On state government see *The Blue Book of the State of Wisconsin* (Madison), published under the direction of the commissioner of labour and industrial statistics and D. E. Spencer, *Local Government in Wisconsin* (Madison, 1888). For a list of works on the history of the state see D. S. Durrie's "Bibliography of Wisconsin" in vol. vi., new series, *Historical Magazine*. The best short history is R. G. Thwaites, *Wisconsin* (Boston, 1908), in the "American Commonwealths" series. The same author's *Story of Wisconsin* (Ibid. 1890) in the "Story of the States" series, and H. E. Legler's *Leading Events in Wisconsin History* (Milwaukee, 1898), a good brief summary, are other single-volume works covering the entire period of the state's history. One of the best accounts of the state's early history is E. H. Neville and D. B. Martin's *Historic Green Bay* (Green Bay, 1893). S. S. Hebberd's *Wisconsin under the Dominion of France* (Madison, 1890) contains an account of the earlier period written, however, before much recent material was brought to light. Much material of value is contained in the *Historical Collections* (18 vols., Madison, 1855 sqq.) of the State Historical Society of Wisconsin (1846; reorganized, 1849), and in the *Bulletins of Information*, *Proceedings* and *Draper Series* of the same society are many valuable historical papers and monographs. See also W. R. Smith's *History of Wisconsin* (3 vols., Madison, 1854). The Parkman Society *Papers* (Milwaukee, 1895–1899) provide a collection of good articles on special topics of Wisconsin history, and the *Original Narratives* and *Reprints* published by the Wisconsin History Commission (created by an act of 1905) deal with Wisconsin in the Civil War. See also Auguste Gosselin, *Jean Nicolet 1618–1642* (1893); B. A. Hinsdale, *The Old North-West* (New York, 1888); Charles Moore, *The North-West under Three Flags* (New York, 1900); R. V. Phelan, *Financial History of Wisconsin* (Madison, 1908); F. J. Turner, *Character and Influence of the Indian Trade in Wisconsin*, vol. ix. of Johns Hopkins University Studies (Baltimore, 1899); F. Parkman, *The Jesuits in North America* (Boston, 1870); and the volumes of the *Jesuit Relations*, edited by R. G. Thwaites.

WISCONSIN, UNIVERSITY OF, a co-educational institution of higher learning at Madison, Wisconsin, the capital of the state, established in 1848 under state control, supported largely by the state, and a part of the state educational system. The university occupies a picturesque and beautiful site on an irregular tract (600 acres), including both wooded hills and undulating meadow lands stretching for 1 m. along the shores of Lake Mendota. The main building, University Hall (1859; enlarged 1897–1899 and 1905–1906), which crowns University Hill, is exactly 1 m. from the state capitol. The other buildings include North Hall (1850), South Hall (1854), Science Hall (1887), the Biology Building (1911), the Chemical Building (1904–1905), the Hydraulic Laboratory (1905), the Engineering Building (1900), the Law School (1894), Chadbourne Hall (1870; remodelled in 1896) for women, Lathrop Hall (1910) for women, Assembly Hall (1879), the Chemical Engineering Building (1885), Machine Shops (1885), the armoury and gymnasium (1894), a group of half a dozen buildings belonging to the College of Agriculture and the Washburn Observatory (1878; a gift of Governor C. C. Washburn). On the lower campus is the building of the Wisconsin State Historical Society.

The university includes a college of letters and science, with general courses in liberal arts and special courses in chemistry, commerce, journalism, music, pharmacy and training of teachers and library work; a college of engineering, with courses in civil, mechanical, electrical, chemical and mining engineering, and an applied electro-chemistry course; a college of agriculture, with a government experiment station, long, middle and short courses in agriculture, a department of home economics, a dairy course and farmers' institutes; a college of law (3 years' course); a college of medicine, giving the first two years of a medical course; a graduate school; and an extension division, including departments of instruction by lectures, of correspondence study, of general information and welfare, and of debating and public discussion. There is a summer session, in which, in addition to courses in all the colleges and schools, instruction is offered to artisans and apprentices and in library training. The college of agriculture, one of the largest and best equipped in the country, provides also briefer courses of practical training for farmers and farmers' wives. In connexion with the state department of health, instruction on the prevention and treatment of tuberculosis is provided, exhibits and instructors or demonstrators being sent to every part of the state. The state hygienic laboratory is conducted by the university. On the university campus is the forest products laboratory (1910) of the United States government. At Milwaukee there is a university settlement associated with the social work of the university.

Admission to the university is on examination or certificate from accredited high schools or academies. Tuition is free for residents of the state. Courses in the first two years are largely prescribed, in the last two years elective "under a definite system." In 1910 there were 395 instructors and 4947 students (3560 men and 1387 women). The university library proper, of 163,000 volumes and 40,000 pamphlets, is housed in the Historical Society's building, in which are also the collection of the Historical Society and that of the Wisconsin Academy of Arts and Sciences—a total in 1910 of 404,000 books and 202,000 pamphlets.

The grounds, buildings and equipments of the university are valued at $2,000,000. The income of the university, including income from the Federal land grants, from invested productive funds and from state tax levies, exceeds one million dollars annually. Since 1905 the state legislature has appropriated for the current expenses of the university a $\frac{2}{7}$ mill tax. More than $2,000,000 was left to the university in 1908 for a memorial theatre, research professorships and graduate fellowships by William Freeman Vilas (1840–1908), who graduated at the university in 1858 and was postmaster-general of the United States in 1885–1888, secretary of the interior in 1888–1889 and U.S. senator from Wisconsin in 1891–1897.

An act for the creation of a university to be supported by the Territory was passed by the first session of the Territorial legislature in 1836, but except for the naming of a board of trustees the plan was never put into operation. A similar act for the establishment of a university at Green Bay had no more result. In 1838 a university of the Territory of Wisconsin was created by act of the Territorial legislature and was endowed with two townships of land. This was the germ of the state university, provision for which was made in the state constitution adopted in 1848. The university was incorporated by act of the legislature in that year with a board of regents as the governing body, chosen by the legislature.[1] A preparatory department was opened in the autumn of that year, and John H. Lathrop (1799–1866), a graduate of Yale, then president of the university of Missouri, was chosen as the first chancellor of the new institution. He was inaugurated in 1850, and in that year North Hall, the first building, was erected. The first academic class graduated in 1854. In the same year the Federal Congress (which had granted to the state seventy-two sections of salt-spring lands, and as no such lands were found in the state, had been petitioned to change the nature of the grant) granted seventy-two sections to be "sold in such manner as the legislature may direct for the benefit and in aid of the university." The Federal land grants, however, which ought to have supported the university, were sacrificed to a desire to attract immigrants, and the institution for many years was compelled to get along on a small margin which rendered extension difficult; and the university permanent fund was soon impaired for the construction of buildings. Henry Barnard in 1859 succeeded Lathrop as chancellor, but resigned in 1861. After the Civil War, the office of chancellor was displaced by that of president. Paul Ansel Chadbourne (1823–1883), a graduate (and afterwards president) of Williams College, became president in 1867, and in his presidency (1867–1870) the university was reorganized, a college of law was founded, co-education was established and the agricultural college was consolidated with the university, a radical departure from the plan adopted in most of the Western states. In 1871–1874 John Hanson Twombly, a graduate of Wesleyan University and one of the founders of Boston University, was president, and the legislature first provided for an annual state tax of $10,000 for the university. With the coming to the presidency (1874) of John Bascom (b. 1827), another graduate of Williams, the university began a new period of development; the preparatory department was abolished in 1880, and the finances of the university were put on a firm basis by the grant of a state tax of one-tenth of a mill. Under the presidency (1887–1892) of Thomas Chrowder Chamberlin (b. 1843), a graduate of Beloit College and a member of the U.S. Geological Survey, the university attendance grew from 500 to 1000 students, and buildings were erected for the college of law, dairy school and science hall. Under President Charles Kendall Adams (1835–1902), who was a graduate of the university of Michigan, where as professor of history he had introduced in 1869–1870 the German method of "seminar" study and research, and who had just resigned the presidency (1885–1892) of Cornell University, the enrolment of the university increased from 1000 in 1892 to 2600 in 1901, and the growth of the graduate school was particularly notable. Under Charles Richard Van-Hise,[1] who was the first alumnus to become president and who succeeded President Adams in 1904, the growth of the university continued, and its activities were constantly enlarged and the scope of its work was widened.

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[1] The university is now governed by regents, of whom two—the president of the university and the state superintendent of public instruction—are *ex officio*, and the others are appointed by the governor for a term of three years, two from the state at large and one from each congressional district.

See S. H. Carpenter, *A Historical Sketch of the University of Wisconsin from 1849 to 1876* (Madison, 1876), and R. G. Thwaites, *The University of Wisconsin, its History and its Alumni* (Ibid., 1900).

WISDOM, BOOK OF, or WISDOM OF SOLOMON (Sept. Σοφία Σαλωμῶνος; Lat. Vulg. *Liber sapientiae*), an apocryphal book of the "Wisdom Literature" (*q.v.*), the most brilliant production of pre-Christian Hebrew philosophical thought, remarkable both for the elevation of its ideas and for the splendour of its diction. It divides itself naturally, by its contents, into two parts, in one of which the theme is righteousness and wisdom, in the other the early fortunes of the Israelite people considered as a righteous nation beloved by God.

The first part (ch. i.-ix.) falls also into two divisions, the first (i.-v.) dwelling on the contrast between the righteous and the wicked, the second (vi.-ix.) setting forth the glories of wisdom. After an exhortation to the judges of the earth to put away evil counsels and thus avoid death, the author declares that God has made no kingdom of death on the earth, but ungodly men have made a covenant with it: certain sceptics (probably both Gentile and Jewish) holding this life to be brief and without a future, give themselves up to sensuality and oppress the poor and the righteous; but God created man to be immortal (ii. 23), and there will be compensation and retribution in the future: the good will rule (on earth), the wicked will be hurled down to destruction, though they seem now to flourish with long life and abundance of children (ii.-v.). At this point Solomon is introduced, and from the following section (vi.-ix.) the book seems to have taken its title. Solomon reminds kings and rulers that they will be held to strict account by God, and, urging them to learn wisdom from his words, proceeds to give his own experience: devoting himself from his youth to the pursuit of wisdom he had found her to be a treasure that never failed, the source and embodiment of all that is most excellent and beautiful in the world—through her he looks to obtain influence over men and immortality, and he concludes with a prayer that God would send her out of his holy heavens to be his companion and guide.

The second part of the book (x.-xix.) connects itself formally with the first by a summary description of the rôle of wisdom in the early times: she directed and preserved the fathers from Adam to Moses (x. 1–xi. 1). From this point, however, nothing is said of wisdom—the rest of the book is a philosophical and imaginative narrative of Israelite affairs from the Egyptian oppression to the settlement in Canaan. A brief description of how the Egyptians were punished through the very things with which they sinned (though the punishment was not fatal, for God loves all things that exist), and how judgments on the Canaanites were executed gradually (so as to give them time to repent), is followed by a dissertation on the origin, various forms, absurdity and results of polytheism and idolatry (xiii.-xv.): the worship of natural objects is said to be less blameworthy than the worship of images—this latter, arising from the desire to honour dead children and living kings (the Euhemeristic theory), is inherently absurd, and led to all sorts of moral depravity. In the four last chapters the author, returning to the history, gives a detailed account of the provision made for the Israelites in the wilderness and of the pains and terrors with which the Egyptians were plagued.

It is not easy to determine whether the book is all from the same author. On the one hand, it may be said that one general theme—the salvation and final prosperity of the righteous—is visible throughout the work, that God is everywhere represented as the supreme moral governor of the world, and that the conception of immortality is found in both parts; the second part, though differing in form from the first, may be regarded as the historical illustration of the principles set forth in the latter. On the other hand, it must be admitted that the points of view in the two parts are very different: the philosophical conception of wisdom and the general Greek colouring, so prominent in the first part, are quite lacking in the second (x. 1–xi. 1 being regarded as a transition or connecting section inserted by an editor). While the first has the form of a treatise, the second is an address to God; the first, though it has the Jewish people in mind, does not refer to them by name except incidentally in Solomon's prayer; the second is wholly devoted to the Jewish national experiences (this is true even of the section on idolatry). It is in the second that we have the finer ethical conception of God as father and saviour of all men, lover of souls, merciful in his dealings with the wicked—in the first part it is his justice that is emphasized; the hope of immortality is prominent in the first, but is mentioned only once (in xv. 3) in the second. The two parts are distinguished by difference of style; the Hebrew principle of parallelism of clauses is employed far more in the first than in the second, which has a number of plain prose passages, and is also rich in uncommon compound terms. In view of these differences there is ground for holding that the second part is a separate production which has been united with the first by an editor, an historical haggadic sketch, a midrash, full of imaginative additions to the Biblical narrative, and enlivened by many striking ethical reflections. The question, however, may be left undecided.

Both parts of the book ignore the Jewish sacrificial cult. Sacrifices are not mentioned at all; a passing reference to the temple is put into Solomon's mouth (ix. 8). Moses is described (xi. 1) not as the great lawgiver, but as the holy prophet through whom the works of the people were prospered. (It may be noted, as an illustration of the allusive style of the book, that, though a number of men are spoken of, not one of them is mentioned by name; in iv. 10-14, which is an expansion of Gen. v. 24, the reader is left to recognize Enoch from his knowledge of the Biblical narrative.) In the second part of the book there is no expression of "messianic" hope; in the first part the picture of the national future agrees in general (if its expressions are to be taken literally) with that given in the book of Daniel: the Jews are to have dominion over the peoples (iii. 8), and to receive from the Lord's hand the diadem of beauty (v. 16), but there is no mention of particular nations. The historical review in the second part is coloured by a bitter hatred of the ancient Egyptians; whether this springs from resentment of the former sufferings of the Israelites or is meant as an allusion to the circumstances of the author's own time it is hardly possible to say.

The book appears to teach individual ethical immortality, though its treatment of the subject is somewhat vague. On the basis of Gen. i.-iii. it is said (ii. 23 f.) that God created man for immortality (that is, apparently, on earth) and made him an image of his own being, but through the envy of the devil death came into the world, yet (iii. 1-4) the souls of the righteous are in the hand of God, and, though they seem to die, their hope is full of immortality. The description, however, appears to glide into the conception of national immortality (iii. 8, v. 16), especially in the fine sorites in vi. 17-20: the beginning of wisdom is desire for instruction, and devoted regard to instruction is love, and love is observance of her laws, and obedience to her laws is assurance of incorruption, and incorruption brings us near to God, and therefore desire for wisdom leads to a kingdom (but the nature of the kingdom is not stated). The individualistic view is expressed in xv. 3: the knowledge of God's power (that is, a righteous life) is the root of immortality. This passage appears to exclude the wicked, who, however, are said (iv. 20) to be punished hereafter. The figurative nature of the language respecting the future makes it difficult to determine precisely the thought of the book on this point; but it seems to contemplate continued existence hereafter for both righteous and wicked, and rewards and punishments allotted on the basis of moral character. Angels are not mentioned; but the serpent of Gen. iii. is, for the first time in literature, identified with the devil ("Diabolos," ii. 24, the Greek translation of the Hebrew "Satan"); the rôle assigned him (envy) is similar to that expressed in "Secrets of Enoch," xxxi. 3-6; he is here introduced to account for the fact of death in the world. In iii. 4 the writer, in his polemic against the prosperous ungodly men of his time, denies that death, short life and lack of children are to be considered misfortunes for the righteous—over against these things the possession of wisdom is declared to be the supreme good. The ethical standard of the book is high except in the bitterness displayed towards the "wicked," that is, the enemies of the Jews. The only occurrence in old Jewish literature (except in Ecclus. xiv. 2) of a word for "conscience" is found in xvii. 11 (*συνείδησις*): wickedness is timorous under the condemnation of conscience (the same thought in Prov. xxviii. 1). The book is absolutely monotheistic, and the character ascribed to the deity is ethically pure with the exception mentioned above.

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[1] President VanHise (b. 1857) graduated at the university of Wisconsin in 1879, became instructor in geology there in 1883, in 1897 became consulting geologist of the Wisconsin Geological and Natural History Survey, and in 1900 became geologist in charge of the Division of Pre-Cambrian and Metamorphic Geology, U.S. Geological Survey. He wrote *Correlation Papers—Archaean and Algonkian* (1892), *Some Principles Controlling the Deposition of Ores* (1901), *A Treatise on Metamorphism* (1903) and several works with other authors on the different iron regions of Michigan.

The style shows that the book was written in Greek, though naturally it contains Hebraisms. The author of the first part was in all probability an Alexandrian Jew; nothing further is known of him; and this is true of the author of the second part, if that be a separate production. As to the date, the decided Greek colouring (the conception of wisdom, the list of Stoic virtues, viii. 7, the idea of pre-existence, viii. 20, and the ethical conception of the future life) points to a time not earlier than the 1st century B.C., while the fact that the history is not allegorized suggests priority to Philo; probably the work was composed late in the 1st century B.C. (this date would agree with the social situation described). Its exclusion from the Jewish Canon of Scripture resulted naturally from its Alexandrian thought and from the fact that it was written in Greek. It was used, however, by New Testament writers (vii. 22 f., Jas. iii. 17, vii. 26; Heb. i. 2 f., ix. 15; 2 Cor. v. 1-4, xi. 23; Acts xvii. 30, xiii. 1-5, xiv. 22-26; Rom. i. 18-32, xvi. 7; 1 Tim. iv. 10), and is quoted freely by Patristic and later authors, generally as inspired. It was recognized as canonical by the council of Trent, but is not so regarded by Protestants.

LITERATURE.—The Greek text is given in O. F. Fritzsche, *Lib. Apocr. Vet. Test.* (1871); W. J. Deane, *Bk. of Wisd.* (1881); H. B. Swete, *Old Test. in Grk.* (1st ed., 1891; 2nd ed., 1897; Eng. trans. in Deane, 1881); W. R. Churton, *Uncan. and Apocr. Script.* (1884); C. J. Ball, *Variorum Apocr.* (1892); Revised Vers. of Apocr. (1895). Introductions and Comms.: C. L. W. Grimm in *Kurzgef. Exeg. Hdbch. z. d. Apocr. d. A. T.* (1860); E. C. Bissell in Lange-Schaff (1860); W. J. Deane (1881); F. W. Farrar in Wace's *Apocr.* (1888); Ed. Reuss, French ed. (1878), Ger. ed. (1894); E. Schürer, *Jew. People* (Eng. trans., 1891); C. Siegfried in Kautzsch, *Apocr.* (1900); Tony André, *Les Apocr.* (1903). See also the articles in Herzog-Hauck's *Realencyclopädie*; Hastings, *Dict. Bible*; Cheyne and Black, *Encycl. Bibl.* (C. H. T.*)

WISDOM LITERATURE, the name applied to the body of Old Testament and Apocryphal writings that contain the philosophical thought of the later pre-Christian Judaism. Old Semitic philosophy was a science not of ontology in the modern sense of the term, but of practical life. For the Greeks "love of wisdom" involved inquiry into the basis and origin of things; the Hebrew "wisdom" was the capacity so to order life as to get out of it the greatest possible good. Though the early Hebrews (of the time before the 5th century B.C.) must have reflected on life, there is no trace of such reflection, of a systematic sort, in their extant literature. "Wise men" are distrusted and opposed by the prophets. The latter were concerned only with the maintenance of the sole worship of Yahweh and of social morality. This was the task of the early Hebrew thinkers, and to it a large part of the higher energy of the nation was devoted. The external law given, as was believed, by the God of Israel, was held to be the sufficient guide of life, and everything that looked like reliance on human wisdom was regarded as disloyalty to the Divine Lawgiver. While the priests developed the sacrificial ritual, it was the prophets that represented the theocratic element of the national life—they devoted themselves to their task with noteworthy persistence and ability, and their efforts were crowned with success; but their virtue of singlemindedness carried with it the defect of narrowness—they despised all peoples and all countries but their own, and were intolerant of opinions, held by their fellow-citizens, that were not wholly in accordance with their own principles.

The reports of the earlier wise men, men of practical sagacity in political and social affairs, have come to us from unfriendly sources; it is quite possible that among them were some who took interest in life for its own sake, and reflected on its human moral basis. But, if this was so, no record of their reflections has been preserved. The class of sages to whom we owe the Wisdom Books did not arise till a change had come over the national fortunes and life. The firm establishment of the doctrine of practical monotheism happened to coincide in time with the destruction of the national political life (in the 6th century B.C.). At the moment when this doctrine had come to be generally accepted by the thinking part of the nation, the Jews found themselves dispersed among foreign communities, and from that time were a subject people environed by aliens, Babylonian, Persian and Greek. The prophetic office ceased to exist when its work was done, and part of the intellectual energy of the people was thus set free for other tasks than the establishment of theistic dogma. The ritual law was substantially completed by the end of the 5th century B.C.; it became the object of study, and thus arose a class of scholars, among whom were some who, under the influence of the general culture of the time, native and foreign, pushed their investigations beyond the limits of the national law and became students and critics of life. These last came to form a separate class, though without formal organization. There was a tradition of learning (Job viii. 8, xv. 10)—the results of observation and experience were handed down orally. In the 2nd century B.C., about the time when the synagogue took shape, there were established schools presided over by eminent sages, in which along with instruction in the law much was said concerning the general conduct of life (see PIRKE ABOTH). The social unification produced by the conquests of Alexander brought the Jews into intimate relations with Greek thought. It may be inferred from Ben-Sira's statements (Ecclus. xxxix. 1-11) that it was the custom for scholars to travel abroad and, like the scholars of medieval Europe, to increase their knowledge by personal association with wise men throughout the world. Jews seem to have entered eagerly into the larger intellectual life of the last three centuries before the beginning of our era. For some the influence of this association was of a general nature, merely modifying their conception of the moral life; others adopted to a greater or less extent some of the peculiar ideas of the current systems of philosophy. Scholars were held in honour in those days by princes and people, and Ben-Sira frankly adduces this fact as one of the great advantages of the pursuit of wisdom. It was in cities that the study of life and philosophy was best carried on, and it is chiefly with city life that Jewish wisdom deals.

The extant writings of the Jewish sages are contained in the books of Job, Proverbs, Psalms, Ben-Sira, Tobit, Ecclesiastes, Wisdom of Solomon, 4th Maccabees, to which may be added the first chapter of Pirke Aboth (a Talmudic tract giving, probably, pre-Christian material). Of these Job, Pss. xlix., lxxiii., xcii. 6-8 (5-7), Eccles., Wisdom, are discussions of the moral government of the world; Prov., Pss. xxxvii., cxix., Ben-Sira, Tob. iv., xii. 7-11, Pirke, are manuals of conduct, and 4th Maccab. treats of the autonomy of reason in the moral life; Pss. viii., xix. 2-7 (1-6), xxix. 3-10, xc. 1-12, cvii. 17-32, cxxxix., cxliv. 3 f., cxlvii. 8 f. are reflections on man and physical nature (cf. the Yahweh addresses in Job, and Ecclus. xlii. 15-xliii. 33). Sceptical views are expressed in Job, Prov. xxx. 2-4 (Agur), Eccles.; the rest take the current orthodox position.

Though the intellectual world of the sages is different from that of the prophetic and legal Hebraism, they do not break with the fundamental Jewish theistic and ethical creeds. Their monotheism remains Semitic—even in their conception of the cosmogonic and illuminating function of Wisdom they regard God as standing outside the world of physical nature and man, and do not grasp or accept the idea of the identity of the human and the divine; there is thus a sharp distinction between their general theistic position and that of Greek philosophy. They retain the old high standard of morals, and in some instances go beyond it, as in the injunctions to be kind to enemies (Prov. xxv. 21 f.) and to do to no man what is hateful to one's self (Tob. iv. 15); in these finer maxims they doubtless represent the general ethical advance of the time.

They differ from the older writers in practically ignoring the physical supernatural—that is, though they regard the miracles of the ancient times (referred to particularly in Wisdom xvi.-xix.) as historical facts, they say nothing of a miraculous element in the life of their own time. Angels occur only in Job and Tobit, and there in noteworthy characters: in Job they are beings whom God charges with folly (iv. 18), or they are mediators between God and man

(v. 1, xxxiii. 23), that is, they are humanized, and the Elohim beings (including the Satan) in the prologue belong to a popular story, the figure of Satan being used by the author to account for Job's calamities; in Tobit the "affable" Raphael is a clever man of the world. Except in Wisdom ii. 24 (where the serpent of Gen. iii. is called "Diabolos"), there is mention of one demon only (Asmodeus, in Tob. iii. 8, 17), and that a Persian figure. Job alone introduces the mythical dragons (iii. 8, vii. 12, ix. 13, xxvi. 12) that occur in late prophetical writings (Amos ix. 3; Isa. xxvii. 1); as the earliest of the Wisdom books, it is the friendliest to supernatural machinery.

Like the prophetical writings before Ezekiel, the Wisdom books, while they recognize the sacrificial ritual as an existing custom, attach little importance to it as an element of religious life (the fullest mention of it is in Ecclus. xxxv. 4 ff., 1); the difference between prophets and sages is that the former do not regard the ritual as of divine appointment (Jer. vii. 22) and oppose it as non-moral, while the latter, probably accepting the law as divine, by laying most stress on the universal side of religion, lose sight of its local and mechanical side (see Ecclus. xxxv. 1-3). Their broad culture (reinforced, perhaps, by the political conditions of the time) made them comparatively indifferent to Messianic hopes and to that conception of a final judgment of the nations that was closely connected with these hopes: a Messiah is not mentioned in their writings (not in Prov. xvi. 10-15), and a final judgment only in Wisdom of Solomon, where it is not of nations but of individuals. In this regard a comparison between them and Daniel, Enoch and Psalms of Solomon is instructive. Their interest is in the ethical training of the individual on earth.

There was nothing in their general position to make them inhospitable to ethical conceptions of the future life, as is shown by the fact that so soon as the Egyptian-Greek idea of immortality made itself felt in Jewish circles it was adopted by the author of the Wisdom of Solomon; but prior to the 1st century B.C. it does not appear in the Wisdom literature, and the nationalistic dogma of resurrection is not mentioned in it at all. Everywhere, except in the Wisdom of Solomon, the Underworld is the old Hebrew inane abode of all the dead, and therefore a negligible quantity for the moralist. Nor do the sages go beyond the old position in their ethical theory: they have no philosophical discussion of the basis of the moral life; their standard of good conduct is existing law and custom; their motive for right-doing is individual eudaemonistic, not the good of society, or loyalty to an ideal of righteousness for its own sake, but advantage for one's self. They do not attempt a psychological explanation of the origin of human sin; bad thought (*yēṣer ra'*, Ecclus. xxxvii. 3) is accepted as a fact, or its entrance into the mind of man is attributed (Wisd. ii. 24)to the devil (the serpent of Gen. iii.). In fine, they eschew theories and confine themselves to visible facts.

It is in keeping with their whole point of view that they claim no divine inspiration for themselves: they speak with authority, but their authority is that of reason and conscience. It is this definitely rational tone that constitutes the differentia of the teaching of the sages. For the old external law they substitute the internal law: conscience is recognized as the power that approves or condemns conduct (ψυχή, Ecclus. xiv. 2; συνείδησις, Wisd. Sol. xvii. 11). Wisdom is represented as the result of human reflection, and thus as the guide in all the affairs of life. It is also sometimes conceived of as divine (in Wisd. of Sol. and in parts of Prov. and Ecclus., but not in Eccles.), in accordance with the Hebrew view, which regards all human powers as bestowed directly by God; it is identified with the fear of God (Job xxviii. 28; Prov. i. 7; Ecclus. xv. 1 ff.) and even with the Jewish law (Ecclus. xxiv. 23). But in such passages it remains fundamentally human; no attempt is made to define the limits of the human and the divine in its composition—it is all human and all divine. The personification of wisdom reaches almost the verge of hypostasis: in Job xxviii. it is the most precious of things; in Prov. viii. it is the companion of God in His creative work, itself created before the world; in Ecclus. xxiv. the nationalistic conception is set forth: wisdom, created in the beginning, compasses heaven and earth seeking rest and finds at last its dwelling-place in Jerusalem (and so substantially 4th Maccabees); the height of sublimity is reached in Wisd. of Sol. vii., where wisdom, the brightness of the everlasting light, is the source of all that is noblest in human life.

Greek influence appears clearly in the sages' attitude toward the phenomena of life. God, they hold, is the sole creator and ruler of the world; yet man is free, autonomous—God is not responsible for men's faults (Ecclus. xv. 11-20); divine wisdom is visible in the works of nature and in beasts and man (Job xxxviii. f.; Pss. viii., cxxxix.). On the other hand, there is recognition of the inequalities and miseries of life (Job; Ecclus. xxxiii. 11 ff., xl. 1-11; Eccles.), and, as a result, scepticism as to a moral government of the world. In Job, which is probably the earliest of the philosophical books, the question whether God is just is not definitely answered: the prologue affirms that the sufferings of good men, suggested by the sneer of Satan, are intended to demonstrate the reality of human goodness; elsewhere (v. 17, xxxiii. 17 ff.) they are regarded as disciplinary; the Yahweh speeches declare man's inability to understand God's dealings; the prosperity of the wicked is nowhere explained. The ethical manuals, Prov. (except xxx. 2-4) and Ecclus., are not interested in the question and ignore it; Agur's agnosticism (Prov. xxx. 2-4) is substantially the position of the Yahweh speeches in Job directed against the "unco-wise" of his day. Koheleth's scepticism (in the original form of Ecclesiastes) is deep-seated and far-reaching: though he is a theist, he sees no justice in the world, and looks on human life as meaningless and resultless. For him death is the end-all, and it is against some such view as this that the argument in Wisd. of Sol. ii.-v. is directed. With the establishment of the belief in ethical immortality this phase of scepticism vanished from the Jewish world, not, however, without leaving behind it works of enduring value.

In all the Wisdom books virtue is conceived of as conterminous with knowledge. Salvation is attained not by believing but by the perception of what is right; wisdom is resident in the soul and identical with the thought of man. Yet, with this adoption of the Greek point of view, the tone and spirit of this literature remain Hebrew.

The writings of the sages are all anonymous. No single man appears as creator of the tendency of thought they represent; they are the product of a period extending over several centuries, but they form an intellectual unity, and presuppose a great body of thinkers. The sages may be regarded as the beginners of a universal religion: they felt the need of permanent principles of life, and were able to set aside to some extent the local features of the current creed. That they did not found a universal religion was due, in part at least, to the fact that the time was not ripe for such a faith; but they left material that was taken up into later systems.

LITERATURE.—K. Siegfried, *Philo von Alexandria* (1875); J. Drummond, *Philo Judaeus* (1888); H. Bois, *Origines d. l. phil. Judéo-Alex.* (1890); T. K. Cheyne, *Job and Sol.* (1887) and *Jew. Relig. Life*, &c. (1898). (C. H. T.*)

WISE, HENRY ALEXANDER (1806–1876), American politician and soldier, was born at Drummondtown (or Acconiac), Accomack county, Virginia, on the 3rd of December 1806. He graduated from Washington (now Washington and Jefferson) College, Pennsylvania, in 1825, and began to practise law in Nashville, Tennessee, in 1828. He returned to Accomack county, Va., in 1830, and served in the National House of Representatives in 1833–1837 as an anti-nullification Democrat, but broke with the party on the withdrawal of the deposits from the United States Bank, and was re-elected to Congress in 1837, 1839 and 1841 as a Whig, and in 1843 as a Tyler Democrat. From 1844 to 1847 he was minister to Brazil. In 1850–1851 he was a member of the convention to revise the Virginia constitution, and advocated white manhood suffrage, internal improvements, and the abolition of imprisonment for debt. In 1855 he was elected governor of the state (1856–1860) as a Democrat. John Brown's raid occurred during his term, and Wise refused to reprieve Brown after sentence had been passed. He strongly opposed secession, but finally voted for the Virginia ordinance, was commissioned brigadier-general in the Confederate army and served throughout the war. He died at Richmond, Va., on the 12th of September 1876. He wrote *Seven Decades of the Union 1790–1860* (1872).

His son, JOHN SERGEANT WISE (b. 1846), United States attorney for the Eastern District of Virginia in 1881–1883, and a member of the National House of Representatives in 1883–1885, wrote *The End of an Era* (1899) and *Recollections of Thirteen Presidents* (1906).

See the *Life* of H. A. Wise, by his grandson, B. H. Wise (1899).

WISE, ISAAC MAYER (1819–1900), American Jewish theologian, was born in Bohemia, but his career is associated with the organization of the Jewish reform movement in the United States. From the moment of his arrival in America (1846) his influence made itself felt. In 1854 he was appointed rabbi at Cincinnati. Some of his actions roused considerable opposition. Thus he was instrumental in compiling a new prayer-book, which he designed as the "American Rite" (Minhag America). He was opposed to political Zionism, and the Montreal Conference (1897), at his instigation, passed resolutions disapproving of the attempt to establish a Jewish state, and affirming that the Jewish Messianic hope pointed to a great universal brotherhood. In keeping with this denial of a Jewish nationality, Wise believed in national varieties of Judaism, and strove to harmonise the synagogue with local circumstances and sympathies. In 1848 he conceived the idea of a union, and after a campaign lasting a quarter of a century the Union of American Hebrew Congregations was founded (1873) in Cincinnati. As a corollary of this he founded in 1875 the "Hebrew Union College" in the same city, and this institution has since trained a large number of the rabbis of America. Wise also organized various general assemblies of rabbis, and in 1889 established the Central Conference of American Rabbis. He was the first to introduce family pews in synagogues, and in many other ways "occidentalized" Jewish worship.

See D. Philipson, *The Reform Movement in Judaism* (1907). (I. A.)

WISEMAN, NICHOLAS PATRICK STEPHEN (1802–1865), English cardinal, was born at Seville on the 2nd of August 1802, the child of Anglo-Irish parents recently settled in Spain for business purposes. On his father's death in 1805 he was brought to Waterford, and in 1810 he was sent to Ushaw College, near Durham, where he was educated until the age of sixteen, when he proceeded to the English College in Rome, reopened in 1818 after having been closed by the Revolution for twenty years. He graduated doctor of theology with distinction in 1825, and was ordained priest in the following year. He was apppointed vice-rector of the English College in 1827, and rector in 1828 when not yet twenty-six years of age. This office he held until 1840. From the first a devoted student and antiquary, he devoted much time to the examination of oriental MSS. in the Vatican library, and a first volume, entitled *Horae Syriacae*, published in 1827, gave promise of a great scholar. Leo XII. apppointed him curator of the Arabic MSS. in the Vatican, and professor of oriental languages in the Roman university. At this date he had close relations, personal and by correspondence, with Mai, Bunsen, Burgess (bishop of Salisbury), Tholuck and Kluge. His student life was, however, broken by the pope's command to preach to the English in Rome; and a course of his lectures, *On the Connexion between Science and Revealed Religion*, deservedly attracted much attention, his general thesis being that whereas scientific teaching has repeatedly been thought to disprove Christian doctrine, further investigation has shown that a reconstruction is possible. He visited England in 1835–1836, and delivered lectures on the principles and main doctrines of Roman Catholicism in the Sardinian Chapel, Lincoln's Inn Fields, and in the church at Moorfields, now pulled down. Their effect was considerable; and at Pusey's request Newman reviewed them in the *British Critic* (December 1836), treating them for the most part with sympathy as a triumph over popular Protestantism. To another critic, who had taken occasion to point out the resemblance between Catholic and pagan ceremonies, Wiseman replied, boldly admitting the likeness, and maintaining that it could be shown equally well to exist between Christian and heathen doctrines. In 1836 he founded the *Dublin Review*, partly to infuse into the lethargic English Catholics higher ideals of their own religion and some enthusiasm for the papacy, and partly to enable him to deal with the progress of the Oxford Movement, in which he was keenly interested. At this date he was already distinguished as an accomplished scholar and critic, able to converse fluently in half-a-dozen languages, and well informed on most questions of scientific, artistic or antiquarian interest. In the winter of 1838 he was visited in Rome by Macaulay, Manning and Gladstone. An article by him on the Donatist schism appearing in the *Dublin Review* in July 1839 made a great impression in Oxford, Newman and others seeing the force of the analogy between Donatists and Anglicans. Some words he quoted from St Augustine influenced Newman profoundly: "Quapropter securus judicat orbis terrarum bonos non esse qui se dividunt ab orbe terrarum." And preaching at the opening of St Mary's church, Derby, in the same year, he anticipated Newman's argument on religious development, published six years later. In 1840 he was consecrated bishop, and sent to England as coadjutor to Bishop Walsh, vicar-apostolic of the Central district, and was also appointed president of Oscott College near Birmingham. Oscott, under his presidency, became a centre for English Catholics, where he was also visited by many distinguished men, including foreigners and non-Catholics. The Oxford converts (1845 and later) added considerably to Wiseman's responsibilities, as many of them found themselves wholly without means, while the old Catholic body looked on the newcomers with distrust. It was by his advice that Newman and his companions spent some time in Rome before undertaking clerical work in England. Shortly after the accession of Pius IX. Wiseman was appointed temporarily vicar-apostolic of the London district, the appointment becoming permanent in February 1849. On his arrival from Rome in 1847 he acted as informal diplomatic envoy from the pope, to ascertain from the government what support England was likely to give in carrying out the liberal policy with which Pius inaugurated his reign. In response Lord Minto was sent to Rome as "an authentic organ of the British Government," but the policy in question proved abortive. Residing in London in Golden Square, Wiseman threw himself into his new duties with many-sided activity, working especially for the reclamation of Catholic criminals and for the restoration of the lapsed poor to the practice of their religion. He was zealous for the establishment of religious communities, both of men and women, and for the holding of retreats and missions. He preached (4th July 1848) at the opening of St George's, Southwark, an occasion unique in England since the Reformation, 14 bishops and 240 priests being present, and six religious orders of men being represented. The progress of Catholicism was undeniable, but yet Wiseman found himself steadily opposed by a minority among his own clergy, who disliked his Ultramontane ideas, his "Romanizing and innovating zeal," especially in regard to the introduction of sacred images into the churches and the use of devotions to the Blessed Virgin and the Blessed Sacrament, hitherto unknown among English Catholics. In July 1850 he heard of the pope's intention to create him a cardinal, and he took this to mean that he was to be permanently recalled to Rome. But on his arrival there he ascertained that a part of the pope's plan for restoring a diocesan hierarchy in England was that he himself should return to England as cardinal and archbishop of Westminster. The papal brief establishing the hierarchy was dated 29th September 1850, and on 7th October Wiseman wrote a pastoral, dated "from out of the Flaminian Gate"—a form diplomatically correct, but of bombastic tone for Protestant ears—in which he spoke enthusiastically, if also a little pompously, of the "restoration of Catholic England to its orbit in the ecclesiastical firmament." Wiseman travelled slowly to England, round by Vienna; and when he reached London (11th November) the whole country was ablaze with indignation at the "papal aggression," which was misunderstood to imply a new and unjustifiable claim to territorial rule. Some indeed feared that his life was endangered by the violence of popular feeling. But Wiseman displayed calmness and courage, and immediately penned an admirable *Appeal to the English People* (a pamphlet of over 30 pages), in which he explained the nature of the pope's action, and argued that the admitted principle of toleration included leave to establish a diocesan hierarchy; and in his concluding paragraphs he effectively contrasted that dominion over Westminster, which he was taunted with claiming, with his duties towards the poor Catholics resident there, with which alone he was really concerned. A course of lectures at St George's, Southwark, further moderated the storm. In July 1852 he presided at Oscott over the first provincial synod of Westminster, at which Newman preached his sermon on the "Second Spring"; and at this date Wiseman's dream of the rapid conversion of England to the ancient faith seemed not incapable of realization. But many difficulties with his own people shortly beset his path, due largely to the suspicions aroused by his evident preference for the ardent Roman zeal of the converts, and especially of Manning, to the dull and cautious formalism of the old Catholics. The year 1854 was marked by his presence in Rome at the definition of the dogma of the immaculate conception of the Blessed Virgin (8th December), and by the publication of his historical romance, *Fabiola*, a tale of the Church of the Catacombs, which had a very wide circulation and was translated into ten languages. In 1855 Wiseman applied for a coadjutor, and

George Errington, bishop of Plymouth, his friend since boyhood, was appointed, with the title of archbishop of Trebizond. Two years later Manning was appointed provost of Westminster and he established in Bayswater his community of the "Oblates of St Charles." All Wiseman's later years were darkened by Errington's conscientious but implacable hostility to Manning, and to himself in so far as he was supposed to be acting under Manning's influence. The story of the estrangement, which was largely a matter of temperament, is fully told in Ward's biography. Ultimately, in July 1860, Errington was deprived by the pope of his coadjutorship with right of succession, and he retired to Prior Park, near Bath, where he died in 1886. In the summer of 1858 Wiseman paid a visit to Ireland, where, as a cardinal of Irish race, he was received with enthusiasm. His speeches, sermons and lectures, delivered during his tour, were printed in a volume of 400 pages, and show an extraordinary power of rising to the occasion and of speaking with sympathy and tact. Wiseman was able to use considerable influence with English politicians, partly because in his day English Catholics were wavering in their historical allegiance to the Liberal party. As the director of votes thus doubtful, he was in a position to secure concessions that bettered the position of Catholics in regard to poor schools, reformatories and workhouses, and in the status of their army chaplains. In 1863, addressing the Catholic Congress at Malines, he stated that since 1830 the number of priests in England had increased from 434 to 1242, and of convents of women from 16 to 162, while there were 55 religious houses of men in 1863 and none in 1830. The last two years of his life were troubled by illness and by controversies in which he found himself, under Manning's influence, compelled to adopt a policy less liberal than that which had been his in earlier years. Thus he had to condemn the Association for the Promotion of the Unity of Christendom, with which he had shown some sympathy in its inception in 1857; and to forbid Catholic parents to send their sons to Oxford or Cambridge, though at an earlier date he had hoped (with Newman) that at Oxford at least a college or hall might be assigned to them. But in other respects his last years were cheered by marks of general regard and admiration, in which non-Catholics joined; and after his death (16th February 1865) there was an extraordinary demonstration of popular respect as his body was taken from St Mary's, Moorfields, to the cemetery at Kensal Green, where it was intended that it should rest only until a more fitting place could be found in a Roman Catholic cathedral church of Westminster. On the 30th of January 1907 the body was removed with great ceremony from Kensal Green and reburied in the crypt of the new cathedral, where it lies beneath a Gothic altar tomb, with a recumbent effigy of the archbishop in full pontificals.

Wiseman was undoubtedly an eminent Englishman, and one of the most learned men of his time. He was the friend and correspondent of many foreigners of distinction, among whom may be named Döllinger, Lamennais, Montalembert and Napoleon III. As a writer he was apt to be turgid and prolix, and there was a somewhat un-English element of ostentation in his manner. But his accomplishments and ability were such as would have secured for him influence and prominence in any age of the Church; and besides being highly gifted intellectually and morally, he was marked by those specially human qualities which command the interest of all students of life and character. He combined with the principles known as Ultramontane no little liberality of view in matters ecclesiastical. He insisted on a poetical interpretation of the Church's liturgy; and while strenuously maintaining her Divine commission to teach faith and morals, he regarded the Church as in other respects a learner; and he advocated a policy of conciliation with the world, and an alliance with the best tendencies of contemporary thought. It was, in his judgment, quite in accordance with the genius of the Catholic Church that she should continuously assimilate all that is worthy in the civilization around.

See the biography by Wilfrid Ward, *The Life and Times of Cardinal Wiseman* (2 vols., 1897; fifth and cheaper edition, 1900).

(A. W. Hu.)

WISHART, GEORGE (*c.* 1513–1546), Scottish reformer, born about 1513, belonged to a younger branch of the Wisharts of Pitarrow. His early life has been the subject of many conjectures; but apparently he graduated M.A., probably at King's College, Aberdeen, and taught as a schoolmaster at Montrose. Accused of heresy in 1538, he fled to England, where a similar charge was brought against him at Bristol in the following year. In 1539 or 1540 he started for Germany and Switzerland, and returning to England became a member of Corpus Christi College, Cambridge. In 1543 he went to Scotland in the train of a Scottish embassy which had come to London to consider the treaty of marriage between Prince Edward and the infant queen of Scots. There has been much controversy whether he was the Wishart who in April 1544 approached the English government with a proposal for getting rid of Cardinal Beaton. Roman Catholic historians such as Bellesheim, and Anglicans like Canon Dixon, have accepted the identification, while Froude does not dispute it and Dr Gairdner avoids committing himself (*Letters and Papers of Henry VIII.* vol. xix. pt. i., Introd. pp. xxvii-xxviii). There was another George Wishart, bailie of Dundee, who allied himself with Beaton's murderers; and Sir John Wishart (d. 1576), afterwards a Scottish judge, has also claims to the doubtful distinction. Sir John was certainly a friend of Creighton, laird of Branston, who was deeply implicated in the plot, but Creighton also befriended the reformer during his evangelical labours in Midlothian. The case against the reformer is not proven and is not probable.

His career as a preacher began in 1544, and the story has been told in glowing colours by his disciple John Knox. He went from place to place in peril of his life denouncing the errors of Rome and the abuses in the church at Montrose, Dundee, Ayr, in Kyle, at Perth, Edinburgh, Leith, Haddington and elsewhere. At Ormiston, in December 1545, he was seized by the earl of Bothwell, and transferred by order of the privy council to Edinburgh castle on January 19, 1546. Thence he was handed over to Cardinal Beaton, who had him burnt at St Andrews on March 1. Foxe and Knox attribute to him a prophecy of the death of the Cardinal, who was assassinated on May 29 following, partly at any rate in revenge for Wishart's death.

Knox's *Hist.*; Reg. P.C. Scotland; Foxe's *Acts and Monuments*; Hay Fleming's *Martyrs and Confessors of St Andrews*; Cramond's *Truth about Wishart* (1898); and *Dict. of Nat. Biogr.* vol. lxii. (248-251, 253-254).

(A. F. P.)

WISHAW, a municipal and police burgh of Lanarkshire, Scotland. Pop. (1901) 20,873. It occupies the face of a hill a short distance south of the South Calder and about 2 m. N. of the Clyde, 15 m. E.S.E. of Glasgow by the Caledonian railway. It owes its importance to the development of the coal and iron industry, and was created a police burgh in 1855. It was extended to include the villages of Cambusnethan and Craigneuk in 1874. The chief public buildings are the town-hall, Victoria hall, the public library and the parish hall, and there is also a public park.

WISLICENUS, JOHANNES (1835–1902), German chemist, was born on the 24th of June 1835 at Klein-Eichstedt, in Thuringia. In 1853 he entered Halle University, but in a few months emigrated to America with his father. For a time he acted as assistant to Professor E. N. Horsford at Harvard, and in 1855 was appointed lecturer at the Mechanics' Institute in New York. Returning to Europe in 1856, he continued his studies at Zürich University, where nine years later he became professor of chemistry. This post he held till 1872. He then succeeded A. F. L. Strecker in the chair of chemistry at Würzburg, and in 1885, on the death of A. W. H. Kolbe, was appointed to the same professorship at Leipzig, where he died on the 6th of December 1902. As an original investigator he devoted himself almost exclusively to organic chemistry, and especially to stereochemistry. His work on the lactic acids cleared up many difficulties concerning the combination of acid and alcoholic properties in oxy-acids in general, and resulted in the discovery of two substances differing in physical properties though possessing a structure of proved chemical identity. To this phenomenon, then noticed for the first time, he gave the name of "geometrical isomerism." So far back as 1869, before the publication of the doctrine of J. H. van't Hoff and J. A. Le Bel, he expressed the opinion that the ordinary constitutional formulae did not afford an adequate explanation of certain carbon compounds, and

In the first of these three periods we find (1) the conception of the *malefica*, who, in common with her male counterpart, uses poison, spells and waxen images, produces tempests, works by means of the evil eye and is regarded as the cause of impotence, a feature which continually called the attention of theologians and jurists to the question of magic by the problems raised by suits for divorce or nullity of marriage. (2) Side by side with her, we find, this time without a male counterpart, the *striga*, frequently embodying also the ideas of the *lamia* and *larva*; originally she is a female demon, in bird form (and in many parts of the world female demons are specially malignant), who flies by night, kills children or even handsome young men, in order to eat them, assumes animal form, sometimes by means of an ointment, or has an animal familiar, rides on a besom, a piece of wood or an animal, and is sometimes brought into connexion with the souls of the dead. This latter feature arises from the gradual fusion of the belief in the *striga*, the *Unholde*, with the kindly suite of Frau Holde, the souls for whom the *tabulae fortunae* were spread. The flight through the air is so common a feature in the savage creed that the demon-idea of the *striga* in Europe can hardly be a genuine folk-belief; or, if it is, it must have existed side by side with a similar witch-belief, of which no traces seem to exist in the earlier literature. The same remark applies to belief in transformation. Although the development of the sexual element is mainly of later date and contemporaneous with the evolution of the Sabbath idea, the *concubitus daemonum* was certainly not unknown to the period before 800. This intrusion of the incubus in the domain of witchcraft was probably due to the attitude of the church towards magic.

Ecclesiastical and Civil Law.—For the attitude of the church to witchcraft there are three factors to be considered: (1) the Biblical recognition of its reality; (2) the universal belief in demons and magic; and (3) the identification of these demons with heathen deities. The orthodox view fluctuates between the theory that witchcraft is idolatry, a recognition of real powers, and that it is disobedience, a superstitious following of non-existent gods. The Biblical conception of a witch is a person who deals with familiar spirits (Lev. xx. 20), and the express provision that a witch should not be suffered to live (Ex. xxii. 18) could have left no doubt that the crime was a real one in the Mosaic law. Although the familiar plays but a small part in this early period, we find that the church early came to the conclusion that witchcraft depended on a compact with demons; in the synod of Elvira (A.D. 306) it was pronounced to be one of the three canonical sins—apostasy—and punished by the refusal of communion, even on the death-bed. Augustine lays down (*De doct. chr.* II. xx.) that witchcraft depends on a pact with the devil; at Worms in A.D. 829 the Frankish bishops declared that the devil aided both sexes to prepare love potions, to cause storms and to abstract milk, fruits of the field, &c.

It must not, however, be supposed that all kinds of witchcraft were equally recognized. The *inmissores tempestatum* and the poisoners by magical means were commonly recognized as real; but the *striga* was usually regarded as a pure superstition. An Irish synod (*c.* A.D. 800) pronounces a Christian to be anathema, who ventures to believe in the possibility of flight through the air and blood-sucking; Stephen of Hungary (997–1038) likewise distinguishes the *malefica* from the *striga*; Regino of Prüm (*c.* 906) concludes that the flight by night with the devil and the goddess Diana is a delusion, the work of the devil. Burchard of Worms (d. 1025) prescribes two years' penance for the belief that the *Unholde* kill Christians, cook them and eat their hearts, which they replace by a piece of wood, and then wake them. Agobard and others even express doubts as to the reality of weather-making. For those who took this view, and even for others who, like John of Damascus, accepted the *striga*, a mild attitude, in strong contrast to the later persecutions, was the accepted policy. The Synod of Reisbach (799) demands penance for witchcraft, but no punishment in this life. John of Damascus, Agobard, John of Salisbury and Burchard are equally mild.

For the church witchcraft was a canonical sin, or superstition; for the civil law it was a violation of the civil rights of others, so far as real results were produced. Consequently we find the legal distinction between the *malefica* and the *striga* is equally marked. The Frankish and Alemannish laws of A.D. 500–600 accept the former but regard the latter as mere superstition. The Lex Salica indeed punished the *striga* as a murderess, but only exacted wergeld. Rothar forbade judges to kill the *striga*, and Charlemagne even punished the belief in them. The Alemanni (A.D. 600) forbade private torture of women suspected of witchcraft or strigism. But although witchcraft was criminal, and we find occasional laws against *sortiariae* (Westfranks, A.D. 873), or expulsions (from Pomerania, 1124, &c.), in this period the crime is unimportant save where *maleficium* is combined with treason and the person of the king is aimed at.

Further Development.—In the second period (1230–1430) we have to deal with two factors of fundamental importance: (1) the elaboration of demonology and allied ideas by the scholastics, and (2) the institution of the Inquisition to deal with the rising flood of heresy. At the beginning of this era the prevalent view of the *striga* seems to have been that she really existed; Caesar of Heisterbach (*c.* 1225) recognizes the female monster who kills children; William of Paris (*c.* 1230) agrees that *lamiae* and *strigae* eat children, but they are allied to the *dominae nocturnae*; that they are real women is a foolish belief. Scholastic ingenuity, however, soon disposed of rationalistic objections to human flights through the air; the ride of disembodied spirits, led by the devil, Diana, Herodias (the Aradia of modern Italy), &c., became the assemblies of witches to do homage to the devil. But this fusion was not the work of the scholastics alone; for the church, witchcraft had long consisted in the recognition of demons. The new sects, especially the Cathars, who held that the influence of the devil had perverted the teachings of Christianity, were, like the early Christians, the object of unfounded charges, in this case of worship of the devil, this naturally led to the belief that they were given to witchcraft.

From the 7th century onwards women and priests figure largely in the accusations of witchcraft, the latter because their office made the canonical offence more serious, the former because love potions, and especially *impotentia ex maleficio*, are the weapons of the female sex. With the rise and development of the belief in the heretics' Sabbath, which first appears early in the 12th century, another sexual element—the *concubitus daemonum*—began to play its part, and soon the predominance of woman in magic was assured. In 1250 certain bishops gave to the Dominican Etienne de Bourbon (Stephanus de Borbone, d. *c.* 1261) a description of the Sabbath; and twenty-five years later the Inquisition took cognisance of the first case of this kind; from the 14th century onwards the idea was indissolubly connected with witchcraft.

In the first half of this second period, witchcraft was still superstition for the canon law, a civil wrong for the secular law; later, although these ideas still persisted, all magic was held to be heresy; its reality and heretical nature was expressly maintained by Thomas Aquinas. Already in 1258 the inquisitors took cognisance of magic as heresy, and from 1320 onwards there was a great increase in the number of cases. At first the witch was handed over to the secular arm for execution, either as an obstinate heretic or as the worker of evil magic; later it was found necessary to make provision for the numerous cases in which the offender abjured; it was decided that repentance due to fear did not release the witch from the consequences of her heresy.

Towards the end of the second period the jurisdiction passed in France from the spiritual to the secular courts by a decision of the parlement of Paris in 1391. The inquisitors did not, however, resign their work, but extended their sphere of operations; the great European persecution from 1434 to 1447 was ecclesiastical as well as secular. In the third period (1430 onwards) the opening of which is marked by this attempt to root out witchcraft, we find that the work of the scholastics and inquisitors has resulted in the complete fusion of originally distinct ideas and the crystallization of our modern idea of witch. To the methods of the inquisitors must be ascribed in great part the spread of these conceptions amongst the people; for the *Malleus Maleficarum* or Inquisitor's Manual (1489), following closely on the important bull *Summis desiderantes affectibus* (Innocent VIII., 1484), gave them a handbook from which they plied their tortured victims with questions and were able to extract such confessions as they desired; by a strange perversion these admissions, wrung from their victims by rack or thumb-screw, were described as voluntary.

The subsequent history of witchcraft may be treated in less detail. In England the trials were most numerous in the 17th century; but the absence of judicial torture made the cases proportionately less numerous than they were on the European continent. One of the most famous witch-finders was Matthew Hopkins, himself hanged for witchcraft after a career of some three years. Many of his methods were not far removed from actual torture; he pricked the body of the witch to find anaesthetic areas; other signs were the inability to shed tears, or repeat the Lord's Prayer, the practice of walking backwards or against the sun, throwing the hair loose, intertwining the fingers, &c. Witches were also weighed against the Bible, or thrown into water, the thumbs and toes tied crosswise, and those who did not sink were adjudged guilty; a very common practice was to shave the witch, perhaps to discover insensible spots, but more probably because originally the familiar spirit was supposed to cling to the hair. The last English trial for witchcraft was in 1712, when Jane Wenham was convicted, but not executed. Occasional cases of lynching continue to occur, even at the present day.

In Scotland trials, accompanied by torture, were very frequent in the 17th century. A famous witch-finder was Kincaid. The last trial and execution took place in 1722.

In New England there was a remarkable outburst of fanaticism—the famous Salem witchcraft delusion—in 1691–1692; but many of the prisoners were not convicted and some of the convicts received the governor's pardon (see SALEM, MASS.).

On the continent of Europe the beginning of the 16th century saw the trial of witchcraft cases taken out of the hands of the Inquisition in France and Germany, and the influence of the *Malleus* became predominant in these countries. Among famous continental trials may be mentioned that of a woman named Voisin in 1680, who was burnt alive for poisoning, in connexion with the Marquise de Brinvilliers. Trials and executions did not finally cease till the end of the 18th century. In Spain a woman was burnt in 1781 at Seville by the Inquisition; the secular courts condemned a girl to decapitation in 1782; in Germany an execution took place in Posen in 1793. In South America and Mexico witch-burning seems to have lasted till well on into the second half of the 19th century, the latest instance apparently being in 1888 in Peru.

The total number of victims of the witch persecutions is variously estimated at from 100,000 to several millions. If it is true that Benedict Carpzov (1595–1666) passed sentence on 20,000 victims, the former figure is undoubtedly too low.

Rise of the Critical Spirit.—It is commonly assumed and has been asserted by Lecky that the historical evidence for witchcraft is vast and varied. It is true that a vast amount of authority for the belief in witchcraft may be quoted; but the testimony for the occurrence of marvels is small in quantity, if we except the valueless declaration of the victims of torture; testimony as to the pathological side of witchcraft is abundant, but affords no proof of the erroneous inferences drawn from the genuine phenomena. If this uncritical attitude is found in our own day, it is not surprising that the rationalistic spirit was long in making its appearance and slow in gaining the victory over superstition. From the 15th century onwards the old view that transformation and transportation were not realities but delusions, caused directly by the devil, began to gather force. Among the important works may be mentioned Johann Weier's *De Praestigiis Daemonum* (1563), Reginald Scott's (*c.* 1538–1590) *Discovery of Witchcraft* (1584) which was ordered to be burnt by King James I., who had himself replied to it in his *Daemonologie* (1597), Balthasar Bekker's *Betooverde Wereld* (1691), which, though it went farther in the direction of scepticism, had less influence than Friedrich v. Spee's *Cautio criminalis* (1631). In France Jean Uvier defended the rationalistic view, and Jean Bodin demanded that he should be sent to the stake for his temerity.

Psychology of Witchcraft.—Although at the height of the witch persecution torture wrung from innocent victims valueless confessions which are at best evidence that long-continued agony of body may be instrumental in provoking hallucinations, there can be no doubt that witches commonly, like the magician in lower planes of culture, firmly believe in their own powers, and the causes of this seem to be not merely subjective. (1) Ignorance of the effects of suggestion leads both the witch and others to regard as supernormal effects which are really due to the victim's belief in the possibility of witchcraft. This applies especially to cases of "ligature." (2) Telepathy (*q.v.*) seems in some cases to play a part in establishing the witch's reputation; some evidence has been produced that hypnotism at a distance is possible, and an account of her powers given by a French witch to Dr Gibotteau suggests that this element cannot be neglected in appraising the evidence for witchcraft. (3) Whatever be the real explanation of the belief in poltergeists (*q.v.*) and "physical phenomena" (*q.v.*), the belief in them rests on a very different basis from that of the belief in lycanthropy; exaggeration and credulity alone will not explain how these phenomena come to be associated with witchcraft. On the other hand, subjective causes played their part in causing the witch to believe in herself. (4) Auto-suggestion may produce hallucinations and delusions in otherwise sane subjects; and for those who do not question the reality of witchcraft this must operate powerfully. (5) The descriptions of witches show that in many cases their sanity was more than questionable; trance and hysteria also played their part. (6) It is uncertain to what extent drugs and salves have helped to cause hallucination; but that they had some share seems certain, though modern experimenters have been led to throw doubt on the alleged effects of some of the drugs; here too, however, the effects of suggestion must be reckoned with; we do not associate the use of tobacco with hallucinations, but it was employed to produce them in Haiti in the same way as hemp among the Bantu of the present day. (7) Hallucinations occurring under torture must have tended to convince bystanders and victims alike, no less than the acceptance of suggestions, positive and negative.

As regards the nature of the ideas accepted as a result of suggestion or auto-suggestion, they were on the one hand derived, as we have seen, from ecclesiastical and especially scholastic sources; but beneath these elements is a stratum of popular belief, derived in the main perhaps from pagan sources, for to this day in Italy witchcraft is known as *la vecchia religione*, and has been handed down in an unbroken tradition for countless generations.

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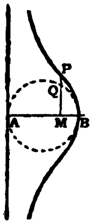
Bastian, *Der Mensch in der Geschichte*. On witchcraft and insanity, see Hack-Tuke, *History of Insanity*; O. Snell, *Hexenprocesse und Geistesstörung*. For a discussion of the evidence for the real existence of witchcraft, see E. Gurney, *Phantasms of the Living*, vol. i.; F. Podmore, *Modern Spiritualism*, i. 13. (N. W. T.)

WITCH-HAZEL, in botany, the common name for a North American shrub, *Hamamelis virginica*, known in gardens. The clusters of rich yellow flowers begin to expand in the autumn before the leaves fall and continue throughout the winter. The bark and leaves are astringent, and the seeds contain a quantity of oil and are edible. The name is derived from the use of the twigs as divining rods, just as hazel twigs were used in England.

Britten and Holland (*Dictionary of English Plant Names*, p. 247) quote three British plants under this name: (1) Wych elm (*Ulmus montana*), which, according to Parkinson (*Theatr*. 1403), was called "Witch hasell," because the leaves are "like unto the leaves of the Hasell nut"; (2) Hornbeam (*Carpinus Betulus*), which, according to Gerard, was so called in some places from its likeness to the elm or "wich Hazell tree"; and (3) Mountain ash (*Pyrus Aucuparia*).

WITCH OF AGNESI, in geometry, a cubic curve invented by Maria Gaetana Agnesi. It is constructed by the following method: Let AQB be a semicircle of diameter AB, produce MQ the ordinate of Q to P so that MQ : MP :: AM : AB. Then the locus of P is the witch. The cartesian equation, if A be taken as origin and AB($=2a$) for the axis of x, is $xy^2=4a^2(2a-x)$. The curve consists of one branch entirely to the left of the line $x=2a$ and having the axis of y as an asymptote.



WITHAM, an urban district in the Maldon parliamentary division of Essex, England, 39 m. N.E. by E. from London by the Great Eastern railway. Pop. (1901) 3454. It lies on the River Brain, an affluent of the Blackwater, also known as the Guith, a form connected with the name Witham. The church of St Nicholas is principally Decorated, but retains earlier portions. Roman bricks appear in its fabric, and premise a Roman station in the vicinity. Surrounding the church (which stands in a high-lying portion of the town known as Chipping Hill) there are earthworks, possibly the remains of a fortification recorded as made by order of Edward the Elder in 913, but perhaps of British origin.

WITHER, GEORGE (1588–1667), English poet and satirist, son of George Wither, of Hampshire, was born at Bentworth, near Alton, on the 11th of June 1588. He was sent to Magdalen College, Oxford, at the age of fifteen, and remained at the university for two years. His neighbours appear to have had no great opinion of him, for they advised his father to put him to "some mechanic trade." He was, however, sent to one of the Inns of Chancery, eventually obtaining an introduction at court. He wrote an elegy (1612) on the death of Prince Henry, and a volume of gratulatory poems (1613) on the marriage of the princess Elizabeth, but his uncompromising character soon prepared trouble for him. In 1611 he published *Abuses Stript and Whipt*, twenty satires of general application directed against Revenge, Ambition, Lust and other abstractions. The volume included a poem called "The Scourge," in which the lord chancellor was attacked, and a series of epigrams. No copy of this edition is known, and it was perhaps suppressed, but in 1613 five editions appeared, and the author was lodged in the Marshalsea prison. The influence of the Princess Elizabeth, supported by a loyal "Satyre" to the king, in which he hints that an enemy at court had fitted personal meanings to his general invective, secured his release at the end of a few months. He had figured as one of the interlocutors, "Roget," in his friend William Browne's *Shepherd's Pipe*, with which were bound up eclogues by other poets, among them one by [illegible], and during his imprisonment he wrote what may [illegible] of Browne's work, *The* [illegible], eclogues in which the two [illegible] "Roget" (in later editions [illegible] eclogues contains a famous [illegible] release he was admitted [illegible] year he printed privately [illegible] a unique copy in the Bodleian. Other editions of this book, which contained the lyric "Shall I, wasting in despair," appeared in 1617 and 1619. In 1621 he returned to the satiric vein with *Wither's Motto. Nec habeo, nec careo, nec curo.* Over 30,000 copies of this poem were sold, according to his own account, within a few months. Like his earlier invective, it was said to be libellous, and Wither was again imprisoned, but shortly afterwards released without formal trial on the plea that the book had been duly licensed. In 1622 appeared his *Faire-Virtue, The Mistresse of Phil' Arete*, a long panegyric of a mistress, partly real, partly allegorical, written chiefly in the seven-syllabled verse of which he was a master.

Wither began as a moderate in politics and religion, but from this time his Puritan leanings became more and more pronounced, and his later work consists of religious poetry, and of controversial and political tracts. His *Hymnes and Songs of the Church* (1622–1623) were issued under a patent of King James I. ordaining that they should be bound up with every copy of the authorized metrical psalms offered for sale (see HYMNS). This patent was opposed, as inconsistent with their privilege to print the "singing-psalms," by the Stationers' Company, to Wither's great mortification and loss, and a second similar patent was finally disallowed by the House of Lords. Wither was in London during the plague of 1625, and in 1628 published *Britain's Remembrancer*, a voluminous poem on the subject, interspersed with denunciations of the wickedness of the times, and prophecies of the disasters about to fall upon England. He also incidentally avenged Ben Jonson's satire on him as the "Chronomastix" of *Time Vindicated*, by a reference to Ben's "drunken conclave." This book he was obliged to print with his own hand in consequence of his quarrel with the Stationers' Company. In 1635 he was employed by Henry Taunton, a London publisher, to write English verses illustrative of the allegorical plates of Crispin van Passe, originally designed for Gabriel Rollenhagen's *Nucleus emblematum selectissimorum* (1610–1613). The book was published as a *Collection of Emblemes, Ancient and Moderne*, of which the only perfect copy known is in the British Museum.

The best of Wither's religious poetry is contained in *Heleluiah: or Britain's Second Remembrancer*, which was printed in Holland in 1641. Many of the poems rise to a high point of excellence. Besides those properly entitled to the designation of hymns, the book contains songs of singular beauty, especially the Cradle-song ("Sleep, baby, sleep, what ails my dear"), the Anniversary Marriage Song ("Lord, living here are we"), the Perambulation Song ("Lord, it hath pleasèd Thee to say"), the Song for Lovers ("Come, sweet heart, come, let us prove"), the Song for the Happily Married ("Since they in singing take delight") and that for a Shepherd ("Renownèd men their herds to keep")—(Nos. 50 in the first part, 17 and 24 in the second, and 20, 21 and 41 in the third). There is also in the second part a fine song (No. 59), full of historical as well as poetical interest, upon the evil times in which the poet lived, beginning—

> "Now are the times, these are the days
> Which will those men approve
> Who take delight in honest ways
> And pious courses love;
> Now to the world it will appear
> That innocence of heart
> Will keep us far more free from fear
> Than helmet, shield or dart."

Wither wrote, generally, in a pure nervous English idiom, and preferred the reputation of "rusticity" (an epithet applied to him even by Baxter) to the tricks and artifices of poetical style which were then in favour. It may be partly on that account that he was better appreciated by posterity than by his contemporaries.

Wither had served as captain of horse in 1639 in the expedition of Charles I. against the Scottish Covenanters, and his religious rather than his political convictions must be accepted as the explanation of the fact that, three years after the Scottish expedition, at the outbreak of the Great Rebellion, he is found definitely siding with the parliament. He sold his estate to raise a troop of horse, and was placed by a parliamentary committee in command of Farnham Castle. After a few days' occupation he left the place undefended, and marched to London. His own house near Farnham was plundered, and he himself was captured by a troop of Royalist horse, owing his life to the intervention of Sir John Denham on the ground that so long as Wither lived he himself could not be accounted the worst poet in England. After this episode he was promoted to the rank of major. He was present at the siege of Gloucester (1643) and at Naseby (1645). He had been deprived in 1643 of his nominal command, and of his commission as justice of the peace, in consequence of an attack upon Sir Richard Onslow, who was, he maintained, responsible for the Farnham disaster. In the same year parliament made him a grant of £2000 for the loss of his property, but he apparently never received the full amount, and complained from time to time of his embarrassments and of the slight rewards he received for his services. An order was made to settle a yearly income of £150 on Wither, chargeable on Sir John Denham's sequestrated estate, but there is no evidence that he ever received it. A small place given him by the Protector was forfeited "by declaring unto him (Cromwell) those truths which he was not willing to hear of." At the Restoration he was arrested, and remained in prison for three years. He died in London on the 2nd of May 1667.

His extant writings, catalogued in Park's *British Bibliographer*, number over a hundred. Sir S. E. Brydges published *The Shepherd's Hunting* (1814), *Fidelia* (1815) and *Fair Virtue* (1818), and a selection appeared in Stanford's *Works of the British Poets*, vol. v. (1819). Most of Wither's works were edited in twenty volumes for the Spenser Society (1871–1882); a selection was included by Henry Morley in his *Companion Poets* (1891); *Fidelia* and *Fair Virtue* are included in Edward Arber's *English Garner* (vol. iv., 1882; vol. vi. 1883), and an excellent edition of *The Poetry of George Wither* was edited by F. Sidgwick in 1902. Among A. C. Swinburne's *Miscellanies* there is an amusing account of a copy of a selection from Wither's poems annotated by Lamb, then by Dr Nott, whose notes were the subject of further ruthless comment from Lamb.

WITHERITE, a mineral consisting of barium carbonate ($BaCO_3$), crystallizing in the orthorhombic system. The crystals are invariably twinned together in groups of three, giving rise to pseudo-hexagonal forms somewhat resembling bipyramidal crystals of quartz, the faces are usually rough and striated horizontally. The colour is dull white or sometimes greyish, the hardness is 3½ and the specific gravity 4·3. The mineral is named after W. Withering, who in 1784 recognized it to be chemically distinct from barytes. It occurs in veins of lead ore at Hexham in Northumberland, Alston in Cumberland, Anglezark, near Chorley in Lancashire, and a few other localities. Witherite is readily altered to barium sulphate by the action of water containing calcium sulphate in solution, and crystals are therefore frequently encrusted with barytes. It is the chief source of barium salts, and is mined in considerable amounts in Northumberland. It is used for the preparation of rat poison, in the manufacture of glass and porcelain, and formerly for refining sugar. (L. J. S.)

WITHERSPOON, JOHN (1723–1794), Scottish-American divine and educationalist, was born at Gifford, Yester parish, East Lothian, Scotland, on the 5th of February 1722/1723, the son of a minister of the Scotch Established Church, James Witherspoon (d. 1759), and a descendant on the distaff side from John Welch and John Knox. He studied at Haddington, and graduated in 1739 at the university of Edinburgh, where he completed a divinity course in 1743. He was licensed to preach by the Haddington presbytery in 1743, and after two years as a probationer was ordained (1745) minister of the parish of Beith. His *Ecclesiastical Characteristics* (1753), *Serious Apology* (1764), and *History of a Corporation of Servants discovered a few years ago in the Interior Parts of South America* (1765), attacked various abuses in the church and satirized the "moderate" party. In 1757 he had become pastor at Paisley; and in 1769 he received the degree of D.D. from Aberdeen. He was sued for libel for printing a rebuke to some of his parishioners who had travestied the sacrament of the Lord's Supper, and after several years in the courts he was ordered to pay damages of £150, which was raised by his parishioners. He refused calls to churches in Dublin and Rotterdam, and in 1766 declined an invitation brought him by Richard Stockton to go to America as president of the College of New Jersey (now Princeton University); but he accepted a second invitation and left Paisley in May 1768. His close relation with the Scotch Church secured important material assistance for the college of which he now became president, and he toured New England to collect contributions. He secured an excellent set of scientific apparatus and improved the instruction in the natural sciences; he introduced courses in Hebrew and French about 1772; and he did a large part of the actual teaching, having courses in languages, divinity, moral philosophy and eloquence. In the American Presbyterian church he was a prominent figure; he worked for union with the Congregationalists and with the Dutch Reformed body; and at the synod of 1786 he was one of the committee which reported in favour of the formation of a General Assembly and which drafted "a system of general rules for . . . government." In politics he did much to influence Irish and Scotch-Irish Presbyterians to support the Whig party. He was a member of the provincial congress which met at New Brunswick in July 1774; presided over the Somerset county committee of correspondence in 1774–1775; was a member of the New Jersey constitutional convention in the spring of 1776; and from June 1776 to the autumn of 1779 and in 1780–1783 he was a member of the Continental Congress, where he urged the adoption of the Declaration of Independence, being the only clergyman to sign it. He became a member of the secret committee of correspondence in October 1776, of the Board of War in October 1777, and of the committee on finance in 1778. He opposed the issue of paper money, supported Robert Morris's plan for a national bank, and was prominently connected with all Congressional action in regard to the peace with Great Britain. He had lost the sight of one eye in 1784, and in 1791 became quite blind. He died on his farm, Tusculum, near Princeton, on the 15th of November 1794.

There is a statue of Witherspoon in Fairmount Park, Philadelphia, and another on the University Library at Princeton. His *Essay on the Connexion between the Doctrine of Justification by the Imputed Righteousness of Christ and Holiness of Life* (1756) was his principal theological work. He also published several sermons, and *Considerations on the Nature and Extent of the Legislative Authority of the British Parliament* (1774), sometimes attributed to Benjamin Franklin. His collected works, with a memoir by his son-in-law, Samuel Stanhope Smith (who succeeded him as president of the college), were edited by Dr Ashbel Green (New York, 1801–1802). See also David Walker Woods, *John Witherspoon* (New York, 1906); and M. C. Tyler, *Literary History of the American Revolution*, vol. ii. (1897).

WITNESS (from O. Eng. *witan*, to know), in law, a person who is able from his knowledge or experience to make statements relevant to matters of fact in dispute in a court of justice. The relevancy and probative effect of the statements which he makes belong to the law of evidence (*q.v.*). In the present article it is only proposed to deal with matters concerning the position of the witness himself. In England, in the earlier stages of the common law, the jurors seem to have been the witnesses, for they were originally chosen for their knowledge or presumed knowledge of the facts in dispute, and they could (and can) be challenged and excluded from the jury if related to the parties or otherwise likely to show bias (see JURY). The Scottish jurors' oath contains the words "and no truth conceal," an obvious survival from the time when a juror was a witness.

Competency.

Modern views as to the persons competent to give evidence are very different from those of Roman law and the systems derived from it. In Roman law the testimony of many persons was not admissible without the application of torture, and a large body of possible witnesses was excluded for reasons which have now ceased to be considered expedient, and witnesses were subject to rules which have long become obsolete. Witnesses must be *idonei*, or duly qualified. Minors, certain heretics, infamous persons (such as women convicted of adultery), and those interested in the result of the trial were inadmissible. Parents and children could not testify against one another, nor could slaves against their masters, nor those at enmity with the party against whom their evidence was offered. Women and slaves could not act as witnesses to a will. There were also some hard and fast rules as to number. Seven witnesses were necessary for a will, five for a *mancipatio* or manumission, or to determine the question whether a person were free or a slave. As under the Mosaic law, two witnesses were generally necessary as a minimum number to prove any fact. *Unius* *responsio testis omnino non audiatur* are the words of a constitution of Constantine. The evidence of a single witness was simply *semiplena probatio*, to be supplemented, in default of a second witness, by torture or by reference to oath. The canon law followed the Roman law as to competence, but extended the disabilities to excommunicated persons and to a layman in a criminal charge against a clerk, unless he were actually the prosecutor. The evidence of a notary was generally equivalent to that of two ordinary witnesses. The evidence of the pope and that of a witness who simply proved baptism or heresy (according to some authorities) are perhaps the only other cases in which canon law dispensed with confirmatory evidence. It is probable that the incompetence of Jews as witnesses in Spain in the 14th and 15th centuries was based on what is termed "want of religion," *i.e.* heresy or unwillingness to take the Christian oath on the gospels. But in England until their expulsion they were in the status of slaves (*captivi*) of the king. A policy similar to that of Roman law was followed for centuries in England by excluding the testimony of parties or persons interested, of witnesses for a prisoner, and of infamous persons, such as those who had been attainted or had been vanquished in the trial by battle, or had stood in the pillory. All these were said *vocem non habere*. In the days of trial by battle a party could render a witness against him incompetent by challenging and defeating him in the judicial combat. Women were generally regarded as wholly or partially incompetent. English law had also certain rules as to the number of witnesses necessary. Thus under a statute of 1383 (6 Rich. II. st. 2, c. 5) the number of compurgators necessary to free an accused person from complicity in the peasant revolt was fixed at three or four. Five was the number necessary under the *Liber feudorum* for proving ingratitude to the lord. In one instance in old Scots law the number of witnesses had the curious effect of determining the punishment. By the assizes of King William, the ordeal of water was undergone by the accused on the oaths of three witnesses; if to them the oaths of three *seniores* were added, the penalty was immediate hanging.

In the course of the gradual development of the law of evidence, which is in a sense peculiar to the English system, the fetters of the Roman rules as to witnesses were gradually shaken off. In civil cases all disabilities by interest, relationship, sex or crime have been swept away. The witness need not be *idoneus* in the Roman sense, and objections which in Roman law went to his competence, in English law go to his credibility. The only general test of competency is now understanding. It excludes lunatics, idiots, dotards and children of tender years; a person convicted of perjury is said to be competent if convicted at common law, but incompetent if convicted under the act of Elizabeth. No trial ever takes place now under this act, and on this point the act seems to have been virtually repealed by Lord Denman's Act (1843; 6 & 7 Vict. c. 85). The disqualification is not absolute as to lunatics; as to children it is sometimes made to depend on whether they are able to understand the nature of the witness's oath. And in certain cases within the Criminal Law Amendment Act 1885 and the Prevention of Cruelty to Children Act 1904, the unsworn evidence of children of tender years is admissible but needs corroboration.

Non-judicial witnesses are those who attest an act of unusual importance, for the due execution of which evidence may afterwards be required. They are either made necessary by law, as the witnesses to marriages and wills, or used by general custom, as the witnesses to deeds. In some cases the attestation has become a mere form, such as the attestation of the lord chancellor to a writ of summons (see Writ).

The rule of English law as to the number of witnesses necessary is expressed in the phrase *testes ponderantur non numerantur*. But there are certain exceptions, all statutory. Two witnesses are necessary to make a will valid; two are required to be present at a marriage and to attest the entry in the marriage register;[1] and in the case of blasphemy, perjury, personation and most forms of treason, two or more witnesses are necessary to justify conviction. Witnesses to bills of sale under the Bills of Sale Act 1882, and witnesses on a charge of personation at elections, are required to be "credible." And in the case of dishonour of a foreign bill of exchange the evidence of a notary public is required, probably a survival from the law merchant or a concession to continental practice. A warrant of attorney must be attested by a solicitor, and certain conveyances of property held on charitable uses must be attested by two solicitors. In certain civil cases the evidence of a single witness is not sufficient unless corroborated in some material particular—not necessarily by another witness—*e.g.* in actions of breach of promise of marriage, or affiliation proceedings and matrimonial causes, or where unsworn evidence of children is admissible. In practice, but not in strict law, the evidence of an accomplice is required to be corroborated.

The English common law in theory has never permitted examination by torture—unless certain forms of cross-examination can be so described. In trials in the court of admiralty the Roman system was used until 1536 (28 Henry VIII. c. 15). Torture in Scotland was abolished at the Union.

In criminal cases an accused person could not formerly be sworn as a witness or examined by the court, though he was free to make statements. The origin of this rule is by some traced to the maxim *nemo tenetur prodere seipsum*, by others to the theory that the petty jury were the prisoner's witnesses. Moreover, witnesses for the defence could not be examined on oath in cases of treason and felony until 1702 in England, 1711 in Ireland and 1735 in Scotland. The husband or wife of the accused could not be examined on oath as a witness either for the prosecution or the defence except in prosecutions for treason or for personal injuries done by one spouse to the other. This exclusion was in accord with the disqualification of parties to civil causes; but there was a lack of reciprocity, for the prosecutor was a competent witness because the crown is the nominal prosecutor. The rule had to a certain extent a beneficial effect for the defence, in saving the accused from cross-examination, which in certain periods and in political trials would have led to abuse. On the abolition of other disqualifications that of the accused was left. This inconsistency led to much legal discussion and to piecemeal, and ultimately complete, change in the law. In 1878 the Criminal Code Commission recommended that prisoners should be allowed to give evidence on their own behalf on oath. Since 1872 many statutes have been passed rendering accused persons and their husbands or wives competent witnesses on charges of particular offences. Most of these acts do not make them compellable witnesses.

By the Criminal Evidence Act 1898 (60 and 61 Vict. c. 36) the defendant, or the wife or husband of the defendant, is made a competent but not a compellable witness for the defence at every stage of criminal proceedings, subject to certain conditions, of which the principal are that a prisoner shall not be called except on his or her own application, and that the failure of the prisoner or his wife or her husband to give evidence is not to be the subject of comment by the prosecution, and that the prisoner may not be cross-examined as to any previous offence or conviction or as to character, unless the proof of a previous offence is admissible evidence in the case, or unless he or she has given evidence of his or her good character, or cross-examined with that view, or unless the nature and conduct of the defence is such as to involve imputations on the character of the prosecutor or the witnesses for the prosecution. The act applies to Great Britain but not to Ireland. It has been extended to proceedings before naval and military courts-martial. This statute abrogates the common law rule making an accused person incompetent, and in practice supersedes most of the prior particular statutes. But it is necessary to observe that as to certain offences named in the schedule of the act and in other earlier or later acts, the husband or wife is competent without the consent of the accused; and that proceedings by indictment for obstruction or non-repair of public ways, bridges and rivers are for purposes of evidence treated as civil proceedings.

Quite apart from statute a husband or wife has always and necessarily been a competent witness in criminal proceedings against the other spouse in respect of personal injuries.

Even where a witness is competent, his statements, whether of fact or of expert opinion, are not admissible in evidence unless he has taken the required oath,[2] or, where he conscientiously objects to taking an oath or by want of religion would not be bound by the oath, has made the substituted affirmation or declaration. This question was settled in 1888 after the entry of Mr Bradlaugh into parliament. Unless he is duly sworn, &c., there is no enforceable sanction for false evidence (see Perjury). English law has gradually accepted as sufficient any form of oath which the witness is prepared to accept as binding on him in accordance with his religious beliefs, whether he be Christian or Jew, Mahommedan, Hindu, Sikh or Buddhist. At one time peers in certain proceedings testified on their honour unsworn, but now no distinction is made except as already stated in the case of young children.

The attestation of documents out of courts of justice is ordinarily not on oath; but where the documents have to be proved in court the attesting witnesses are sworn like others, and the only judicial exception is that of witnesses ordered to produce documents (called in Scotland "havers") who are not sworn unless they have to verify the documents produced. Questions as to competence (including questions of the right to affirm instead of swearing or as to the proper form of oath) are settled by examination by the court without oath, on what is termed the *voir dire*. The evidence of judicial witnesses is taken *viva voce* at the trial, except in interlocutory proceedings and in certain matters in the chancery division and in bankruptcy courts. Where the witness cannot attend the court or is abroad his evidence may be taken in writing by a commissioner delegated by the court, or by a foreign tribunal under letters of request issued by the court in which the cause is pending. The depositions are returned by the delegated authority to the court of trial. Under English law evidence must be taken *viva voce* in a criminal trial, with a few exceptions, *e.g.* where a witness who has made a deposition before a magistrate at an earlier stage in the case is dead or unable to travel, or in certain cases within the Merchant Shipping Acts, or of offences in India or by crown officials out of England. In Europe *commissions* rogatoires are freely used to obtain written depositions for the purpose of criminal trials, and are allowed to be executed in England. In England the *viva voce* examination of witnesses is not conducted by the presiding judge but by the advocates in the cause, and the witness is called not by the court but by the party. The court, however, has full power to call witnesses not called by either party, or to examine witnesses on questions not inquired into by the advocates of either party.

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[1] The provisions of the Marriage Act 1823 appear to be directory. does not invalidate the marriage, but creates diffi- of in other proceedings, *e.g.* for bigamy.

[2] The giving of evidence unsworn appears to have been at one time regarded as a privilege. The men of Ripon, for instance, were by a charter of Æthelstan to be believed on their yea and nay in all disputes.

The examination of a witness by the advocate of the side for which he is called is termed "examination-in-chief"; when by the advocate of the other party it is called "cross-examination." The judge, and by his leave the jurors, are free to question the witness. But the main duty of the judge is not himself to interrogate the witness but to see that neither side asks irrelevant or vexatious questions (see R.S.C. 1883, order 36, rule 38).

Attendance.

As a general rule competent witnesses are also compellable, except the king; *i.e.* they can be required to attend the court and to take the oath and to answer all relevant questions. But by the statutes as to evidence in criminal cases the accused is not a compellable witness, nor in many specified cases is the husband or wife of the accused. The attendance of witnesses is secured in the following manner: In civil actions in the High Court of Justice by writ of subpoena personally served with tender of the necessary journey money (see WRIT); in civil actions in county courts by witness summons; in criminal proceedings before the High Court of Justice or a court of assize or quarter sessions by crown office subpoena or by recognizance entered into before justices when the accused was committed for trial. In proceedings before justices out of quarter sessions the attendance of a witness is secured by witness summons or if need be by arrest on warrant of a justice. In criminal cases tender of expenses is not essential. Where a witness refuses to attend or to be sworn or to answer, he is summarily punishable for contempt if the court is one of record,[1] and liable to imprisonment if the proceedings are before a court of summary jurisdiction. Various acts of parliament deal with compelling appearance before committees of parliament, courts martial and other tribunals of a special nature. The attendance of a witness who is in custody is obtained by writ of *habeas corpus ad testificandum* or by judge's order in certain cases, or by order of the home secretary under the Prison Act 1898. A witness's expenses in a civil case are payable by the party calling him and are included in the costs of the cause. Scales of allowances are scheduled to the Rules of the Supreme Court and the County Court Rules. Failure of a witness duly summoned to attend in a civil action exposes him to liability in respect of pecuniary damage done to the party by his absence. In criminal cases the witness's expenses fall on the party calling him, but in prosecutions for felony and many misdemeanours the expenses are paid out of the local rate in accordance with scales fixed by the home secretary (see COSTS).

A witness is privileged from arrest on civil process while he is in attendance on a court of justice or is on his way to or from the court (*eundo, morando et redeundo*). The privilege does not exempt from arrest on a criminal charge. All witnesses except the defendant in a criminal case are entitled to object to answer any question put to them in court on the ground that the answer might tend to criminate them or to expose them to a penalty or forfeiture, or where the question is as to the fact of adultery. The defendant in a criminal case if sworn as a witness is not entitled to refuse to answer questions tending to prove him guilty of the offence for which he is being tried, and a witness cannot refuse to answer a question on the ground that the answer might involve admission of a debt or subject him to a civil action (1806, c. 37).

Witnesses are also privileged from making disclosure of matters known to them in the following cases: (1) Public officers, as to matters coming within their official cognizance if they can swear that it is inconsistent with the public service to disclose them. This applies to state secrets, and extends to jurors as to what passed among them, and the public prosecutor; and the police on this ground refuse to disclose the sources of information leading to prosecutions for crime. (2) Lawyers, as to communications between themselves and their clients, unless the communications are in themselves part of a criminal or unlawful enterprise. English law declines to extend professional privilege to communications between doctor and patient or priest and penitent. In most European countries, and in many British colonies, medical privilege is recognized as to matters communicated to the doctor or even discovered by him in attending the patient. In Catholic countries confessions to a priest are sacred. In England it is not now the practice to insist on evidence by a minister of religion as to matters confessed to him as such. (3) Communications between husband and wife during the marriage have always been privileged from disclosure, and this privilege is preserved by modern legislation (1853, c. 83, s. 3; 1898, c. 36, s. 1. d.).

It is correlative to the obligation of a witness to testify that no action may be brought against him under English law for any statement however defamatory, however irrelevant, and however malicious, made by him in the course of his testimony in judicial proceedings (*Seaman* v. *Netherclift*, 1876, 1 C.P.D. 540; *Hodson* v. *Pare*, 1899, 1 Q.B. 455). The only remedy, if the statement is deliberately false, is to prosecute him for perjury.

On charges of treason lists of the witnesses to be called by the crown must be supplied to the accused. In ordinary indictable cases there is no such obligation, but the names of the witnesses for the crown are written on the back of the indictment; and where the witnesses have not been examined at the preliminary inquiry it is now established practice to require notice to the accused of their names, and a précis of what they will be called to prove. In Scotland in all indictable cases a list of witnesses must be served on the accused (the panel) (1887, c. 35), and the same rule is observed in France. In the United States the same course is adopted where a capital offence is charged.

Scotland.—The rules as to competence of witnesses have been made substantially the same as in England by modern legislation (1837, c. 37, s. 9; 1840, c. 59, s. 1; 1852, c. 27; 1874, c. 64). Their attendance is procured by citation. Witnesses to produce documents are called "havers."

The evidence of witnesses is taken on oath (in the Scots form) or affirmation. Their privileges are substantially the same as in England, but they may be sued for irrelevant defamatory statements volunteered during their evidence, the law of Scotland on this point being the same as under the Dutch Roman law (see Nathan, *Common Law of S. Africa*, § 1593).

British Possessions.—In India the law as to witnesses and evidence is consolidated in the Indian Evidence Act 1872, which contains in code form the substance of the English law on the subject. The test of competency is understanding: "all persons shall be competent to testify unless the court considers that they are prevented from understanding the questions put to them or from giving rational answers to these questions by tender years, extreme old age, disease whether of body or mind, or of any other cause of the same kind. A lunatic is not incompetent to testify unless he is prevented by his lunacy from understanding the questions put to him and giving rational answers to them" (s. 118). In criminal proceedings the defendant is not, but the husband or wife of the defendant is, competent (s. 120). Under the Indian Oaths Act (x. of 1873) Hindus or Mahommedans or persons objecting to make an oath may affirm (s. 6). The court may accept an oath or solemn affirmation in any form common amongst or held as binding by persons of the persuasion or religion to which the witness belongs, unless it is repugnant to justice or decency (s. 8). In the rest of the British empire the law as to witnesses does not differ materially from that of England, but has in most colonies been incorporated in statutes or codes (*e.g.* British Guiana, Ord. No. 20 of 1893). Colonial legislation has provided for the evidence of accused persons under conditions similar to but not identical with those prevailing in England. In colonies with a large native population there is from time to time a tendency to reject the evidence of coloured witnesses against Europeans.

United States.—The rules of the United States as to witnesses have a common origin with those of England and are on the same lines, but in most states depend on the particular provisions of state codes. The number of witnesses necessary for the attestation of a marriage or will is not uniform in all the states. While slavery was lawful, the evidence of slaves (and in some states that of free persons of colour) was not received for or against whites. These rules appear not to have been absolutely overridden by the 14th amendment to the Federal Constitution, and the laws of Delaware and Nebraska discriminate against free persons of colour. Incompetency by conviction of perjury or subornation is retained in federal laws (Rev. Stat. § 5392) and in those of a few states (see Wigmore, p. 654 *n*).

European Countries.—In the law of most European states the Roman law as to the competency and examination of witnesses is more closely followed than in countries whose law is based on that of England. In criminal cases the prisoner is not only competent but necessary, and the whole system of procedure is inquisitorial, beginning with interrogation of the accused, not by the state prosecutor, but by the president of the court. In view of this system it is not surprising that the English conception of the rules of proof and relevancy, known as the law of evidence, is not accepted; since under the continental system the person who puts the questions is the person who has to determine their relevancy. In France consanguinity and affinity to the parties disqualify a witness in civil cases, and he is also asked whether he is employé or servant of the parties (Code Civil, Proc. 262, 268). In criminal cases a like inquiry is made. Consanguinity and affinity in the case of lineals may be made ground of disqualification if the objection is taken, as may pecuniary interest in the penalty (*Code d'instr. Crim.* 75, 322). Husband and wife cannot testify for or against each other even after divorce (*ib.*). In France disability to be a witness may be inflicted as part of the punishment on conviction for certain crimes (Code Penal, art. 42). (W. F. C.)

WITNEY, a market town in the Woodstock parliamentary division of Oxfordshire, England, on the river Windrush, a tributary of the Thames, 75½ m. W.N.W. of London on the East Gloucestershire branch of the Great Western railway. Pop. of urban district (1901) 3574. The urban district was extended in 1898 to include portions of the scattered villages of Hailey and to his brother's sons, Rudolph II. (d. 1353) and Rupert I. Rupert, who from 1353 to 1390 was sole ruler, gained the electoral dignity for the Palatinate of the Rhine in 1356 by a grant of some lands in upper Bavaria to the emperor Charles IV. It had been exercised from the division of 1329 by both branches in turn. The descendants of Louis IV. retained the rest of Bavaria, but made several divisions of their territory, the most important of which was in 1392, when the branches of Ingoldstadt, Munich and Landshut were founded. These were reunited under Albert IV., duke of Bavaria-Munich (1447–1508) and the upper Palatinate was added to them in 1628. Albert's descendants ruled over a united Bavaria, until the death of Duke Maximilian III. in 1777, when it passed to the Elector Palatine, Charles Theodore. The Palatinate of the Rhine, after the death of Rupert I. in 1390, passed to his nephew, Rupert II., and in 1398 to his son, Rupert III., who was German king from 1400 to 1410. On his death it was divided into four branches. Three of these had died out by 1559, and their possessions were inherited by the fourth or Simmern line, among whom the Palatinate was again divided (see PALATINATE).

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[1] In ecclesiastical courts the punishment was by excommunication.

In 1742, after the extinction of the two senior lines of this family, the Sulzbach branch became the senior line, and its head, the elector Charles Theodore, inherited Bavaria in 1777. He died in 1799, and Maximilian Joseph, the head of the Zweibrücken branch, inherited Bavaria and the Palatinate. He took the title of king as Maximilian I.

In 1623, when the elector Frederick V. (the "Winter King") was driven from his dominions, the electoral privilege was transferred to Bavaria, and in 1648, by the Peace of Westphalia, an eighth electorate was created for the Wittelsbachs of the Palatinate, and was exercised by the senior branch of the family.

The Wittelsbachs gave three kings to Germany, Louis IV., Rupert and Charles VII. Members of the family were also margraves of Brandenburg from 1323 to 1373, and kings of Sweden from 1654 to 1718.

See J. Döllinger, *Das Haus Wittelsbach und seine Bedeutung in der deutschen Geschichte* (Munich, 1880); J. F. Böhmer, *Wittelsbachische Regesten bis 1340* (Stuttgart, 1854); F. M. Wittmann, *Monumenta Wittelsbacensia* (Urkundenbuch, Munich, 1857–1861); K. T Heigel, *Die Wittelsbacher* (Munich, 1880); F. Leitschuh, *Die Wittelsbacher in Bayern* (Bamberg, 1894).

WITTEN, a town of Germany, in the Prussian province of Westphalia, favourably situated among the coal-fields of the Ruhr, 14 m. E. of Essen and 15 m. N.E. of Elberfeld by rail. Pop. (1905) 35,841. It is an important seat of the steel industry. Other industries are the making of soap, chemicals and beer. Witten was made a town in 1825.

See Hassel, *Wittener Ortskunde und Ortsgesetze* (Witten, 1903).

WITTENBERG, a town of Germany, in the Prussian province of Saxony, situated on the Elbe, 59 m. by rail S.W. of Berlin, on the main line to Halle and at the junction of railways to Falkenberg, Torgau and Rosslau. Pop. (1905) 20,332. The three suburbs which adjoin the town are not older than 1817. Wittenberg is interesting chiefly on account of its close connexion with Luther and the dawn of the Reformation, and several of its buildings are associated with the events of that time. Part of the Augustinian monastery in which Luther dwelt, at first as a monk and in later life as owner with his wife and family, is still preserved, and has been fitted up as a Luther museum. It contains numerous relics of Luther and portraits and other paintings by the Cranachs. The Augusteum, built in 1564–1583 on the site of the monastery, is now a theological seminary The Schlosskirche, to the doors of which Luther nailed his famous ninety-five theses in 1517, dates from 1439–1499; it was, however, seriously damaged by fire during the bombardment of 1760, was practically rebuilt, and has since (1885–1892) been restored. The old wooden doors, burnt in 1760, were replaced in 1858 by bronze doors, bearing the Latin text of the theses. In the interior of the church are the tombs of Luther and Melanchthon, and of the electors Frederick the Wise, by Peter Vischer the elder (1527), and John the Constant, by Hans Vischer; also portraits of the reformers by Lucas Cranach the younger. The parish church, in which Luther often preached, was built in the 14th century, but has been much altered since Luther's time. It contains a magnificent painting by Lucas Cranach the elder, representing the Lord's Supper, Baptism and Confession, also a font by Hermann Vischer (1457). The present infantry barracks were at one time occupied by the university of Wittenberg, founded in 1502, but merged in the university of Halle in 1815. Luther was appointed professor of philosophy here in 1508; and the new university rapidly acquired a considerable reputation from its connexion with the early Reformers. In opposition to the strict Lutheran orthodoxy of Jena it represented the more moderate doctrines of Melanchthon. In the Wittenberg Concord (1536) the reformers agreed to a settlement of the eucharistic controversy. Shakespeare makes Hamlet and Horatio study at Wittenberg. The ancient electoral palace is another of the buildings that suffered severely in 1760; it now contains archives. Melanchthon's house and the house of Lucas Cranach the elder (1472–1553), who was burgomaster of Wittenberg, are also pointed out. Statues of Luther (by Schadow), Melanchthon and Bugenhagen embellish the town. The spot, outside the Elster Gate, where Luther publicly burned the papal bull in 1520, is marked by an oak tree. Floriculture, iron-founding, distilling and brewing are carried on. The formerly considerable manufacture of the heavier kinds of cloth has died out.

Wittenberg is mentioned as early as 1180. It was the capital of the little duchy of Saxe-Wittenberg, the rulers of which afterwards became electors of Saxony; and it continued to be a Saxon residence under the Ernestine electors. The Capitulation of Wittenberg (1547) is the name given to the treaty by which John Frederick the Magnanimous was compelled to resign the electoral dignity and most of his territory to the Albertine branch of the Saxon family. In 1760 the town was bombarded by the Austrians. It was occupied by the French in 1806, and refortified in 1813 by command of Napoleon; but in 1814 it was stormed by the Prussians under Tauentzien, who received the title of "von Wittenberg" as a reward. Wittenberg continued to be a fortress of the third class until the reorganization of the German defences after the foundation of the new empire led to its being dismantled in 1873.

See Meynert, *Geschichte der Stadt Wittenberg* (Dessau, 1845); Stier, *Die Schlosskirche zu Wittenberg* (Wittenberg, 1860); Zitzlaff, *Die Begrabnissstätten Wittenbergs und ihre Denkmäler* (Wittenberg, 1897); and Gurlitt, "Die Lutherstadt Wittenberg," in Muther's *Die Kunst* (Berlin, 1902).

WITTENBERGE, a town of Germany, in the Prussian province of Brandenburg, on the Elbe, near the influx of the Stepenitz into that river, 77 m. N.W. from Berlin by the main line of railway to Hamburg, and at the junction of railways to Stendal, Lüneburg and Perleberg. Pop. (1905) 18,501. The magnificent bridge here spanning the Elbe, one mile in length, was built in 1851 at a cost of £237,500. The chief industries are the manufacture of railway plant, cloth, wool, soap, shoddy, furniture, bricks and cement.

WITTGENSTEIN, LUDWIG ADOLF PETER, COUNT, prince of Sayn-Wittgenstein-Ludwigsburg (1769–1843), Russian soldier, was descended from a family of formerly independent counts in Westphalia. His father had settled in Russia, and he entered the army, distinguishing himself in the Polish War of 1794–95, and then serving in the Caucasus. In 1805 he fought at Austerlitz, in 1806 against the Turks and in 1807 against Napoleon at Friedland and against the Swedes in Finland. In the war of 1812 he commanded the right wing army of the Russians. In the campaign of 1813 in January he took over the command of the Russian army after Kutúzov's death. But after the defeats of the Spring campaign he laid down this command and led an army corps during the Dresden and Leipzig campaigns, and at Bar-sur-Aube in the 1814 campaign he was severely wounded. In 1823 he was promoted field-marshal, and in 1828 he was appointed to command the Russian army in the war against Turkey. But ill health soon obliged him to retire. In 1834 the king of Prussia gave him the title of prince. He died on the 11th of June 1843.

WITTINGAU (Czech, *Třeboň*), a town of Bohemia, 95 m. S. of Prague by rail. Pop. (1900) 5467, mostly Czech. The parish church is a Gothic edifice of the 14th century, with fine cloisters; and the Lušnic château, once belonging to the family of Rosenberg, and now to Prince Schwarzenberg, dating from the 15th century, is reputed to contain the most extensive and valuable archives in Bohemia. The artificial cultivation of fish, now chiefly carp, in the numerous ponds that surround the town dates from the 14th century.

WITU, or Vitu, a sultanate of East Africa included in the Tanaland province of the British East Africa protectorate. It extends along the coast from the town of Kipini at the mouth of the Ozi river (2° 30′ S.) to the northern limit of Manda Bay (2° S.); area 1200 sq. m. The chief town, Witu, is 16 m. N. of Kipini. The state was founded by Ahmed-bin-Fumo Luti, the last Nabhan sultan of Patta (an island off the coast), who was conquered by Seyyid Majid of Zanzibar. Ahmed, about 1860, took refuge in the forest district, and made himself an independent chief, acquiring the title of Simba or the Lion. In 1885 Ahmed was induced to place his country under German protection, and in 1887 the limits of Witu were fixed by international agreement. In 1890 Germany transferred her protectorate to Great Britain. In the September of that year a British naval force under Admiral Sir E. Fremantle was sent against the sultan Bakari, who had succeeded Ahmed in 1887 and by whose orders nine German traders and settlers had been murdered. Disorders continued until 1894, and in the following year Omar-bin-Hamed of the Nabhan dynasty—an ancient race of Asiatic origin—was recognized as sultan. The sultan is guided by a British resident, and the state since the accession of Sultan Omar has been both peaceful and prosperous. The population of the sultanate is over 15,000; of the town of Witu 6000, chiefly Swahilis. The port of Witu is Mkonumbi (pop. 1000).

WIVELISCOMBE (pronounced Wilscomb), a market town in the western parliamentary division of Somersetshire, England, 9½ m. W. of Taunton by the Great Western railway. Pop. (1901), 2246. It stands on a picturesque sloping site in a hilly district, and has some agricultural trade and a brewing industry, while in the neighbourhood are slate quarries.

Traces of a large Roman camp may still be seen to the south-east of Wiveliscombe (*Wellescombe, Wilscombe, Wiviscombe*), which is near the line of a Roman road, and hoards of Roman coins have been discovered in the neighbourhood. The town probably owed its origin to the suitability of its position for defence, and it was the site of a Danish fort, later replaced by a Saxon settlement. The overlords were the bishops of Bath and Wells, who had a palace and park here. They obtained a grant of freewarren in 1257. No charter granting self-government to Wiveliscombe has been found, and the only evidence for the traditional existence of a borough is that part of the town is called "the borough," and that until the middle of the 19th century a bailiff and a portreeve were annually chosen by the court leet. A weekly market on Tuesdays, granted to the bishop of Bath and Wells in 1284, is still held. During the 17th and 18th centuries the town was a centre of the woollen manufacture.

WLADISLAUS (Wladislaw), the name of four kings of Poland and two Polish kings of Hungary.[1]

Wladislaus I. (1260–1333), king of Poland, called Lokietek, or "Span-long," from his diminutive stature, was the re-creator of the Polish realm, which in consequence of internal quarrels had at the end of the 13th century split up into fourteen independent principalities, and become an easy prey to her neighbours, Bohemia, Lithuania, and, most dangerous of all, the Teutonic Order. In 1296 the gentry of Great Poland elected Wladislaus, then prince of Cujavia, to reign over them; but distrusting the capacity of the taciturn little man, they changed their minds and placed themselves under the protection of the powerful Wenceslaus, king of Bohemia, who was crowned at Gnesen in 1300. Wladislaus thereupon went to Rome, where Pope Boniface VIII., jealous of the growing influence of Bohemia, adopted his cause; and on the death of Wenceslaus in 1305 Wladislaus succeeded in uniting beneath his sway the principalities of Little and Great Poland. From the first he was beset with great difficulties. The towns, mostly of German origin, and the prelates headed by Muskata, bishop of Cracow, were against him because he endeavoured to make use of their riches for the defence of the sorely pressed state. The rebellious magistrates of Cracow he succeeded in suppressing, but he had to invoke the aid of the Teutonic Order to save Danzig from the margraves of Brandenburg, thus saddling Poland with a far more dangerous enemy; for the Order not only proceeded to treat Danzig as a conquered city, but claimed possession of the whole of Pomerania. Wladislaus thereupon (1317) appealed to Pope John XXII., and a tribunal of local prelates appointed by the holy see ultimately (Feb. 9, 1321) pronounced judgment in favour of Wladislaus, and condemned the Order not only to restore Pomerania but also to pay heavy damages. But the knights appealed to Rome; the pope reversed the judgment of his own tribunal; and the only result of these negotiations was a long and bloody six years' war (1327–1333) between Poland and the Order, in which all the princes of Central Europe took part, Hungary and Lithuania siding with Wladislaus, and Bohemia, Masovia and Silesia with the Order. It was not till the last year but one of his life that Wladislaus succeeded with the aid of his Hungarian allies in inflicting upon the knights their first serious reverse at Plowce (27th of September 1332). In March 1333 he died. He had laid the foundations of a strong Polish monarchy, and with the consent of the pope revived the royal dignity, being solemnly crowned king of Poland at Cracow on the 20th of January 1320. His reign is remarkable for the development of the Polish constitution, the gentry and prelates being admitted to some share in the government of the country.

See Max Perlbach, *Preussisch-polnische Studien zur Geschichte des Mittelalters* (Halle, 1886); Julius A. G. von Pflugk-Harttung, *Der deutsche Orden im Kampfe Ludwigs des Bayern mit der Kurie* (Leipzig, 1900).

Wladislaus II., Jagiello (1350–1434), king of Poland, was one of the twelve sons of Olgierd, grand-duke of Lithuania, whom he succeeded in 1377. From the very beginning of his reign Jagiello was involved in disputes with the Teutonic Order, and with his uncle, the valiant Kiejstut, who ruled Samogitia independently. By the treaty of Dawidyszek (June 1, 1380) he contracted an alliance with the knights, and two years later, acting on the advice of his evil counsellor, Wojdyllo, enticed Kiejstut and his consort to Krewo and there treacherously murdered them (Aug. 15, 1382). This foul deed naturally drove Witowt (*q.v.*), the son of Kiejstut, into the arms of the Order; but both princes speedily recognized that the knights were the real enemies of Lithuania, and prudently composing their differences invaded Prussian territory. This was the beginning of the fifty years' struggle with the Teutonic Order which was to make the reign of Jagiello so memorable. He looked about him betimes for allies against the common enemy of the Slavonic races, and fortune singularly favoured him. The Poles had brought their young queen Jadwiga home from Hungary, and in 1384 Jagiello sent a magnificent embassy to Cracow offering her his hand on condition that they shared the Polish crown. Jadwiga had long been betrothed to William of Austria; but she sacrificed her predilections for her country's good. On the 15th of February 1386 Jagiello, who had previously been elected king of Poland under the title of Wladislaus II., accepted the Roman faith in the cathedral of Cracow, and on the 18th his espousals with Queen Jadwiga were solemnized.

Jagiello's first political act after his coronation was the conversion of Lithuania to the true religion. This solemn act was accomplished at Vilna, the Lithuanian capital, on the 17th of February 1387, when a stately concourse of nobles and prelates, headed by the king, proceeded to the grove of secular oaks beneath which stood the statue of Perkunos and other idols, and in the presence of an immense multitude hewed down the oaks, destroyed the idols, extinguished the sacred fire and elevated the cross on the desecrated heathen altars, 30,000 Lithuanians receiving Christian baptism. A Catholic hierarchy was immediately set up. A Polish Franciscan, Andrew Wassilo, was consecrated as the first Catholic bishop of Vilna, and Lithuania was divided ecclesiastically into seven dioceses. Mainly on the initiative of Queen Jadwiga, Red Russia with its capital the great trading city of Lemberg was persuaded to acknowledge the dominion of Poland; and there on the 27th of September 1387 the hospodars of Walachia and Moldavia for the first time voluntarily enrolled themselves among the vassals of Poland.

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[1] In Hungarian history the Polish Wladislaus (Mag. Ulászló) is distinguished from the Hungarian Ladislaus (László). They are reckoned separately for purposes of numbering. Besides the Wladislaus kings of Poland, there were three earlier dukes of this name: Wladislaus I. (d. 1102), Wladislaus II. (of Cracow, d. 1163) and Wladislaus III., duke of Great Poland and Cracow (d. 1231). By some historians these are included in the numbering of the Polish sovereigns, King Wladislaus I. being thus IV. and so on.

With savage Lithuania converted and in close alliance with Catholic Poland, the Teutonic Order was seriously threatened. The knights endeavoured to re-establish their position by sowing dissensions between Poland and Lithuania. In this for a time they succeeded (see Witowt); but in 1401 Jagiello recognized Witowt as independent grand-duke of Lithuania (union of Vilna, January 18, 1401), and their union was cemented in the battle of Grünewald, which shook the whole fabric of the Teutonic Order to its very foundations. Henceforth a remarkable change in the whole policy of the Order was apparent. The struggle was no longer for dominion but for existence. Fortunate for them, in Jagiello they possessed an equally cautious and pacific opponent. Wladislaus II., in sharp contrast to Witowt, was of anything but a martial temperament. He never swerved from his main object, to unite Poland and Lithuania against the dangerous denationalizing German influences which environed him. But he would take no risks and always preferred craft to violence. Hence his leaning upon the holy see in all his disputes with his neighbours. Hence, too, his moderation at the peace of Thorn (1st of February 1411), when the knights skilfully extricated themselves from their difficulties by renouncing their pretensions to Samogitia, restoring Dobrzyn and paying a war indemnity; Jagiello was content to discredit them rather than provoke them to a war *à outrance*. Equally skilful was Jagiello's long diplomatic duel with the emperor Sigismund, then the disturbing element of Central Europe, who aimed at the remodelling of the whole continent and was responsible for the first projected partition of Poland.

Jagiello was married four times. At the dying request of the childless Jadwiga he espoused a Styrian lady, Maria Cillei, who bore him a daughter, also called Jadwiga. His third wife, Elizabeth Grabowska, died without issue, and the question of the succession then became so serious that Jagiello's advisers counselled him to betroth his daughter to Frederick of Hohenzollern, who was to be educated in Poland as the heir to the throne. But in 1422 Jagiello himself solved the difficulty by wedding Sonia, princess of Vyazma, a Russian lady rechristened Sophia, who bore him two sons, Wladislaus and Casimir, both of whom ultimately succeeded him. Jagiello died at Grodko near Lemberg in 1434. During his reign of half a century Poland had risen to the rank of a great power, a position she was to retain for nearly two hundred years under the dynasty which Jagiello had founded.

See August Sokolowski, *History of Poland*, vol. i. (Pol.) (Vienna, 1903); Carl Edward Napierski, *Russo-Lithuanian Acts* (Rus.) (St Petersburg, 1868); *Monumenta Medii Aevi* (Cracow, 1882); Karol Szajnocha, *Jadwiga and Jagiello* (Pol.) (Lemberg, 1855–1856)

Wladislaus III. (1424–1444), king of Poland and Hungary, the eldest son of Wladislaus II. Jagiello, by his fourth wife, Sophia of Vyazma, was born at Cracow on the 31st of October 1424, succeeding to the throne in his tenth year. The domestic troubles which occurred during his minority had an important influence upon the development of the Polish constitution; but under the wise administration of Zbigniew Olesnicki Poland suffered far less from her rebels than might have been anticipated, and Wladislaus gave the first proof of his manhood by defeating the arch-traitor Spytek of Melztyn in his camp at Grotnik on the 4th of May 1439. On the sudden death of the emperor Albert, who was also king of Bohemia and Hungary, the Hungarians elected Wladislaus as their king, despite the opposition of the widowed empress Elizabeth, already big with the child who subsequently ascended the Hungarian throne as Wladislaus V. But Wladislaus III., who was solemnly crowned king of Hungary at Buda by the Magyar primate in July 1440, had to fight against the partisans of the empress for three years till Pope Eugenius IV. mediated between them so as to enable Wladislaus to lead a crusade against the Turks. War was proclaimed against Sultan Murad II. at the diet of Buda on Palm Sunday 1443, and with an army of 40,000 men, mostly Magyars, the young monarch, with Hunyadi commanding under him, crossed the Danube, took Nish and Sofia, and advancing to the slope of the Balkans, returned to Hungary covered with glory. Europe resounded with the praises of the youthful hero, and the Venetians, the Genoese, the duke of Burgundy and the pope encouraged Wladislaus to continue the war by offering him every assistance. But at this juncture the sultan offered terms to Wladislaus through George Brankovic, despot of Servia, and, by the peace of Szeged (July 1, 1444), Murad engaged to surrender Servia, Albania and whatever territory the Ottomans had ever conquered from Hungary, including 24 fortresses, besides paying an indemnity of 100,000 florins in gold. Unfortunately, Wladislaus listened to the representations of the papal legate, Cardinal Julian Cesarini, who urged him in the name of religion to break the peace of Szeged and resume the war. Despite the representations of the Poles and of the majority of the Magyars, the king, only two days after solemnly swearing to observe the terms of the treaty, crossed the Danube a second time to co-operate with a fleet from the West which was to join hands with the land army at Gallipoli, whither also the Greeks and the Balkan Slavs were to direct their auxiliaries. But the Walachians were the sole allies of Hungary who kept faith with her, and on the bloody field of Varna, November the 10th, 1444, Wladislaus lost his life and more than a fourth of his army.

See Julian Bartoszewicz, *View of the Relations of Poland with the Turks and Tatars* (Pol.) (Warsaw, 1860); August Sokolowski, *History of Poland*, vol. ii. (Pol.) (Vienna, 1904); Ignácz Acsady, *History of the Hungarian Realm*, vol. i. (Hung.) (Budapest, 1905).

Wladislaus IV. (1595–1648), king of Poland, son of Sigismund III., king of Poland, and Anne of Austria, succeeded his father on the throne in 1632. From his early youth he gave promise of great military talent, and served his apprenticeship in the science of war under Zolkiewski in the Muscovite campaigns of 1610–1612, and under Chodkiewicz in 1617–1618. Wladislaus's first official act was to march against the Muscovites, who had declared war against Poland immediately after the death of Sigismund, and were besieging Smolensk, the key of Poland's eastern frontier. After a series of bloody engagements (Aug. 7–22, 1632) Wladislaus compelled the tsar's general to abandon the siege, and eventually to surrender (March 1, 1634) with his whole army. Meanwhile the Turks were threatening in the south, and Wladislaus found it expedient to secure his Muscovite conquests. Peace was concluded at the river Polyankova on the 28th of May 1634, the Poles conceding the title of tsar to Michael Romanov, who renounced all his claims upon Livonia, Esthonia and Courland, besides paying a war indemnity of 200,000 rubles. These tidings profoundly impressed Sultan Murad, and when the victorious Wladislaus appeared at Lemberg, the usual starting-point for Turkish expeditions, the Porte offered terms which were accepted in October, each power engaging to keep their borderers, the Cossacks and Tatars, in order, and divide between them the suzerainty of Moldavia and Walachia, the sultan binding himself always to place philo-Polish hospodars on those slippery thrones. In the following year the long-pending differences with Sweden were settled, very much to the advantage of Poland, by the truce of Stumdorf, which was to last for twenty-six years from the 12th September 1635. Thus externally Poland was everywhere triumphant. Internally, however, things were in their usually deplorable state owing to the suspicion, jealousy and parsimony of the estates of the realm. They had double reason to be grateful to Wladislaus for defeating the enemies of the republic, for he had also paid for the expenses of his campaigns out of his own pocket, yet he could not obtain payment of the debt due to him from the state till 1643. He was bound by the *pacta conventa* which he signed on his accession to maintain a fleet on the Baltic. He proposed to do so by levying tolls on all imports and exports passing through the Prussian ports which had been regained by the truce of Stumdorf. Sweden during her temporary occupation of these ports had derived from them an annual income of 3,600,000 gulden. But when Wladislaus, their lawful possessor, imposed similar tolls in the interests of the republic, Danzig protested and appealed to the Scandinavian powers. Wladislaus's little fleet attempted to blockade the port of the rebellious city, whereupon a Danish admiral broke the blockade and practically destroyed the Polish flotilla. Yet the *sejm*, so sensitive to its own privileges, allowed the insult to the king and the injury to the state to pass unnoticed, conniving at the destruction of the national navy and the depletion of the treasury, "lest warships should make the crown too powerful." For some years after this humiliation, Wladislaus became indifferent to affairs and sank into a sort of apathy; but the birth of his son Sigismund (by his first wife, Cecilia Renata of Austria, in 1640) gave him fresh hopes, and he began with renewed energy to labour for the dynasty as well as for the nation. He saw that Poland, with her existing constitution, could not hope for a long future, and he determined to bring about a royalist reaction and a reform along with it by every means in his power. He began by founding the Order of the Immaculate Conception, consisting of 72 young noblemen who swore a special oath of allegiance to the crown, and were to form the nucleus of a patriotic movement antagonistic to the constant usurpations of the diet, but the *sejm* promptly intervened and quashed the attempt. Then he conceived the idea of using the Cossacks, who were deeply attached to him, as a means of chastising the *szlachta*, and at the same time forcing a war with Turkey, which would make his military genius indispensable to the republic, and enable him if successful to carry out domestic reforms by force of arms. His chief confidant in this still mysterious affair was the veteran grand hetman of the crown, Stanislaw Koniecpolski, who understood the Cossacks better than any man then living, but differed from the king in preferring the conquest of the Crimea to an open war with Turkey. Simultaneously Wladislaus contracted an offensive and defensive alliance with Venice against the Porte, a treaty directly contrary indeed to the *pacta conventa* he had sworn to observe, but excusable in the desperate circumstances. The whole enterprise fell through, owing partly to the death of Koniecpolski before it was matured, partly to the hastiness with which the king published his intentions, and partly to the careful avoidance by the Porte of the slightest occasion of a rupture. Frustrated in all his plans, broken-hearted by the death of his son (by his second wife, Marie Ludwika of Angoulême, Wladislaus had no issue), the king, worn out and disillusioned, died at Merecz on the 20th of May 1648, in his 52nd year. After his cousin Gustavus Adolphus, whom in many respects he strikingly resembled, he was indubitably the most amiable and brilliant of all the princes of the House of Vasa.

See Wiktor Czermak, *The Plans of the Turkish Wars of Wladislaus IV.* (Pol.) (Cracow, 1895); V. V. Volk-Karachevsky, *The Struggle of Poland with the Cossacks* (Rus.) (Kiev, 1899); *Letters and other Writings of Wladislaus IV.* (Pol.) (Cracow, 1845). (R. N. B.)

WOAD, a herbaceous plant, known botanically as *Isatis tinctoria* (natural order Cruciferae), which occurs sporadically in England in fields, on banks and chalk-pits. The erect branched stem, 1 to 3 ft. in height, bears sessile leaves and terminal clusters of small yellow flowers; the brown pendulous pods are ½ in. long. The ancient Britons stained themselves with this plant. It is still cultivated in Lincolnshire.

WOBURN, a market town in the northern parliamentary division of Bedfordshire, England, with a station (Woburn Sands), on a branch of the London & North-Western railway, 2 m. from the town and 51 m. N.W. by N. from London. Pop. (1901) 1129. It lies in a hollow of a northern spur of the Chiltern Hills, in a finely wooded locality. There is some agricultural trade, and a little straw-plaiting and lace-making are carried on. To the west of the town lies Woburn Park, the demesne of Woburn Abbey, the seat of the dukes of Bedford. The abbey was a Cistercian foundation of 1145, but only scanty remains of the buildings are seen in the mansion which rose on its site. This, with most of the abbey lands, was granted by Henry VIII. to John, Lord Russell, in 1547, who was created earl of Bedford in 1550 (the dukedom dating from 1694). The mansion was begun in 1744; it contains a magnificent collection of paintings and other objects of art.

WOBURN, a city of Middlesex county, Massachusetts, U.S.A., 10 m. W. by N.W. of Boston. Pop. (1890) 13,499; (1900) 14,254, of whom 3840 were foreign-born and 261 were negroes; (1910, U.S. census) 15,308. Area, 12·6 sq. m. Woburn is served by the southern division of the Boston & Maine railway, and is connected with Burlington, Lexington, Reading, Stoneham, Wilmington, Winchester, Arlington, Boston and Lowell by electric railways. In the city area are several villages, including Woburn proper, known as "the Centre," North Woburn, Woburn Highlands, Cummingsville (in the western part), Mishawum (in the north-east), Montvale (in the east) and Walnut Hill (also in the east). There are two ancient burying-grounds; the oldest, on Park Street, dates from about 1642 and contains the graves of ancestors of four presidents—Cleveland, Benjamin Harrison, Franklin Pierce and Garfield—and a granite obelisk to the memory of Loammi Baldwin (1744–1807). On Academy Hill is the Warren Academy building used by a Free Industrial School. Forest Park (53 acres) is a fine stretch of natural woods, and there are several small parks and squares; on Woburn Common is the Public Library, by H. H. Richardson, the gift of Charles Winn. The building houses an art gallery and historical museum, and a library of about 50,000 volumes especially rich in Americana. Among colonial houses still standing are the birthplace of Count Rumford (in North Woburn), built about 1714, and now preserved by the Rumford Historical Association as a depository for the Rumford Library and historical memorials, and the Baldwin mansion (built partly in 1661 and later enlarged), the home of Loammi Baldwin (1780–1838), known as "the father of civil engineering in America." Woburn's manufactories are concentrated within a small area. The city is the most important leather manufacturing centre of New England: in 1905 the value of the leather product was $2,851,554, being 61·3% of the value of all factory products ($4,654,067); other manufactures are chemicals, leather-working machinery, boots and shoes, glue and cotton goods. Market gardening is an important industry.

Woburn, first settled about 1638–1640, was incorporated as a township under its present name in 1642, and was the first township set off from Charlestown. It then included a large part of the present Winchester and the greater part of the present Wilmington and Burlington, separately organized in 1730 and 1799 respectively. It was named after Woburn in Bedfordshire by its chief founder, Edward Johnson (1599–1672), whose work, *The Wonder-Working Providence of Zion's Saviour* (1654; latest ed. 1910), was one of the earliest historical accounts of the Massachusetts Bay Colony. The leather industry was established by David Cummings at Cummingsville shortly before the War of Independence. Woburn's industrial growth dates from the construction through the township of the old Middlesex Canal. The city was chartered in 1888.

See P. L. Converse, *Legends of Woburn, 1642–1892* (2 vols., Woburn, 1892–1896); Samuel Sewall, *History of Woburn, 1640 to 1860* (Boston, 1868); F. E. Wetherell, *Two Hundred and Fiftieth Anniversary of Woburn* (Woburn, 1892); and G. M. Champney in S. A. Drake's *History of Middlesex County* (2 vols., Boston, 1880).

WOCHUA (ACHUA), a pygmy people of Africa, living in the forests of the Mabode district, south of the Welle. They were discovered (1880–1883) by Dr W. Junker, who described them as "well proportioned, though the oval-shaped head seemed somewhat too large for the size of the body." Some are of light complexion, like the Akka and Batwa, but as a general rule they belong to the darker, crisper-haired, more genuine negro stock.

WODEN, a deity of the Anglo-Saxons, the name being the Anglo-Saxon counterpart of the Scandinavian Odin (*q.v.*). In German the same god was called Wodan or Wuotan. Owing to the very small amount of information which has come down to us regarding the gods of ancient England and Germany, it cannot be determined how far the character and adventures attributed to Odin in Scandinavian mythology were known to other Teutonic peoples. It is clear, however, that the god was credited with special skill in magic, both in England and Germany, while the story of the Langobardic migration (see LOMBARDS) represents him as the dispenser of victory. From Woden also most of the anglo-Saxon royal families traced their descent. By the Romans he was identified at an early date with Mercurius, whence our name "Wednesday" (Woden's day) as a translation of *dies Mercurii*. Tacitus states that the ancient Germans worshipped Mercurius more than any other god, and that they offered him human sacrifices. Many scholars connect the origin of the deity with the popular German and Swedish belief in a raging host (in Germany called *das wütende Heer* or *Wutes Heer*, but in Sweden *Odens Jagt*), which passes through the forests on stormy nights. There is evidence, however, that deities similar to Woden were known to some of the ancient peoples of central Europe, *e.g.* the Gauls and Thracians. See TEUTONIC PEOPLES, *ad fin.* (H. M. C.)

WODROW, ROBERT (1679–1734), Scottish historian, was born at Glasgow, being a son of James Wodrow, professor of divinity. He was educated at the university and was librarian from 1697 to 1701. From 1703 till his death, on the 21st of March 1734, he was parish minister at Eastwood, near Glasgow. He had sixteen children, his son Patrick being the "auld Wodrow" of Burns's poem "Twa Herds." His great work, *The History of the Sufferings of the Church of Scotland from the Restoration to the Revolution*, was published in two volumes in 1721–1722 (new ed. with a life of Wodrow by Robert Burns, D.D., 1807–1808). Wodrow also wrote a *Life* (1828) of his father. He left two other works in MS.—*Memoirs of Reformers and Ministers of the Church of Scotland*, and *Analecta: or Materials for a History of Remarkable Providences, mostly relating to Scotch Ministers and Christians.* Of the former, two volumes were published by the Maitland Club in 1834–1845 and one volume by the New Spalding Club in 1890; the latter was published in four volumes by the Maitland Club in 1842–1843.

Wodrow left a great mass of correspondence, three volumes of which, edited by T. M'Crie, appeared in 1843–1844. The Wodrow Society, founded in Edinburgh to perpetuate his memory, was in existence from 1841 to 1847, several works being published under its auspices.

WOELFL, JOSEPH (1772–1812), Austrian pianist and composer, was born in 1772 at Salzburg, where he studied music under Leopold Mozart and Michael Haydn. After a short residence at Warsaw he produced his first opera, *Der Höllenberg*, with some success at Vienna, where it was soon followed by *Das schöne Milchmädchen* and some other dramatic pieces. His fame now rests upon his compositions for the pianoforte, and the skill with which he is said to have met their formidable demands upon his power as an executant. The perfection of his technique was immeasurably enhanced by the enormous stretch of his fingers (his hand could strike a thirteenth with ease); and to his wide grasp of the keyboard he owed a facility of execution which he turned to excellent account, especially in his extempore performances. His technique was superior even to that of the young Beethoven, who played in company with him at the house of Count Wetzlar, and in memory of this exhibition of good-humoured rivalry he dedicated to Beethoven his "Three Sonatas," *Op.* 6. Quitting Vienna in 1798, he exhibited his skill in most of the great European capitals, and, after spending some years in Paris, made his first appearance in London on the 27th of May 1805. Here he enjoyed a long term of popularity, crowned about 1808 by the publication of his sonata, *Op.* 41, containing some variations on "Life let us cherish." This, on account of its technical difficulty, he entitled *Non Plus Ultra*; and, in reply to the challenge, Dussek's London publishers reprinted a sonata by that composer, originally called *Le Retour à Paris*, with the title *Plus Ultra*, and an ironical dedication to *Non Plus Ultra*. Woelfl died in Great Marylebone Street, London, on the 21st of May 1812.

WOFFINGTON, MARGARET [PEG] (*c.* 1714–1760), English actress, was born at Dublin, of poor parents. As a child of ten she played Polly Peachum in a lilliputian presentation of *The Beggar's Opera*, and danced and acted at various Dublin theatres until 1740, when her success as Sir Harry Wildair in *The Constant Couple* secured her a London engagement. In this, and as Sylvia in *The Recruiting Officer*, she had a pronounced success; and at Drury Lane and Covent Garden, as well as in Dublin, she appeared in all the plays of the day to ever growing popularity. Among her best impersonations were the elegant women of fashion, like Lady Betty Modish and Lady Townley, and in "breeches parts" she was unapproachable. She lived openly with Garrick, and her other love affairs were numerous and notorious, but her generosity and kindness of heart were equally well known. She educated her sister Mary, and cared for and pensioned her mother. She built and endowed by will some almshouses at Teddington, where she lived quietly after her retirement in 1757.

See Austin Dobson's introduction to Charles Reade's novel *Peg Woffington* (London, 1899), and Augustin Daly's *Woffington: a Tribute to the Actress and the Woman* (1888).

WÖHLER, FRIEDRICH (1800–1882), German chemist, was born at Eschersheim, near Frankfort-on-the-Main, on the 31st of July 1800. In 1814 he began to attend the gymnasium at Frankfort, where he carried out experiments with his friend Dr J. J. C. Buch. In 1820 he entered Marburg University, and next year removed to Heidelberg, where he worked in Leopold Gmelin's laboratory. Intending to practise as a physician, he took his degree in medicine and surgery (1823), but was persuaded by Gmelin to devote himself to chemistry. He studied in Berzelius's laboratory at Stockholm, and there began a lifelong friendship with the Swedish chemist. On his return he had proposed to settle as a *Privatdozent* at Heidelberg, but accepted the post of teacher of chemistry in the newly established technical school (*Gewerbeschule*) in Berlin (1825), where he remained till 1831. Private affairs then called him to Cassel, where he soon became professor at the higher technical school. In 1836 he was appointed to the chair of chemistry in the medical faculty at Göttingen, holding also the office of inspector-general of pharmacies in the kingdom of Hanover. This professorship he held until his death on the 23rd of September 1882.

Wöhler had made the acquaintance of Liebig, his junior by three years, in 1825, and the two men remained close friends and allies for the rest of their lives. Together they carried out a number of joint researches. One of the earliest, if not the earliest, was the investigation, published in 1830, which proved the polymerism of cyanic and cyanuric acid, but the most famous were those on the oil of bitter almonds (benzaldehyde) and the radicle benzoyl (1832), and on uric acid (1837), which are of fundamental importance in the history of organic chemistry. But it was the achievement of Wöhler alone, in 1828, to break down the barrier held to exist between organic and inorganic chemistry by artificially preparing urea, one of those substances which up to that time it had been thought could only be produced through the agency of "vital force." Most of his work, however, lay in the domain of inorganic chemistry. The isolation of the elementary bodies and the investigation of their properties was one of his favourite pursuits. In 1827 he obtained metallic aluminium as a fine powder, and in 1845 improved methods enabled him to get it in fully metallic globules. Nine years afterwards H. E. Sainte-Claire Deville, ignorant of what he had done, adopted the same methods in his efforts to prepare the metal on an industrial scale; the result of Wöhler's claim of priority was that the two became good friends and joined in a research, published in 1856–1857, which yielded "adamantine boron." By the same method as had succeeded with aluminium (reduction of the chloride by potassium) Wöhler in 1828 obtained metallic beryllium and yttrium. Later, in 1849, titanium engaged his attention, and, proving that what had up to that time passed as the metal was really a cyanonitride, he showed how the true metal was to be obtained. He also worked at the nitrides, and in 1857 with H. Buff carried out an inquiry on the compounds of silicon in which they prepared the previously unknown gas, silicon hydride or siliciuretted hydrogen. A problem to which he returned repeatedly was that of separating nickel and cobalt from their ores and freeing them from arsenic; and in the course of his long laboratory practice he worked out numerous processes for the preparation of pure chemicals and methods of exact analysis.

The Royal Society's *Catalogue* enumerates 276 separate memoirs written by him, apart from 43 in which he collaborated with others.

In 1831 he published *Grundriss der anorganischen Chemie*, and in 1840 *Grundriss der organischen Chemie*, both of which went through many editions. Still more valuable for teaching purposes was his *Mineralanalyse in Beispielen* (1861), which first appeared in 1853 as *Praktische Übungen in der chemischen Analyse*. Chemists also had to thank him for translating three editions of the *Lehrbuch* of Berzelius and all the successive volumes of the *Jahresbericht* into German from the original Swedish. He assisted Liebig and Poggendorff in the *Handwörterbuch der reinen und angewandten Chemie*, and was joint-editor with Liebig of the *Annalen der Chemie und Pharmacie*.

A memoir by Hofmann appeared in the *Ber. deut. chem. Gesellsch.* (1882), reprinted in *Zur Erinnerung an vorangegangene Freunde* (1888).

WOHLGEMUTH, MICHAEL (1434–1519), German painter, was born at Nuremberg in 1434. Little is known of his private life beyond the fact that in 1472 he married the widow of the painter Hans Pleydenwurff, whose son Wilhelm worked as an assistant to his stepfather. The importance of Wohlgemuth as an artist rests, not only on his own individual paintings, but also on the fact that he was the head of a large workshop, in which many different branches of the fine arts were carried on by a great number of pupil-assistants, including Albert Dürer. In this *atelier* not only large altar-pieces and other sacred paintings were executed, but also elaborate retables in carved wood, consisting of crowded subjects in high relief, richly decorated with gold and colour, such as pleased the rather doubtful Teutonic taste of that time. Wood-engraving was also carried on in the same workshop, the blocks being cut from Wohlgemuth's designs, many of which are remarkable for their vigour and clever adaptation to the special necessities of the technique of woodcutting. Two large and copiously illustrated books have woodcuts supplied by Wohlgemuth and his stepson Wilhelm Pleydenwurff. The first is the *Schatzkammer der wahren Reichthümer des Heils*, printed by Koburger in 1491; the other is the *Historia mundi*, by Schedel, 1493–1494, usually known as the *Nuremberg Chronicle*, which is highly valued, not for the text, but for its remarkable collection of spirited engravings.

The earliest known work by Wohlgemuth is a retable consisting of four panels, dated 1465, now in the Munich gallery, a decorative work of much beauty. In 1479 he painted the retable of the high altar in the church of St Mary at Zwickau, which still exists, receiving for it the large sum of 1400 gulden. One of his finest and largest works is the great retable painted for the church of the Austin friars at Nuremberg, now moved into the museum; it consists of a great many panels, with figures of those saints whose worship was specially popular at Nuremberg. In 1501 Wohlgemuth was employed to decorate the town hall at Goslar with a large series of paintings; some on the ceiling are on panel, and others on the walls are painted thinly in tempera on canvas. As a portrait-painter he enjoyed much repute, and some of his works of this class are very admirable for their realistic vigour and minute finish. Outside Germany Wohlgemuth's paintings are scarce: the Royal Institution at Liverpool possesses two good examples—"Pilate washing his Hands," and "The Deposition from the Cross," parts probably of a large altar-piece. During the last ten years of his life Wohlgemuth appears to have produced little by his own hand. One of his latest paintings is the retable at Schwabach, executed in 1508, the contract for which still exists. He died at Nuremberg in 1519.

See the reproductions in *Die Gemälde von Dürer und Wohlgemuth*, by Riehl and Thode (Nuremberg, 1889–1895).

WOKING, a market town in the Chertsey parliamentary division of Surrey, England, 24 m. S.W. of London by the London and South-Western railway. Pop. of urban district (1891) 9786; (1901) 16,244. The river Wey and the Basingstoke canal pass through the parish. St Peter's church dates from the 13th century. Modern structures include a public hall, and an Oriental institute (in the building erected for the Royal Dramatic College, including a museum of Eastern antiquities, a mosque, and residences for Orientals). In the vicinity are the Surrey county asylum and a female convict prison. Near Woking is Brookwood cemetery, belonging to the London Necropolis Company, with a crematorium.

WOKINGHAM, a market town and municipal borough in the Wokingham parliamentary division of Berkshire, England, 36 m. W. by S. of London by the South-Western railway, served also by the South-Eastern and Chatham railway. Pop. (1901) 3551. It lies on a slight eminence above a valley tributary to that of the river Loddon, in a well-wooded district on the outskirts of the former royal forest of Windsor. The church of St Laurence is Perpendicular, greatly altered by restoration. Two miles west of the town is the village of Bearwood. The trade of Wokingham is principally agricultural. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 557 acres.

Wokingham (*Wokyngham*, *Oakingham*, *Ockingham*), which was within the limits of Windsor Forest, was formerly situated partly in Berkshire and partly in a detached piece of Wiltshire, which is now annexed to Berkshire; the Berkshire portion of the town was in the manor of Sonning, which was held by the bishops of Salisbury from before the Conquest until the reign of Elizabeth. The earliest existing charter to Wokingham is that of Elizabeth (1583), which recites and confirms some ancient customary privileges respecting the election of an alderman and other corporate officers. The governing charter for more than 250 years was that of James I. (1612), incorporating it as a free town under the title of the "Alderman and Burgesses of the Town of Wokingham in the Counties of Berks and Wilts." Under the provisions of the Municipal Corporations Act of 1882 a new charter of incorporation was granted, instituting a municipal body to consist of a mayor, 4 aldermen and 12 councillors. Wokingham was assessed at £50 for ship-money, Reading being assessed at £220. It had at this time a manufacture of silk stockings, which flourished as early as 1625, and survived up to the 19th century. The town shared in the benefactions of Laud, whose father was born there. The Tuesday market, which is still held and which, during the first half of the 19th century, was famous for poultry, was granted to the bishop of Salisbury by Henry III. (1219), who also granted (1258) two annual fairs to be held on the vigil, day and morrow of St Barnabas and All Saints respectively; the latter is still kept up, the former appears in the list of fairs held in 1792.

WOLCOT, JOHN (1738–1819), English satirist and poet, known under the pseudonym of Peter Pindar, was the son of Alexander Wolcot, surgeon at Dodbrooke, adjoining Kingsbridge, in Devonshire, and was baptized there on the 9th of May 1738. He was educated at Kingsbridge free school, at the Bodmin and Liskeard grammar schools, and in France. For seven years he was apprenticed to his uncle, John Wolcot, a surgeon at Fowey, and he took his degree of M.D. at Aberdeen in 1767. In 1769 he was ordained, and went to Jamaica with his uncle's patient, Sir William Trelawny, the new governor In 1772 he became incumbent of Vere, Jamaica, but on the death of his patron (11th of December 1772) he returned to England, and settled as a physician at Truro. In 1781 Wolcot went to London, and took with him the young Cornish artist, John Opie, whose talents in painting he had been the first to recognize. Before they left Cornwall Opie apparently made a rash engagement to share his profits with Wolcot, but a breach between them occurred soon after they settled in London. Wolcot had already achieved some success in a *Supplicating Epistle to the Reviewers* (1778), and after his settlement in London he threw off with marvellous rapidity a succession of pungent satires. George III. was his favourite subject of ridicule, and his peculiarities were described or distorted in *The Lousiad* (1785), *Peeps at St James's* (1787) and *The Royal Visit to Exeter*. Two of Wolcot's happiest satires on the "farmer king" depicted the royal survey of Whitbread's brewery, and the king's naïve wonder how the apples got into the apple dumplings. In his *Expostulatory Odes* (1789) he eulogized the prince of Wales. Boswell's biography of Johnson was ridiculed in *An Epistle to James Boswell* (1786), and in the same year followed another piece, called *Bozzy and Piozzi*. Other subjects were found in *Sir Joseph Banks and the Emperor of Morocco* (1790), and a *Complimentary Epistle to James Bruce* (1790). Among his early satires were *Lyric Odes to the Academicians* (1782), and another series on the same subject, *Farewell Odes* (1786). He specially attacked Benjamin West, but expressed great admiration for the landscapes of Gainsborough and Richard Wilson. Wolcot was himself no mean artist, and in 1797 appeared *Six Picturesque Views from Paintings by Peter Pindar, engraved by Alken*. In 1795 he disposed of his works to the booksellers for an annuity of £250. His various pieces were published in 1796 in four octavo volumes and often reprinted. Wolcot cared little whether he hit above or below the belt, and the gross vituperation he indulged in spoils much of his work for present-day readers; but he had a broad sense of humour, a keen eye for the ridiculous, and great felicity of imagery and expression. Some of his serious pieces—his rendering of Thomas Warton's epigram on *Sleep* and his *Lord Gregory*, for example—reveal an unexpected fund of genuine tenderness. In William Gifford, who attacked him in the *Epistle to P. Pindar*, he for once met with more than his match. Wolcot made a personal assault on his enemy in Wright's shop in Piccadilly, but Gifford was too quick for him, and Wolcot was soundly thrashed. He died at Latham Place, Somers Town, London, on the 14th of January 1819, and seven days later was buried, as he had desired, near Samuel Butler, the author of *Hudibras*, in St Paul's, Covent Garden.

Polwhele, the Cornish historian, was well acquainted with Wolcot in his early life, and the best account of his residence in the west is found in vol. i. of Polwhele's *Traditions* and in Polwhele's *Biographical Sketches*, vol. ii. Cyrus Redding was a frequent visitor at the old man's house, and has described Wolcot's later days in his *Past Celebrities*, vol. i., and his *Fifty Years' Recollections*, vols. i. and ii.

WOLCOTT, ROGER (1679–1767), American administrator, was born in Windsor, Connecticut, on the 4th of January 1679, the son of Simon Wolcott (d. 1687). He was a grandson of Henry Wolcott (1578–1655) of Galdon Manor, Tolland, Somerset, who emigrated to New England in 1628, assisted John Mason and others to found Windsor, Conn., in 1635, and was a member of the first General Assembly of Connecticut in 1637 and of the House of Magistrates from 1643 to his death.[1] Roger Wolcott was early apprenticed to a weaver and throve at this trade, he was a member of the Connecticut General Assembly in 1709, one of the Bench of Justices in 1710, commissary of the Connecticut forces in the expedition of 1711 against Canada, a member of the Council in 1714, judge of the county court in 1721 and of the superior court in 1732, and deputy-governor and chief-justice of the superior court in 1741. He was second in command to Sir William Pepperrell, with rank of major-general in the expedition (1745) against Louisbourg, and was governor of Connecticut in 1751–1754. He died in what is now East Windsor, on the 17th of May 1767.

He wrote *Poetical Meditations* (1725), an epic on *The Agency of the Honourable John Winthrop in the Court of King Charles the Second* (printed in pp. 262-298 of vol. iv., series 1, *Collections* of Massachusetts Historical Society), and a pamphlet to prove that "the New England Congregational churches are and always have been consociated churches." His *Journal at the Siege of Louisbourg* is printed in pp. 131-161 of vol. i. (1860) of the *Collections* of the Connecticut Historical Society.

His son, Erastus Wolcott (1722–1793) was a member of the Connecticut General Assembly and its speaker; he was a brigadier-general of Connecticut militia in the War of Independence, and afterwards a judge of the Superior Court of Connecticut.

Another son, Oliver Wolcott (1726–1797), graduated at Yale in 1747 and studied medicine with his brother Alexander (1712–1795). In 1751 he was made sheriff of the newly established Litchfield county and settled in Litchfield, where he practised law. He was a member of the Council in 1774–1786 and of the Continental Congress in 1775–1776, 1778 and 1780–1784. Congress made him a commissioner of Indian affairs for the Northern Department in 1775, and during the early years of the War of Independence he was active in raising militia in Connecticut. He was one of the signers of the Declaration of Independence; commanded Connecticut militia that helped to defend New York City in August 1776; in 1777 organized more Connecticut volunteers and took part in the last few days of the campaign against General John Burgoyne; and in 1779 commanded the militia during the British invasion of Connecticut. In 1784, as one of the commissioners of Indian affairs for the Northern Department, he negotiated the treaty of Fort Stanwix (22nd Oct.) settling the boundaries of the Six Nations. In 1786–1796 he was lieutenant-governor of Connecticut, and in November 1787 was a member of the Connecticut Convention which ratified the Federal Constitution, he became governor in 1796 upon the death (15th Jan.) of Samuel Huntington, and served until his death on the 1st of December 1797.

See the sketch by his son Oliver in Sanderson's *Biography of the Signers of the Declaration of Independence* (Philadelphia, 1820–1827).

Oliver's son, Oliver Wolcott, jun. (1760–1833), graduated at Yale in 1778, studied law in Litchfield under Judge Tapping Reeve, and was admitted to the bar in 1781. With Oliver Ellsworth he was appointed (May 1784) a commissioner to adjust the claims of Connecticut against the United States. In 1788 he was made comptroller of public accounts of Connecticut; in the next year was appointed auditor of the Federal Treasury; in June 1791 became comptroller of the Treasury, and in February 1795 succeeded Alexander Hamilton as Secretary of the Treasury. At the end of 1800 he resigned after a bitter attack by the Democratic-Republican press, against which he defended himself in an *Address to the People of the United States*. In 1801–1802 he was judge of the Circuit Court of the Second District (Connecticut, Vermont and New York), and then entered business in New York City, where he was president of the short-lived Merchants' Bank (1803) and president (1812–1814) of the Bank of North America. With a brother he then founded factories at Wolcottville (near Litchfield). He re-entered politics as a leader of the "Toleration Republicans," attempting to oust the Congregational clergy from power by adopting a more liberal constitution in place of the charter; he was defeated for governor in 1815, but in 1817 presided over the state convention which adopted a new constitution, and in the same year was elected governor, serving until 1827. He died in New York City on the 1st of June 1833.

His grandson, George Gibbs (1815–1873), in 1846 edited *Memoirs of the Administration of Washington and John Adams* . *from the Papers of Oliver Wolcott, Secretary of the Treasury*. Wolcott wrote *British Influence on the Affairs of the United States Proved and Explained* (1804).

A grandson of the second Oliver's brother Frederick was Roger Wolcott (1847–1901), who graduated at Harvard in 1870, and was admitted to the Suffolk bar in 1874. He practised law in Boston, and served in the Massachusetts House of Representatives in 1882–1884 as a Republican. In 1892 he was elected lieutenant-governor (re-elected 1893 and 1895), and in 1896 became acting-governor upon the death (5th March) of Governor Frederick T. Greenhalge. He was elected governor in 1896 and served until 1900. He died on the 21st of December 1901.

Edward Oliver Wolcott (1848–1905), a member of the same family, went to Colorado, became interested in silver mining there, was a U.S. Senator in 1889–1901, and was a prominent Republican bimetallist.

See William Lawrence, *Roger Wolcott* [1847–1901] (Boston, 1902), and for all the family, Samuel Wolcott, *Memorial of Henry Wolcott, one of the first Settlers of Windsor, Connecticut, and of some of his Descendants* (New York, 1881).

WOLF, FRIEDRICH AUGUST (1759–1824), German philologist and critic, was born on the 15th of February 1759 at Hainrode, a little village not far from Nordhausen, in the province of Hanover. His father was the village schoolmaster and organist. In time the family removed to Nordhausen, and there young Wolf went to the grammar school, where he soon acquired all the Latin and Greek that the masters could teach him, besides learning French, Italian, Spanish and music. The precocity of his attainments was only equalled by the force of will and confidence in his own powers which characterized him throughout life. After two years of solitary study, at the age of eighteen, Wolf went (1777) to the university of Göttingen. His first act there was a prophecy—one of those prophecies which spring from the conscious power to bring about their fulfilment. He had to choose his "faculty," and chose one which then existed only in his own mind, the faculty of "philology." What is even more remarkable, the omen was accepted. He carried his point, and was enrolled as he desired. C. G. Heyne was then the chief ornament of Göttingen, and Wolf and he were not on good terms. Heyne excluded him from his lectures, and brusquely condemned

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[1] Henry Wolcott the younger (d. 1680) was one of the patentees of Connecticut under the charter of 1662.

Wolf's views on Homer. Wolf, however, pursued his studies in the university library, from which he borrowed with his old avidity. During 1779–1783 Wolf was a schoolmaster, first at Ilfeld, then at Osterode. His success as a teacher was striking, and he found time to publish an edition of the *Symposium* of Plato, which excited notice, and led to his promotion (1783) to a chair in the Prussian university of Halle. The moment was a critical one in the history of education. The literary impulse of the Renaissance was almost spent; scholarship had become dry and trivial. A new school, that of Locke and Rousseau, sought to make teaching more modern and more human, but at the sacrifice of mental discipline and scientific aim. Wolf was eager to throw himself into the contest on the side of antiquity. In Halle (1783–1807), by the force of his will and the enlightened aid of the ministers of Frederick the Great, he was able to carry out his long-cherished ideas and found the science of philology. Wolf defined philology broadly as "knowledge of human nature as exhibited in antiquity." The matter of such a science, he held, must be sought in the history and education of some highly cultivated nation, to be studied in written remains, works of art, and whatever else bears the stamp of national thought or skill. It has therefore to do with both history and language, but primarily as a science of *interpretation*, in which historical facts and linguistic facts take their place in an organic whole. Such was the ideal which Wolf had in his mind when he established the philological *seminarium* at Halle.

Wolf's writings make little show in a library, and were always subordinate to his teaching. During his time at Halle he published his commentary on the *Leptines* of Demosthenes (1789)—which suggested to his pupil, Aug. Boeckh, the *Public Economy of Athens*—and a little later the celebrated *Prolegomena* to Homer (1795). This book, the work with which his name is chiefly associated, was thrown off in comparative haste to meet an immediate need. It has all the merits of a great piece of oral teaching—command of method, suggestiveness, breadth of view. The reader does not feel that he has to do with a theory, but with great ideas, which are left to bear fruit in his mind (see HOMER). The publication led to an unpleasant polemic with Heyne, who absurdly accused him of reproducing what he had heard from him at Göttingen.

The Halle professorship ended tragically, and with it the happy and productive period of Wolf's life. He was swept away, and his university with him, by the deluge of the French invasion. A painful gloom oppressed his remaining years (1807–1824), which he spent at Berlin. He became so fractious and intolerant as to alienate some of his warmest friends. He gained a place in the department of education, through the exertions of W. von Humboldt. When this became unendurable, he once more took a professorship. But he no longer taught with his old success; and he wrote very little. His most finished work, the *Darstellung der Alterthumswissenschaft*, though published at Berlin (1807), belongs essentially to the Halle time. At length his health gave way. He was advised to try the south of France. He got as far as Marseilles, and, dying there on the 8th of August 1824, was laid in the classic soil of that ancient Hellenic city.

Mark Pattison wrote an admirable sketch of Wolf's life and work in the *North British Review* of June 1865, reproduced in his *Essays* (1889); see also J. E. Sandys, *Hist. of Class. Schol.* iii. (1908), pp. 51-60. Wolf's *Kleine Schriften* were edited by G. Bernhardy (Halle, 1869). Works not included are the *Prolegomena*, the *Letters to Heyne* (Berlin, 1797), the commentary on the *Leptines* (Halle, 1789) and a translation of the *Clouds* of Aristophanes (Berlin, 1811). To these must be added the *Vorlesungen* on *Iliad* i.-iv., taken from the notes of a pupil and edited by Usteri (Bern, 1830). (D. B. M.)

WOLF, HUGO (1860–1903), German composer, was born on the 13th of March 1860 at Windischgraz in Styria. His father, who was in the leather trade, was a keen musician. From him Hugo learned the rudiments of the piano and the violin. After an unhappy school life, in which he showed little aptitude for anything but music, he went in 1875 to the Conservatoire. He appears to have learned very little there, and was dismissed in 1877 because of a practical joke in the form of a threatening letter to the director, for which he was perhaps unjustly held responsible. From the age of seventeen he had to depend upon himself for his musical training. By giving lessons on the piano and with occasional small help from his father he managed to live for several years in Vienna, but it was a life of extreme hardship and privation, for which his delicate constitution and his proud, sensitive and nervous temperament were particularly ill-suited. In 1884 he became musical critic to the *Salonblatt*, a Viennese society paper, and contrived by his uncompromisingly trenchant and sarcastic style to win a notoriety which was not helpful to his future prospects. His ardent discipleship of Wagner was unfortunately linked with a bitter opposition to Brahms, for whose works he always retained an ineradicable dislike. The publication at the end of 1887 of twelve of his songs seems to have definitely decided the course of his genius, for about this time he retired from the *Salonblatt*, and resolved to devote his whole energies to song-composition. The nine years which followed practically represent his life as a composer. They were marked by periods of feverish creative activity, alternating with periods of mental and physical exhaustion, during which he was sometimes unable even to bear the sound of music. By the end of 1891 he had composed the bulk of his works, on which his fame chiefly rests, 43 Mörike Lieder, 20 Eichendorff Lieder, 51 Goethe Lieder, 44 Lieder from Geibel and Heyse's *Spanisches Liederspiel*, and 22 from Heyse's *Italienisches Liederbuch*, a second part consisting of 24 songs being added in 1896. Besides these were 13 settings of lyrics by different authors, incidental music to Ibsen's *Fest auf Solhaug*, a few choral and instrumental works, an opera in four acts, *Der Corregidor*, successfully produced at Mannheim in June 1896, and finally settings of three sonnets by Michelangelo in March 1897. In September of this year the malady which had long threatened descended upon him; he was placed in an asylum, released in the following January, only to be immured again some months later by his own wish, after an attempt to drown himself in the Traunsee. Four painful years elapsed before his death on the 22nd of February 1903. Apart from his works and the tragedy of his last years there is little in Wolf's life to distinguish it from that of other struggling and unsuccessful musicians. His touchy and difficult temperament perpetually stood in the way of worldly success. What little he obtained was due to the persevering efforts of a small band of friends, critics and singers, to make his songs known, to the support of the Vienna Wagner-Verein, and to the formation in 1895 of the Hugo-Wolf-Verein in Berlin. No doubt it was also a good thing for his reputation that the firm of Schott undertook in 1891 the publication of his songs, but the financial result after five years amounted to 85 marks 35 pfennigs (about £4, 10s.). He lived in cheap lodgings till in 1896 the generosity of his friends provided him with a house of his own, which he enjoyed for one year.

Among the song composers who have adopted the modern standpoint, according to which accepted canons of beauty and of form must yield if they interfere with a closer or more vivid realization of dramatic or emotional expression, Wolf holds a place in which he has no rival, not because of the daring originality of his methods and the remarkable idiosyncrasies of his style, but because these are the direct outcome of rare poetical insight and imaginative power. He has that gift of vision which makes the difference between genius and talent. His frequent adoption of a type of song built upon a single phrase or *leit-motiv* in the accompaniment has led to the misleading statement that his work represents merely the transference of Wagnerian principles to song. In reality the forms of Wolf's songs vary as widely as those of the poems which he set. No less remarkable is the immense range of style at his command. But with Wolf methods of form and style are so inseparably linked with the poetical conceptions which they embody, that they can hardly be considered apart. His place among the greatest song-writers is due to the essential truth and originality of his creations, and to the vivid intensity with which he has presented them. These results depend not merely on musical gifts that are exceptional, but also upon a critical grasp of poetry of the highest order.

No other composer has exhibited so scrupulous a reverence for the poems which he set. To displace an accent was for him as heinous an act of sacrilege as to misinterpret a conception or to ignore an essential suggestion. Fineness of declamation has never reached a higher point than in Wolf's songs. Emphasis should also be laid upon the objective and dramatic attitude of his mind. He preferred to make himself the mouthpiece of the poetry rather than to use his art for purposes of self-revelation, avoiding for his songs the works of those whom with healthy scorn he termed the Ich-Poeten. Hence the men and women characterized in his songs are living realities, forming a veritable portrait gallery, of which the figures, though unmistakably the work of a single hand, yet maintain their own separate identity. These statements can be verified as well by a reference to the simpler and more melodious of his songs, as to those which are of extreme elaboration and difficulty. Among the former may be named *Das verlassene Mägdlein in der Frühe* and *Der Gärtner* (Mörike), *Verschwiegene Liebe* and *Der Musikant* (Eichendorff), *Anakreons Grab* (Goethe), *Alle gingen, Herz, zur Ruh'* and *Herz, was fragst* (*Spanisches Liederspiel*), Nos. 1 and 4 of the *Italienisches Liederbuch*, and among the latter *Aeolsharfe* and *Der Feuerreiter* (Mörike), *Ganymed* and *Prometheus* (Goethe). (W. A. J. F.)

WOLF, JOSEPH (1820–1899), Anglo-German artist, the son of a German farmer, was born in 1820 at Münstermaifeld, on the river Moselle, in the Rhine Province. In his boyhood he was an assiduous student of bird and animal life, and showed a remarkable capacity as a draughtsman of natural history subjects. His powers were first recognized by Professor Schlegel of the Leiden museum, who gave him employment as an illustrator. In 1848 he settled in London, where he remained till his death on the 20th of April 1899. He made many drawings for the Zoological Society, and a very large number of illustrations for books on natural history and on travel in various countries; but he also won a considerable success as a painter.

See A. H. Palmer, *The Life of Joseph Wolf* (London, 1895).

WOLF (*Canis lupus*), the common English name for any wild member of the typical section of the genus *Canis* (see CARNIVORA). Excluding some varieties of domestic dogs, wolves are the largest members of the genus, and have a wide geographical range, extending over nearly the whole of Europe and Asia, and North America from Greenland to Mexico, but are not found in South America or Africa, where they are replaced by other members of the family. They present great diversities of size, length and thickness of fur, and coloration, although resembling each other in all important structural characters. These differences have given rise to a supposed multiplicity of species, expressed by the names *C. lycaon* (Central Europe), *C. laniger* and *C. niger* (Tibet), the *C. occidentalis*, *C. nubilus*, *C. mexicanus*, &c., of North America, and the great blackish-brown Alaskan *C. pambasileus*, the largest of them all. But it is doubtful whether these should be regarded as more than local varieties. In North America there is a second distinct smaller species, called the coyote or prairie-wolf (*Canis latrans*), and perhaps the Japanese wolf (*C. hodophylax*) may be distinct, although, except for its smaller size and shorter legs, it is scarcely distinguishable from the common species. The wolf enters the N.W. corner of India, but in the peninsula is replaced by the more jackal-like *C. pallipes*, which is probably a member of the jackal group, and not a wolf at all.

The ordinary colour of the wolf is yellowish or fulvous grey, but almost pure white and entirely black wolves are known. In northern countries the fur is longer and thicker, and the animal generally larger and more powerful than in the southern portion of its range. Its habits are similar everywhere and it is still, and has been from time immemorial, especially known to man in [illegible] as the devastator of sheep flocks. [illegible] by lying in ambush, or stealing up [illegible] but by fairly running it down [illegible] remarkable endurance [illegible] summer when the young [illegible] provided for by their parents, [illegible] relays, and by their combined and persevering efforts are able to overpower and kill deer, antelopes and wounded animals of all sizes. It is singular that such closely allied species as the domestic dog and the Arctic fox are among the favourite prey of wolves, and, as is well known, children and even full-grown people are not infrequently the objects of their attack when pressed by hunger. Notwithstanding the proverbial ferocity of the wolf in a wild state, many instances are recorded of animals taken when quite young becoming tame and attached to the person who has brought them up, when they exhibit many of the ways of a dog. They can, however, rarely be trusted by strangers.

The history of the wolf in the British Isles, and its gradual extirpation, has been thoroughly investigated by Mr J. E. Harting in his work on *Extinct British Animals*, from which the following account is abridged. To judge by the osteological remains which the researches of geologists have brought to light, there was perhaps scarcely a county in England or Wales in which, at one time or another, wolves did not abound, while in Scotland and Ireland they must have been still more numerous. The fossil remains which have been discovered in Britain are not larger than, nor in any way to be distinguished from, the corresponding bones and teeth of European wolves of the present day. Wolf-hunting was a favourite pursuit of the ancient Britons as well as of the Anglo-Saxons. In Athelstan's reign these animals abounded to such an extent in Yorkshire that a retreat was built by one Acehorn, at Flixton, near Filey, wherein travellers might seek refuge if attacked by them. As is well known, great efforts were made by King Edgar to reduce the number of wolves in the country, but, notwithstanding the annual tribute of 300 skins paid to him during several years by the king of Wales, he was not altogether so successful as has been commonly imagined. In the reign of Henry III. wolves were sufficiently numerous in some parts of the country to induce the king to make grants of land to various individuals upon the express condition of their taking measures to destroy these animals wherever they could be found. In Edward II.'s time, the king's forest of the Peak, in Derbyshire, is especially mentioned as infested with wolves, and it was not until the reign of Henry VII. (1485–1509) that wolves appear to have become finally extinct in England. This, however, is rather a matter of inference from the cessation of all mention of them in local records than from any definite evidence of their extirpation. Their last retreat was probably in the desolate wolds of Yorkshire. In Scotland, as might be supposed from the nature of the country, the wolf maintained its hold for a much longer period. There is a well-known story of the last of the race being killed by Sir Ewen Cameron of Lochiel in 1680, but there is evidence of wolves having survived in Sutherlandshire and other parts into the following century (perhaps as late as 1743), though the date of their final extinction cannot be accurately fixed. In Ireland, in Cromwell's time, wolves were particularly troublesome, and said to be increasing in numbers, so that special measures were taken for their destruction, such as the offering of large rewards for their heads, and the prohibition (in 1652) of the exportation of "wolf-dogs," the large dogs used for hunting the wolves. The active measures taken then and later reduced their numbers greatly, so that towards the end of the century they became scarce, but, as in the case of the sister island, the date of their final disappearance cannot now be ascertained. It has been placed, upon the evidence of somewhat doubtful traditions, as late as 1766.

It is owing to their position that the British Islands have been able to clear themselves of these formidable and destructive animals, for France, with no natural barriers to prevent their incursions from the continent to the east, is liable every winter to visits from numbers of these animals. (W. H. F.; R. L.*)

WOLFDIETRICH, German hero of romance. The tale of Wolfdietrich is connected with the Merovingian princes, Theodoric and Theodebert, son and grandson of Clovis; but in the Middle High German poems of *Ortnit* and *Wolfdietrich* in the *Heldenbuch* (*q.v.*) Wolfdietrich is the son of Hugdietrich, emperor of Constantinople. Repudiated and exposed by his father, the child was spared by the wolves of the forest, and was educated by the faithful Berchtung of Meran. The account of his parents and their wooing, however, differs in various texts. After the emperor's death Wolfdietrich was driven from his inheritance by his brothers at the instigation of the traitor Sabene. Berchtung and his sixteen sons stood by Wolfdietrich. Six of these were slain and the other ten imprisoned. It was only after long exile in Lombardy at the court of King Ortnit that the hero returned to deliver the captives and regain his kingdom. Wolfdietrich's exile and return suggested a parallel with the history of Dietrich of Bern, with whom he was often actually identified; and the Mentors of the two heroes, Hildebrand and Berchtung, are cast in the same mould. Presently features of the

Wolfdietrich legend were transferred to the Dietrich cycle, and in the *Anhang* to the *Heldenbuch* it is stated in despite of all historical considerations that Wolfdietrich was the grandfather of the Veronese hero. Among the exploits of Wolfdietrich was the slaughter of the dragon which had slain Ortnit (*q.v.*). He thus took the place of Hardheri, one of the mythical Hartung brothers, the original hero of this feat. The myth attached itself to the family of Clovis, around which epic tradition rapidly gathered. Hugdietrich is generally considered to be the epic counterpart of Theodoric (Dietrich), eldest son of Clovis. The prefix was the barbarian equivalent of Frank,[1] and was employed to distinguish him from Theodoric the Goth. After his father's death he divided the kingdom with his brothers. Wolfdietrich represents his son Theodebert (d. 548), whose succession was disputed by his uncles, but was secured by the loyalty of the Frankish nobles. But father and son are merged by a process of epic fusion in Wolfdietrich. The rape of Sydrat, daughter of the heathen Walgunt of Salnecke, by Hugdietrich disguised as a woman, is typical of the tales of the wooing of heathen princesses made fashionable by the Crusades, and was probably extraneous to the original legend. It may, however, also be put on a semi-historical basis by adopting the suggestion of C. Voretzsch (*Epische Studien I. Die Comp. des Huon von Bordeaux*, Halle 1900), that Wolfdietrich is far more closely connected with Theodoric than Theodebert, and that Hugdietrich, therefore, stands for Clovis, the hero, in the Merovingian historians, of a well-known Brautfahrtsaga.

Ortnit and *Wolfdietrich* have been edited by Dr J. L. Edlen von Lindhausen (Tübingen, 1906). G. Sarrazin, in *Zeitschr. für deutsche Phil.* (1896), compared the legend of Wolfdietrich with the history of Gundovald, as given by Gregory of Tours in books vi. and vii. of his *Hist. Francorum.*

WOLFE, CHARLES (1791–1823), Irish poet, son of Theobald Wolfe of Blackhall, Co. Kildare, was born on the 14th of December 1791. He was educated at English schools and at Trinity College, Dublin, where he matriculated in 1809 and graduated in 1814. He was ordained priest in 1817, and obtained the curacy of Ballyclog, Co. Tyrone, which he shortly exchanged for that of Donoughmore in the same county. He died at Cork on the 21st of February 1823 in his thirty-second year. Wolfe was well known as a poet in Trinity College circles. He is remembered, however, solely by his stirring stanzas on the "Burial of Sir John Moore," written in 1816 in the rooms of Samuel O'Sullivan, a college friend, and printed in the *Newry Telegraph*.

See John Russell, *Remains of the Rev. Charles Wolfe* (2 vols., 1825; 4th ed., 1829), and a correspondence in *Notes and Queries*, 8th series, vol. viii. pp. 145, 178, 235, 253, 331 and 418.

WOLFE, JAMES (1727–1759), British general, the hero of Quebec, was born at Westerham in Kent on the 2nd of January 1727. At an early age he accompanied his father, Colonel (afterwards Lieutenant-General) Edward Wolfe, one of Marlborough's veterans, to the Carthagena expedition, and in 1741 his ardent desire for a military career was gratified by his appointment to an ensigncy. At the age of fifteen he proceeded with the 12th Foot (now Suffolk Regiment) to the Rhine Campaign, and at Dettingen he distinguished himself so much as acting adjutant that he was made lieutenant. In 1744 he received a company in Barrel's regiment (now the 4th King's Own). In the Scottish rising of the "Forty-five" he was employed as a brigade-major. He was present at Hawley's defeat at Falkirk, and at Culloden. With his old regiment, the 12th, Wolfe served in the Flanders campaigns of the duke of Cumberland, and at Val (Lauffeld) won by his valour the commendation of the duke. Promotion followed in 1749 to a majority, and in 1750 to the lieutenant-colonelcy of the 20th, with which he served in Scotland. Some years later he spent six months in Paris. When war broke out afresh in 1757 he served as a staff officer in the unfortunate Rochefort expedition, but his prospects were not affected by the failure, for had his advice been taken the result might well have been different. Next year he was sent to N. America as a brigadier-general in the Louisburg expedition under Amherst and Boscawen. The landing was effected in the face of strenuous opposition, Wolfe leading the foremost troops. On the 27th of July the place surrendered after an obstinate defence; during the siege Wolfe had had charge of a most important section of the attack, and on his lines the fiercest fighting took place. Soon afterwards he returned to England to recruit his shattered health, but on learning that Pitt desired him to continue in America he at once offered to return. It was now that the famous expedition against Quebec was decided upon, Wolfe to be in command, with the local rank of major-general. In a brief holiday before his departure he met at Bath Miss Lowther, to whom he became engaged. Very shortly afterwards he sailed, and on the 1st of June 1759 the Quebec expedition sailed from Louisburg (see QUEBEC). After wearisome and disheartening failures, embittered by the pain of an internal disease, Wolfe crowned his work by the decisive victory on the Plains of Abraham (13th of September 1759) by which the French permanently lost Quebec. Twice wounded earlier in the fight, he had refused to leave the field, and a third bullet passing through his lungs inflicted a mortal injury. While he was lying in a swoon some one near him exclaimed, "They run; see how they run!" "Who run?" demanded Wolfe, as one roused from sleep. "The enemy," was the answer; "they give way everywhere." Wolfe rallied for a moment, gave a last order for cutting off the retreat, and murmuring, "Now God be praised, I will die in peace," breathed his last. On the battle-ground a tall column bears the words, "Here died Wolfe victorious on the 13th of September 1759." In the governor's garden, in Quebec, there is also a monument to the memory of Wolfe and his gallant opponent Montcalm, who survived him only a few hours, with the inscription "Wolfe and Montcalm. *Mortem virtus communem, famam historia, monumentum posteritas dedit.*" In Westminster Abbey a public memorial to Wolfe was unveiled on the 4th of October 1773.

See R. Wright, *Life of Major-General James Wolfe* (London, 1864); F. Parkman, *Montcalm and Wolfe* (London, 1884); *Twelve British Soldiers* (London, 1899); *General Wolfe's Instructions to Young Officers* (1768–1780); Beckles Willson, *The Life and Letters of James Wolfe* (1909); and A. G. Bradley, *Wolfe* (1895).

WOLFENBÜTTEL, a town of Germany, in the duchy of Brunswick, situated on both banks of the Oker, 7 m. S. of Brunswick on the railway to Harzburg. Pop. (1905) 19,083. Lessing was ducal librarian here, and the old library building, designed in 1723 in imitation of the Pantheon at Rome, contains a marble statue of him. The library, including 300,000 printed books and 10,000 MSS., was, however, transferred to a large and new Renaissance edifice in 1887. It is especially rich in Bibles, *incunabula* and books of the early Reformation period, and contains some fragments of the Gothic bible of Ulfilas. Opposite the old library is the palace, now occupied by a seminary. The ducal burial-vault is in the church of St Mary.

A castle is said to have been founded on the site of Wolfenbüttel by a margrave of Meissen about 1046. When this began in 1267 to be the residence of the early Brunswick or Wolfenbüttel line of counts, a town gradually grew up around it. In 1542 it was taken by the Saxons and Hessians, who, however, evacuated it five years later after the battle of Mühlberg. In the Thirty Years' War, in June 1641, the Swedes, under Wrangel and Königsmark, defeated the Austrians under the archduke Leopold at Wolfenbüttel. The town passed wholly into the possession of the Brunswick-Wolfenbüttel family in 1671, and for nearly one hundred years enjoyed the distinction of being the ducal capital. In 1754, however, Duke Charles transferred the ducal residence to Brunswick.

See Voges, *Erzählungen aus der Geschichte der Stadt Wolfenbüttel* (Wolfenbüttel, 1882); von Heinemann, *Die herzogliche Bibliothek zu Wolfenbüttel* (2nd ed., Wolfenbüttel, 1894). For the "Wolfenbüttel fragments" see LESSING and REIMARUS.

WOLFF, CASPAR FRIEDRICH (1733–1794), German anatomist and physiologist, justly reckoned the founder of modern embryology, was born in 1733 at Berlin, where he studied anatomy and physiology under the elder J. F. Meckel. He graduated in medicine at Halle in 1759, his thesis being his famous *Theoria generationis*. After serving as a surgeon in the Seven Years' War, he wished to lecture on anatomy and physiology in Berlin, but being refused permission he accepted a call from the empress Catharine to become professor of those subjects at the academy of St Petersburg, and acted in this capacity until his death there in 1794.

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[1] "Hugo Theodoricus iste dicitur, id est Francus, quia olim omnes Franci Hugones vocabantur . . .," *Annales Quedlinburg.* (Pertz *Script.* iii. 420.)

While the theory of "evolution" in the crude sense—*i.e.* a simple growth in size and unfolding of organs all previously existent in the germ—was in possession of the field, his researches on the development of the alimentary canal in the chick first clearly established the converse view, that of *epigenesis*, *i.e.* of progressive formation and differentiation of organs from a germ primitively homogeneous. He also largely anticipated the modern conception of embryonic layers, and is said even to have foreshadowed the cell theory.

WOLFF (less correctly Wolf), **CHRISTIAN** (1679–1754), German philosopher and mathematician, the son of a tanner, was born at Breslau on the 24th of January 1679. At the university of Jena he studied first mathematics and physics, to which he soon added philosophy. In 1703 he qualified as *Privatdozent* in the university of Leipzig, where he lectured till 1706, when he was called as professor of mathematics and natural philosophy to Halle. Before this time he had made the acquaintance of Leibnitz, of whose philosophy his own system is a modification. In Halle Wolff limited himself at first to mathematics, but on the departure of a colleague he added physics, and presently included all the main philosophical disciplines. But the claims which Wolff advanced on behalf of the philosophic reason (see Rationalism) appeared impious to his theological colleagues. Halle was the headquarters of Pietism, which, after a long struggle against Lutheran dogmatism, had itself assumed the characteristics of a new orthodoxy. Wolff's professed ideal was to base theological truths on evidence of mathematical certitude, and strife with the Pietists broke out openly in 1721, when Wolff, on the occasion of laying down the office of pro-rector, delivered an oration "On the Practical Philosophy of the Chinese" (Eng. tr. 1750), in which he praised the purity of the moral precepts of Confucius, pointing to them as an evidence of the power of human reason to attain by its own efforts to moral truth. For ten years Wolff was subjected to attack, until in a fit of exasperation he appealed to the court for protection. His enemies, however, gained the ear of the king Frederick William I. and represented to him that, if Wolff's determinism were recognized, no soldier who deserted could be punished, since he would only have acted as it was necessarily predetermined that he should. This so enraged the king that he at once deprived Wolff of his office, and commanded him to leave Prussian territory within forty-eight hours on pain of a halter. The same day Wolff passed into Saxony, and presently proceeded to Marburg, to which university he had received a call before this crisis. The landgrave of Hesse received him with every mark of distinction, and the circumstances of his expulsion drew universal attention to his philosophy. It was everywhere discussed, and over two hundred books and pamphlets appeared for or against it before 1737, not reckoning the systematic treatises of Wolff and his followers. In 1740 Frederick William, who had already made overtures to Wolff to return, died suddenly, and one of the first acts of his successor, Frederick the Great, was to recall him to Halle. His entry into the town on the 6th of December 1740 partook of the nature of a triumphal procession. In 1743 he became chancellor of the university, and in 1745 he received the title of *Freiherr* from the elector of Bavaria. But his matter was no longer fresh, he had outlived his power of attracting students, and his class-rooms remained empty. He died on the 9th of April 1754.

The Wolffian philosophy held almost undisputed sway in Germany till it was displaced by the Kantian revolution. It is essentially a common-sense adaptation or watering-down of the Leibnitzian system; or, as we can hardly speak of a system in connexion with Leibnitz, Wolff may be said to have methodized and [illegible] dogmatic form the thoughts of his great predecessor [illegible] however, lose the greater part of their suggestive[illegible] Since his philosophy disappeared before the [illegible] the appearance of more speculative mi[illegible] dwell almost exclusively on its de[illegible] ness of insight, and the aridity of its neo-scholastic formalism, which tends to relapse into verbose platitudes. But this is to do injustice to Wolff's real merits. These are mainly his comprehensive view of philosophy, as embracing in its survey the whole field of human knowledge, his insistence everywhere on clear and methodic exposition, and his confidence in the power of reason to reduce all subjects to this form. To these must be added that he was practically the first to "teach philosophy to speak German." The Wolffian system retains the determinism and optimism of Leibnitz, but the monadology recedes into the background, the monads falling asunder into souls or conscious beings on the one hand and mere atoms on the other. The doctrine of the pre-established harmony also loses its metaphysical significance, and the principle of sufficient reason introduced by Leibnitz is once more discarded in favour of the principle of contradiction which Wolff seeks to make the fundamental principle of philosophy. Philosophy is defined by him as the science of the possible, and divided, according to the two faculties of the human individual, into a theoretical and a practical part. Logic, sometimes called *philosophia rationalis*, forms the introduction or propaedeutic to both. Theoretical philosophy has for its parts ontology or *philosophia prima*, cosmology, rational psychology and natural theology; ontology treats of the existent in general, psychology of the soul as a simple non-extended substance, cosmology of the world as a whole, and rational theology of the existence and attributes of God. These are best known to philosophical students by Kant's treatment of them in the *Critique of Pure Reason*. Practical philosophy is subdivided into ethics, economics and politics. Wolff's moral principle is the realization of human perfection.

Wolff's most important works are as follows: *Anfangsgründe aller mathematischen Wissenschaften* (1710; in Latin, *Elementa matheseos universae*, 1713–1715); *Vernünftige Gedanken von den Kräften des menschlichen Verstandes* (1712; Eng. trans. 1770); *Vern. Ged. von Gott, der Welt und der Seele des Menschen* (1719); *Vern. Ged. von der Menschen Thun und Lassen* (1720); *Vern. Ged. von dem gesellschaftlichen Leben der Menschen* (1721); *Vern. Ged. von den Wirkungen der Natur* (1723); *Vern. Ged. von den Absichten der natürlichen Dinge* (1724); *Vern. Ged. von dem Gebrauche der Theile in Menschen, Thieren und Pflanzen* (1725); the last seven may briefly be described as treatises on logic, metaphysics, moral philosophy, political philosophy, theoretical physics, teleology, physiology: *Philosophia rationalis, sive logica* (1728); *Philosophia prima, sive Ontologia* (1729); *Cosmologia generalis* (1731); *Psychologia empirica* (1732); *Psychologia rationalis* (1734); *Theologia naturalis* (1736–1737); *Philosophia practica universalis* (1738–1739); *Jus naturae* and *Jus Gentium* (1740–1749); *Philosophia moralis* (1750–1753). His *Kleine philosophische Schriften* have been collected and edited by G. F. Hagen (1736–1740). In addition to Wolff's autobiography (*Eigene Lebensbeschreibung*, ed. H. Wuttke, 1841) and the usual histories of philosophy, see W. Schrader in *Allgemeine deutsche Biographie*, xliv.; C. G. Ludovici, *Ausführlicher Entwurf einer vollständigen Historie der Wolff'schen Philosophie* (1736–1738); J. Deschamps, *Cours abrégé de la philosophie wolffienne* (1743); F. W. Kluge, *Christian von Wolff der Philosoph* (1831); W. Arnsperger, *Christian Wolffs Verhältnis zu Leibniz* (1897). (A. S. P.-P.; X.)

WOLFF, JOSEPH (1795–1862), Jewish Christian missionary, was born at Weilersbach, near Bamberg, Germany, in 1795. His father became rabbi at Württemberg in 1806, and sent his son to the Protestant lyceum at Stuttgart. He was converted to Christianity through reading the books of Johann Michael von Sailer, bishop of Regensburg, and was baptized in 1812 by the Benedictine abbot of Emaus, near Prague. Wolff was a keen Oriental scholar and pursued his studies at Tübingen and at Rome, where he was expelled from the Collegio di Propaganda in 1818 for attacking the doctrine of infallibility and criticizing his tutors. After a short stay in the monastery of the Redemptorists at Val Sainte near Fribourg, he went to London, entered the Anglican Church, and resumed his Oriental and theological studies at Cambridge. In 1821 he began his missionary wanderings in the East by visiting Egypt, the Sinaitic peninsula, Jerusalem, Aleppo, Mesopotamia, Persia, Tiflis and the Crimea, returning to England in 1826, when Edward Irving introduced him to Lady Georgina Walpole, 6th daughter of Horatio Walpole, earl of Orford, whom he married in February 1827. In 1828 Wolff set out to search for the ten tribes, travelling through Anatolia, Armenia, Turkestan and Afghanistan to Simla and Calcutta, suffering many hardships but preaching with enthusiasm. He visited Madras, Pondicherry, Tinnevelly, Goa and [illegible] by Egypt and Malta. In 1836 he [illegible] Abyssinia, took him to Jiddah, and him[illegible] Bombay, going on to the United States, [illegible] deacon in 1837, and priest in 1838

In the same year he was given the rectory of Linthwaite in Yorkshire. In 1843 he went to Bokhara to seek two British officers, Lieut.-Colonel C. Stoddart and Captain A. Conolly, and narrowly escaped the death that had overtaken them; his *Narrative* of this mission went through seven editions between 1845 and 1852. In 1845 he was presented to the vicarage of Ile Brewers, Somerset, and was planning another great missionary tour when he died on the 2nd of May 1862.

He published several *Journals* of his expeditions, especially *Travels and Adventures of Joseph Wolff* (2 vols., London, 1860).

His son, SIR HENRY DRUMMOND WOLFF (1830–1908), was a well-known English diplomatist and Conservative politician, who started as a clerk in the foreign office and was created K.C.M.G. in 1862 for various services abroad. In 1874–1880 he sat in parliament for Christchurch, and in 1880–1885 for Portsmouth, being one of the group known as the "Fourth Party." In 1885 he went on a special mission to Constantinople in connexion with the Egyptian question, and as the result various awkward difficulties, hinging on the sultan's suzerainty, were got over. In 1888 he was sent as minister to Teheran, and from 1892 to 1900 was ambassador at Madrid. He died on the 11th of October 1908. Sir Henry was a notable *raconteur*, and he did good service to the Conservative party by helping to found the Primrose League. He was created G.C.M.G. in 1878 and G.C.B. in 1889.

WOLFRAMITE, or WOLFRAM, a mineral consisting of iron-manganese tungstate, (Fe, Mn)WO_4. The name is of doubtful origin, but it has been assumed that it is derived from the German *Wolf* and *Rahm* (froth), corresponding with the *spuma lupi* of old writers, a term hardly appropriate, however, to the mineral in question. Wolframite crystallizes in the monoclinic system, with approximation to an orthorhombic type; and the crystals offer perfect pinacoidal cleavage. The colour of wolframite is generally dark brownish-black, the lustre metallic or adamantine, the hardness 5 to 5·5, and the specific gravity 7·1 to 7·5. Wolframite may be regarded as an isomorphous mixture, in variable ratio, of iron and manganese tungstates, sometimes with a small proportion of niobic and tantalic acids. It was in wolframite that the metal tungsten was first recognized in 1785 by two brothers, J. J. and F. d'Elhuyar. At the present time the mineral is used in the manufacture of tungsten-steel and in the preparation of certain tungstates.

Wolframite is commonly associated with tin-ores, as in many parts of Cornwall, Saxony and Bohemia. In consequence of the two minerals, cassiterite and wolframite, having nearly the same density, their separation becomes difficult by the ordinary processes of ore-dressing, but may be effected by means of magnetic separators, the wolframite being attracted by powerful magnets. A process introduced many years ago by R. Oxland consisted in roasting the mixed ore with carbonate of soda, when the wolfram was converted into sodium tungstate, which was easily removed as a soluble salt. Wolframite occurs at many localities in the United States, notably at Trumbull, Conn., where it has been mined, and at Monroe, Conn., where it accompanies bismuth ores. Other localities are in Mecklenburg county, N.C., and in the Mammoth mining district, Nevada. Wolframite has in some cases resulted from the alteration of scheelite (*q.v.*), though on the contrary pseudomorphs are known in which scheelite has taken the form of wolframite. By oxidation wolframite may become encrusted with tungstic ochre, or tungstite, sometimes known as wolframine, a name to be carefully distinguished from wolframite.

As the relative proportions of iron and manganese vary in wolframite, the composition tends towards that of other minerals. Thus there is a manganous tungstate ($MnWO_4$) known as hübnerite, a name given by E. N. Riotte, in 1865, in compliment to Adolph Hübner, a Saxon mineralogist. There is also a mineral which contains little more than ferrous tungstate ($FeWO_4$), and is known as ferberite, having been named by A. Breithaupt in 1863 after Rudolph Ferber. The original hübnerite came from the Mammoth district, Nevada, and the ferberite from the Sierra Almagrera in Spain. It is possible that such minerals may represent the extreme terms in the series formed by the varieties of wolframite.

(F. W. R.*)

WOLFRAM VON ESCHENBACH, the most important and individual poet of medieval Germany, flourished during the end of [illegible] 12th and beginning of the 13th century. He was one of the brilliant group of Minnesingers whom the Landgrave Hermann of Thuringia gathered round him at the historic castle of the Wartburg. We know by his own statement that he was a Bavarian, and came of a knightly race, counting his achievements with spear and shield far above his poetical gifts. The Eschenbach from which he derived his name was most probably Ober-Eschenbach, not far from Pleinfeld and Nuremberg; there is no doubt that this was the place of his burial, and so late as the 17th century his tomb was to be seen in the church of Ober-Eschenbach, which was then the burial place of the Teutonic knights. Wolfram probably belonged to the small nobility, for he alludes to men of importance, such as the counts of Abenberg, and of Wertheim, as if he had been in their service. Certainly he was a poor man, for he makes frequent and jesting allusions to his poverty. Bartsch concludes that he was a younger son, and that while the family seat was at Eschenbach, Wolfram's home was the insignificant estate of Wildenburg (to which he alludes), now the village of Wehlenberg. Wolfram seems to have disdained all literary accomplishments, and in fact insists on his unlettered condition both in *Parzival* and in *Willehalm*. But this is somewhat perplexing, for these poems are beyond all doubt renderings of French originals. Were the poems read to him, and did he dictate his translation to a scribe? The date of Wolfram's death is uncertain. We know that he was alive in 1216, as in *Willehalm* he laments the death of the Landgrave Herrmann, which took place in that year, but how long he survived his friend and patron we do not know.

Wolfram von Eschenbach lives in, and is revealed by, his work, which shows him to have been a man of remarkable force and personality. He has left two long epic poems, *Parzival* and *Willehalm* (the latter a translation of the French chanson de geste *Aliscans*), certain fragments, *Titurel* (apparently intended as an introduction to the *Parzival*), and a group of lyrical poems, *Wächter-Lieder*. These last derive their name from the fact that they record the feelings of lovers who, having passed the night in each other's company, are called to separate by the cry of the watchman, heralding the dawn. These *Tage Lieder*, or *Wächter Lieder*, are a feature of Old German folk-poetry, of which Wagner has preserved the tradition in the warning cry of Brangaene in the second act of *Tristan*. But the principal interest of Wolfram's work lies in his *Parzival*, immeasurably the finest and most spiritual rendering of the *Perceval-Grail* story.

The problem of the source of the *Parzival* is the crux of medieval literary criticism (see PERCEVAL). These are the leading points. The poem is divided into sixteen books. From iii. to xii., inclusive, the story marches *pari passu* with the *Perceval* of Chrétien de Troyes, at one moment agreeing almost literally with the French text, at the next introducing details quite unknown to it. Books i. and ii., unrepresented in Chrétien, relate the fortunes of the hero's father, and connect the story closely with the house of Anjou; the four concluding books agree with the commencement, and further connect the Grail story with that of the Swan Knight, for the first time identifying that hero with Parzival's son, a version followed by the later German romance of *Lohengrin*. At the conclusion Wolfram definitely blames Chrétien for having mistold the tale, while a certain Kiot, the Provençal (whom he has before named as his source), had told it aright from beginning to end. Other peculiarities of this version are the representation of the Grail itself as a stone, and of the inhabitants of the castle as an ordered knighthood, *Templeisen*; the numerous allusions to, and evident familiarity with, Oriental learning in its various branches; and above all, the connecting thread of ethical interpretation which runs through the whole poem. The *Parzival* is a soul-drama; the conflict between light and darkness, faith and doubt, is its theme, and the evolution of the hero's character is steadily and consistently worked out. The teaching is of a character strangely at variance with the other romances of the cycle. Instead of an asceticism, based upon a fundamentally low and degrading view of women, Wolfram upholds a sane and healthy morality; chastity, rather than celibacy, is his ideal, and a loyal observance of the marriage bond is in his eyes the highest virtue. Not retirement *from* the world, but fulfilment of duty *in* the world, is the goal he marks out for attainment. Whether views so large, so sane and so wholesome, are to be placed to the credit of the German poet, or of his French source (and modern criticism is leaning more and more to a belief in the existence of Kiot), the *Parsival* is the work of a remarkable personality, and, given the age and the environment, a unique literary achievement.

Wolfram has moments of the highest poetical inspiration, but his meaning, even for his compatriots, is often obscure. He is in no sense a master of language, as was Gottfried von Strassbourg. This latter, in a very interesting passage of the *Tristan*, passes in review the poets of the day, awarding to the majority praise for the excellence of their style, but one he does not name, only blaming him as being so obscure and involved that none can tell what his meaning may be; this un-named poet has always been understood to be Wolfram von Eschenbach, and in a passage of *Willehalm* the author refers to the unfavourable criticisms passed on *Parsival*. Wolfram and Gottfried were both true poets, but of widely differing style. Wolfram was, above all, a man of deeply religious character (witness his introduction to *Willehalm*), and it seems to have been this which specially impressed the mind of his compatriots; in the 13th-century poem of *Der Wartburg-Krieg* it is Wolfram who is chosen as the representative of Christianity, to oppose the enchanter Klingsor von Ungerland. (J. L. W.)

WOLGAST, a seaport town of Germany, in the Prussian province of Pomerania, situated on the river Peene, which separates it from the island of Usedom, 30 m. by rail E. of Greifswald. Pop. (1905) 8346. There are various manufactures. Wolgast became a town in 1247, and after being the residence of the duke of Pomerania-Wolgast, it was ceded to Sweden in 1648. It was captured four times during the Thirty Years' War, and in 1675 by Frederick William, elector of Brandenburg. It was restored to Germany in 1815.

See B. Heberlein, *Beiträge zur Geschichte der Burg und Stadt Wolgast* (Wolgast, 1892).

WOLLASTON, WILLIAM (1659–1724), English philosophical writer, was born at Coton-Clanford in Staffordshire, on the 26th of March 1659. On leaving Sidney Sussex College, Cambridge, in 1681, he became an assistant master at the Birmingham grammar-school, and took holy orders. In 1688 an uncle left him a fortune. He then moved to London, married a lady of wealth, and devoted himself to learning and philosophy. He embodied his views in the one book by which he is remembered, *The Religion of Nature Delineated* (1st ed. 1722; 2nd ed. 1724). He died in October 1724.

Wollaston's *Religion of Nature*, which falls between Clarke's *Discourse of the Unchangeable Obligations of Natural Religion* and Butler's *Sermons*, was one of the popular philosophical books of its day. To the 8th edition (1750) was added a life of the author. The book was designed to be an answer to two questions: Is there such a thing as natural religion? and, If there is, what is it? Wollaston starts with the assumption that religion and morality are identical, and labours to show that religion is "the pursuit of happiness by the practice of truth and reason." He claims originality for his theory that the moral evil is the practical denial of a true proposition and moral good the affirmation of it (see ETHICS). Wollaston also published anonymously a small book, *On the Design of the Book of Ecclesiastes, or the Unreasonableness of Men's Restless Contention for the Present Enjoyments, represented in an English Poem* (London, 1691).

See John Clarke, *Examination of the Notion of Moral Good and Evil advanced in a late book entitled The Religion of Nature Delineated* (London, 1725); Drechsler, *Über Wollaston's Moral-Philosophie* (Erlangen, 1802); Sir Leslie Stephen's *History of English Thought in the Eighteenth Century* (London, 1876), ch. iii. and ch. ix.; H. Sidgwick's *History of Ethics* (1902), pp. 198 sq.

WOLLASTON, WILLIAM HYDE (1766–1828), English chemist and natural philosopher, was born at East Dereham, Norfolk, on the 6th of April 1766, the second of seventeen children. His father, the Rev. Francis Wollaston (1731–1815), [illegible] Chislehurst, grandson of the William Wollaston [illegible] was an enthusiastic astronomer. Wollaston [illegible] Charterhouse, and afterwards at Caius [illegible] which he became a fellow. He took [illegible] and M.D. (1793), starting [illegible] St Edmunds, whence [illegible] little way, and failed to obtain a vacant physicianship at St George's hospital; the result was that he abandoned medicine and took to original research. He devoted much attention to the affairs of the Royal Society, of which he was elected a fellow in 1793 and made secretary in 1806. He was elected interim president in June 1820, on the death of Sir Joseph Banks; but he did not care to enter into competition with Sir Humphry Davy, and the latter was elected president at the anniversary meeting in November 1820. Wollaston became a member of the Geological Society of London in 1812, and served frequently on the Council and for some time as a vice-president. Beyond appearing at the meetings of learned societies he took little part in public affairs; he lived alone, conducting his investigations in a deliberate and exhaustive manner, but in the most rigid seclusion, no person being admitted to his laboratory on any pretext. Towards the close of 1828 he felt the approach of a fatal malady—a tumour in the brain—and devoted his last days to a careful revisal of his unpublished researches and industrial processes, dictating several papers on these subjects, which were afterwards published in the *Philosophical Transactions*. He died in London on the 22nd of December 1828.

Most of Wollaston's original work deals more or less directly with chemical subjects, but diverges on all sides into optics, acoustics, mineralogy, astronomy, physiology, botany and even art. In chemistry he made a speciality of the platinum metals. Platinum itself he discovered how to work on a practical scale, and he is said to have made a fortune from the secret, which, however, he disclosed in a posthumous paper (1829); and he was the first to detect the metals palladium (1804) and rhodium (1805) in crude platinum. In regard to palladium his conduct was open to criticism. He anonymously offered a quantity of the metal for sale at an instrument-maker's shop, issuing an advertisement in which some of its main properties were described. Richard Chevenix (1774–1830), a chemist, having bought some of the substance, decided after experiment that it was not a simple body as claimed, but an alloy of mercury with platinum, and in 1803 presented a paper to the Royal Society setting forth this view. As secretary, Wollaston saw this paper when it was sent in, and is said to have tried to persuade the author to withdraw it. But having failed, he allowed the paper, and also a second by Chevenix of the same tenor in 1805, to be read without avowing that it was he himself who had originally detected the metal, although he had an excellent opportunity of stating the fact in 1804 when he discussed the substance in the paper which announced the discovery of rhodium. In 1809 he proved the elementary character of columbium (niobium) and titanium. In optics he was the first, in 1802, to observe the dark lines in the solar spectrum. Of the seven lines he saw, he regarded the five most prominent as the natural boundaries or dividing lines of the pure simple colours of the prismatic spectrum, which he supposed to have four primary divisions. He described the reflecting goniometer in 1809 and the camera lucida in 1812, provided microscopists with the "Wollaston doublet," and applied concavo-convex lenses to the purposes of the oculist. His cryophorus was described in 1813, in a paper "On a method of freezing at a distance." In 1821, after H. C. Oersted (1777–1851) had shown that a magnetic needle is deflected by an electric current, he attempted, in the laboratory of the Royal Institution in the presence of Humphry Davy, to convert that deflection into a continuous rotation, and also to obtain the reciprocal effect of a current rotating round a magnet. He failed in both respects, and when Michael Faraday, who overheard a portion of his conversation with Davy on the subject, was subsequently more successful, he was inclined to assert the merit of priority, to which Faraday did not admit his claim. Among his other papers may be mentioned those dealing with the formation of fairy rings (1807), a synoptic scale of chemical equivalents (1814), sounds inaudible to ordinary ears (1820), the physiology of vision (1824), the apparent direction of the eyes in a portrait (1824) and the comparison of the light of the sun with that of the moon and fixed stars (1829).

In geological circles Wollaston is famous for the medal which bears his name, and which (together with a donation fund) is annually awarded by the council of the Geological Society of London, being the result of the interest on £1000 bequeathed by Wollaston for "promoting researches concerning the mineral structure of the earth." The first award was made in 1831. The medal is the highest honour [illegible] by the society; it was originally made of palladium, but [illegible]

[illegible] Wollaston will be found in George [illegible]

[illegible] forming mineral consisting of calcium [illegible] crystallizing in the monoclinic system and [illegible] (q.v.) group. It differs, however, [illegible] group in having cleavages, not parallel [illegible] in two directions perpendicular to the plane of symmetry. Crystals are usually elongated parallel to the axis of symmetry and flattened parallel to the ortho-pinacoid, hence the early name "tabular spar"; the name wollastonite is after W. H. Wollaston. The mineral usually occurs in white cleavage masses. The hardness is 5, and the specific gravity 2·85. It is a characteristic product of contact-metamorphism, occurring especially, with garnet, diopside, &c., in crystalline limestones. Crystals are found in the cavities of the ejected limestone blocks of Monte Somma, Vesuvius. At Santa Fé in the State of Chiapas, Mexico, a large rock-mass of wollastonite carries ores of gold and copper: here are found large pink crystals which are often partially or wholly altered to opal. (L. J. S.)

WOLLIN, an island of Germany, in the Prussian province of Pomerania, the more easterly of the islands at the mouth of the Oder which separate the Stettiner Haff from the Baltic Sea. It is divided from the mainland on the E. by the Dievenow Channel, and from Usedom on the W. by the Swine. It is roughly triangular in shape, and has an area of 95 sq. m. Heath and sand alternate with swamps, lakes and forest on its surface, which is flat, except towards the south-west, where the low hills of Lebbin rise. Cattle-rearing and fishing are the chief resources of the inhabitants, who number about 14,000. Misdroy, on the N.W. coast, is a favourite sea-bathing resort, and some of the other villages, as Ostswine, opposite Swinemünde, Pritter, famous for its eels, and Lebbin, are also visited in summer. Wollin, the only town, is situated on the Dievenow, and is connected with the mainland by three bridges. It carries on the industries of a small seaport and fishing-town. Pop. (1900) 4679.

Near the modern town once stood the ancient and opulent Wendish city of Wolin or Jumne, called Julin by the Danes, and Winetha or Vineta (*i.e.* Wendish town) by the Germans. In the 10th and 11th centuries it was the centre of an active and extensive trade. Adam of Bremen (d. 1076) extols its size and wealth, and mentions that Greeks and other foreigners frequented it, and that Saxons were permitted to settle there on equal terms with the Wends, so long as they did not obtrude the fact of their Christianity. The Northmen made a settlement here about 970, and built a fortress on the "silver hill," called Jomsburg, which is often mentioned in the sagas. Its foundation was attributed to a legendary Viking exiled from Denmark, called Palnotoke or Palnatoki. The stronghold of Jomsburg was destroyed in 1098 by King Magnus Barfod of Norway. This is probably the origin of the legend that Vineta was overthrown by a storm or earthquake and overwhelmed by the sea. Some submarine granite rocks near Damerow in Usedom are still popularly regarded as its ruins. The town of Wollin became in 1140 the seat of the Pomeranian bishopric, which was transferred to Kammin about 1170. Wollin was burnt by Canute VI. of Denmark in 1183, and was taken by the Swedes in 1630 and 1759 and by the Brandenburgers in 1659 and 1675.

See Khull, *Die Geschichte Palnatokis und der Jomsburger* (Graz, 1892); Koch, *Vineta in Prosa und Poesie* (Stettin, 1905); W. von Raumer, *Die Insel Wollin* (Berlin, 1851); Haas, *Sagen und Erzählungen von den Inseln Usedom und Wollin* (Stettin, 1904).

WOLLONGONG, a seaport of Camden county, New South Wales, Australia, 49 m. by rail S. of Sydney, the third port and chief harbour on the S. coast of the colony. Pop. (1901) 3545. Its harbour, known as Belmont Basin, is excavated out of the rock, having an area of 3 acres, and a depth of 18 ft. at low water. A breakwater protects its mouth; it has a lighthouse, and is defended by a fort on Signal Hill. It is the port for the Osborne-Wallsend and Mount Pleasant collieries, which are connected with it by rail. It lies at the foot of Mount Keira, amid fine mountain and coast scenery.

WOLOF (WOLOFF, JOLOF), a Negroid people of Senegal, French West Africa. They occupy the seaboard between St Louis and Cape Verde and the south bank of the Senegal from its mouth to Dagana. Farther inland the districts of the Walo, Cayor Baol and Jolof (the last, the name of a chief division of the nation, being sometimes used as the national name) are almost exclusively peopled by Wolof. The cities of St Louis and Dakar are both in the Wolof country, and throughout the French Sudan no military station is without a Wolof colony, preserving national speech and usages. The name is variously explained as meaning "speaker" or "black." The Wolof justify both meanings, for they are at once far the blackest and among the most garrulous of all African peoples. They are a very tall race, with splendidly proportioned busts but weak and undeveloped legs and flat feet.

The Wolof language is spoken throughout Senegambia, and numerous grammars, dictionaries and vocabularies have appeared since 1825. There is, however, no written literature. The Wolof preserve their national songs, legends and proverbs by memory, but have little knowledge of letters beyond the Arabic characters on their paper spells and amulets. Wolof, a typical agglutinating language, differs from all other African forms of speech. The roots, almost all monosyllables ending in consonants, are determined by means of suffixes, and coalesce while remaining invariable in their various meanings. By these suffixes the meaning of the words is endlessly modified.

Most Wolof are nominally Mahommedans, and some near the Christian missions profess Christianity, but many pagan rites are still observed. Animal worship is prevalent. The capture of a shark is hailed with delight, and family genii have offerings made to them, the most popular of these household deities, the lizard, having in many houses a bowl of milk set aside for it daily. The Wolof have three hereditary castes, the nobles, the tradesmen and musicians (who are despised), and the slaves. These latter are kindly treated. Polygyny is customary.

The old kingdom of Cayor, the largest of Wolof states, has been preserved by the French. The king is elected, but always from the ruling family, and the electors, themselves unable to succeed, only number four. When elected the king receives a vase said to contain the seeds of all plants growing in Cayor, and he is thus made lord of the land. In earlier days there was the Bur or "Great Wolof," to whom all petty chiefs owed allegiance. The Wolof are very loyal to the French, and have constantly proved themselves courageous soldiers.

WOLOWSKI, LOUIS FRANÇOIS MICHEL RAYMOND (1810–1876), French economist and politician, was born in Warsaw and educated in Paris, but returned to Warsaw and took part in the revolution of 1830. Sent to Paris as secretary to the legation by the provisional government, he settled there on the suppression of the Polish rebellion and was naturalized in 1834. In 1833 he founded the *Revue de législation et de jurisprudence*, and wrote voluminously on economic and financial subjects. He established the first Crédit Foncier in France in 1852, and in 1864 became professor of political economy at the Conservatoire in succession to J. A. Blanqui. He was a member of the national assembly from 1848 to 1851, and again from 1871 till his election as a senator in 1876. He was a strong free-trader and an ardent bimetallist.

Of his works the following are the more important: *Mobilisation du crédit foncier* (1839); *De l'organisation industrielle de la France avant Colbert* (1842); *Les Finances de la Russie* (1864); *La Question des banques* (1864); *La Liberté commerciale* (1869); *L'Or et l'argent* (1870).

WOLSELEY, GARNET JOSEPH WOLSELEY, VISCOUNT (1833–   ), British field marshal, eldest son of Major Garnet Joseph Wolseley of the King's Own Borderers (25th Foot), was born at Golden Bridge, Co. Dublin, on the 4th of June 1833. Educated at Dublin, he obtained a commission as ensign in the 12th Foot in March 1852, and was transferred to the 80th Foot, with which he served in the second Burmese War. He was severely wounded on the 19th of March 1853 in the attack of Donabyû, was mentioned in despatches, and received the war medal. Promoted to be lieutenant and invalided home, he exchanged into the 90th Light Infantry, then in Dublin. He accompanied the regiment to the Crimea, and landed at Balaklava in December 1854. He was selected to be an assistant engineer, and did duty with the Royal Engineers in the trenches before Sevastopol. He was promoted to be captain in January 1855, after less than three years' service, and served throughout the siege, was wounded at the Quarries on the 7th of June, and again in the trenches on the 30th of August. After the fall of Sevastopol Wolseley was employed on the quartermaster-general's staff, assisted in the embarkation of the troops and stores, and was one of the last to leave the Crimea in July 1856. For his services he was twice mentioned in despatches, was noted for a brevet majority, received the war medal with clasp, the 5th class of the French Legion of Honour, the 5th class of the Turkish Mejidie and the Turkish medal. After six months' duty with the 90th

Foot at Aldershot, he went with it again, in March 1857, to join the expedition to China under Major-General the Hon. T. Ashburnham. Wolseley embarked in command of three companies in the transport "Transit," which was wrecked in the Strait of Banka. The troops were all saved, but with only their arms and a few rounds of ammunition, and were taken to Singapore, whence, on account of the Indian Mutiny, they were despatched with all haste to Calcutta. Wolseley distinguished himself at the relief of Lucknow under Sir Colin Campbell in November, and in the defence of the Alambagh position under Outram, taking part in the actions of the 22nd of December 1857, the 12th and 16th of January 1858, and the repulse of the grand attack of the 21st of February. In March he served at the final siege and capture of Lucknow. He was then appointed deputy-assistant quartermaster-general on the staff of Sir Hope Grant's Oudh division, and was engaged in all the operations of the campaign, including the actions of Bari, Sarsi, Nawabganj, the capture of Faizabad, the passage of the Gumti and the action of Sultanpur. In the autumn and winter of 1858 he took part in the Baiswara, trans-Gogra and trans-Rapti campaigns, ending with the complete suppression of the rebellion. For his services he was frequently mentioned in despatches, and, having received his Crimean majority in March 1858, was in April 1859 promoted to be lieutenant-colonel, and received the Mutiny medal and clasp. Wolseley continued to serve on Sir Hope Grant's staff in Oudh, and when Grant was nominated to the command of the British troops in the Anglo-French expedition to China in 1860, accompanied him as deputy-assistant quartermaster-general. He was present at the action at Sin-ho, the capture of Tang-ku, the storming of the Taku Forts, the occupation of Tientsin, the battle of Pa-le-cheau and the entry into Peking. He assisted in the re-embarkation of the troops before the winter set in. He was mentioned in despatches, and for his services received the medal and two clasps. On his return home he published the *Narrative of the War with China in 1860*.

In November 1861 Wolseley was one of the special service officers sent to Canada to make arrangements for the reception of troops in case of war with the United States in connexion with the mail steamer "Trent" incident, and when the matter was amicably settled he remained on the headquarters staff in Canada as assistant quartermaster-general. In 1865 he became a brevet colonel, was actively employed the following year in connexion with the Fenian raids from the United States, and in 1867 was appointed deputy quartermaster-general in Canada. In 1869 his *Soldiers' Pocket Book for Field Service* was published, and has since run through many editions. In 1870 he successfully commanded the Red river expedition to put down a rising under Louis Riel at Fort Garry, now the city of Winnipeg, the capital of Manitoba, then an outpost in the Wilderness, which could only be reached through a network of rivers and lakes extending for 600 m. from Lake Superior, traversed only by Indians, and where no supplies were obtainable. The admirable arrangements made and the careful organization of the transport reflected great credit on the commander, who on his return home was made K.C.M.G. and C.B.

Appointed assistant adjutant-general at the war office in 1871 he worked hard in furthering the Cardwell schemes of army reform, was a member of the localization committee, and a keen advocate of short service, territorial regiments and linked battalions. From this time till he became commander-in-chief Wolseley was the prime mover and the deciding influence in practically all the steps taken at the war office for promoting the efficiency of the army under the altered conditions of the day. In 1873 he commanded the expedition to Ashanti, and, having made all his arrangements at the Gold Coast before the arrival of the white troops in January 1874, was able to complete the campaign in two months, and re-embark them for home before the unhealthy season began. This was the campaign which made his name a household word in England. He fought the battle of Amoaful on the 31st of January, and, after five days' fighting, ending with the battle of Ordahsu, entered Kumasi, which he burned. He received the thanks of both Houses of Parliament and a grant of £25,000, was promoted to be major-general for distinguished service in the field, received the medal and clasp and was made G.C.M.G. and K.C.B. The freedom of the city of London was conferred upon him with a sword of honour, and he was made honorary D.C.L. of Oxford and LL.D. of Cambridge universities. On his return home he was appointed inspector-general of auxiliary forces, but had not held the post for a year when, in consequence of the native unrest in Natal, he was sent to that colony as governor and general commanding. In November 1876 he accepted a seat on the council of India, from which in 1878, having been promoted lieutenant-general, he went as high-commissioner to the newly acquired possession of Cyprus, and in the following year to South Africa to supersede Lord Chelmsford in command of the forces in the Zulu War, and as governor of Natal and the Transvaal and high commissioner of South-East Africa. But on his arrival at Durban in July he found that the war in Zululand was practically over, and after effecting a temporary settlement he went to the Transvaal. Having reorganized the administration there and reduced the powerful chief Sikukuni to submission, he returned home in May 1880 and was appointed quartermaster-general to the forces. For his services in South Africa he received the Zulu medal with clasp, and was made G.C.B.

In 1882 he was appointed adjutant-general to the forces, and in August of that year was given the command of the British forces in Egypt to suppress the rebellion of Arabi Pasha (see Egypt: *Military Operations*). Having seized the Suez Canal, he disembarked his troops at Ismailia, and after a very short and brilliant campaign completely defeated Arabi Pasha at Tel-el-Kebir, and suppressed the rebellion. For his services he received the thanks of parliament, the medal with clasp, the bronze star, was promoted general for distinguished service in the field, raised to the peerage as Baron Wolseley of Cairo and Wolseley, and received from the Khedive the 1st class of the order of the Osmanieh. In 1884 he was again called away from his duties as adjutant-general to command the Nile expedition for the relief of General Gordon and the besieged garrison of Khartum. The expedition arrived too late: Khartum had fallen, and Gordon was dead; and in the spring of 1885 complications with Russia over the Penjdeh incident occurred, and the withdrawal of the expedition followed. For his services he received two clasps to his Egyptian medal, the thanks of parliament, and was created a viscount and a knight of St Patrick. He continued at the war office as adjutant-general to the forces until 1890, when he was given the command in Ireland. He was promoted to be field marshal in 1894, and was nominated colonel of the Royal Horse Guards in 1895, in which year he was appointed by the Unionist government to succeed the duke of Cambridge as commander-in-chief of the forces. This was the position to which his great experience in the field and his previous signal success at the war office itself had fully entitled him. His powers were, however, limited by a new order in council, and after holding the appointment for over five years, he handed over the command-in-chief to Earl Roberts at the commencement of 1901. The fact that the unexpectedly large force required for South Africa was mainly furnished by means of the system of reserves which Lord Wolseley had originated was in itself a high tribute to his foresight and sagacity; but the new conditions at the war office had never been to his liking, and on being released from responsibility he brought the whole subject before the House of Lords in a speech which resulted in some remarkable disclosures.

Lord Wolseley had been appointed colonel-in-chief of the
Royal Irish Regiment in 1898, and in 1901 was
stick in waiting. He married in 1867 Louisa
A. Erskine, his only child, Frances, being
under special remainder.
he also published
The Life of John
of Queen An
giving
the

WOLSEY, THOMAS (*c.* 1475–1530), English cardinal and statesman, born at Ipswich about 1475, was son of Robert Wolsey (or Wuley, as his name was always spelt) by his wife Joan. His father is generally described as a butcher, but he sold other things than meat; and although a man of some property and a churchwarden of St Nicholas, Ipswich, his character seems to have borne a striking resemblance to that of Thomas Cromwell's father. He was continually being fined for allowing his pigs to stray in the street, selling bad meat, letting his house to doubtful characters for illegal purposes, and generally infringing the by-laws respecting weights and measures (extracts from the Ipswich records, printed in the *Athenaeum*, 1900, i. 400). He died in September 1496, and his will, which has been preserved, was proved a few days later.

Thomas was educated at Magdalen College, Oxford; but the details of his university career are doubtful owing to the defectiveness of the university and college registers. He is said to have graduated B.A. at the age of fifteen (*i.e.* about 1490); but his earliest definite appearance in the records is as junior bursar of Magdalen College in 1498–1499, and senior bursar in 1499–1500, an office he was compelled to resign for applying funds to the completion of the great tower without sufficient authority (W. D. Macray, *Reg. of Magdalen College*, i. 29-30, 133-134). He must have been elected fellow of Magdalen some years before; and as master of Magdalen College school he had under his charge three sons of Thomas Grey, first marquess of Dorset. Dorset's beneficent intentions for his sons' pedagogue probably suggested Wolsey's ordination as priest at Marlborough on March 10, 1498, and on October 10, 1500, he was instituted, on Dorset's presentation, to the rectory of Limington in Somerset. His connexion with Magdalen had perhaps terminated with his resignation of the bursarship, though he supplicated for the degrees of B.D. and D.D. in 1510; and the college appears to have derived no advantage from Wolsey's subsequent greatness.

At Limington he came into conflict with law and order as represented by the sheriff, Sir Amias Paulet, who is said by Cavendish to have placed Wolsey in the stocks; Wolsey retaliated long afterwards by confining Paulet to his chambers in the Temple for five or six years. Dorset died in 1501, but Wolsey found other patrons in his pursuit of wealth and fame. Before the end of that year he obtained from the pope a dispensation to hold two livings in conjunction with Limington, and Archbishop Deane of Canterbury also appointed him his domestic chaplain. Deane, however, died in 1503, and Wolsey became chaplain to Sir Richard Nanfan, deputy of Calais, who apparently recommended him to Henry VII. Nanfan died in 1507, but the king made Wolsey his chaplain and employed him in diplomatic work. In 1508 he was sent to James IV. of Scotland, and in the same year he pleased Henry by the extraordinary expedition with which he crossed and recrossed the Channel on an errand connected with the king's proposal of marriage to Margaret of Savoy. His ecclesiastical preferments, of which he received several in 1506–1509, culminated in his appointment by Henry to the deanery of Lincoln on February 2, 1509.

Henry VIII. made Wolsey his almoner immediately on his accession, and the receipt of some half-dozen further ecclesiastical preferments in the first two years of the reign marks his growth in royal favour. But it was not till towards the end of 1511 that Wolsey became a privy councillor and secured a controlling voice in the government. His influence then made itself felt on English policy. The young king took little pains with the government, [illegible] affairs was shared between the clerical and [illegible] Richard Fox (*q.v.*) and Archbishop Warham, [illegible] war party led by Surrey. Hitherto pacific [illegible] hole prevailed; but Wolsey, who was nothing [illegible] ned the balance in favour of war, and his [illegible] rative energy first found full scope in the [illegible] English expedition to Biscay in 1512, and [illegible] northern France in 1513. He brought about [illegible] ance and marriage between Mary Tudor and [illegible], and reaped his reward in the bishoprics of [illegible] nai, the archbishopric of York, which was conferred on him by papal bull in September, and the cardinalate which he had sent Polydore Vergil to beg from Leo X. in May 1514, but did not receive till the following year. Nevertheless, when Francis I. in 1515 succeeded Louis XII. and won the battle of Marignano, Wolsey took the lead in assisting the emperor Maximilian to oppose him; and this revival of warlike designs was resented by Fox and Warham, who retired from the government, leaving Wolsey supreme. Maximilian proved a broken reed, and in 1518 Wolsey brought about a general pacification, securing at the same time his appointment as legate *à latere* in England. He thus superseded Warham, who was *legatus natus*, in ecclesiastical authority; and though legates *à latere* were supposed to exercise only special and temporary powers, Wolsey secured the practical permanence of his office.

The election of Charles V. as emperor in 1519 brought the rivalry between him and Francis I. to a head, and Wolsey was mainly responsible for the attitude adopted by the English government. Both monarchs were eager for England's alliance, and their suit enabled Wolsey to appear for the moment as the arbiter of Europe. England's commercial relations with Charles V.'s subjects in the Netherlands put war with the emperor almost out of the question; and cool observers thought that England's obvious policy was to stand by while the two rivals enfeebled each other, and then make her own profit out of their weakness. But, although a gorgeous show of friendship with France was kept up at the Field of Cloth of Gold in 1520, it had been determined before the conference of Calais in 1521, at which Wolsey pretended to adjudicate on the merits of the dispute, to side actively with Charles V. Wolsey had vested interests in such a policy. Parliament had in 1513–1515 showed signs of strong anti-clerical feeling; Wolsey had in the latter year urged its speedy dissolution, and had not called another; and he probably hoped to distract attention from the church by a spirited foreign policy, as Henry V. had done a century before. He had, moreover, received assurances from the emperor that he would further Wolsey's candidature for the papacy; and although he protested to Henry VIII. that he would rather continue in his service than be ten popes, that did not prevent him from secretly instructing his agents at Rome to press his claims to the utmost. Charles, however, paid Wolsey the sincere compliment of thinking that he would not be sufficiently subservient on the papal throne; while he wrote letters in Wolsey's favour, he took care that they should not reach their destination in time; and Wolsey failed to secure election both in 1521 and 1524. This ambition distinguishes his foreign policy from that of Henry VII., to which it has been likened. Henry VII. cared only for England; Wolsey's object was to play a great part on the European stage. The aim of the one was national, that of the other was oecumenical.

In any case the decision taken in 1521 was a blunder. Wolsey's assistance helped Charles V. to that position of predominance which was strikingly illustrated by the defeat and capture of Francis I. at Pavia in 1525; and the balance of power upon which England's influence rested was destroyed. Her efforts to restore it in 1526–1528 were ineffectual; her prestige had depended upon her reputation for wealth derived from the fact that she had acted in recent years as the paymaster of Europe. But Henry VII.'s accumulations had disappeared; parliament resisted in 1523 the imposition of new taxation; and the attempts to raise forced loans and benevolences in 1526–1528 created a storm of opposition. Still more unpopular was the brief war with Charles V. in which Wolsey involved England in 1528. The sack of Rome in 1527 and the defeat of the French before Naples in 1528 confirmed Charles V.'s supremacy. Peace was made in 1529 between the two rivals without England being consulted, and her influence at Wolsey's fall was less than it had been at his accession to power.

This failure reacted upon Wolsey's position at home. His domestic was sounder than his foreign policy: by his development of the star chamber, by his firm administration of justice and maintenance of order, and by his repression of feudal jurisdiction, he rendered great services to the monarchy. But the inevitable opposition of the nobility to this policy was not mitigated by the fact that it was carried out by a churchman; the result was to embitter the antagonism of the secular party to the church and to concentrate it upon Wolsey's head. The control of the papacy by Charles V., moreover, made it impossible for Wolsey to succeed in his efforts to obtain from Clement VII. the divorce which Henry VIII. was seeking from Charles V.'s aunt, Catherine of Aragon. An inscription on a contemporary portrait of Wolsey at Arras calls him the author of the divorce, and Roman Catholic historians from Sanders downwards have generally adopted the view that Wolsey advocated this measure merely as a means to break England's alliance with Spain and confirm its alliance with France. This view is unhistorical, and it ignores the various personal and national motives which lay behind that movement. There is no evidence that Wolsey first suggested the divorce, though when he found that Henry was bent upon it, he pressed for two points: (i.) that an application should be made to Rome, instead of deciding the matter in England, and (ii.) that Henry, when divorced, should marry a French princess.

The appeal to Rome was a natural course to be advocated by Wolsey, whose despotism over the English church depended upon an authority derived from Rome; but it was probably a mistake. It ran counter to the ideas suggested in 1527 on the captivity of Clement VII., that England and France should set up independent patriarchates; and its success depended upon the problematical destruction of Charles V.'s power in Italy. At first this seemed not improbable; French armies marched south on Naples, and the pope sent Campeggio with full powers to pronounce the divorce in England. But he had hardly started when the French were defeated in 1528; their ruin was completed in 1529, and Clement VII. was obliged to come to terms with Charles V., which included Campeggio's recall in August 1529.

Wolsey clearly foresaw his own fall, the consequent attack on the church and the triumph of the secular party. Parliament, which he had kept at arm's length, was hostile; he was hated by the nobility, and his general unpopularity is reflected in Skelton's satires and in Hall's *Chronicle*. Even churchmen had been alienated by his suppression of monasteries and by his monopoly of ecclesiastical power; and his only support was the king, who had now developed a determination to rule himself. He surrendered all his offices and all his preferments except the archbishopric of York, receiving in return a pension of 1000 marks (equal to six or seven thousand pounds a year in modern currency) from the bishopric of Winchester, and retired to his see, which he had never before visited. A bill of attainder, passed by the Lords, was rejected at Cromwell's instigation and probably with Henry's goodwill by the Commons. The last few months of his life were spent in the exemplary discharge of his archiepiscopal duties; but a not altogether unfounded suspicion that he had invoked the assistance of Francis I., if not of Charles V. and the pope, to prevent his fall involved him in a charge of treason. He was summoned to London, but died on his way at Leicester abbey on November 30, and was buried there on the following day.

The completeness of Wolsey's fall enhanced his former appearance of greatness, and, indeed, he is one of the outstanding figures in English history. His qualities and his defects were alike exhibited on a generous scale; and if his greed and arrogance were colossal, so were his administrative capacity and his appetite for work. "He is," wrote the Venetian ambassador Giustiniani, "very handsome, learned, extremely eloquent, of vast ability and indefatigable. He alone transacts the business which occupies all the magistrates and councils of Venice, both civil and criminal; and all state affairs are managed by him, let their nature be what it may. He is grave, and has the reputation of being extremely just; he favours the people exceedingly, and especially the poor, hearing their suits and seeking to despatch them instantly." As a diplomatist he has had few rivals and perhaps no superiors. But his pride was equal to his abilities. The familiar charge, repeated in Shakespeare, of having written *Ego et meus rex*, while true in fact, is false in intention, because no Latin scholar could put the words in any other order; but it reflects faithfully enough Wolsey's mental attitude. Giustiniani explains that he had to make proposals to the cardinal before he broached them to Henry, lest Wolsey "should resent the precedence conceded to the king." "He is," wrote another diplomatist, "the proudest prelate that ever breathed." He arrogated to himself the privileges of royalty, made servants attend him upon their knees, compelled bishops to tie his shoe-latchets and dukes to hold the basin while he washed his hands, and considered it condescension when he allowed ambassadors to kiss his fingers; he paid little heed to their sacrosanct character, and himself laid violent hands on a papal nuncio. His egotism equalled Henry VIII.'s; his jealousy and ill-treatment of Richard Pace, dean of St Paul's, referred to by Shakespeare but vehemently denied by Dr Brewer, has been proved by the publication of the Spanish state papers; and Polydore Vergil the historian, and Sir R. Sheffield, speaker of the House of Commons, were both sent to the Tower for complaining of his conduct. His morals were of the laxest description, and he had as many illegitimate children as Henry VIII. himself. For his son, before he was eighteen years old, he procured a deanery, four archdeaconries, five prebends and a chancellorship, and he sought to thrust him into the bishopric of Durham. For himself he obtained, in addition to his archbishopric and lord chancellorship, the abbey of St Albans, reputed to be the richest in England, and the bishopric first of Bath and Wells, then of Durham, and finally that of Winchester. He also used his power to extort enormous pensions from Charles V. and Francis I. and lavish gifts from English suitors. His New Year's presents were reckoned by Giustiniani at 15,000 ducats, and the emperor paid—or owed—him 18,000 livres a year. His palaces outshone those of his king, and few monarchs could afford such a display of plate as commonly graced the cardinal's table. His foundations at Oxford and Ipswich were, nevertheless, not made out of his superabundant revenues, but out of the proceeds of the dissolution of monasteries, not all of which were devoted to those laudable objects.

That such a man would ever have used the unparalleled powers of ecclesiastical jurisdiction with which he had been entrusted for a genuine reformation of the church is only a pious opinion cherished by those who regret that the Reformation was left for the secular arm to achieve; and it is useless to plead lack of opportunity on behalf of a man who for sixteen years had enjoyed an authority never before or since wielded by an English subject. Wolsey must be judged by his deeds and not by doubtful intentions. During the first half of his government he materially strengthened the Tudor monarchy by the vigorous administration of justice at home and by the brilliance of his foreign policy abroad. But the prestige he secured by 1521 was delusive; its decline was as rapid as its growth, and the expense of the policy involved taxation which seriously weakened the loyalty of the people. The concentration of civil and ecclesiastical power by Wolsey in the hands of a churchman provided a precedent for its concentration by Henry VIII. in the hands of the crown; and the personal example of lavish ostentation and loose morals which the cardinal-archbishop exhibited cannot have been without influence on the king, who grew to maturity under Wolsey's guidance.

The *Letters and Papers of Henry VIII.*, vols. i.-iv., supplemented by the *Spanish and Venetian Calendars*, contain almost all that is known of Wolsey's public career, though additional light on the divorce has been thrown by Stephen Ehses' *Römische Dokumente* (1893). Cavendish's brief *Life*, which is almost contemporary, has been often edited. Fiddes's huge tome (1724) is fairly exhaustive. Brewer, in his elaborate prefaces to the *Letters and Papers* (reissued as his *History of the Reign of Henry VIII.*), originated modern admiration for Wolsey; and his views are reflected in Creighton's *Wolsey* in the "Twelve English Statesmen" series, and in Dr Gairdner's careful articles in the *Dict. Nat. Biog.* and *Cambridge Modern History*. A less enthusiastic view is adopted in H. A. L. Fisher's volume (v.) in Longmans' *Political History* (1906) and in A. F. Pollard's *Henry VIII.* (1902 and 1905). (A. F. P.)

WOLTER, CHARLOTTE (1834–1897), Austrian actress, was born at Cologne on the 1st of March 1834, and began her artistic career at Budapest in 1857. She played minor parts at the Karl theatre in Vienna, and soon obtained an engagement at the Victoria theatre in Berlin, where she remained until 1861. Her performance of Hermione in the *Winter's Tale* took the playgoing world by storm, and she was given in 1862 an appointment at the Vienna Hofburg theatre, to which she remained faithful until her death on the 14th of June 1897. According to her wish, she was buried in the costume of Iphigenia, in which rôle she had achieved her most brilliant success. Charlotte Wolter was one of the great tragic actresses of modern times. Her repertory included Medea, Sappho, Lady Macbeth, Mary Stuart, Preciosa, Phèdre, Adrienne Lecouvreur, Jane Eyre and Messalina, in which character she was immortalized by the painter Hans Makart. She was also an inimitable exponent of the heroines in plays by Grillparzer, Hebbel, Dumas and Sardou.

See Ehrenfeld, *Charlotte Wolter* (Vienna, 1887); Hirschfeld, *Charlotte Wolter, ein Erinnerungsblatt* (1897).

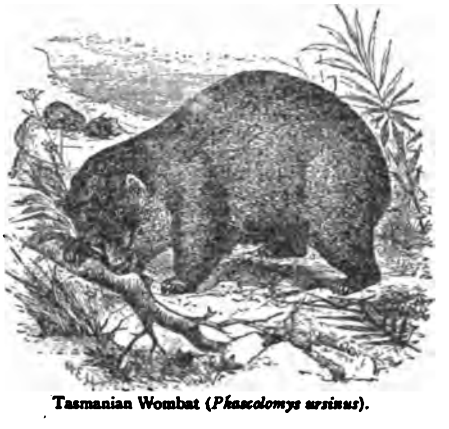
WOLVERHAMPTON, HENRY HARTLEY FOWLER, Viscount (1830–), English statesman, was born at Durham on the 16th of May 1830. He became a prosperous solicitor in Wolverhampton, and coming of a Liberal nonconformist family took a prominent part in politics. In 1880 he was elected Liberal member of parliament for Wolverhampton, and was re-elected for the east division at successive contests. In 1884–1885 he was under-secretary for the Home Office, and in 1886 financial secretary to the treasury. In Mr Gladstone's 1892–1894 ministry he was president of the local government board, and in Lord Rosebery's cabinet, 1894–1895, secretary of state for India. In these and the succeeding years of opposition he was recognized as a sound economist and a sober administrator, as well as a universally respected representative of nonconformist views. In Sir Henry Campbell-Bannerman's cabinet, 1905–1908, he was chancellor of the duchy of Lancaster, and he retained this office in Mr Asquith's ministry, but was transferred to the House of Lords with a viscountcy (April 1908). He retired in 1910. His daughter, Ellen Thorneycroft Fowler, who married Mr A. L. Felkin in 1903, became well known as a novelist with her *Concerning Isabel Carnaby* (1898) and other books.

WOLVERHAMPTON, a market town, and municipal, county and parliamentary borough of Staffordshire, England, 125 m. N.W. from London by the London & North-Western railway, served also by the northern line of the Great Western and by a branch of the Midland railway. Pop. (1891) 82,622; (1901) 94,187. It lies at the north-western edge of the group of great manufacturing towns extending S.E. to Birmingham, but there are pleasant residential suburbs to the west, where the country is rich and well wooded. The situation is elevated and healthy. The church of St Peter is a fine cruciform building, with S. porch and central tower. The lower part of the tower and the S. transept date from the 13th century; the nave, clerestory, upper part of the tower and N. transept from the 15th; the chancel was rebuilt in the restoration, completed in 1865, with an apsidal termination. The chief public buildings are the town hall (1871), exchange, agricultural hall, free library and theatres. A large free grammar school, founded in 1515 by Sir Stephen Jermyns, a native of the town and alderman of London, occupies modern buildings (1876). There are a Blue Coat school (1710) and a school of art. The benevolent institutions include a general hospital, the eye infirmary, orphan asylum, nursing institution and institute of the society for outdoor blind. In Queen Square is an equestrian statue of Albert, Prince Consort, unveiled by Queen Victoria in 1866, and on Snow Hill a statue (1879) of Charles Pelham Villiers. There are parks on the east and west of the town, and a new racecourse (1887) replaces that formerly on the site of the west park. In the district S. and E. of Wolverhampton (the Black Country) coal and ironstone are mined. Ironmongery and steel goods of all kinds, especially locks, machinery, tools and cycles, are produced; there are also tin and zinc works. Large agricultural markets are supplied from the districts W. and N. of the town. An annual fair is held at Whitsuntide. In 1902 an industrial and art exhibition was held. The parliamentary borough of Wolverhampton has three divisions, each returning one member. The town is governed by a mayor, 12 aldermen and 36 councillors. Area, 3525 acres. Wednesfield (pop. 4883), Heath Town or Wednesfield Heath (9441) and Willenhall (18,515) are neighbouring urban districts, with populations employed in the manufacture of locks, keys and small iron goods, in iron and brass foundries, varnish works, &c.

The town of Wolverhampton (*Handone, Wolvernehamptone, Wollernehampton*) seems to have grown up round the church of St Mary, afterwards the royal free chapel of Wolverhampton, probably founded in 996 by Wulfruna, widow of the earl of Northampton, who in that year endowed it with extensive lands. The estates of the clerks of Handone are enumerated in Domesday. In 1204 John granted the manor of Wolverhampton to the church, and at the Reformation it was held by the dean of the collegiate body; in 1553 Edward VI. granted the college and manor to Dudley, duke of Northumberland, but Mary, at the beginning of her reign, refounded the college and restored to it its property, and this arrangement was confirmed by Elizabeth. Henry III. (1258) granted the Wednesday market, which is still held, and a fair for eight days, beginning on the eve of the feast of SS. Peter and Paul (June 29). During the Great Rebellion the sympathies of Wolverhampton were royalist. In 1645 it was for a time the headquarters of Prince Rupert, while Charles I. lay at Bushbury to the north. At the end of the 17th century the market was esteemed the second market in the county. An account of Wolverhampton published in 1751 stated that the chief manufacture was locks, "here being the most ingenious locksmiths in England," and attributed the slow growth of the town to the fact that most of the land was church property. Wolverhampton was incorporated in 1848 as a municipal borough. It was not represented in parliament until after the passing of the Reform Bill (1832), under which it returned two members until in 1885 the representation was increased to three. The county borough dates from 1888.

WOLVERTON, a town in the Buckingham parliamentary division of Buckinghamshire, England, near the river Ouse, 52½ m. N.W. by N. of London by the London & North-Western railway. Pop. (1901) 5323. Its modern growth and importance are the result of the establishment of carriage works by the railway company. There are also printing works. A steam tramway connects the town with the old market town of Stony Stratford on the Ouse, 2 m. W.

WOMBAT, the title of the typical representatives of the marsupial family *Phascolomyidae* (see Marsupialia). They have the dental formula: i. $\frac{1}{1}$, c. $\frac{0}{0}$, p. $\frac{1}{1}$, m. $\frac{4}{4}$; = 24. All the teeth are of continuous growth, having persistent pulps. The incisors are large and chisel-like, much as in rodents. The body is broad and depressed, the neck short, the head large and flat, the eyes small and the tail rudimentary and hidden in the fur. The



Tasmanian Wombat (*Phascolomys ursinus*).

limbs are equal, stout and short. The feet have broad, naked, tuberculated soles; the forefeet with five distinct toes, each furnished with a long, strong and slightly curved nail, the first and fifth considerably shorter than the other three. The hind-feet have a very short nailless first toe; the second, third and fourth toes partially united by integument, of nearly equal length; the fifth distinct and rather shorter; these four are provided with long and curved nails. In the typical group of the genus *Phascolomys* we find the following characters:—Fur rough and coarse; ears short and rounded; muzzle naked; postorbital process of the frontal bone obsolete; ribs fifteen pairs. Vertebrae: C. 7, D. 15, L. 4, S. 4, Ca. 10-12. The wombat of Tasmania and the islands of Bass's Straits (*P. ursinus*), and the closely similar but larger *P. platyrhinus* of the southern portion of the mainland of Australia, belong to this group. On the other hand, in the hairy-nosed wombat (*P. latifrons*) of Southern Australia, the fur is smooth and silky; the ears are large and more pointed; the muzzle is hairy; the frontal region of the skull is broader than in the other section, with well-marked postorbital processes; and there are thirteen ribs. Vertebrae: C. 7, D. 13, L. 6, S. 4, Ca. 15-16.

In general form and action wombats resemble small bears, having a somewhat similar shuffling manner of walking, but they are still shorter in the legs, and have a broader and flatter back. They live entirely on the ground, or in burrows or holes among rocks, and feed on grass, roots and other vegetable substances. They sleep during the day, but wander forth at night in search of food, and are shy and gentle, though they can bite strongly when provoked. The only noise the Tasmanian wombat makes is a low hissing, but the hairy-nosed wombat is said to emit a short quick grunt when annoyed. The prevailing colour of the last-named species, as well as *P. ursinus* of Tasmania, is brownish grey. The large wombat of the mainland is variable in colour, some individuals being pale yellowish brown, others dark-grey and some black. The length of the head and body is about 3 ft. Fossil remains of wombats, some of larger size than any now existing, have been found in caves and Pleistocene deposits in Australia. (R. L.*)

WOMBWELL, an urban district in the Barnsley parliamentary division of the West Riding of Yorkshire, England, 4 m. S.E. of Barnsley, on the Great Central and Midland railways. The inhabitants are chiefly employed in the extensive collieries. Pop. (1901) 13,252.

WOMEN. The very word "woman" (O. Eng. *wifmann*), etymologically meaning a wife (or the wife division of the human race, the female of the species *Homo*), sums up a long history of dependence and subordination, from which the women of to-day have only gradually emancipated themselves in such parts of the world as come under "Western civilization." Though married life and its duties necessarily form a predominant element in the woman's sphere, they are not necessarily the whole of it; and the "woman's movement" is essentially a struggle for the recognition of equality of opportunity with men, and for equal rights irrespective of sex, even if special relations and conditions are willingly incurred under the form of partnership involved in marriage. The difficulties of obtaining this recognition are obviously due to historical causes combined with the habits and customs which history has produced.

Early law.

The dependent position of women in early law is proved by the evidence of most ancient systems which have in whole or in part descended to us.[1] In the Mosaic law divorce was a privilege of the husband only,[2] the vow of a woman might be disallowed by her father or husband,[3] and daughters could inherit only in the absence of sons, and then they must marry in their tribe.[4] The guilt or innocence of a wife accused of adultery might be tried by the ordeal of the bitter water.[5] Besides these instances, which illustrate the subordination of women, there was much legislation dealing with, *inter alia*, offences against chastity, and marriage of a man with a captive heathen woman or with a purchased slave. So far from second marriages being restrained, as they were by Christian legislation, it was the duty of a childless widow to marry her deceased husband's brother. In India subjection was a cardinal principle. "Day and night must women be held by their protectors in a state of dependence," says Manu.[6] The rule of inheritance was agnatic, that is, descent traced through males to the exclusion of females.[7] The gradual growth of *stridhana*, or property of a woman given by the husband before or after marriage, or by the wife's family, may have led to the suttee, for both the family of the widow and the Brahmans had an interest in getting the life estate of a woman out of the way.[8] Women in Hindu law had only limited rights of inheritance, and were disqualified as witnesses.

In Roman law a woman was even in historic times completely dependent. If married she and her property passed into the power of her husband; if unmarried she was (unless a vestal virgin) under the perpetual tutelage of her father during his life, and after his death of her agnates, that is, those of her kinsmen by blood or adoption who would have been under the power of the common ancestor had he lived. Failing agnates, the tutelage probably passed to the *gens*. The wife was the purchased property of her husband, and, like a slave, acquired only for his benefit. A woman could not exercise any civil or public office. In the words of Ulpian, "feminae ab omnibus officiis civilibus vel publicis remotae sunt."[9] A woman could not continue a family, for she was "caput et finis familiae suae,"[10] could not be a witness, surety, tutor, or curator; she could not adopt or be adopted, or make a will or contract. She could not succeed *ab intestato* as an agnate, if further removed than a sister. A daughter might be disinherited by a general clause, a son only by name. On the other hand, a woman was privileged in some matters, but rather from a feeling of pity for her bodily weakness and presumed mental incapacity[11] than for any more worthy reason. Thus she could plead ignorance of law as a ground for dissolving an obligation, which a man could not as a rule do; she could accuse only in cases of treason and witchcraft; and she was in certain cases exempt from torture. In succession *ab intestato* to immovable property Roman law did not, as does English, recognize any privilege of males over females.

Legal disabilities were gradually mitigated by the influence of fictions, the praetorian equity and legislation. An example of the first was the mode by which a woman freed herself from the authority of her tutor by fictitious cession into the authority of a tutor nominated by herself, or by sale of herself into the power of a nominal husband on the understanding that he was at once to emancipate her to another person, who then manumitted her. The action of equity is illustrated by the recognition by the praetor of cognatic or natural as distinguished from agnatic or artificial relationship, and of a widow's claim to succeed on the death of her husband intestate and without relations. Legislation, beginning as early as the Twelve Tables, which forbade excessive mourning for the dead by female mourners, did not progress uniformly towards enfranchisement of women. For instance, the Lex Voconia (about 169 B.C.), called by St Augustine the most unjust of all laws, provided that a woman could not be instituted heir to a man who was registered as owner of a fortune of 100,000 asses.[12] A constitution of Valentinian I. forbade bequests by women to ecclesiastics. But the tendency of legislation was undoubtedly in the direction [illegible] Adoption of women was allowed by Diocletian and Maxi[illegible] in 291. The tutelage of women of full age was removed by Claudius, and, though afterwards in part revived, has disappeared by the time of Justinian. This implied full testamentary and contractual liberty. In regard to the separate property of the married woman, the period of *dos* had by the time of Justinian long superseded the period of *manus*. The result was that, in spite of a few remaining disabilities, such as the general incapacity to be surety or witness to a will or contract, of a wife to make a gift to her husband, of a widow to marry within a year of her husband's death, the position of women had become, in the words of Sir H. Maine, "one of great personal and proprietary independence."[1] For this improvement in their position they were largely indebted to the legislation of the Christian emperors, especially of Justinian, who prided himself on being a protector of women.

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[1] But in the earliest extant code, however, that of Khammurabi, the position of women was free and dignified. See BABYLONIAN LAW.

[2] Deut. xxiv. 1.

[3] Numb. xxx. 3.

[4] Numb [illegible]

[5] Numb. v. 11.

[6] Ch. ix. § 2 (Sir W. Jones's translation).

[7] Whether this was the oldest rule of inheritance has been much debated. That birth of a child gave the mother certain legal rights in a primitive stage of society is the view of many writers. See especially *Das Mutterrecht* of J. J. Bachofen (Stuttgart, 1861).

[8] Maine, *Early History of Institutions*, lect. xi.

[9] *Dig.* i. 16, 195.

[10] *Ibid.*

[11] *Imbecillitas* is the term used more than once in the texts of Roman law.

[12] The way in which this law was evaded was by non-enrolment of the testator in the census (see Montesquieu, *Esprit des lois*, bk. xxvii.). Another way was by leaving her the inheritance by *fideicommissum* (see TRUST).

The following are a few of the matters in which Christianity appears to have made alterations, generally but perhaps not always improvements, in the law. As a rule the influence of the church was exercised in favour of the abolition of the disabilities imposed by the older law upon celibacy and childlessness, of increased facilities for entering a professed religious life,[2] and of due provision for the wife. The church also supported the political power of those who were her best friends. The government of Pulcheria or Irene would hardly have been endured in the days of the pagan empire. Other cases in which Christianity probably exercised influence may be briefly stated. (1) All differences in the law of succession *ab intestato* of males and females were abolished by Justinian. (2) The appointment of mothers and grandmothers as tutors was sanctioned by the same emperor. (3) He extended to all cases the principle established by the Senatus Consultum Tertullianum (158), enabling the mother of three (if a freed woman four) children to succeed to the property of her children who died intestate, and gave increased rights of succession to a widow. (4) The restrictions on the marriage of senators and other men of high rank with women of low rank were extended by Constantine, but almost entirely removed by Justinian. (5) Second marriages were discouraged (especially by making it legal to impose a condition that a widow's right to property should cease on re-marriage), and the Leonine Constitutions at the end of the 9th century made third marriages punishable. (6) The same constitutions made the benediction of a priest a necessary part of the ceremony of marriage.[3] The criminal law in its relation to women presents some points of interest. Adultery was punished with death by Constantine, but the penalty was reduced by Justinian to relegation to a convent. A woman condemned for adultery could not re-marry. A marriage between a Christian and a Jew rendered the parties guilty of adultery. Severe laws were enacted against offences of unchastity, especially procurement and incest. It was a capital crime to carry off or offer violence to a nun. A wife could not commit *furtum* of her husband's goods, but he had a special action *rerum amotarum* against her. By several sumptuary constitutions, contained in the *Code*, bk. xi., women as well as men were subject to penalties for wearing dress or ornaments (except rings) imitating those reserved for the emperor and his family. Actresses and women of bad fame were not to wear the dress of virgins dedicated to Heaven. If a consul had a wife or mother living with him, he was allowed to incur greater expense than if he lived alone. The interests of working women were protected by enactments for the regulation of the *gynoecia*, or workshops for spinning, dyeing, &c.

The canon law, looking with disfavour on the female independence prevailing in the later Roman law, tended rather in the opposite direction. The *Decretum* specially inculcated subjection of the wife to the husband, and obedience to his will in all things.[4] The chief differences between canon and Roman law were in the law of marriage, especially in the introduction of publicity and of the formalities of the ring and the kiss. The benediction of a priest was made a necessary part of the ceremony, as indeed it had been made by the civil power, as has been already stated, in the post-Justinian period of Roman law. But in practice this rule appears to have fallen into disuse until it was again revived by the council of Trent. It was, however, the

[illegible]
women [illegible]
relations. [illegible]
They were [illegible]
the church, [illegible]
might be [illegible]
who had [illegible]
as witnesses. In [illegible]
receivable.[5]

The early law of the [illegible]
from the different way[illegible]
of Sir H. Maine [illegible] The [illegible]
systems of inheritance [illegible]
inherit, either as individuals [illegible]
the same generation have [illegible]
herit, but transmit a right of [illegible]
Sometimes they succeed to one [illegible]
part movable property, which they [illegible]
in producing by their household [illegible]
real Salic law (not in the imaginary [illegible]
of succession which, in my opinion, [illegible]
their descendants to a share in the [illegible]
property, but confine land exclusively to [illegible]
ants of males. . . . The idea is that the proper [illegible]
for a woman is by giving her a marriage portion [illegible]
is once married into a separate community [illegible]
in blood, neither she nor her children are deemed to [illegible]
further claim on the parent group." Among the Scandi[illegible]
races women were under perpetual tutelage, whether married [illegible]
unmarried. The first to obtain freedom were the widows.
As late as the code of Christian V., at the end of the 17th century,
it was enacted that if a woman married without the consent of
her tutor he might have, if he wished, administration and usufruct
of her goods during her life.[8] The provision made by the Scandinavian laws under the name of morning-gift was perhaps the parent of the modern settled property.[9] The Brehon law of Ireland excepted women from the ordinary course of the law. They could distrain or contract only in certain named cases, and distress upon their property was regulated by special rules. In the pre-Conquest codes in England severe laws were denounced against unchastity, and by a law of Canute a woman was to lose nose and ears for adultery. The laws of Athelstan contained the peculiarly brutal provision for the punishment of a female slave convicted of theft by her being burned alive by eighty other female slaves. Other laws were directed against the practice of witchcraft (*q.v.*) by women. Monogamy was enforced both by the civil and ecclesiastical law; and second and third marriages involved penance. A glimpse of cruelty in the household is afforded by the provision, occurring no less than three times in the ecclesiastical legislation, that if a woman scourged her female slave to death she must do penance. Traces of wife-purchase are seen in the law of Ethelbert, enacting that if a man carry off a freeman's wife he must at his own expense procure the husband another wife. The codes contain few provisions as to the property of married women, but those few appear to prove that she was in a better position than at a later

han those falling within it. The doctrine of coercion and the
ctice of separate acknowledgment of deeds by married women
ssary before the Married Women's Property Act) seem to be
of the period when women, besides being chattels, were
s chattels. Formerly a wife could not steal her husband's
but since the Married Women's Property Act this has
sible. Adultery is no crime, England being almost the
where such is the case. It was punished by fine in the
ourts up to the 17th century, and was made criminal
by an ordinance of the Long Parliament. The
n be committed only against women are chiefly
ncy, such as rape, procurement and similar
onsiderable change in the law in the direction
to women was made by the Criminal Law
In regard to the protection given to a wife
n legislation has considerably strengthened
of judicial separation and maintenance
CE). The whipping of female offenders
stisement of a wife by a husband,
a reasonable extent, would now
The husband's rights are limited
se of her misconduct.
slightly from that of England.
ment specially reserved for
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Higher education and its results.

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[1] *Ancient Law*, ch. v. Hence the necessity of such laws as the Lex Oppia (see SUMPTUARY LAWS).

[2] A remarkable example of this tendency was the provision that an actress might leave the stage and break her contract of service with impunity in order to become a nun. Even under the pagan emperors a constitution of Diocletian and Maximian in 285 had enacted that no one was to be compelled to marry (*Cod.* v. 4, 14).

[3] See R. T. Troplong, *De l'influence du christianisme sur le droit civil*.

[4] Pt. ii. caus. xxxiii. qu. v. ch. 16.

[5] On this branch of the subject see Manssen's *Het Christendom en de Vrouw* (Leiden, 1877).

[6] *Early Law and Custom*, ch. v.

[7] See Stiernhöök, *De jure Sveonum* (Stockholm, 1672), bk. ii. ch. i.; Messenius, *Leges Svecorum* (Stockholm, 1714).

[8] Bk. iii. ch. xvi. §§ 1, 2.

[9] The development of the bride-price no doubt was in the same direction. Its original meaning was, however, different. It was the sum paid by the husband to the wife's family for the purchase of part of the family property, while the morning-gift was paid as *pretium virginitatis* to the bride herself. In its English form morning-gift occurs in the laws of Canute; in its Latinized form of *morgangiva* it occurs in the *Leges Henrici Primi*.

period. The laws of Ine gave her a third of her husband's property; the laws of Edmund as to betrothal allowed this to be increased to half by antenuptial contract, to the whole if she had children and did not re-marry after her husband's death. No doubt the dower *ad ostium ecclesiae* favoured by the church generally superseded the legal rights where the property was large (in fact this is specially provided by Magna Carta, c. 7). "Provisio hominis tollit provisionem legis." The legal rights of a married woman apart from contract were gradually limited, until by the time of Glanvill her person and property had become during her husband's lifetime entirely at his disposal, and after his death limited to her dower and her *pars rationabilis*.

A few of the more interesting matters in which the old common and statute law of England placed women in a special position may be noticed. A woman was exempt from legal duties more particularly attaching to men and not performable by deputy. She could apparently originally not hold a proper feud, *i.e.* one of which the tenure was by military service.[1] The same principle appears in the rule that she could not be endowed of a castle maintained for the defence of the realm and not for the private use of the owner. She could receive homage, but not render it in the form used by men, and she was privileged from suit and service at the sheriff's tourn. She was not sworn to the law by the oath of allegiance in the leet or tourn, and so could not be outlawed, but was said to be waived. She could be constable, either of a castle or a vill, but not sheriff, unless in the one case of Westmorland, an hereditary office, exercised in person in the 17th century by the famous Anne, countess of Dorset, Pembroke and Montgomery. In certain cases a woman could transmit rights which she could not enjoy. On such a power of transmission, as Sir H. Maine shows,[2] rested the claim of Edward III. to the crown of France. The claim *through* a woman was not a breach of the French constitutional law, which rejected the claim *of* a woman. The jealousy of a woman's political influence is strikingly shown by the case of Alice Perrers, the mistress of Edward III. She was accused of breaking an ordinance by which women had been forbidden to do business for hire and by way of maintenance in the king's court.[3]

By Magna Carta a woman could not accuse a man of murder except of that of her husband. This disability no doubt arose from the fact that in trial by battle she naturally did not appear in person but by a champion. She was not admitted as a witness to prove the status of a man on the question arising whether he were free or a villein. She could not appoint a testamentary guardian, and could only be a guardian even of her own children to a limited extent. Her will was revoked by marriage, that of a man only by marriage and the subsequent birth of a child. By 31 Hen. VI. c. 9 the king's writ out of chancery was granted to a woman alleging that she had become bound by an obligation through force or fraud. By 39 Hen. VI. c. 2 a woman might have livery of land as heiress at fourteen. Benefit of clergy was first allowed to women partially by 21 Jac. I. c. 6, fully by 3 Will. & M. c 9 and 4 and 5 Will. & M. c. 24. Public whipping was not abolished until 57 Geo. III. c. 75, whipping in all cases until 1 Geo. IV c. 57. Burning was the punishment specially appropriated to women convicted of treason or witchcraft. A case of sentence to execution by burning for petit treason occurred as lately as 1784. In some old statutes very curious sumptuary regulations as to women's dress occur. By the sumptuary laws of Edward III. in 1363 (37 Edw. III. cc. 8-14) women were in general to be dressed according to the position of their fathers or husbands. Wives and daughters of servants were not to wear veils above twelvepence in value. Handicraftsmen's and yeomen's wives were not to wear silk veils. The use of fur was confined to the ladies of knights with a rental above 200 marks a year. Careful observance of difference of rank in the dress was also inculcated by 3 Edw IV. c. 5. The wife or daughter of a knight was not to wear cloth of gold or sable fur, of a knight-bachelor not velvet, of an esquire or gentleman not velvet, satin or ermine, of a labourer not clothes beyond a certain price or a girdle garnished with silver. By 22 Edw. IV. c. 1, cloth of gold and purple silk were confined to women of the royal family. It is worthy of notice that at the times of passing these sumptuary laws the trade interests of women were protected by the legislature. By 37 Edw. III. c. 6, handicraftsmen were to use only one mystery, but women might work as they had been accustomed. 3 Edw. IV. c. 3 forbade importation of silk and lace by Lombards and other alien strangers, imagining to destroy the craft of the silk spinsters and all such virtuous occupations for women. In some cases the wives and daughters of tradesmen were allowed to assist in the trades of their husbands and fathers; see, for instance, the act concerning tanners, 1 Jac. I. c. 22. Some trading corporations, such as the East India Company, recognized no distinction of sex in their members. The disabilities imposed on women by substantive law are sometimes traceable in the early law of procedure. For instance, by the Statute of Essoins (12 Edw. II. st. 2), essoin *de servitio regis* did not lie where the party was a woman; that is, a woman (with a few exceptions) could not excuse her absence from court by alleging that she was on public duty. The influence of the church is very clearly traceable in some of the earlier criminal legislation. Thus by 13 Edw. I. st. 1, c. 34, it was punishable with three years' imprisonment to carry away a nun, even with her consent. The Six Articles, 31 Hen. VIII. c. 14, forbade marriage and concubinage of priests and sanctioned vows of chastity by women.

In Scotland, as early as *Regiam Majestatem* (12th century) women were the object of special legal regulation. In that work the *mercheta mulieris* (probably a tax paid to the lord on the marriage of his tenant's daughter) was fixed at a sum differing according to the rank of the woman. Numerous ancient laws dealt with trade and sumptuary matters. By the *Leges Quatuor Burgorum* female brewsters making bad ale were to forfeit eightpence and be put on the cucking-stool, and were to set an ale-wand outside their houses under a penalty of fourpence. The same laws also provided that a married woman committing a trespass without her husband's knowledge might be chastised like a child under age. The *Statuta Gilde* of the 13th century enacted that a married woman might not buy wool in the streets or buy more than a limited amount of oats. The same code also ensured a provision for the daughter of one of the gild-brethren unable to provide for herself through poverty, either by marrying her or putting her in a convent. By the act 1429, c. 9, wives were to be arrayed after the estate of their husbands. By 1457, c. 13, no woman was to go to church with her face covered so that she could not be known. 1581, c. 18, was conceived in a more liberal spirit, and allowed women to wear any head-dress to which they had been accustomed. 1621, c. 25, permitted servants to wear their mistress's cast-off clothes. 1681, c. 80, contained the remarkable provision that not more than two changes of raiment were to be made by a bride at her wedding. In its more modern aspect the law is in most respects similar to that of England. (J. W.)

Modern English law specially affecting women.

In separate legal articles attention is drawn, on various subjects, to any special provisions or disabilities affecting women; see, for instance, EVIDENCE, DIVORCE, MARRIAGE, CHILDREN (*Law relating to*), INFANT, HUSBAND AND WIFE. The movement for removing the older disabilities has progressed at such different rates in various countries that it is impossible to do more than note here the chief distinctions remaining under English law in 1910.

Civil Rights.—The age at which a girl can contract a valid marriage, in English law, is, following the Roman law, twelve; she is thus two years in advance of a boy, who must be fourteen. Under the Infants Settlement Act 1855, a valid settlement could be made by a woman at seventeen with the approval of the court, the age for a man being twenty; by the Married Women's Property Act 1907 any settlement by a husband of his wife's property is not valid unless executed by her if she is of full age, or confirmed by her after she attains full age. An unmarried woman is liable for the support of illegitimate children till they attain the age of sixteen. She is generally assisted, in the absence of agreement, by an affiliation order granted by magistrates. A married woman having separate property is, under the Married Women's Property Acts 1882 and 1908, liable for the support of her parents, husband, children and grandchildren becoming chargeable to any union or parish. At common law the father was entitled as against the mother to the custody of a legitimate child up to the age of sixteen, and could only forfeit such right by misconduct. But the Court of Chancery, wherever there was trust property and the infant could be made a ward of court, took a less rigid view of the paternal rights and looked more to the interest of the child, and consequently in some cases to the extension of the mother's rights at common law. Legislation has tended in the same direction. By the Infants' Custody Act 1873, the Court of Chancery was empowered to enforce a provision in a separation deed, giving up the custody or control of a child to the mother. The Judicature Act 1873, § 25 (10), enacted that in questions relating to the custody and education of infants the rules of equity should prevail. The Guardianship of Infants Act 1886 largely extended the mother's powers of appointing and acting as a guardian, and gave the court a discretion to regard the mother's wishes as to the custody of the children. The Summary Jurisdiction (Married Women) Act 1895 enabled a court of summary jurisdiction, to whom a married woman has made application, to commit to the applicant the custody of any children of the marriage between the applicant and her husband, while under the age of sixteen years.

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[1] It is remarkable that the great fiefs of France, except the Isle of France, the special apanage of the crown, all became in time female fiefs. This is shown by the table at the end of Laboulaye's *Recherches*.

[2] *Early Law and Custom*, ch. v

[3] *Rot. Parl.*, vol. iii. p. 12.

The most remarkable disabilities under which women were still placed in 1910 were (1) the exclusion of female heirs from intestate succession to real estate, unless in the absence of a male heir (see INHERITANCE; (SUCCESSION); and (2) the fact that a husband could obtain a divorce for the adultery of his wife, while a wife could only obtain it for her husband's adultery if coupled with some other cause, such as cruelty or desertion.

Suits in which either necessarily or practically only women are plaintiffs are: breach of promise, affiliation (*q.v.*) and (though not nominally) seduction (*q.v.*).

The action for breach of promise[1] may indeed be brought by a man, but this is very rare, and its only real interest is as a protection for women. It may be brought by but not against an infant, and not against an adult if he or she has merely ratified a promise made during infancy; it may be brought against but not by a married man or woman (in spite of the inherent incapacity of such a person to have married the plaintiff), and neither by nor against the personal representatives of a deceased party to the promise (unless where special damage has accrued to the personal estate of the deceased). The promise need not be in writing. The parties to an action are by 32 and 33 Vict. c. 68 competent witnesses; the plaintiff cannot, however, recover a verdict without his or her testimony being corroborated by other material evidence. The measure of damages is to a greater extent than in most actions at the discretion of the jury; they may take into consideration the injury to the plaintiff's feelings, especially if the breach of promise be aggravated by seduction. Either party has a right to trial by jury under the rules of the Supreme Court, 1883. The action cannot be tried in a county court, unless by consent, or unless remitted for trial there by the High Court. Unchastity of the plaintiff unknown to the defendant when the promise was made and dissolution of the contract by mutual consent are the principal defences which are usually raised to the action. Bodily infirmity of the defendant is no defence to the action, though it may justify the other party in refusing to marry the person thus affected. Where the betrothed are within prohibited degrees of consanguinity or affinity, there can be no valid promise at all, and so no action for its breach.

Criminal Law.—There are some offences which can be committed only by women, others which can be committed only against them. Among the former are concealment of birth (in ninety-nine cases out of a hundred), the now obsolete offence of being a common scold, and prostitution (*q.v.*) and kindred offences. Where a married woman commits a crime in company with her husband, she is generally presumed to have acted by his coercion, and so to be entitled to acquittal. This presumption, however, was never made in witchcraft cases, and is not now made in cases of treason, murder and other grave crimes, or in crimes in which the principal part is most usually taken by the wife, such as keeping a brothel. In fact, the exceptions to the old presumption are now perhaps more numerous than those falling within it. The doctrine of coercion and the practice of separate acknowledgment of deeds by married women (necessary before the Married Women's Property Act) seem to be vestiges of the period when women, besides being chattels, were treated as chattels. Formerly a wife could not steal her husband's property, but since the Married Women's Property Act this has become possible. Adultery is no crime, England being almost the only country where such is the case. It was punished by fine in the ecclesiastical courts up to the 17th century, and was made criminal for a short time by an ordinance of the Long Parliament. The offences which can be committed only against women are chiefly those against decency, such as rape, procurement and similar crimes, in which a considerable change in the law in the direction of increased protection to women was made by the Criminal Law Amendment Act 1885. In regard to the protection given to a wife against her husband modern legislation has considerably strengthened the wife's position by means of judicial separation and maintenance in case of desertion (see DIVORCE). The whipping of female offenders was abolished in 1820. Chastisement of a wife by a husband, possibly at one time lawful to a reasonable extent, would now certainly constitute an assault. The husband's rights are limited to restraining the wife's liberty in case of her misconduct.

In Scotland the criminal law differs slightly from that of England. At one time drowning was a punishment specially reserved for women. Incest (*q.v.*), or an attempt to commit incest, has always been punishable as a crime. Adultery and fornication are still nominally crimes, but criminal proceedings in these cases have fallen into desuetude. The age of testamentary capacity is still twelve, not twenty-one, as in England.

Higher education and its results.

The whole idea of women's position in social life, and their ability to take their place, independently of any question of sex, in the work of the world, was radically changed in the English-speaking countries, and also in the more progressive nations beyond their bounds, during the 19th century. This is due primarily to the movement for women's higher education and its results. To deal in detail with this movement in various countries would here be too intricate a matter; but in the English-speaking countries at all events the change is so complete that the only curious thing now is, not what spheres women may not enter, more or less equally with men, but the few from which they are still excluded.

Before the accession of Queen Victoria, there was no systematic education for English women, but as the first half of the 19th century drew to a close, broader views began to be held on the subject, while the humanitarian movement, as well as the rapidly increasing number of women, helped to put their education on a sounder basis. It became more thorough; its methods were better calculated to stimulate intellectual power; and the conviction that it was neither good, nor politic, for women to remain intellectually in their former state of ignorance, was gradually accepted by every one. The movement owed much to Frederick Denison Maurice. He was its pioneer; and Queen's College (1848), which he founded, was the first to give a wider scope to the training of its scholars. Out of its teaching, and that of its professors (including Charles Kingsley), grew nearly all the educational advantages which women enjoy to-day; and to the women who were trained at Queen's College we owe some of the best teaching in England. Bedford College, Cheltenham College, the North London Collegiate School for Girls, the Girls' Public Day School Company's schools, are some of those which sprang into life in different parts of England, and were filled, as rapidly as they were opened, by the girls of the middle and professional classes. From their teaching came the final stage which gave women the same academic advantages as men. Somerville College and Lady Margaret Hall at Oxford, Girton and Newnham Colleges at Cambridge, Westfield College in London, St Hilda's College, St Hugh's Hall, Holloway College, Owens College, the Manchester and Birmingham and Victoria Universities, and other colleges for women in all parts of the United Kingdom, are some of the later but equally successful results of the movement. The necessity for testing the quality of the education of women, however, soon began to be felt. The University of Cambridge was the first to institute a special examination for women over eighteen, and its example was followed by Oxford; but while London, Dublin (Trinity College), Belfast (Queen's), Victoria, Edinburgh, Glasgow, and St Andrews universities now grant degrees, Oxford and Cambridge still denied them in 1910. In the act of 1908 establishing the new Roman

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[1] The action for breach of promise of marriage is in some of its incidents peculiar to English law. In Roman law, betrothal (*sponsalia*) imposed a duty on the betrothed to become husband and wife within a reasonable time, subject to the termination of the obligation by death, repudiation by the words *conditione tua non utor*, or lapse of time, the time fixed being two years. No action lay for breach of promise to marry unless *arrhae sponsalitiae* had been given, *i.e.* earnest of the bargain, to be forfeited by the party refusing to carry it out. The *arrha* might also be given by a parent, and was equally liable to forfeiture. A provincial governor, or one of his relations or household, could not recover any *arrha* that might have been given, it being supposed that he was in a position of authority and able to exercise influence in forcing consent to a betrothal. In the canon law breach of the promise made by the *sponsalia*, whether *de praesenti* or *de futuro*, a division unknown to Roman law, does not without more appear to have sufficed to found an action for its breach, except so far as it fell under ecclesiastical cognizance as *laesio fidei*, but it had the more serious legal effect of avoiding as a canonical disability the subsequent marriage, while the original *sponsalia* continued, of a betrothed person to any other than the one to whom he or she was originally betrothed. The *sponsalia* became inoperative, either by mutual consent or by certain supervening impediments, such as ordination or a vow of chastity. The canonical disability of pre-contract was removed in England by 32 Hen. VIII. c. 38, re-established in the reign of Edward VI., and finally abolished in 1753. In England the duty of the parties is the same as in Roman law, viz. to carry out the contract within a reasonable time, if no time be specially fixed. Formerly a contract to marry could be specifically enforced by the ecclesiastical court compelling a celebration of the marriage *in facie ecclesiae*. The last instance of a suit for this purpose was in 1752, and the right to bring it was abolished in 1753 by Lord Hardwicke's Act (26 Geo. II. c. 33). In Scotland a promise in the nature of *sponsalia de futuro* not followed by consummation may be resiled from, subject to the liability of the party in fault to an action for the breach, which by 6 Geo. IV. c. 120, s. 28, is a proper cause for trial by jury. If, however, the *sponsalia* be *de praesenti*, and, according to the more probable opinion, if they be *de futuro* followed by consummation, a pre-contract is constituted, giving a right to a decree of declarator of marriage and equivalent to marriage, unless declared void during the lifetime of the parties.

Catholic university in Ireland, it was provided that two members of the senate should be women; and Queen's University, Belfast, had three women in 1910 in its senate. Women may point with justifiable pride to the fact that within a very few years of their admission to university examinations, they provided at Cambridge both a senior classic and a senior wrangler. In America (see Co-EDUCATION) the movement has gone much farther than in Great Britain.

The temperate, calm, earnest demeanour of women, both in the schools and in university life, awakened admiration and respect from all; and the movement brought into existence a vast number of women, as well-educated as men, hard-working, persevering and capable, who invaded many professions, and could hold their ground where a sound education was the foundation of success. The pioneers of female education spent their energies in developing their higher and more intellectual ideals, but later years opened up other positions which better education has enabled women to fill. In the literary field they soon invaded journalism (see NEWSPAPERS), and took an important place on the staffs of libraries and museums. They form an important (and in America, the predominating) section of the teaching profession in the state schools, and in all research work play an increasingly valuable part. It is not possible for every woman to be a scholar, a doctor (see below), a lawyer,[1] or possibly to attain the highest position in professions where competition with men is keen, but the development of women's work has opened many other outlets for their energies. As members of school boards, factory inspectors, poor law guardians, sanitary inspectors, they have had ample scope for gratifying their ambition and energy. The progress made in philanthropy and religious activity[2] is largely due to their devotion, under the auspices of countless new societies. And increasing provision has been made, in the arts and crafts, for the furtherance of their careers. There are successful women architects now working in England, and in 1905 a woman won the silver medal of the Royal Society of British Architects; a large number of women travel for business firms; in decorative work, as silversmiths, dentists, law copyists, proof-readers, and in plan tracing women work with success; wood-carving has become almost as recognized a career for them as that of typewriting and shorthand, in which an increasing number are finding employment. Agriculture and gardening have opened up a new field of work, and, with it, kindred occupations.

Medicine.

Women have always found a peculiarly fitting sphere as nurses, though it is only in recent years that nursing (*q.v.*) has been professionalized by means of proper education. But their admission to the medical profession itself was one of the earliest triumphs of the 19th-century movement. It began in America, but was quickly followed up in England. After having been refused admission to instruction by numerous American medical schools, Miss Elizabeth Blackwell was allowed to enter as a student by the Geneva Medical College, N.Y., in 1847, from which she graduated in 1849. Hers was the first woman's name to be placed on the Medical Register of the United Kingdom (1859). In Great Britain the struggle to obtain admission to the teaching schools and to the examinations for medical degrees and diplomas was long and bitter. Though the Society of the Apothecaries admitted Mrs Garrett Anderson (*q.v.*) to their diploma in 1865, it was only after a series of rebuffs and failures that women were admitted to the degree examinations of the various universities. In August 1876 an "enabling" act was passed, empowering the nineteen British medical examining bodies to confer their degrees or diplomas without distinction of sex. In 1908 the Royal College of Physicians and Surgeons decided to admit women to their diplomas and fellowships. In the meantime women doctors had become a common phenomenon.

Political position.

Women in England may fill some of the highest positions in the state. A woman may be a queen, or a regent, and as queen regnant has, by 1 Mary, sess. 3, c. 1, as full rights as a king. Among the public offices a woman may hold are those of county, borough, parish and rural or urban district councillor, overseer, guardian of the poor, churchwarden and sexton. In 1908 Mrs Garrett Anderson was elected mayor of Aldeburgh, the first case of a woman holding that position. Women have also been nominated as members of Royal Commissions (*e.g.* those on the Poor Law and Divorce). A woman cannot serve on a jury, but may, if married, be one of a "jury of matrons" empanelled to determine the condition of a female prisoner on a writ *de ventre inspiciendo*. She can vote (if unmarried or a widow) in county council, municipal, poor law and other local elections. The granting of the parliamentary franchise to women was, however, still withheld in 1910. The history of the movement for women's suffrage is told below. It may be remarked that, with or without the possession of a vote on their own account, politics in England have in modern times been very considerably influenced by the work of women as speakers, canvassers and organizers. The great Conservative auxiliary political organization, the Primrose League, owes its main success to women, and the Women's Liberal Federation, on the opposite side, has done much for the Liberal party. The Women's Liberal Unionist Association, which came into being in 1886 at the time of the Irish Home Rule Bill, also played an active part in defence of the Unionist cause.

Women's suffrage.

The movement for the abolition of the sex distinction in respect of the right conferred upon certain citizens to share in the election of parliamentary representatives dates for practical purposes from the middle of the 19th century. The governmental systems of the ancient world were based without exception on the view that women could take no part in state politics, except in oriental countries as monarchs. Exceptional women such as Cleopatra, Semiramis, Arsinoe, might in the absence of men of the royal house, and by reason of royal descent or personal prestige, occupy the throne, and an Aspasia might be recognized as the able head of a political salon, but women in general derived thence no political status. Though Christianity and a broadening of men's theories of life tended to raise the moral and social status of women, yet Paul definitely assigns subservience as the proper function of women, and many of the fathers looked upon them mainly as inheriting the temptress function of Eve. This view generally obtained throughout the middle ages, though here and there glimmerings of a new idea are seen; many of the great English abbesses discharged their territorial duties as landowners, and women as custodians of castles voted for knights of the shire. In the 17th and 18th centuries in England and America, under the influence of advancing political theory, and in France in the 18th century, this idea began to take shape. In England the writings of Mary Astell (*Serious Proposal to Ladies*, 1697) and others led to the gradual revision of the inherited idea of the education and the true sphere of women, while in 1790 Mary Wollstonecraft published her *Vindication of the Rights of Women*. In America the dawning of a political consciousness is evidenced by the claim made in 1647 by Margaret Brent to sit in the Assembly of Maryland as the executor of Lord Baltimore, and by the requests made by Abigail Adams (wife of John Adams), Mercy Otis Warren and Hannah Lee Corbin, that women taxpayers should enjoy direct representation. In France the movement towards democracy did not in the hands of Rousseau include the enfranchisement of women, and Comte taught that women were politically inferior to men; Condorcet, however, demanded equal rights for both sexes. Although, through an oversight, women could vote under the first constitution of New Jersey from 1776 to 1807, there is no doubt that women's suffrage had made practically no progress in any country till comparatively late in the 19th century. There has been considerable discussion as to whether women had constitutionally a right to vote in England prior to the Reform Act of 1832 (see Mrs C. C. Stopes, *British Freewoman*). The discussion, however, is one of purely antiquarian interest, and the Reform Act made quite clear what had certainly been the recognized custom before, by introducing specifically the word "male" in the new franchise law (2 and 3 Will. IV., cap. 45, sections 19 and 20).

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[1] Women have long practised law in the United States, and in 1896 the benchers of the Ontario Law Society decided to admit them to the bar In France in December 1900 an act was passed enabling women to practise as barristers, and Madame Petit was sworn in Paris, while a woman was briefed for the defence in a murder case in Toulouse in 1903, this being the first case of a woman pleading in a European criminal court. In Finland and Norway women have long practised as barristers, and in Denmark since 1908 they have been admitted as assistants to lawyers. By the law of the Netherlands they are admitted as notaries. In England a special tribunal of the House of Lords presided over by the Lord Chancellor decided in 1903 not to admit women to the English bar, on the grounds that there was no precedent and that they were not desirous of creating one; but numbers of women take degrees in law in British universities, and several have become solicitors.

[2] In the olden times before the Reformation in England various religious communities absorbed a large number of the surplus female population, and in High Church and Roman Catholic circles many ladies still enter various sisterhoods and devote their lives to teaching the young, visiting the poor and nursing the sick. In the Church of England the only office which remained open to women was the modest one of churchwarden, and this office is not infrequently filled by women. The Convocation of Canterbury in 1908 refused by a majority of two to admit women to parochial church councils, though qualified persons of the female sex may vote for parochial lay representatives on the church council. In the Independent Churches there are fewer restrictions. Among the Congregationalists women have equal votes on all questions and may become deacons or even ministers; Miss Jane Brown has been recognized as pastor of Brotherton Congregational Church, Yorkshire, and Miss L. Smith as pastor of that in Cardiff, and in the Methodist Church women frequently act as local preachers. The same equality and share in religious work is accorded to women by the Baptists, the Society of Friends and the Salvation Army, the success of which is largely due to them. In Unitarian congregations in the United States and Australia many women have been appointed ministers, and in England the Rev. Gertrude von Petzold held in 1910 the post of minister of the Narborough Road Free Christian Church, Leicester.

The earliest known handbill representing the modern "women's suffrage" movement in England dates from about 1847, and in 1857 the first society was formed in Sheffield, the "Sheffield Female Political Association," due largely to the work of a Quaker lady, Anne Kent of Chelmsford. In July of the same year Mrs John Stuart Mill published an article in the *Westminster Review*.[1] The earliest outstanding figure, however, is Lydia Ernestine Becker (1827–1890), descended on the mother's side from an old Lancashire family, her father being the son of a German who settled in England in early youth. She became a well-known botanist, and an intimate friend of Charles Darwin. In 1858 the *Englishwoman's Journal* was started, and by this time there was a vigorous agitation for the alteration of the law relating to the property and earnings of married women. Among the leaders of that movement were Barbara Leigh Smith (Mrs Bodichon) and Bessie Rayner Parkes (Madame Belloc). At the same time a famous group of women, Emily Davies, Miss Beale and Miss Buss (founders respectively of the Cheltenham Ladies' College and the North London Collegiate School) and Miss Garrett (Dr Garrett Anderson), Miss Helen Taylor (John Stuart Mill's stepdaughter) and Miss Wolstenholme (afterwards Mrs Elmy), discussed women's suffrage at the "Kensington Society."

A new era began with the election in 1865, as member for Westminster, of John Stuart Mill, who placed women's suffrage in his election address. From that time the subject became more or less prominent in each successive parliament. Mill presented the first petition in May 1867. In 1868 the case of Chorlton *v.* Lings was decided against women applicants for the vote by the Court of Common Pleas, and a similar decision was given by the Supreme Court of Appeal in Scotland. From this time the efforts of the various local committees (in London, Manchester, Bristol, Edinburgh and Birmingham) were directed to promoting a bill in parliament, and to forwarding petitions (an average of 200,000 signatures a year was maintained from 1870 to 1880). The *Women's Suffrage Journal* was founded in 1870, and in the same year Jacob Bright moved the second reading of the Women's Disabilities Bill which was carried by a majority of 33 votes. Mr Gladstone then threw his opposition into the scale, and the bill was rejected in committee by 220 to 94. In 1871 the same bill was again lost by 220 to 151, in spite of a memorial headed by Florence Nightingale, Mary Carpenter, Augusta Webster, Harriet Martineau, Frances Power Cobbe and Anna Louisa Chisholm (Mrs H. W. Chisholm). G. O. Trevelyan's Household Franchise Bill in 1873 raised the hopes of the women's suffragist, and Mr Joseph Chamberlain at a great Liberal meeting in Birmingham carried a resolution in favour of the proposed change. From 1874 to 1876 the bill was in charge of a conservative, Mr Forsyth, and, despite the opposition of John Bright and the efforts of a parliamentary committee for "maintaining the integrity of the franchise," the number of supporters was well maintained. The work proceeded uneventfully from 1876 to 1884, huge meetings being held in all the chief towns. In 1880 the franchise was conferred upon women owners in the Isle of Man, subsequently upon women occupiers also. In 1883 a great Liberal conference at Leeds voted in favour of women's suffrage under the leadership of Dr Crosskey and Walter S. B. M'Laren. The next notable event in the movement was the defeat of W. Woodall's amendment to the Reform Bill (1884), providing that words importing the masculine gender should include women, by 271 votes to 135, Mr Gladstone again making a powerful appeal to his party to withdraw the support which they had given in the past. 104 Liberal members crossed over in answer to this appeal. Numerous bills and resolutions followed year by year in the names of W. Woodall, L. H. Courtney (Lord Courtney, whose bill was read a second time without a division, 1886), W. S. B. M'Laren, Baron Dimsdale, Caleb Wright, Sir Albert K. Rollit, F. Faithfull Begg (1897; second reading majority 71). Up to 1906 all those attempts had failed, in most cases owing to time being taken for government business.

The period 1906 to 1910 witnessed entirely new developments. The suffragists of the existing societies still carried on their constitutional propaganda, and various bills were introduced. In 1907 Mr W. H. Dickinson's bill was talked out, and in 1908 Mr H. Y. Stanger's bill was carried on its second reading by a majority of 179, but the government refused facilities for its progress. Prior to this, however, a number of suffragists had come to the conclusion that the failure of the various bills was due primarily to government hostility. Furthermore the advent of a Liberal government in 1906 had aroused hopes among them that the question would be officially taken up. Questions were therefore put by women to Liberal cabinet ministers at party meetings, and disturbances occurred, with the result that Miss Christabel Pankhurst and Miss Annie Kenney were fined in Manchester in 1906. A certain section of suffragists thereafter decided upon comprehensive opposition to the government of the day, until such time as one or other party should officially adopt a measure for the enfranchisement of women. This opposition took two forms, one that of conducting campaigns against government nominees (whether friendly or not) at bye-elections, and the other that of committing breaches of the law with a view to drawing the widest possible attention to their cause and so forcing the authorities to fine or imprison them. Large numbers of women assembled while parliament was sitting, in contravention of the regulations, and on several occasions many arrests were made. Fines were imposed, but practically all refused to pay them and suffered imprisonment. At a later stage some of the prisoners adopted the further course of refusing food and were forcibly fed in the gaols.

The failure of all the bills previously drafted on the basis of exact equality between the sexes, and the fact that both Unionists and Liberals refused to make the matter a party question, coupled with a general feeling of discomfort at the relations between the so-called "militant" suffragists and the authorities, led in the spring of 1910 to the formation of a committee (called the Conciliation Committee) of members of parliament under the presidency of the earl of Lytton. This committee, consisting of some 55 members belonging to all parties, succeeded in agreeing upon a new bill based upon the occupier franchise established by the Municipal Franchise Act of 1884. It was urged on behalf of this bill that it would establish the principle on a sufficiently

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[1] This article was written in reference to the Women's Rights Convention held in Worcester, Mass., U.S.A., in October 1850.

[illegible] of [illegible] without [illegible] ever [illegible] considerable [illegible] would be [illegible] represented [illegible] and the [illegible] of government [illegible] Shackle- [illegible] attempt [illegible] by a majority of [illegible] votes; [illegible] to a committee of the whole house, [illegible] therefore sent to a [illegible] gave further [illegible] announced [illegible] bill was opposed [illegible] was noteworthy [illegible] Liberals, it was [illegible] by Mr [illegible] members, and evidence [illegible] 32 out of [illegible] new voters would have [illegible] a large [illegible] women.

[illegible] may here be mentioned. [illegible] women's suffrage [illegible] the same view, namely [illegible] have [illegible] natural privileges as men, [illegible] should have the [illegible] system [illegible] *Suffrage Societies* is the oldest [illegible] *National Union of* [illegible] as a number of separate local [illegible] It began about [illegible] a great amalgamation [illegible] and after various [illegible] under the present title. [illegible] societies was formed in [illegible] All the early suffragists [illegible] had 200 branches in [illegible] in latter years the chief name is that [illegible] this body [illegible] The union pursued continuously the [illegible] Henry Fawcett [illegible] and stood apart altogether from the [illegible] Its official organ, *The Common Cause*, was [illegible] societies [illegible] in 1908.

[illegible] *National Women's Social and Political Union*, associated [illegible] Emmeline Pankhurst and Miss Christa- [illegible] originated the more "militant" [illegible] 1910 reached the figure of £60,000, and [illegible] some 500 of its members had undergone [illegible] It undertook a widespread campaign of meetings, [illegible] its speakers were subjected to an opposition of [illegible] at first [illegible] there was no doubt that the movement received [illegible] a wholly new stimulus. Its official organ, *Votes* [illegible] obtained a large circulation.

[illegible] of various kinds multiplied. In 1907 were formed (3) the [illegible] *Freedom League* (chiefly associated with the name of Mrs [illegible] a prominent supporter of the Labour party), whose [illegible] objected to the internal administration of the Social and [illegible] Union, but agreed in adopting its policy in a modified [illegible] and (4) the *Men's League for Women's Suffrage*, a society [illegible] included men of all parties, and in September 1910 adopted [illegible] government election policy. Numerous other party[1] and [illegible] societies were formed, and resolutions supporting the [illegible] either in the abstract or as a part of adult suffrage, were [illegible] by various Conservative, Liberal and Labour conferences [illegible] associations.

The remarkable prominence of the movement and the fact that successive parliaments contained a majority of pledged suffragists [illegible] the formation of opposition societies. In 1908 was formed [illegible] *Women's National Anti-Suffrage League*, of men and women, which drew into its ranks prominent persons such as Lord Cromer, [illegible] Curzon, Lady Jersey and Mrs Humphry Ward; and about the same time the *Men's League for Opposing Women's Suffrage* [illegible] into existence. These two leagues amalgamated in December [illegible], as the *National League for Opposing Women's Suffrage*, with [illegible] Cromer as president. The *Anti-Suffrage Review* was founded [illegible] 1909.

In New Zealand a measure for the enfranchisement of women, introduced by Richard Seddon, was carried in September 1893 (in the upper house by a majority of 2). In Australia the vote has been extended to all adult women both in the states (the first being South Australia, 1894, the last Victoria, 1908) and for the Commonwealth parliament. They have, moreover, the right to sit in the representative assemblies.

The movement assumed an organized form in the United States somewhat earlier than in the United Kingdom. It arose out of the interest taken by women in the temperance and anti-slavery agitations, and was fostered by the discussion on women's property rights. In 1840 the question was raised in a more acute form by the exclusion of women delegates from the World's Convention, and in 1848 the first women's suffrage convention was held at Seneca Falls, the leading spirits being Mrs Elizabeth Cady Stanton, Martha C. Wright and Lucretia Mott. Later tions at Salem and Worcester, Massachusetts, in 1850, were the predecessors of annual meetings, but the extravagant dress adopted by some of the women brought ridicule upon the movement, which was further thrown into the background by the Civil War. In 1869 were formed: (1) in New York, the *National Women's Suffrage Association*, and (2) in Cleveland, the *American Woman's Suffrage Association*. In 1890 these two societies amalgamated as the *National American Woman's Suffrage Association*, of which in 1900 Mrs Carrie Chapman Catt became president. The question was considered by a select committee in the 48th Congress, and 200 petitions, representing millions of individuals, were presented in 1900. The Labour and Socialist parties in general supported the women's claim, but there was considerable opposition in other parties. In 5 states (Wyoming since 1869; Colorado, 1893; Utah, 1896; Idaho, 1896; and Washington, 1910) women are electors, and in 25 states they have exercised the school suffrage. In Louisiana they obtained the suffrage in connexion with tax levies in 1898. Anti-suffrage societies have also been formed in Brooklyn (1894), Massachusetts (1895), Illinois (1897), Oregon (1899).

In Finland all adult men and women over the age of 24, excluding paupers, received the right to vote for members of the Diet in 1906, in which year nineteen women became members of the Diet. In Norway, where there is male suffrage for men over 25 years of age, women were entitled to vote by a law of 1907, provided they or, if married, their husbands (*i.e.* where property is jointly owned) had paid income tax on an annual income of 400 kroner (£22) in the towns, or 300 kroner (£16, 10s.) in country districts. In Sweden a suffrage bill was carried in the lower but rejected in the upper house in 1909. In all the chief countries there are suffrage societies of greater or less strength. In Russia the question was placed in the forefront of the demands made by the Duma in 1906, and in 1907 propertied women received the right to confer votes on their sons who would otherwise be unenfranchised. In France a feminist congress met at Lyons in 1909.

The *International Woman Suffrage Alliance* originated in the United States in 1888. Its membership increased steadily, and at the Convention held in London in 1909 delegates were present from twenty-two countries. In the United Kingdom this Alliance is represented by the *National Union of Women s Suffrage Societies*. A social and propagandist club was founded in London in 1909 with an international membership. An international journal under the title *Jus Suffragii* (Brussels) was founded in 1907.

AUTHORITIES.—It is impossible to do more than mention a few works out of many dealing with various phases of the modern "women's movement." See Alice Zimmern's *Renaissance of Girls' Education in England* (1898); A. R. Cleveland, *Women under English Law* (1896); J. L. de Lanessan, *L'Éducation de la femme moderne* (1908); M. Ostrogorski, *Femme au point de vue du droit public* (1892); Mrs C. P. Gilman, *Women and Economics* (1899); Miss C. E. Collet, *Report on Changes in the Employment of Women* (1898; Parl. papers, C. 8794); B. and M. Van Vorst, *Woman in industry* (1908); A. Loria, *Le Féminisme au point de vue sociologique* (1907); Helen Blackburn, *Record of Women's Suffrage*, in the United Kingdom (1902); Susan B. Anthony, *History of Woman's Suffrage*, in the United States (4 vols., 1881–1902); C. C. Stopes, *British Free Women* (1894); W. Lyon Blease, *The Emancipation of Women* (1910). The classical exposition of the arguments on behalf of women's suffrage is J. S. Mill's *Subjection of Women*; the most important statement in opposition is perhaps that of Professor A. V. Dicey in the *Quarterly Review* (Oct. 1908). (X.)

WOOD, ANTHONY À[2] (1632–1695), English antiquary, was the fourth son of Thomas Wood (1580–1643), B.C.L. of Oxford, where Anthony was born on the 17th of December 1632. He was sent to New College school in 1641, and at the age of twelve was removed to the free grammar school at Thame, where his studies were interrupted by civil war skirmishes. He was then placed under the tuition of his brother Edward (1627–1655), of Trinity College; and, as he tells us, "while he continued in this condition his mother would alwaies be soliciting him to be an apprentice which he could never endure to heare of." He was entered at Merton College in 1647, and made postmaster. In 1652 he amused himself with ploughing and bell-ringing,

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he *Conservative and Unionist Women's Franchise Associa*hich the countess of Selborne became president in 1910.

[2] In the *Life* he speaks of himself and his family as Wood or à Wood, the last form being a pedantic return to old usage adopted by himself. A pedigree is given in Clark's edition.

and "having had from his most tender years an extraordinary ravishing delight in music," began to teach himself the violin, and was examined for the degree of B.A. He engaged a music-master, and obtained permission to use the Bodleian, "which he took to be the happiness of his life." He was admitted M.A. in 1655, and in the following year published a volume of sermons by his late brother Edward. He began systematically to copy monumental inscriptions and to search for antiquities in the city and neighbourhood. He went through the Christ Church registers, "at this time being resolved to set himself to the study of antiquities." Dr John Wallis, the keeper, allowed him free access to the university registers in 1660; "here he layd the foundation of that book which was fourteen years afterwards published, viz. *Hist. et Antiq. Univ. Oxon.*" He also came to know the Oxford collections of Brian Twyne to which he was greatly indebted. He steadily investigated the muniments of all the colleges, and in 1667 made his first journey to London, where he visited Dugdale, who introduced him into the Cottonian library, and Prynne showed him the same civility for the Tower records. On October 22, 1669, he was sent for by the delegates of the press, "that whereas he had taken a great deal of paines in writing the *Hist. and Antiq of the Universitie of Oxon*, they would for his paines give him an 100 *li.* for his copie, conditionally, that he would suffer the book to be translated into Latine." He accepted the offer and set to work to prepare his English MS. for the translators, Richard Peers and Richard Reeve, both appointed by Dr Fell, dean of Christ Church, who undertook the expense of printing. In 1674 appeared *Historia et antiquitates Universitatis Oxoniensis*, handsomely reprinted "e Theatro Sheldoniano," in two folio volumes, the first devoted to the university in general and the second to the colleges. Copies were widely distributed, and university and author received much praise. On the other hand, Bishop Barlow told a correspondent that "not only the Latine but the history itself is in many things ridiculously false" (*Genuine Remains*, 1693, p.183). In 1678 the university registers which had been in his custody for eighteen years were removed, as it was feared that he would be implicated in the Popish plot. To relieve himself from suspicion he took the oaths of supremacy and allegiance. During this time he had been gradually completing his great work, which was produced by a London publisher in 1691–1692, 2 vols. folio, *Athenae Oxonienses: an Exact History of all the Writers and Bishops who have had their Education in the University of Oxford from 1500 to 1690, to which are added the Fasti, or Annals for the said time.* On the 29th of July 1693 he was condemned in the vice-chancellor's court for certain libels against the late earl of Clarendon, fined, banished from the university until he recanted, and the offending pages burnt. The proceedings were printed in a volume of *Miscellanies* published by Curll in 1714. Wood was attacked by Bishop Burnet in a *Letter to the Bishop of Lichfield and Coventry* (1693, 4to), and defended by his nephew Dr Thomas Wood, in a *Vindication of the Historiographer, to which is added the Historiographer's Answer* (1693), 4to, reproduced in the subsequent editions of the *Athenae.* The nephew also defended his uncle in *An Appendix to the Life of Bishop Seth Ward*, 1697, 8vo. After a short illness he died on the 28th of November 1695, and was buried in the outer chapel of St John Baptist (Merton College), in Oxford, where he superintended the digging of his own grave but a few days before.

He is described as "a very strong lusty man," of uncouth manners and appearance, not so deaf as he pretended, of reserved and temperate habits, not avaricious and a despiser of honours. He received neither office nor reward from the university which owed so much to his labours. He never married, and led a life of self-denial, entirely devoted to antiquarian research. Bell-ringing and music were his chief relaxations. His literary style is poor, and his taste and judgment are frequently warped by prejudice, but his two great works and unpublished collections form a priceless source of information on Oxford and her worthies. He was always suspected of being a Roman Catholic, and invariably treated Jacobites and Papists better than Dissenters in the *Athenae*, but he died in communion with the Church of England.

Wood's original manuscript (purchased by the Bodleian in 1846) was first published by John Gutch as *The History and Antiquities of the Colleges and Halls in the University of Oxford, with a continuation* (1786–1790, 2 vols. 4to), and *The History and Antiquities of the University of Oxford* (1792–1796, 3 vols. 4to), with portrait of Wood. To these should be added *The Antient and Present State of the City of Oxford, chiefly collected by A. à Wood, with additions by the Rev. Sir J. Peshall* (1773, 4to; the text is garbled and the editing very imperfect). An admirable edition of the *Survey of the Antiquities of the City of Oxford, composed in 1661–66 by Anthony Wood*, edited by Andrew Clark, was issued by the Oxford Historical Society (1889–1899, 3 vols. 8vo). *Modius Salium, a Collection of Pieces of Humour*, chiefly ill-natured personal stories, was published at Oxford in 1751, 12mo. Some letters between Aubrey and Wood were given in the *Gentleman's Magazine* (3rd ser., ix. x. xi.). Wood consulted Dr Hudson about getting a third volume of the *Athenae* printed in Holland, saying, "When this volume comes out I'll make you laugh again" (*Reliq. Hearnianae*, i. 59). This was included in a second edition of the *Athenae* published by R. Knaplock and J. Tonson in 1721 (2 vols. folio), "very much corrected and enlarged, with the addition of above 500 new lives." The third appeared as "a new edition, with additions, and a continuation by Philip Bliss" (1813–1820, 4 vols. 4to). The Ecclesiastical History Society proposed to bring out a fourth edition, which stopped at the *Life*, ed. by Bliss (1848, 8vo; see *Gent. Mag.*, N.S., xxix. 135, 268). Dr Bliss's interleaved copy is in the Bodleian, and Dr Griffiths announced in 1859 that a new edition was contemplated by the Press, and asked for additional matter (see *Notes and Queries*, 2nd ser., vii. 514, and 6th ser., vi. 5, 51). Wood bequeathed his library (127 MSS. and 970 printed books) to the Ashmolean Museum, and the keeper, William Huddesford, printed a catalogue of the MSS. in 1761. In 1858 the whole collection was transferred to the Bodleian, where 25 volumes of Wood's MSS. had been since 1690. Many of the original papers from which the *Athenae* was written, as well as several large volumes of Wood's correspondence and all his diaries, are in the Bodleian.

We are intimately acquainted with the most minute particulars of Wood's life from his *Diaries* (1657–1695) and autobiography; all earlier editions are now superseded by the elaborate work of Andrew Clark, *The Life and Times of Anthony Wood, Antiquary, of Oxford, 1632–1695, described by himself* (Oxford Historical Society, 1891–1900, 5 vols. 8vo). See also *Reliquiae Hearnianae*, ed. Bliss (2nd ed., 1869, 3 vols. 12mo); Hearne's *Remarks and Collections* (Oxford Historical Society, 1885–1907), vols. i.-viii.; Macray's *Annals of the Bodleian Library* (2nd ed., 1890); Nichols's *Literary Anecdotes*, i. iv. v. viii.; Noble's *Biogr. History of England*, i. (H. R. T.)

WOOD, MRS HENRY [Ellen] (1814–1887), English novelist, was born at Worcester on the 17th of January 1814. Her maiden name was Price; her father was a glove manufacturer in Worcester. She married Henry Wood in 1836, and after her marriage lived for the most part in France, her husband, who died in 1866, being at the head of a large shipping and banking firm. In 1860 she wrote a temperance tale, *Danesbury House*, which gained a prize of £100 offered by the Scottish Temperance League; but before this she had regularly contributed anonymous stories to periodicals. Her first great success was made with *East Lynne* (1861), which obtained enormous popularity. It was translated into several languages, and a number of dramatic versions were made. *The Channings* and *Mrs Halliburton's Troubles* followed in 1862; *Verner's Pride* and *The Shadow of Ashlydyat* in 1863; *Lord Oakburn's Daughters*, *Oswald Cray* and *Trevlyn Hold* in 1864. She became proprietor and editor of the *Argosy* magazine in 1867, and the *Johnny Ludlow* tales, published anonymously there, are the most artistic of her works. Among the thirty-five novels Mrs Henry Wood produced, the best of those not hitherto mentioned were *Roland Yorke* (1869); *Within the Maze* (1872) and *Edina* (1876). She continued to edit the *Argosy*, with the assistance of her son, Mr C. W. Wood, till her death, which occurred on the 10th of February 1887.

Memorials of Mrs Henry Wood, by her son, were published in 1894.

WOOD, SIR HENRY EVELYN (1838–), British field marshal, was born at Braintree, Essex, on the 9th of February 1838, the youngest son of Sir John Page Wood, Bart. Educated at Marlborough, he entered the Royal Navy in 1852, and served as a midshipman in the Russian war, being employed on shore with the naval brigade in the siege operations before Sevastopol, mentioned in despatches, and severely wounded at the assault on the Redan on June 18, 1855. Immediately afterwards he left the navy for the army, becoming a cornet in the 13th Light Dragoons. Promoted lieutenant in 1856, he exchanged into the 17th Lancers in 1857, and served in the Indian Mutiny with distinction as brigade-major of a flying column, winning the

Victoria Cross. In 1861 he became captain, in 1862 brevet-major, exchanging about the same time into the 73rd Highlanders (Black Watch), but returned to the cavalry three years later. Having meantime served as an aide-de-camp at Dublin, he was next employed on the staff at Aldershot until 1871, when he was appointed to the 90th (now 2nd Scottish Rifles) as a regimental major. In 1867 he had married the Hon. Mary Pauline Southwell, sister of the 4th Lord Southwell. In 1873 he was promoted brevet lieutenant-colonel, and in 1874 served in the Ashanti War (brevet-colonel); in 1874–1878 he was again on the staff at Aldershot, and in November 1878 he became regimental lieutenant-colonel, the 90th being at that time in South Africa engaged in the Kaffir War. In January 1879 he was in command of the left column of the army that crossed the Zulu frontier, and shortly afterwards he received the local rank of brigadier-general. Under him served Colonel Redvers Buller and also the Boer leader, Piet Uys, who fell at Inhlobana, but the repulse at that place was more than counterbalanced by the successful battle of Kambula. At the close of the war Sir Evelyn Wood, who received the K.C.B. for his services, was appointed to command the Chatham district. But in January 1881 he was again in South Africa with the local rank of major-general, and after Sir G. P. Colley's death at Majuba it fell to his lot to negotiate the armistice with General Joubert. Remaining in Natal until February 1882, he then returned to the Chatham command, having meantime been promoted substantive major-general. In 1882 he was made a G.C.M.G. and commanded a brigade in the Egyptian expedition. He remained in Egypt for six years. From 1883 to 1885 he was Sirdar of the Egyptian army, which he reorganized and in fact created. During the Nile operations of 1884–85 he commanded the forces on the line of communication of Lord Wolseley's army. In 1886 he returned to an English command, and two years later (January 1889), with the local rank of lieutenant-general, he was appointed to the Aldershot command. He became lieutenant-general in 1891, and was given the G.C.B. at the close of his tenure of the command, when he went to the War Office as quartermaster-general. Four years afterwards he became adjutant-general. He was promoted full general in 1895. He commanded the II. Army Corps and Southern Command from 1901 to 1904, being promoted field marshal on the 8th of April 1903. In 1907 he became colonel of the Royal Horse Guards. After retiring from active service he took a leading part, as chairman of the Association for the City of London, in the organization of the Territorial Force. Sir Evelyn Wood published several works, perhaps the best known of which to the soldier are *Achievements of Cavalry* (1897) and *Cavalry in the Waterloo Campaign* (1896). He also wrote *The Crimea in 1854 and in 1894*; an autobiography, *From Midshipman to Field Marshal*; and *The Revolt in Hindostan*.

WOOD, JOHN GEORGE (1827–1889), English writer and lecturer on natural history, was born in London on the 21st of July 1827. He was educated at Ashbourne grammar school and at Merton College, Oxford; and after he had taken his degree in 1848 he worked for two years in the anatomical museum at Christ Church under Sir Henry Acland. In 1852 he was ordained a deacon of the Church of England, became curate of the parish of St Thomas the Martyr, Oxford, and also took up the post of chaplain to the Boatmen's Floating Chapel at Oxford. He was ordained priest in 1854, and in that year gave up his curacy to devote himself for a time to literary work. In 1858 he accepted a readership at Christ Church, Newgate Street, and he was assistant-chaplain to St Bartholomew's Hospital, London, from 1856 until 1862. Between 1868 and 1876 he held the office of precentor to the Canterbury Diocesan Choral Union. After 1876 he devoted himself to the production of books and to delivering in all parts of the country lectures on zoology, which he illustrated by drawing on a black-board or on large sheets of white paper with coloured crayons. These "sketch lectures," as he called them, were very popular, and made his name widely known both in Great Britain and in the United States. In 1883–he delivered the Lowell lectures at Boston. Wood was for a time editor of the *Boy's Own Magazine*. His most important work was a *Natural History* in three volumes, but he was better known by the series of books which began with *Common Objects of the Sea-Shore*, and which included popular monographs on shells, moths, beetles, the microscope and *Common Objects of the Country*. *Our Garden Friends and Foes* was another book which found hosts of appreciative readers. He died at Coventry on the 3rd of March 1889.

WOOD, SEARLES VALENTINE (1798–1880), English palaeontologist, was born on the 14th of February 1798. He went to sea in 1811 as a midshipman in the East India Company's service, which he left, however, in 1826. He then settled at Hasketon near Woodbridge, Suffolk. He devoted himself to a study of the mollusca of the Newer Tertiary (Crag) of Suffolk and Norfolk, and the Older Tertiary (Eocene) of the Hampshire basin. On the latter subject he published *A Monograph of the Eocene Bivalves of England* (1861–1871), issued by the Palaeontographical Society. His chief work was *A Monograph of the Crag Mollusca* (1848–1856), published by the same society, for which he was awarded the Wollaston medal in 1860 by the Geological Society of London; a supplement was issued by him in 1872–1874, a second in 1879, and a third (edited by his son) in 1882. He died at Martlesham, near Woodbridge, on the 26th of October 1880. His son, Searles Valentine Wood (1830–1884), was for some years a solicitor at Woodbridge, but gave up the profession and devoted his energies to geology, studying especially the structure of the deposits of the Crag and glacial drifts.

WOODBRIDGE, a market town in the Woodbridge parliamentary division of Suffolk, England; 79 m. N.E. by E. from London by the Great Eastern railway. Pop. of urban district (1901) 4640. It is prettily situated near the head of the Deben estuary, which enters the North Sea 10 m. S. by E. The church of St Mary the Virgin is a beautiful Perpendicular structure, with a massive and lofty tower of flint work. The large estate left by Thomas Seekford of Sekforde (1578) endows the grammar school and hospital. Woodbridge Abbey, built by Seekford, occupies the site of an Augustinian foundation of the 12th century. There is a large agricultural trade, and general fairs and horse fairs are held.

WOODBURY, CHARLES HERBERT (1864–), American marine painter, was born at Lynn, Massachusetts, on the 14th of July 1864. He graduated at the Massachusetts Institute of Technology, Boston, in 1886, was a pupil of the Académie Julien, Paris. He was president of the Boston Water Color Club, and became associate of the National Academy of Design, New York. His wife, Marcia Oakes Woodbury, born in 1865 at South Berwick, also became known as a painter.

WOODBURY, LEVI (1789–1851), American political leader, was born at Francestown, New Hampshire, on the 22nd of December 1789. He graduated from Dartmouth College in 1809, was admitted to the bar in 1812, and was a judge of the superior court from 1816 to 1823. In 1823–1824 he was governor of the state, in 1825 was a member and speaker of the state House of Representatives, and in 1825–1831 and again in 1841–1845 was a member of the U.S. Senate. He was secretary of the navy in 1831–1834, secretary of the treasury in 1834–1841, and associate justice of the U.S. Supreme Court from 1846 until his death, at Portsmouth, New Hampshire, on the 4th of September 1851. From about 1825 to 1845 Woodbury was the undisputed leader of the Jacksonian Democracy in New England.

See his *Writings, Political, Judicial and Literary* (3 vols., Boston, 1852), edited by Nahum Capen; and an article in the *New England Magazine*, new series, xxxvii. p. 658 (February 1908).

WOODBURY, a city and the county-seat of Gloucester county, New Jersey, U.S.A., in the western part of the state, 9 m. S. of Philadelphia. , Pop. (1900) 4087, including 246 foreign-born and 517 negroes; (1910) 4642. It is served by the West Jersey & Seashore Railroad. Among its public institutions is the Deptford Institute Free Library. There are various manufactures. Woodbury is said to have been settled about 1684; it became the county-seat in 1787. It was chartered as a borough in 1854 and as a city in 1870.

WOOD-CARVING, the process whereby wood is ornamented with design by means of sharp cutting tools held in the hand. The term includes anything within the limit of sculpture in the round up to hand-worked mouldings such as help to compose the tracery of screens, &c.

Material.—The texture of wood limits the scope of the carver in that the substance consists of bundles of fibres (called grain) growing in a vertical direction without much lateral cohesive strength. It is therefore essential to arrange the more delicate parts of a design " with the grain " instead of across it, and the more slender stalks or leaf-points should not be too much separated from their adjacent surroundings. The failure to appreciate these primary rules may constantly be seen in damaged work, when it will be noticed that, whereas tendrils, tips of birds' beaks, &c., arranged across the grain have been broken away, similar details designed more in harmony with the growth of the wood and not too deeply undercut remain intact. Oak is the most suitable wood for carving, on account of its durability and toughness without being too hard. Chestnut (very like oak), American walnut, mahogany and teak are also very good woods; while for fine work Italian walnut, lime, sycamore, apple, pear or plum, are generally chosen. Decoration that is to be painted and of not too delicate a nature is as a rule carved in pine.

Tools.—The carver requires but few kinds of tools:—(1) the gouge—a tool with a curved cutting edge—used in a variety of forms and sizes for carving hollows, rounds and sweeping curves; (2) the chisel, large and small, whose straight cutting edge is used for lines and cleaning up flat surfaces; (3) the " V" tool used for veining, and in certain classes of flat work for emphasizing lines. A special screw for fixing work to the bench, and a mallet, complete the carver's kit, though other tools, more or less legitimate, are often used, such as a router for bringing grounds to a uniform level, bent gouges and bent chisels for cutting hollows too deep for the ordinary tool.

Method.—The process for relief carving is usually as follows. The carver first fixes the wood to his bench by means of the screw already referred to. He then (*a*) sketches on the main lines of his idea, indicating the flowers, foliage, &c.; or (*b*) should the design be very intricate or of a geometrical character, he traces the whole design from a pattern first prepared on paper; or (*c*) he may combine the first two methods. Next he grounds out the spaces between the lines with a gouge to a more or less uniform depth. Then he " bosts " the upstanding pattern that remains, *i.e.* he models and shapes the details of his design, carefully balancing the lights and shadows; and finally, after having obtained the result he desires, he cleans up the whole. The quicker he works, the fewer times he goes over the same part, the more sketchy the subsidiary portions, the less high finish he puts into the detail, the better the result. Incised work, chip-carving, &c., are generally finished at once and not in stages. Much carved work, that of savage nations for instance, is of course carved without the assistance of a bench. Many small articles, too, are carved in the hand. Little models of antelopes or bears, so familiar in Switzerland, are carved in this way with a tool somewhat like a half-open knife but with the blade fixed.

Style.—From the remotest ages the decoration of wood has been a foremost art. The tendency of human nature has always been to ornament every article in use. Just as a child of to-day instinctively cuts patterns on the bark of his switch freshly taken from the hedgerow, so the primitive man, to say nothing of his more civilized successor, has from the earliest times cut designs on every wooden article he is accustomed to handle. The North American Indian carves his wooden fish-hook or his pipe stem just as the Polynesian works patterns on his paddle. The native of British Guiana decorates his cavassa grater with a well-conceived scheme of incised scrolls, while the savage of Loango Bay distorts his spoon with a hopelessly unsuitable design of perhaps figures standing up in full relief carrying a hammock.

Figure work.

Figure-work seems to have been universal. The craving to represent one's god in a tangible form finds expression in numberless ways. The early carver, and, for that matter, the native of the present day, has always found a difficulty in giving expression to the eye, and at all times has evaded it by inlaying this feature with coloured material. Obsidian, for example, is used by the modern Easter Islander in common with the Egyptian craftsman of the earlier dynasties. To carve a figure in wood is not only more difficult but is less satisfactory than marble (for which see SCULPTURE), owing to the tendency of wood to crack, to be injured by insects, or to suffer from changes in the atmosphere. The texture of the material, too, often proves fatal to the expression of the features, especially in the classic type of youthful face. On the other hand, magnificent examples exist of the more rugged features of age: the beetling brows, the furrows and lines neutralizing the defects of the grain of the wood. However, in ancient work the surface was not of such consequence, for figures as a rule were painted.

Colour.

It is not always realized at the present day to what extent colour has even from the most ancient times been used to enhance the effect of wood-carving and sculpture. The modern prejudice against gold and other tints is perhaps due to the fact that painted work has been vulgarized. One associates coloured carvings too readily with theatre galleries and the triumphal car of the circus procession. The " restored " work too of some church screens does anything but encourage the revival of this time-honoured custom. The arrangement of a proper and harmonious scheme of colour is not the work of the house-painter, but of the specially trained artist. Witness the old coloured screens of Norfolk, the harmonious greens and reds, the proper proportion of gold, the panels adorned with saints on backgrounds of delicate diaper work, and compare these triumphs of decoration with the rougher blues and reds of the average restored screen, and one ceases to wonder why we now prefer the wood plain.

Of late years carving has gone out of fashion; a change has come about. The work is necessarily slow, thus causing charges to appear high. Other and cheaper methods of decoration have driven carving from its former place. Machine work has much to answer for, and the endeavour to popularize the craft by means of the village class has not always achieved its own end. The gradual disappearance of the individual artist, elbowed out as he has been by the contractor, is fatal to the continuance of an art which can never flourish when done at so much a yard. So long as the carver is expected to work to some one else's pattern—so long as he is, in detail at least, not his own designer—this art, which attained its zenith in the glories of the 15th-century cathedral and in the continental domestic work of the hundred years to follow, can never hope to live again.

Egypt.

Ancient Work before the Christian Era.—The extreme dryness of the climate of Egypt accounts for the existence of a number of wood-carvings from this remote period (see EGYPT: *Art and Archaeology*). Some wood panels from the tomb of Hosul at Sakkarah are of the III. dynasty (over 4000 B.C.). The carving consists of hieroglyphs and figures in low relief, and the style is extremely delicate and fine. A stool shown on one of the panels has the legs shaped like the fore and hind limbs of an animal, a form common in Egypt for thousands of years.

Figure work.

In the Cairo museum may be seen the statue of a man of 50 years of age, of the period of the great pyramid, possibly 4000 B.C. The expression of the face and the realism of the carriage have never been surpassed by any Egyptian sculptor of this or any other period. The figure is carved out of a solid block of sycamore, and in accordance with the Egyptian custom the arms are joined on. The eyes are inlaid with pieces of opaque white quartz, with a line of bronze surrounding to imitate the lid; a small disk of transparent rock crystal forms the iris, while a tiny bit of polished ebony fixed behind the crystal imparts to it a lifelike sparkle. " The IV., V. and VI. dynasties cover the finest period of Egyptian sculpture. The statues found in the tombs show a freedom of treatment which was never reached in later times. They are all portraits, which the artist strove his utmost to render exactly like his model. For these are not, like more modern statues, simply works of art, but had primarily a religious signification " (Maspero). As the spirits of the deceased might inhabit these " Ka " statues, the features and proportions were closely copied.

There are to be found in the principal museums of Europe many Egyptian examples of the utmost interest—mummy cases of human

Mummy cases.

beings with the face alone carved, animal mummy cases, sometimes boxes, with the figure of a lizard, perhaps, carved in full relief standing on the lid. Sometimes the animal, a cat, sitting on its haunches, for example, or a jackal, crouching on all fours, would be carved in the round and its hollowed body used as the case itself.

Furniture.

Of furniture, folding seats like the modern campstool, and chairs with legs terminating in the heads of beasts or the feet of animals, still exist. Beds supported by lions' paws (XI. and XII. dynasties, from Gebelein, now in the Cairo Museum), head-rests, 6 or 8 in. high, shaped like a crutch on a foot, very like those used by the native of New Guinea to-day, are carved with scenes, &c., in outline. In the British Museum may be seen a tiny little coffer, 4 in. by 2½ in., with very delicate figures carved in low relief. This little box stands on cabriole legs ¾ of an inch long with claw feet, quite Louis Quinze in character. There are incense ladles, the handle representing a bouquet of lotus flowers, the bowl formed like the leaf of an aquatic plant with serrated edges (from Gurnah, XVIII. dynasty); mirror handles, representing a little pillar, or a lotus stalk, sometimes surmounted by a head of Hathor (the Egyptian Venus) or of Bêsu (god of the toilet); pin-cushions, in the shape of a small round tortoise with holes in the back for toilet pins, which were also of wood with dog-head ends (XI. dynasty, Cairo Museum); and perfume boxes such as a fish, the two halves forming the bottom and top—the perfume or pomatum was removed by little wooden spoons, one shaped in the form of a cartouche emerging from a full-blown lotus, another shaped like the neck of a goose, a third consisting of a dog running with a fish in its mouth, the fish forming the bowl. The list might be prolonged, but enough has been said to show to what a pitch of refinement the art of wood-carving had reached thousands of years before the birth of Christ.

Assyria, Greece and Rome.

Of the work of Assyria, Greece and Rome, little is actually known except from history or inference. It may be safely assumed that the craft kept pace with the varying taste and refinement of all the older civilizations. Important pieces of wood sculpture which once existed in Greece and other ancient countries are only known to us from the descriptions of Pausanias and other classic writers. Many examples of the wooden images of the gods (*ξόανα*) were preserved down to late historic times. The Palladium, or sacred figure of Pallas, which was guarded by the Vestal Virgins in Rome and was fabled to have been brought by Aeneas from the burning Troy, was one of these wooden *ξόανα*.

First Eleven Centuries after Christ.—Wood-carving examples of this period are extremely rare. The carved panels of the main doors of St Sabina on the Aventine Hill, Rome, are very interesting specimens of early Christian relief sculpture in wood, dating, as the dresses show, from the 5th century. The doors are made up of a large number of small square panels, each minutely carved with a scene from the Old or New Testament. The whole feeling of these reliefs is thoroughly classic, though of course in a very debased form. A very fine fragment of Byzantine art (11th–12th centuries) is preserved in a monastery at Mount Athos in Macedonia. It consists of two panels (one above the other) of relief sculpture, surmounted by a semicircular arch of conventional foliage springing from columns ornamented with animals in foliage of spiral form. The capitals and bases are square, each face being carved with a figure. It is a wonderfully fine piece of work, conceived in the best decorative spirit.

Scandinavian work.

In Scandinavian countries we find some very early work of excellent design. In the Christiania Museum there are some fine chairs of the 9th or 10th centuries carved with that particular flat and broad treatment of scroll and strapwork so eminently suited to soft wood. In the Copenhagen Museum there are panels from Iceland in the same style. The celebrated wooden doorways of Aal (A.D. 1200) (Plate II. fig. 3), Sauland, Flaa, Solöer and other Norwegian churches (Christiania Museum) are only an elaboration of the same treatment of dragons and intricate scroll work, a style which we still see carried on in the door-posts of the 15th century in the Nordiska Museum, Stockholm, and in the Icelandic work of quite modern times. In these early days the leaf was not much developed in design. The carver depended almost entirely on the stalk, a style of work which has its counterpart in Burmese work of the 17th century.

Gothic Period (12th–15th Centuries).—It was towards the end of this epoch that wood-carving reached its culminating point. The choir stalls, rood-screens, roofs, retables, of England, France and the Teutonic countries of Europe, have in execution, balance and proportion, never at any time been approached. In small designs, in detail, in minuteness, in mechanical accuracy, the carver of this time has had his rivals, but for greatness of architectural conception, for a just appreciation of decorative treatment, the designer of the 15th century stands alone.

It should always be borne in mind that colour was the keynote of this scheme. The custom was practically universal, and enough traces remain to show how splendid was the effect of these old Gothic churches and cathedrals in their perfection. The priests in their gorgeous vestments, the lights, the crucifix, the banners and incense, the frescoed or diapered walls, and that crowning glory of Gothic art, the stained glass, were all in harmony with these beautiful schemes of c [illegible]. Red, blue, green, white and gilding were th [illegible]. Not only were the screens painted in colours, but the parts painted white were often further decorated with delicate lines and sprigs of foliage in conventional pattern. The plain surfaces of the panels were also adorned with saints, often on a background of delicate gesso diaper, coloured or gilded (Southwold). Nothing could exceed the beauty of the triptychs or retables of Germany, Flanders (Plate I. fig. 1) or France; carved with scenes from the New Testament in high relief arranged under a delicate lacework of canopies and clustered pinnacles glistening with gold and brilliant colours. In Germany the effect was further enhanced by emphasizing parts of the gilding by means of a transparent varnish tinted with red or green, thus giving a special tone to the metallic lustre.

The style of design used during this great period owes much of its interest to the now obsolete custom of employing direct the craftsman and his men, instead of the present-day habit of giving the work to a contractor. It is easy to trace how those bands of carvers travelled about from church to church. In one district the designer would employ a particular form and arrangement of vine leaf, while in another adjoining quite a different style repeatedly appears. Judging by results, this system produced the best class of work both in design and execution. The general scheme was of course planned by one master mind, but the carrying out of each section, each part, each detail, was left to the individual workman. Hence that variety of treatment, that endless diversity, which gives a charm and interest to Gothic art, unknown in more symmetrical epochs. The Gothic craftsman appreciated the cardinal fact that in design beautiful detail does not necessarily insure a beautiful composition, and subordinated the individual part to the general effect. He also often carved *in situ*, a practice seldom if ever followed in the present day. Here and there one comes across the work of long years ago still unfinished. A half-completed bench-end, a fragment of screen left plain, clearly show that sometimes at least the church was the workshop.

Gothic and Renaissance: a Comparison.—Gothic design roughly divides itself into two classes: (1) the geometrical, *i.e.* tracery and diaper patterns, and (2) the foliage designs, where the mechanical scroll of the Renaissance is as a rule absent. The lines of foliage treatment, so common in the bands of the 15th-century rood-screens and the panel work especially of Germany, serve to illustrate the widely different motives of the craftsmen of these two great epochs. Again, while the Renaissance designer as a rule made the two sides of the panel alike, the Gothic carver seldom repeated a single detail. While his main lines and grouping corresponded, his detail differed. Of numberless examples a 15th-century chest (Plate III. fig. 6) in the Kunstgewerbe Museum, Berlin, may be referred to. The arrangements of foliage, &c., on top, back and front, are typical of Gothic at its best.

End of the 12th century-1300.—As this section treats of wood-carving in Europe generally, and not of any one country alone, the dates just named must be of necessity only approximate. The 13th century was marked not only by great skill both in design and treatment, but also much devotional feeling. The craftsman seems to have not merely carved, but to have carved to the glory of God. At no time was work more delicately conceived or more beautifully cut. This early Gothic style certainly lent itself to fine finish, and in this respect was more suited to stone treatment than to wood. But the loving care bestowed on each detail seems to point to a religious devotion which is sometimes absent from later work. Very good examples of capitals (now, alas, divided down the centre) are to be seen in Peterborough cathedral. Scrolls and foliage spring from groups of columns of four. Some Italian columns of the same date (Victoria and Albert Museum) should be compared, much to the advantage of the former. Exeter cathedral boasts misereres unsurpassed for skilful workmanship; mermaids, dragons, elephants, masks, knights and other subjects introduced into foliage, form the designs. Salisbury cathedral is noted for its stall elbows, and the reredos in the south transept of Addisham, Kent, is another fine example testifying to the great skill of the 13th-century wood-carvers. A very interesting set of stalls, the early history of which is unknown, was placed in Barming church, Kent, about the year 1868. The book rest ends are carved with two scrolls and an animal standing between, and the ends of the stalls with figure sculpture: Christ rescuing souls from Hell, Samson slaying the lion, St George and the dragon, &c. The work of these stalls is that of an artist who knew what effect he wanted to produce and got it. There is in the Berlin Museum a very fine example of a 13th-century prayer desk from Johanniskirche in Herford. The front is carved in three panels under arches, two with vine leaves and grapes and the other with an oak tree conventionally treated. Along the arches is carved in Latin "this three-divisioned desk has John with the help of Thomas carved. Who will not praise this work may he then be removed," a somewhat drastic method of obtaining favourable criticism.

1300–1380.—During this period foliage forms, though still conventional, more closely followed nature. The canopy work of the choir of Winchester contains exquisite carvings of oak and other leaves. The choir stalls of Ely and Chichester and the tomb of Edward III. in Westminster Abbey are all fine examples of this period. Exeter boasts a throne—that of Bishop Stapledon (A.D. 1308–1326) standing 57 ft. high—which remains unequalled for perfection of proportion and delicacy of detail (Plate IV. fig. 8). In France the stalls of St Benoit-sur-Loire, Lisieux, and Evreux are good 14th-century examples. But little Gothic work is now to be seen in the churches of this country It is to the museums we have to look for traces of the old Gothic carvers. The two retables in Dijon Museum, the work of Jacques de Baerze (1301), a sculptor of Flanders, who carved for Philippe le Hardi, duke of Burgundy, are masterpieces of design and workmanship The tracery is of the very finest, chiefly gilt on backgrounds of diapered gesso (Plate I fig 1).

1380–1520—Towards the end of the 14th century carvers gave up natural foliage treatment to a great extent, and took to more conventional forms (Plate III fig. 4). The oak and the maple no longer inspired the designer, but the vine was constantly employed. A very large amount of 15th century work remains to us, but the briefest reference only can be made to some of the more beautiful examples that help to make this period so great.

The rood screen.

The rood screen, that wonderful feature of the medieval church, was now universal. It consisted of a tall screen of usually about 11 ft. high, on the top of which rested a loft, *i.e.* a platform about 6 ft. in width guarded on either side by a gallery and either on the top or in front of that, facing the nave, was placed the rood, *i.e.* a large crucifix with figures of St Mary and St John on either side. This rood screen sometimes spanned the church in one continuous length (Leeds, Kent), but often filled in the aisle and chancel arches in three separate divisions (Church Handborough, Oxon.). The loft was as a rule approached by a winding stair built in the thickness of the aisle wall. The lower part of the screen itself was solid panelled to a height of about 3 ft. 6 in. and the upper part of this panelling was filled in with tracery (Carbrook, Norfolk), while the remaining flat surfaces of the panels were often pictured with saints on a background of delicate gesso diaper (Southwold, Suffolk). Towards the end of this period the employment of figures became less common as a means of decoration, and the panels were sometimes filled entirely with carved foliage (Swimbridge, Devon). The upper part of the rood screen consisted of open arches with the heads filled in with pierced tracery, often enriched with crockets (Scarning, Norfolk), embattled transoms (Castle Hedingham, Essex), or floriated cusps (Eye, Suffolk). The mullions were constantly carved with foliage (Cheddar, Somerset), pinnacles (Causton, Norfolk), angels (Pilton, Devon), or decorated with canopy work in gesso (Southwold). But the feature of these beautiful screens was the loft with its gallery and vaulting. The loft floor rested on the top of the rood screen and was usually balanced and kept in position by means of a groined vaulting (Harberton, Devon) or a cove (Eddington, Somerset). The finest examples of vaulting are to be seen in Devon (Plate IV. fig 10). The bosses at the intersections of the ribs and the carved tracery of the screen at Honiton stand unrivalled. Many screens still possess the beam which formed the edge of the loft floor and on which the gallery rested. It was here that the medieval rood-screen carver gave most play to his fancy, and carved the finest designs in foliage to be seen throughout the whole Gothic period. Although these massed moulds, crests and bands have the appearance of being carved out of one log, they were in practice invariably built up in parts, much of the foliage, &c., being pierced and placed in hollow moulds in order to increase the shadow. As a rule the arrangement consisted of a crest running along the top, with a smaller one depending from the lower edge, and three bands of foliage and vine between them (Feniton, Devon). The designs of vine leaves at Kenton (Plate IV. fig. 10), Bow and Dartmouth, all in Devon, illustrate three very beautiful treatments of this plant. At Swimbridge, Devon, there is a very elaborate combination; the usual plain beads which separate the bands are carved with twisted foliage also. At Abbots Kerswell and other places in the district round Totnes the carvers introduced birds in the foliage with the best effect. The variety of cresting used is very great. That at Winchcomb, Gloucester, consists of dragons combined with vine leaves and foliage. It illustrates how Gothic carvers sometimes repeated their patterns in as mechanical a way as the worst workmen of the present time. Little can be said of the galleries, so few remain to us. They were nearly all pulled down when the order to destroy the roods was issued in 1548. That they were decorated with carved saints under niches (Llananno, Wales), or painted figures (Strencham, Worcester), is certain from the examples that have survived the Reformation. At Atherington, Devon, the gallery front is decorated with the royal coat of arms, other heraldic devices, and with prayers. The Breton screen at St Fiacre-le-Faouet is a wonderful example of French work of this time, but does not compare with the best English examples. Its flamboyant lines and its small tracery never obtained any foothold in England, though screens carved in this way (Colebrook, Devon) are sometimes to be found.

The rood was sometimes of such dimensions as to require some support in addition to the gallery on which it rested. A carved beam was used from which a chain connected the rood itself. At Cullompton, Devon, such a beam still exists, and is carved with foliage; an open cresting ornaments the under side and two angels support the ends. This particular rood stood on a base of rocks, skulls and bones, carved out of two solid logs averaging 18 in. wide and 21 in. high, and together measuring 15 ft. 6 in. long; there are round holes along the top which were probably used for lights.

Roofs.

No country in Europe possesses roofs to equal those of England in the 15th century. The great roof of Westminster Hall (see ROOF) remains to the present day without an equal. In Norfolk and Suffolk roofs abound of the hammer-beam class; that at Woolpit, Suffolk, is of the first rank. Each bracket is carved with strongly designed foliage, the end of every beam terminates in an angel carrying a shield, and the purlins are crested, while each truss is supported by a canopied niche (containing a figure) resting on an angel corbel. Here, too, as at Ipswich and many other churches, there is a row of angels with outspread wings under the wall-plate. This idea of angels in the roof is a very beautiful one, and the effect was of course much enhanced by the colouring. The roof at St Nicholas, King's Lynn, is a magnificent example of tie-beam construction. The trusses are filled in with tracery at the sides and the centres more or less open, and the beams, which are crested and embattled, contain a row of angels on either side. In Devon, Cullompton possesses a very fine semicircular ceiling supported at intervals by ribs pierced with carving. Each compartment is divided up into small square panels, crossed by diagonal ribs of cresting, while every joint is ornamented with a boss carved in the decorative way peculiar to the Gothic craftsman. The nave roof of Manchester cathedral is nearly flat, and is also divided up into small compartments and bossed, the beams are supported by carved brackets resting on corbels with angels at each base.

Choir stalls.

In the 15th century, choir stalls with their canopies continued to increase in magnificence. Manchester cathedral (middle of 15th century) and Henry VII.'s chapel in Westminster Abbey (early 16th) are good examples of the fashion of massing pinnacles and canopies; a custom which hardly compares with the more simple beauty of the 14th-century work of Ely cathedral. The stalls of Amiens cathedral were perhaps the finest in the world at the beginning of the 16th century. The cresting employed, though common on the Continent, is of a kind hardly known in England, consisting as it does of arches springing from arches, and decorated with crockets and finials. The tabernacle work over the end seats, with its pinnacles and flying buttresses, stretches up towards the roof in tapering lines of the utmost delicacy. The choir stalls (the work of Jorg Syrlin, 1468) in Ulm cathedral are among the finest produced by the German carver (Plate III. fig. 4). The front panels are carved with foliage of splendid decorative boldness, strength and character; the stall ends were carved with foliage and sculpture along the top edge, as was sometimes the case in Bavaria and France as well as Germany.

Bench ends.

In early times the choir alone possessed seats, the nave being left bare. Gradually benches were introduced, and during the 15th century became universal. The "poppy-head" form of ornament now reached perfection and was constantly used for seats other than those of the choir. The name refers to the carved finial which is so often used to complete the top of the bench end and is peculiarly English in character. In Devon and Cornwall it is rarely met with (Ilsington, Devon). In Somerset it is more common, while in the eastern counties thousands of examples remain. The quite simple fleur-de-lys form of poppy-head, suitable for the village, is seen in perfection at Trunch, Norfolk, and the very elaborate form when the poppy-head springs from a crocketed circle filled in with sculpture, at St Nicholas, King's Lynn. Often the foliage contained a face (Cley, Norfolk), or the poppy-head consisted of figures or birds only (Thurston, Suffolk) or a figure standing on a dragon (Great Brincton, Northampton); occasionally the traditional form was departed from and the finial carved like a lemon in outline (Bury St Edmunds) or a diamond (Tirley, Glos.). In Denmark an ornament in the form of a large circle sometimes takes the place of the English poppy-head. In the Copenhagen Museum there is a set of bench ends of the 15th century with such a decoration carved with coats of arms, interlacing strap-work, &c. But the old 15th-century bench end did not depend entirely on the poppy-head for its embellishment. The side was constantly enriched with elaborate tracery (Dennington, Norfolk) or with tracery and domestic scenes (North Cadbury, Somerset), or would consist of a mass of sculpture in perspective, with canopy work, buttresses and sculptured niches, while the top of the bench end would be crowned with figures carved in the round, of the finest craftsmanship. Such work at Amiens cathedral is a marvel alike of conception, design and execution. In the Kunstgewerbe Museum, Berlin, some beautiful stall ends are to be seen. Out of a dragon's mouth grows a conventional tree arranged and balanced in excellent proportion. On another stall end a tree is carved growing out of the mouth of a fool. This custom of making foliage grow out of the mouth or eyes is hardly defensible, and was by no means confined to any country or time. We have plenty of Renaissance examples of the same treatment.

Pulpits.

Before the 15th century preaching had not become a regular institution in England, and pulpits were not so common. However, the value of the sermon began to be appreciated from the use to which the Lollards and other sects put this method of teaching doctrine, and pulpits became a necessity. A very beautiful one exists at Kenton, Devon. It is, as is generally the case, octagonal, and stands on a foot. Each angle is carved with an upright column of foliage between pinnacles, and the panels, which are painted with saints, are enriched with carved canopies and foliage; it is, however, much restored. The pulpit at Trull, Somerset, is noted for its fine figure carving. A large figure standing under a canopy fills each of the panelled sides, while many other smaller figures help to enrich the general effect. Examples of Gothic sounding boards are very rare; that, together with the pulpit, in the choir of Winchester is of the time of Prior Silkstede (1520), and is carved with his rebus, a skein of twisted silk.

Font covers.

The usual form of font cover during the hundred years before the Reformation was pyramidal, the ribs of the salient angles being straight and cusped (Frindsbury, Kent) or of curved outline and cusped (St Mildred, Canterbury). There is a very charming one of this form at Colebrook, Devon. It is quite plain but for a little angel kneeling on the top, with its hands clasped in prayer. But the most beautiful form is the massed collection of pinnacles and canopy work, of which there is such a fine example at Sudbury, Suffolk. It was not uncommon to carve a dove on the topmost pinnacle (Castleacre, Norfolk), in allusion to the descent of the Holy Spirit. The finest font in England is undoubtedly that of Ufford, Suffolk. It rises some 20 ft. in height, and when the panels were painted with saints and the exquisite tabernacle work coloured and gilded, must have been a masterpiece of Gothic craftsmanship. A cord connecting the tops of these covers with the roof or with a carved beam standing out from the wall, something like a crane (Salle, Norfolk), was used to remove the cover on the occasion of baptism.

Lecterns.

Many lecterns of the Gothic period do not exist to-day. They usually had a double sloping desk which revolved round a central moulded post. The lectern at Swanscombe, Kent, has a circle of good foliage ornamenting each face of the book rest, and some tracery work at either end. The box form is more common in France than in England, the pedestal of such a lectern being surrounded by a casing of three or more sides. A good example with six sides is in the church of Vance (France), and one of triangular form in the Musée of Bourges, while a four-sided box lectern is still in use in the church of Lenham, Kent. The Gothic prayer desk, used for private devotional purposes, is hardly known in England, but is not uncommon on the Continent. There is a beautiful specimen in the Musée, Bourges; the front and sides of the part for kneeling are carved with that small tracery of flowing character so common in France and Belgium during the latter part of the 15th century, and the back, which rises to a height of 6 ft., contains a little crucifix with traceried decoration above and below.

Ciboria.

A word should be said about the ciboria, so often found on the continent of Europe. In tapering arrangement of tabernacle work they rival the English font covers in delicacy of outline (Musée, Rouen).

Doors.

Numbers of doors are to be met with not only in churches but also in private houses. Lavenham, Suffolk, is rich in work of this latter class. In England the general custom was to carve the head of the door only with tracery (East Brent, Somerset), but in the Tudor period doors were sometimes covered entirely with "linenfold" panelling (St Albans Abbey). This form of decoration was exceedingly common on the Continent as well as in England. In France the doors towards the latter part of the 15th century were often square-headed, or perhaps had the corners rounded. These doors were usually divided into some six or eight oblong panels of more or less equal size. One of the doors of Bourges Cathedral is treated thus, the panels being filled in with very good tracery enriched with crockets and coats of arms. But a more restrained form of treatment is constantly employed, as at the church of St Godard, Rouen, where the upper panels only are carved with tracery and coats of arms and the lower adorned with simple linenfold design.

Altar-pieces.

To Spain and the Teutonic countries of Europe we look for the most important object of church decoration, the retable; the Reformation accounting for the absence in England of any work of this kind. The magnificent altar-piece in Schleswig cathedral was carved by Hans Bruggerman, and consists, like many others, of a number of panels filled with figures standing some four or five deep. The figures in the foremost rows are carved entirely separate, and stand out by themselves, while the background is composed of figure work and architecture, &c., in diminishing perspective. The panels are grouped together under canopy work forming one harmonious whole. The genius of this great carver shows itself in the large variety of the facial expression of those wonderful figures all instinct with life and movement. In France few retables exist outside the museums. In the little church of Marissel, not far from Beauvais, there is a retable consisting of eleven panels, the crucifixion being, of course, the principal subject. And there is a beautiful example from Antwerp in the Musée Cluny, Paris; the pierced tracery work which decorates the upper part being a good example of the style composed of interlacing segments of circles so common on the Continent during late Gothic times and but seldom practised in England. In Spain the cathedral of Valladolid was famous for its retable, and Alonso Cano and other sculptors frequently used wood for large statuary, which was painted in a very realistic way with the most startlingly lifelike effect. Denmark also possessed a school of able wood-carvers who imitated the great altar-pieces of Germany. A very large and well-carved example still exists in the cathedral of Roskilde. But besides these great altar-pieces tiny little models were carved on a scale the minuteness of which staggers the beholder. Triptychs and shrines, &c., measuring but a few inches were filled in with tracery and figures that excite the utmost wonder. In the British Museum there is such a triptych (Flemish, 1511); the centre panel, measuring an inch or two square, is crowded with figures in full relief and in diminishing perspective, after the custom of this period. This rests on a semicircular base which is carved with the Lord's Supper, and is further ornamented with figures and animals. The whole thing inclusive measures about 9 in. high, and, with the triptych wings open, 5 in. wide. The extraordinary delicacy and minuteness of detail of this microscopic work baffle description. There is another such a piece, also Flemish, in the Wallace collection, which rivals that just referred to in misapplied talent. For, marvellous as these works of art are, they fail to satisfy They make one's eyes ache, they worry one as to how the result could ever have been obtained, and after the first astonishment one must ever feel that the same work of art on a scale large enough for a cathedral could have been carved with half the labour.

Panelling.

With regard to panelling generally, there were, during the last fifty years of the period now under review, three styles of design followed by most European carvers, each of which attained great notoriety Firstly, a developed form of small tracery which was very common in France and the Netherlands. A square-headed panel would be filled in with small detail of flamboyant character, the perpendicular line or mullion being always subordinate, as in the German chasse (Musée Cluny), and in some cases absent, as the screen work of Evreux cathedral shows us. Secondly, the "linenfold" design. The great majority of examples are of a very conventional form, but at Bere Regis, Dorsetshire, the designs with tassels, and at St Sauvéur, Caen, those with fringe work, readily justify the universal title applied to this very decorative treatment of large surfaces. At the beginning of the 16th century yet another pattern became the fashion. The main lines of the design consisted of flat hollow mouldings sometimes in the form of interlacing circles (Gatton, Surrey), at other times chiefly straight (Rochester cathedral), and the intervening spaces would be filled in with cusps or sprigs of foliage. It marks the last struggle of this great school of design to withstand the oncoming flood of the new art—the great Renaissance. From this time onward Gothic work, in spite of various attempts, has never again taken a place in domestic decoration. The lines of the tracery style, the pinnacle, and the crocket—unequalled as they have always been in devotional expression—are universally considered unsuited for decoration in the ordinary dwelling-house.

Domestic work.

But little reference can be made to the domestic side of the period which ended with the dawn of the 16th century, because so few remains exist. On the Continent we have a certain proportion of timbered houses, the feature of which is the sculpture. At Bayeux, Bourges, Reims and pre-eminently Rouen, we see by the figures of saints, bishops or virgins, how much the religious feeling of the middle ages entered into the domestic life. In England the carved corner post (which generally carried a bracket at the top to support the overhanging storey) calls for comment. In Ipswich there are several such posts. On one house near the river, that celebrated subject, the fox preaching to geese, is carved in graphic allusion to the dissemination of false doctrine.

Of mantelpieces there is a good example in the Rouen Museum. The overhanging corners are supported by dragons and the plain mouldings have little bunches of foliage carved at either end, a custom as common in France during the 15th century as it was in England a century earlier; the screen beam at Eastbourne parish church, for example.

As a rule, cabinets of the 15th century were rectangular in plan. In Germany and Austria the lower part was often enclosed, as well as the upper; the top, middle and lower rails being carved with geometrical design or with bands of foliage (Museum, Vienna). But it was also the custom to make these cupboards with the corners cut off, thus giving five sides to the piece of furniture. A very pretty instance, which is greatly enhanced by the metal work of the lock plates and hinges, is in the Musée Cluny, and there are other good specimens with the lower part open in the Victoria and Albert Museum, South Kensington.

The chest was a very important piece of furniture, and is often to be met with covered with the most elaborate carving (Orleans Museum). There is a splendid chest (14th century) in the Cluny Museum; the front is carved with twelve knights in armour standing under as many arches, and the spandrels are filled in with faces, dragons and so on. But it is to the 15th century that we look for the best work of this class; there is no finer example than that in the Kunstgewerbe Museum, Berlin (Plate III. fig. 6). The front is a very animated hunting scene most decoratively arranged in a scheme of foliage, and the top bears two coats of arms with helms, crests and mantling. But the more general custom in chest decoration was to employ tracery with or without figure work; Avignon Museum contains some typical examples of the latter class.

A certain number of seats used for domestic purposes are of great interest. A good example of the long bench placed against the wall, with lofty panelled back and canopy over, is in the Musée Cluny, Paris. In the Museum at Rouen is a long seat of a movable kind with a low panelled back of pierced tracery, and in the Dijon Museum there is a good example of the typical chair of the period, with arms and high panelled and traceried back. There was a style of design admirably suited to the decoration of furniture when made of softwood such as pine. It somewhat resembled the excellent Scandinavian treatment of the 10th-12th centuries already referred to. A pattern of Gothic foliage, often of beautiful outline, would be simply grounded out to a shallow depth. The shadows, curves and twists only being emphasized by a few well-disposed cuts with a "V" tool; and of course the whole effect greatly improved by colour. A Swiss door of the 15th century in the Berlin Museum, and some German, Swiss and Tirolese work in the Victoria and Albert Museum, offer patterns that might well be imitated to-day by those who require simple decoration while avoiding the hackneyed Elizabethan forms.

Figure work.

It is hard to compare the figure work of England with that on the Continent owing to the disastrous effect of the Reformation. But when we examine the roofs of the Eastern counties, the bench ends of Somerset, or the misereres in many parts of the country, we can appreciate how largely wood sculpture was used for purposes of decoration. If as a rule the figure work was not of a very high order, we have conspicuous exceptions in the stall elbows of Sherborne, and the pulpit of Trull, Somerset. Perhaps the oldest instance is the much-mutilated and much-restored effigy of Robert, duke of Normandy, in Gloucester Cathedral (12th century), and carved, as was generally the case in England, in oak. At Clifton Reynes, Buckingham, there are two figures of the 13th century. They are both hollowed out from the back in order to facilitate seasoning the wood and to prevent cracking. During the 13th, 14th and 15th centuries there are numberless instances of figure carving of the most graphic description afforded in the misereres in many of our churches and cathedrals. But of figures carved in the round apart from their surroundings hardly an instance remains. At the little chapel of Cartmel Fell, in the wilds of Westmorland, there is a figure of Our Lord from a crucifix, some 2 ft. 6 in. in length. The cross is gone, the arms are broken away, and the feet have been burned off. A second figure of Our Lord (originally in the church of Keynes Inferior) is in the museum of Caerleon, and a third, from a church in Lincolnshire, is now in a private collection. On the continent some of the finest figure work is to be found in the retables, some of which are in the Victoria and Albert Museum. A Tirolese panel of the 15th century carved in high relief, representing St John seated with his back to the onlooker, is a masterpiece of perspective and foreshortening, and the drapery folds are perfect. The same may be said of a small statue of the Virigin, carved in lime by a Swiss hand, and some work of the great Tylman Reimenschneider of Wurzburg (1468–1531) shows that stone sculptors of medieval times were not ashamed of wood.

Renaissance Period (*16th-17th Centuries*).—With the beginning of the 16th century the great Renaissance began to elbow its way in to the exclusion of Gothic design. But the process was not sudden, and much transition work has great merit. The rood screen at Hurst, Berkshire, the stall work of Cartmel Priory, Westmorland, and the bench ends of many of the churches in Somerset, give good illustrations. But the new style was unequal to the old in devotional feeling, except in classic buildings like St Paul's cathedral, where the stalls of Grinling Gibbons better suit their own surroundings. The rest of this article will therefore be devoted in the main to domestic work, and the exact location of examples can only be given when not the property of private owners or where the public have access.

During the 16th century the best work is undoubtedly to be found on the Continent, France, Germany and the Netherlands producing numberless examples not only of house decoration but of furniture as well. The wealth of the newly discovered American continent was only one factor which assisted in the civilizing influence of this time, and hand in hand with the spread of commerce came the desire for refinement. The custom of building houses chiefly in wood wherever timber was plentiful continued. Pilasters took the place of pinnacles, and vases or dolphins assisted the acanthus leaf to oust the older forms of design. House fronts of wood gave ample scope to the carver. That of Sir Paul Pinder (1600), formerly in Bishopsgate, but now preserved in the Victoria and Albert Museum, is a good example of decorative treatment without overloading. The brackets carved in the shape of monsters which support the projecting upper storey are typical of hundreds of dwellings, as for instance St Peter's Hospital, Bristol. The panels, too, of Sir Paul Pinder's house should be noted as good examples of that Jacobean form of medallion surrounded by scroll work which is at once as decorative as it is simple.

In England that familiar style known as Elizabethan and Jacobean prevailed throughout the 16th and 17th centuries. At the present time hardly a home in the land has not its old oak chest carved with the familiar half circle or scroll border along the top rail, or the arch pattern on the panels. The court cupboards, with their solid or open under parts and upper cornice supported by turned balusters of extravagant thickness, are to be seen wherever one goes. And chairs, real as well as spurious, with solid backs carved in the usual flat relief, are bought up with an avidity inseparable from fashion. Four-post bedsteads are harder to come by. The back is usually broken up into small panels and carved, the best effect being seen in those examples where the panelling or the framework only is decorated. The dining-hall tables often had six legs of great substance, which were turned somewhat after the shape of a covered cup, and were carved with foliage bearing a distant resemblance to the acanthus. Rooms were generally panelled with oak, sometimes divided at intervals by flat pilasters and the upper frieze carved with scroll work or dolphins. But the feature which distinguished the period was the fire mantel. It always must be the principal object in a room, and the Elizabethan carver fully appreciated this fact. By carving the chimney breast as a rule to the ceiling and covering the surrounding walls with more or less plain panelling, the designer, by thus concentrating the attention on one point, often produced results of a high order. Caryatid figures, pilasters and friezes were among the customary details employed to produce good effects. No finer example exists than that lately removed from the old palace at Bromley-by-Bow to the Victoria and Albert Museum. The mantelshelf is 6 ft. from the ground and consists of a deep quadrant mould decorated with flat scroll work of good design. The supporting pilasters on either side are shaped and moulded in the customary Jacobean manner and are crowned by busts with Ionic capitals on the heads. Above the shelf the large centre panel is deeply carved with the royal coat of arms with supporters and mantling, and on either side a semicircular arched niche contains a figure in classic dress. The Elizabethan carver often produced splendid staircases, sometimes carving the newel posts with heraldic figures bearing coats of arms, &c. The newels of a staircase at Highgate support different types of Cromwellian soldiers, carved with great vivacity and life. But in spite of excellent work, as for example the beautiful gallery at Hatfield, the carving of this period did not, so far as England was concerned, compare with other epochs, or with contemporary work in other parts of Europe. Much of the work is badly drawn and badly executed. It is true that good decorative effects were constantly obtained at the very minimum of cost, but it is difficult to discover much merit in work which really looks best when badly cut.

In France this flat and simple treatment was to a certain extent used. Doors were most suitably adorned in this way, and the split baluster so characteristic of Jacobean work is often to be met with. There are some very good cabinets in the museum at Lyngby, Denmark, illustrating these two methods of treatment in combination. But the Swiss and Austrians elaborated this style, greatly improving the effect by the addition of colour. However, the best Continental designs adopted the typical acanthus foliage of Italy, while still retaining a certain amount of Gothic feeling in the strength of the lines and the "cut" of the detail (Plate IV. fig. 9). Panelling—often long and narrow—was commonly used for all sorts of domestic purposes, a feature being a medallion in the centre with a simple arrangement of vase, dolphins, dragons, or birds and foliage filling in the spaces above and below.

The cabinets of Holland and Belgium are excellent models of design. These pieces of furniture were usually arranged in two storeys with a fine moulded and carved cornice, mid division and plinth. The pilasters at the sides, and small raised panels carved only on the projecting part, would compose a very harmonious whole. A proportion of the French cabinets are decorated with caryatids not carved in the best taste, and, like other French woodwork of this period, are sometimes overloaded with sculpture. The doors of St Maclou, Rouen, fine as they are, would hardly to-day be held up as models for imitation. A noteworthy set of doors belong to the Hôtel de Ville, Oudenarde. The central door contains twelve and that on either side eight panels, each of which is carved with Renaissance foliage surrounding an unobtrusive figure. In the Palais de Justice we see that great scheme of decoration which takes up the whole of the fireplace end of the hall. Five large figures carved in the round are surrounded by small ones and with foliage and coats of arms.

In Italy, the birthplace of the Renaissance, there is much fine work of the 16th century. A very important school of design was promoted by Raphael, whose patterns were used or adapted by a large number of craftsmen. The shutters of "Raphael's Stanze" in the Vatican, and the choir stalls in the church of St Pietro de' Cassinesi at Perugia, are among the most beautiful examples of this style of carving. The work is in slight relief, and carved in walnut with those graceful patterns which Raphael developed out of the newly discovered remains of ancient Roman wall painting from the palace of Nero and other places. In the Victoria and Albert Museum are many examples of Italian work (Plate IV. fig. 11): the door from a convent near Parma, with its three prominent masks and heavy gadroon moulds; a picture frame with a charming acanthus border and egg and tongue moulds on either side; and various marriage chests in walnut covered with very elaborate schemes of carving. It is sometimes difficult to distinguish Spanish, or for that matter South of France work, from Italian, so much alike is the character. The Spaniards yield to none in good workmanship. Some Spanish panels of typical Italian design are in the Victoria and Albert Museum as well as cabinets of the purest Renaissance order. There is a wonderful Portuguese coffer (17th century) in this section. The top is deeply carved in little compartments with scenes from the life of Our Lord.

17th-18th Centuries.—In England the great school of Grinling Gibbons arose. Although he carved many beautiful mouldings of conventional form (Hampton Court Palace, Chatsworth, &c.), his name is usually associated with a very heavy form of decoration which was copied direct from nature. Great swags of drapery and foliage with fruit and dead birds, &c., would be carved in lime a foot thick. For technical skill these examples are unsurpassed; each grape would be undercut, the finer stalks and birds' legs stand out quite separate, and as a consequence soon succumb to the energy of the housemaid's broom. Good work of this class is to be found at Petworth; Trinity College, Oxford; Trinity College, Cambridge; St Paul's cathedral; St James', Piccadilly; and many other London churches.

During the reigns of Louis XIV. and XV. the principal merit of carved design, *i.e.* its appropriateness and suitability, gradually disappeared. Furniture was often carved in a way hardly legitimate. The legs, the rails of tables and chairs, the frames of cabinets, of looking-glasses, instead of being first made for construction and strength, and then decorated, were first designed to carry cherubs' heads and "rococo" (*i.e.* rock and shell ornament), quite regardless of utility or convenience. A wealth of such mistaken design was also applied to state carriages, to say nothing of bedsteads and other furniture. However, the wall panelling of the mansions of the rich, and sometimes the panelling of furniture, was decorated with rococo design in its least illegitimate form. The main part of the wood surface would be left plain, while the centre would be carved with a medallion surrounded by foliage, vases or trophies of torches and musical instruments, &c., or perhaps the upper part of the panel would be thus treated. France led the fashion, which was more or less followed all over Europe. In England gilt chairs in the style of Louis XV. were made in some quantities. But Thomas Chippendale, Ince and Mayhew, Sheraton, Johnson, Heppelwhite and other cabinet-makers did not as a rule use much carving in their designs. Scrolls, shells, ribbon, ears of corn, &c., in very fine relief, were, however, used in the embellishment of chairs, &c., and the claw and ball foot was employed as a termination to the cabriole legs of cabinets and other furniture.

The mantelpieces of the 18th century were as a rule carved in pine and painted white. Usually the shelves were narrow and supported by pilasters often of flat elliptic plan, sometimes by caryatids, and the frieze would consist of a raised centre panel carved with a classic scene in relief, or with a mask alone, and on either side a swag of flowers, fruit and foliage.

Interior doorways were often decorated with a broken pediment more or less ornate, and a swag of foliage commonly depended from either side over a background of scroll work. The outside porches so often seen in Queen Anne houses were of a character peculiar to the 18th century. A small platform or curved roof was supported by two large and heavy brackets carved with acanthus scroll work. The staircases were as a rule exceedingly good. Carved and pierced brackets were fixed to the "open strings" (*i.e.* the sides of the steps), giving a very pretty effect to the graceful balustrade of turned and twisted columns.

Renaissance figure work calls for little comment. During the 16th century many good examples were produced—those priestly statues in the museum of Sens for example. But the figure work used in the decoration of cabinets, &c., seldom rose above the ordinary level. In the 18th century cherubs' heads were fashionable and statuettes were sometimes carved in boxwood as ornaments, but as a means of decorating houses wood sculpture ceased to be. The Swiss, however, have kept up their reputation for animal sculpture to the present day, and still turn out cleverly carved chamois and bears, &c.; as a rule the more sketchily cut the better the merit. Their more ambitious works, their groups of cows, &c., sometimes reach a high level of excellence.

Of the work of the 19th century little can be said in praise. Outside and beyond the present-day fashion for collecting old oak there seems to be no demand for carved decoration. In church work a certain number of carvers find occupation, as also for repairs or the production of imitations. But the carving one is accustomed to see in hotels or on board the modern ocean palace is in the main the work of the machine. There is no objection to the machine in itself, as it only grounds out and roughly models the design which is finished by hand. Its fatal drawback is that it is of commercial value only when a large number of panels of the same pattern are turned out at the same time. It is this repetition which takes away the life of good work, which places that gulf between the contract job and the individual effort of the artist. The price of all labour has so greatly increased, to build a house is so much more expensive than it was before the days of the trades union that none but the very rich can afford to beautify their home in the way to which our forefathers were accustomed.

Coptic.—In the early medieval period, screens and other fittings were produced for the Coptic churches of Egypt by native Christian workmen. In the British Museum there is a set of ten small cedar panels from the church door of Sitt Miriam, Cairo (13th century). The six sculptured figure panels are carved in very low relief and the four foliage panels are quite Oriental in character, intricate and fine both in detail and finish. In the Cairo Museum there is much work treated after the familiar Arab style, while other designs are quite Byzantine in character. The figure work is not of a very high order.

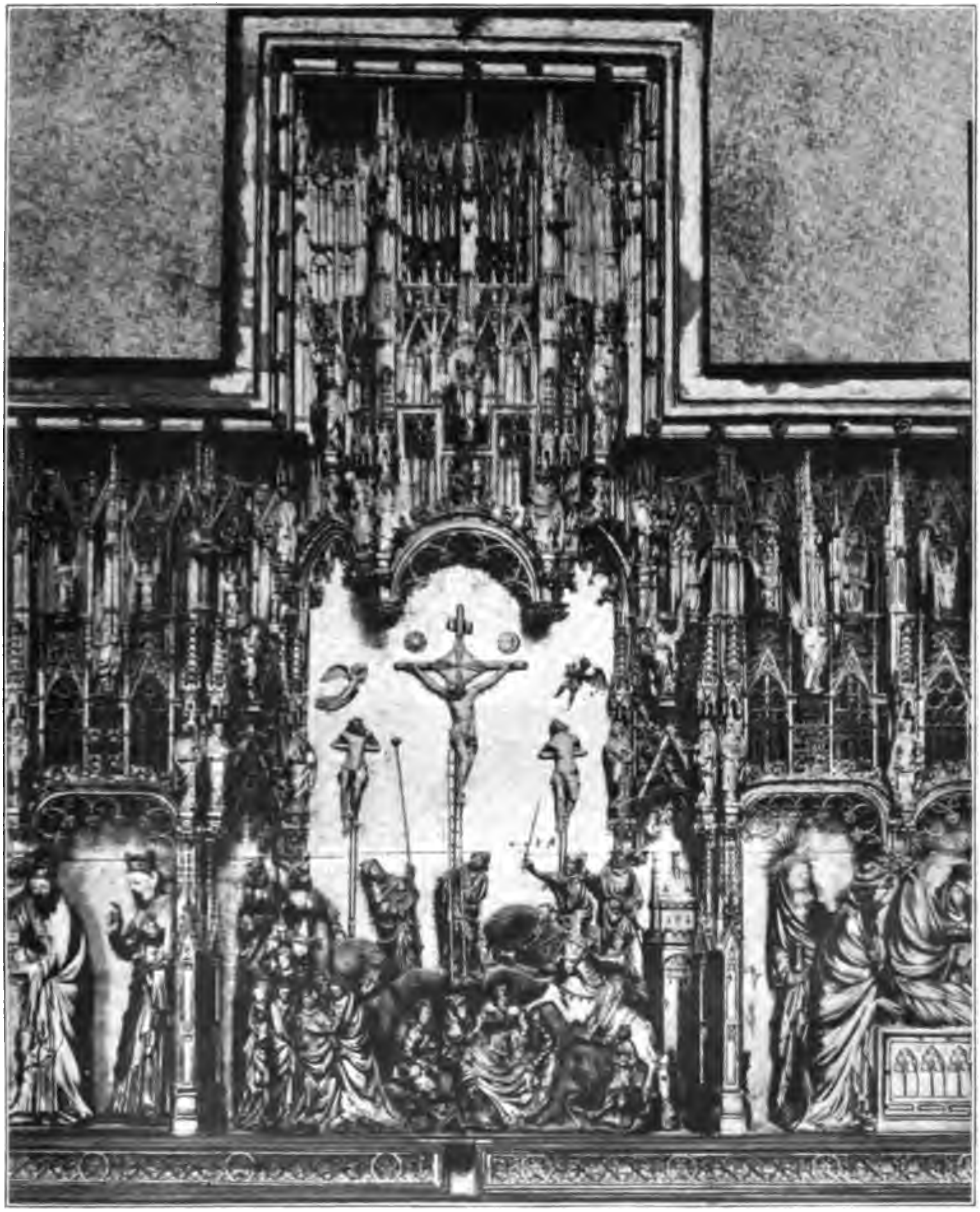
Mohammedan Work.—Nothing can exceed the skill with which the Moslem wood-carvers of Persia, Syria, Egypt and Spain designed and executed the richest panelling and other decorations for wall linings, ceilings, pulpits and all kinds of fittings and furniture. The mosques and private houses of Cairo, Damascus and other Oriental cities are full of the most elaborate and minutely delicate woodwork. A favourite style of ornament was to cover the surface with very intricate interlacing patterns, formed by finely moulded ribs; the various geometrical spaces between the ribs were then filled in with small pieces of wood carved with foliage in slight relief. The use of different woods such as ebony or box, inlaid so as to emphasize the design, combined with the ingenious richness of the patterns, give this class of woodwork an almost unrivalled splendour of effect. Carved ivory is also often used for the filling in of the spaces. The Arabs are past masters in the art of carving flat surfaces in this way. A gate in the mosque of the sultan Bargoug (Cairo, 14th century) well illustrates this appreciation of lines and surfaces. The pulpit or mimbar (15th century) from a Cairo mosque, now in the Victoria and Albert Museum, is also a good example in the same style, the small spaces in this case being filled in with ivory carved in flat relief.

Screens made up of labyrinths of complicated joinery, consisting of multitudes of tiny balusters connecting hexagons, squares or other forms, with the flat surfaces constantly enriched with small carvings, are familiar to every one. In Cairo we also have examples in the mosque of Qous (12th century) of that finely arranged geometrical interlacing of curves with foliage terminations which distinguishes the Saracenic designer. Six panels in the Victoria and Albert Museum (13th century; Plate II. fig. 5), and work on the tomb of the sultan El Ghoury (16th century), show how deeply this form of decoration was ingrained in the Arab nature. Figure work and animals were sometimes introduced, in medieval fashion, as in the six panels just referred to, and at the hôpital du Moristan (13th century) and the mosque of El Nesfy Qeyçoun (14th century). There is a magnificent panel on the door of Beyt-el-Emyr. This exquisite design is composed of vine leaves and grapes of conventional treatment in low relief. The Arab designer was fond of breaking up his panelling in a way reminding one of a similar Jacobean custom. The main panel would be divided into a number of hexagonal, triangular or other shapes, and each small space filled in with conventional scroll work. Much of this simple flat design reminds one of that Byzantine method from which the Elizabethan carvers were inspired.

Persia.—The Persian carvers closely followed Arab design. A pair of doors of the 14th century from Samarkand (Victoria and Albert Museum) are typical. Boxes, spoons and other small articles were often fretted with interlacing lines of Saracenic character, the delicacy and minuteness of the work requiring the utmost patience and skill. Many of the patterns remind one of the sandalwood work of Madras, with the difference that the Persians were satisfied with a much lower relief. Sometimes a very beautiful result was obtained by the sparing use of fretted lattice pattern among foliage. A fine panel of the 14th century in the Victoria and Albert Museum shows how active was Arab influence even as far as Bokhara.

India and Burma.—Throughout the great Indian peninsula wood-carving of the most luxurious kind has been continuously produced for many centuries. The ancient Hindu temples were decorated with doors, ceilings and various fittings carved in teak and other woods with patterns of extreme richness and minute elaboration. We have architectural remains from Kashmir Smats (Punjab) dating from the 3rd or 4th century, the patterns employed being of a bold and decorative character strongly resembling the best Elizabethan design. The doors of the temple of Somnath, on the north-west coast, were famed for their magnificence and were highly valued as sacred relics. In 1024 they were carried off to Ghazni by the Moslem conqueror, Sultan Mahmud, and are now lying at the fort at Agra. The gates which now exist are very fine specimens of ancient wood-carving, but are probably only copies of the original very early doors. The Asiatic carver, like certain of his European brethren, is apt to be carried away by his own enthusiasm and to overcrowd his surfaces. Many a door, column, gallery or even a whole house-front is covered with the most intricate design bewildering to behold (Bhera, Shahpur). But this is not always the case, and the Oriental is at times more restrained in his methods. Architectural detail is to be seen with only a simple enrichment carved round the framing, producing the happiest result. The Hindu treatment of the circle is often exceedingly good, and might perhaps less rarely inspire western design. Sometimes native work strongly resembles Scandinavian of the 12th century. The scrolls are designed on the same lines, and foliage and flowers (beyond elementary buds) are not employed (Burma, 17th century, Victoria and Albert Museum). The pierced work of Bombay calls for note. Foliage, fruit and flowers are constantly adapted to a scheme of fret-cut decoration for doors or windows as well as the frames of chairs and the edges of tables. A reference should also be made to those wonderful sandalwood tables, cabinets and boxes to be seen in Southern India, always covered with design, often with scores of figures and monsters with every space filled in with the minutest decoration. Many of the gong stands of Burma show the highest skill; the arrangement of two figures bearing a pole from which a gong hangs is familiar. The Burmese are sculptors of proved merit.

China and Japan.—In these countries the carver is unrivalled for deftness of hand. Grotesque and imitative work of the utmost perfection is produced, and many of the carvings of these countries, Japan in particular, are beautiful works of art, especially when the carver copies the lotus, lily or other aquatic plant. A favourite form of decoration consists of breaking up the architectural surfaces, such as ceilings, friezes, &c., into framed squares and filling up each



Photo, F. A. Crallan.

Fig. 1.—Centre Panel of Retable in Dijon Museum. Flemish, 1301 A.D.

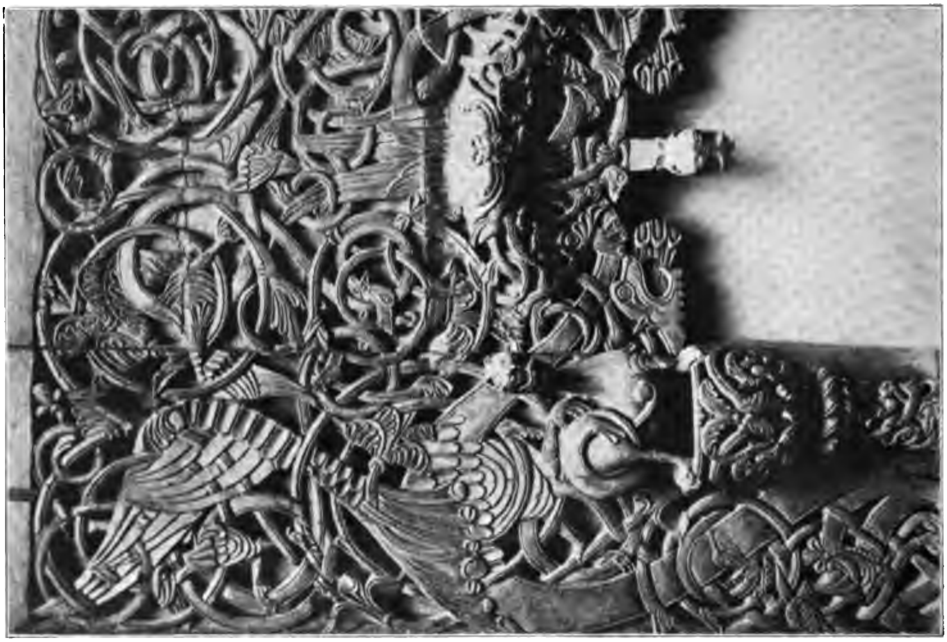


Fig. 3.—Detail of Doorway from Aal, Norway.
Scandinavian, about 1200 A.D.

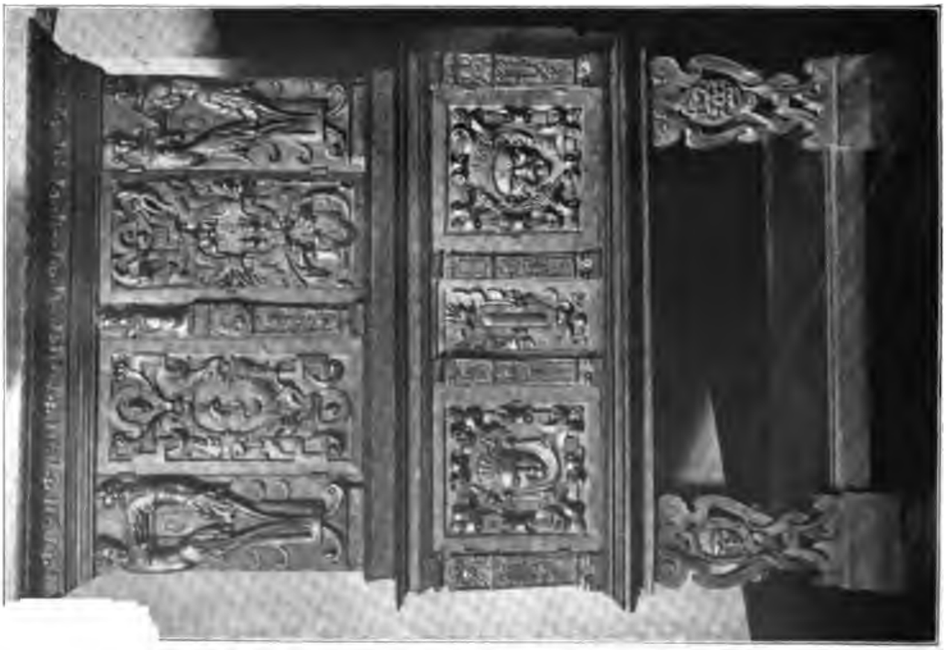


Fig. 2.—French Cabinet. Renaissance, 1577.

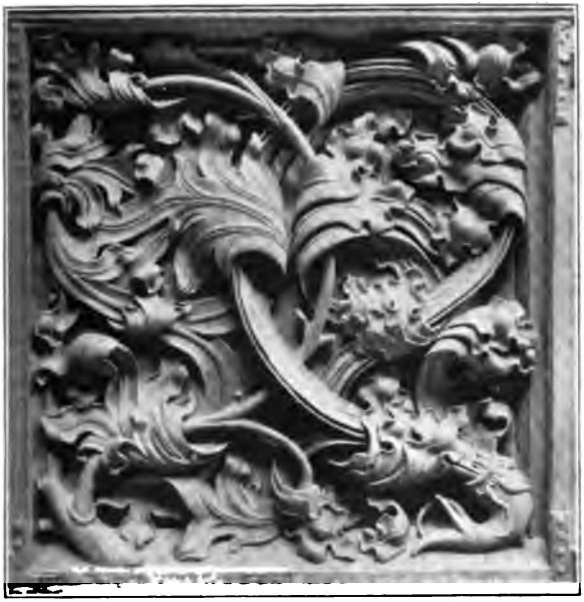


Fig. 4.—Panel from Front of Stalls, Ulm Cathedral. 1468–1474.

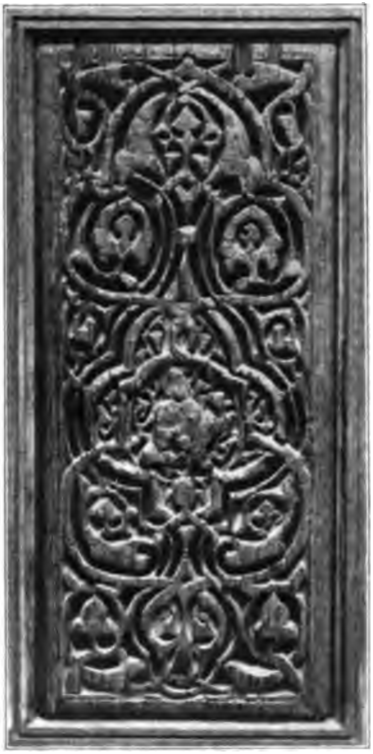
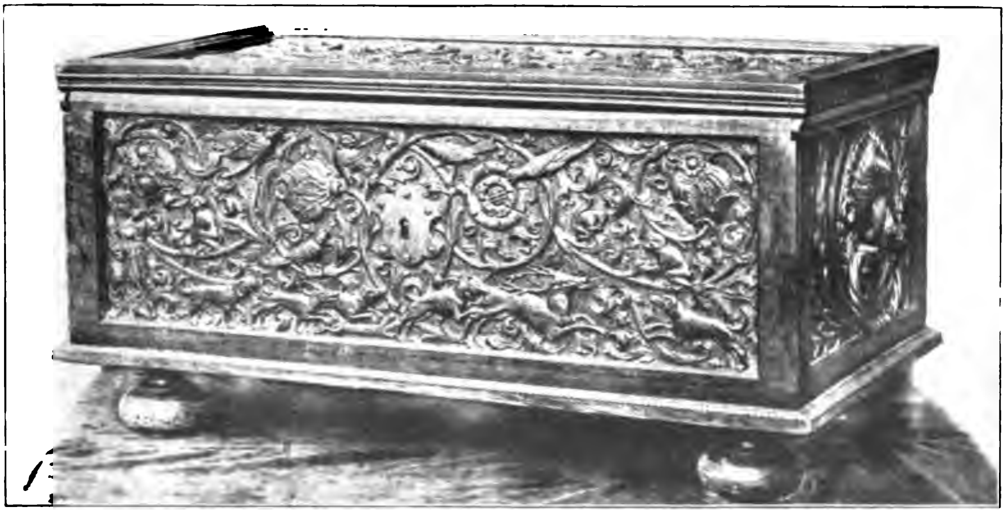


Fig. 5.—Arabian Panel. 13th Century.



From Lessing's Holzschnitzereien, by permission of Ernst Wasmuth.

Fig. 6.—German Chest. Late 15th Century.

WOODCARVING

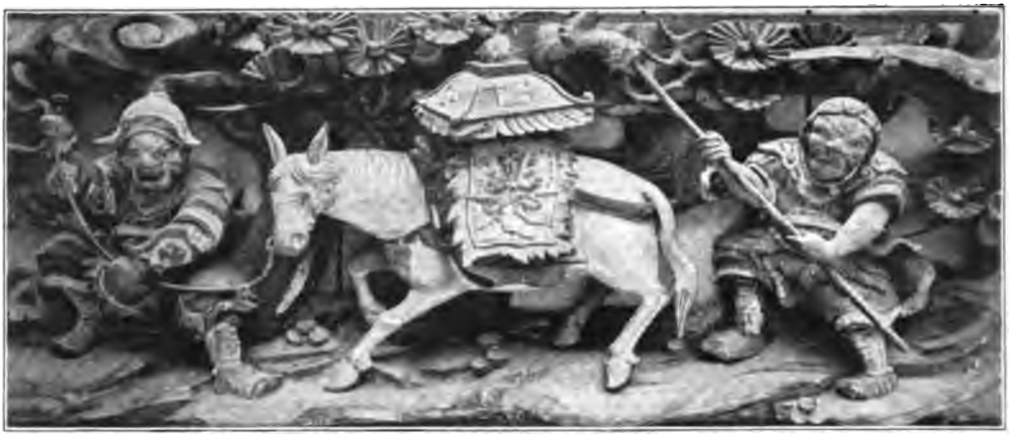


Fig. 7.—Japanese Panel from a Buddhist Temple. Early 18th Century.

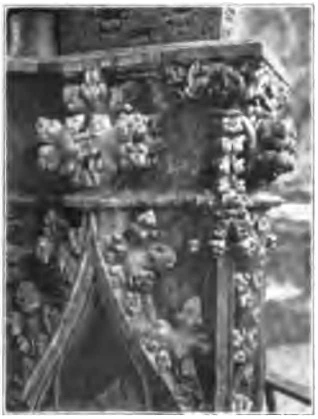


Photo. F. A. Crallan.

Fig. 8.— Detail of Bishop Stapledon's Throne, 1308–1326 A.D. Exeter Cathedral.

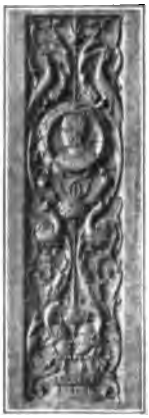


Fig. 9.—Flemish Panel. Renaissance, 16th Century.

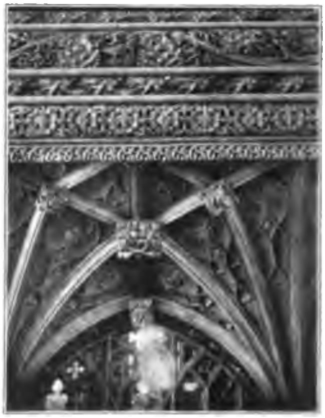


Photo. F. A. Crallan.

Fig. 10.—Detail of Rood-Screen Vaulting. Late 15th Century. Kenton, Devon.

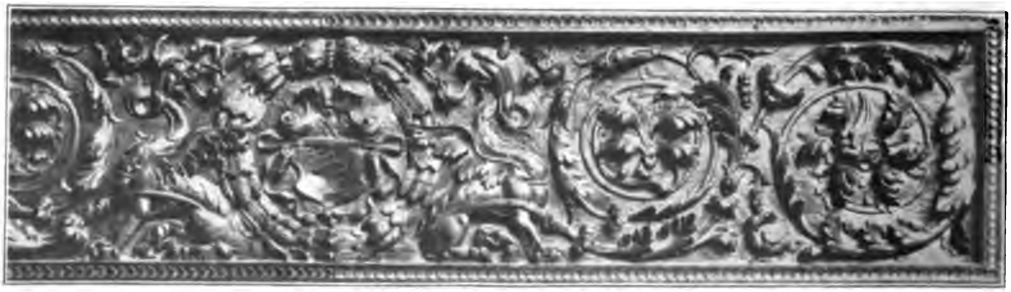


Fig. 11.—Front of Walnut Coffer, 16th Century. Renaissance. Italian.

panel with a circle, or diamond of conventional ng
spandrel in each corner (door of T'ai-hê Hall, Pekin).
feature is the finial of the newel post, so constantly left
straight in profile and deeply carved with monsters and
heavily enriched moulding bearing a strong resemblance
gadroon pattern is commonly used to give emphasis to edges,
the dragon arranged in curves imitative of nature is frequ
employed over a closely designed and subordinated backgrou
The general rule that in every country designers use much the same means whereby a pattern is obtained holds good in China. There are forms of band decoration here which closely resemble those of Gothic Europe, and a chair from Turkestan (3rd century) might almost be Elizabethan, so like are the details. Screens of grill form, so familiar in Mahommedan countries, are common, and the deeply grounded, closely arranged patterns of Bombay also have their counterparts. The imperial dais in the Ch'ien-Ch'ing Hall, Pekin, is a masterpiece of intricate design. The back consists of one central panel of considerable height, with two of lesser degree on either side luxuriously carved. The whole is crowned with a very heavy crest of dragons and scroll work; the throne also is a wonderful example of carved treatment, and the doors of a cabinet in the same building show how rich an effect of foliage can be produced without the employment of stalk or scroll. The Chinaman, who is unequalled as a microscopic worker, does not limit himself to ivory or metal. One might almost say, he wastes his talent on such an ungrateful material as wood. In this material fans and other trifles are carved with a delicacy that courts disaster.

In Japan much of the Chinese type is apparent. The native carver is fond of massing foliage without the stalk to lead him. He appears to put in his foliage, fruit and flowers first and then to indicate a stalk here and there, thus reversing the order of the Western method. Such a treatment, especially when birds and beasts are introduced, has the highest decorative effect. But, as such close treatment is bound to do, it depends for success to some extent upon its scheme of colour. A long panel in the Victoria and Albert Museum, depicting merchants with their packhorse (Plate IV. fig. 7), strongly resembles in its grouping and treatment Gothic work of the 15th century, as for example the panel of St Hubert in the museum at Châlons. The strength and character of Japanese figure work is quite equal to the best Gothic sculpture of the 15th century.

Savage Races.—There is a general similarity running through the carved design of most races of primitive culture, the "chip" form of ornament being almost universally employed. Decorated surfaces depending almost entirely upon the incised line also obtain all over the uncivilized world, and may no doubt be accounted for by the extensive use of stonecutting tools. The savage carver shows the same tendency to over-exalt his art by crowding on too much design as the more civilized craftsman of other lands, while he also on occasion exercises a good deal of restraint by a harmonious balance of decoration and plain space. So far as his chip designs and those patterns more or less depending on the line are concerned, his work as a rule is good and suitable, but when he takes to figure work his attempts do not usually meet with success. Primitive carving, generally, shows that very similar stages of artistic development are passed through by men of every age and race.

A very favourite style of "chip" pattern is that formed by small triangles and squares entirely covering a surface (Hervey Islanders), the monotony being sometimes varied by a band of different arrangement in the middle of the article or at the top or bottom. This form of art is hardly of a kind calculated to enlarge the imagination, though so far as the cultivation of patience and accuracy is concerned, has no equal. But many natives, as for example the Fiji Islanders, employ chip designs rivalling those of Europe in variety. Upon occasion the savage appreciates the way in which plain surfaces contrast and emphasize decorated parts, and judiciously restricts his skill to bands of decoration or to special points (Marquesas Islands). The Ijos of the lower Niger design their paddles in a masterly way, and show a fine sense of proportion between the plain and the decorated surface. Their designs, though slightly in relief, are of the chip nature. The method of decorating a subject with groups of incised lines, straight or curved, though often very effective and in every way suitable, is not a very advanced form of art and has decided limits. The native of the Congo does good work of this kind.

Carving in relief is common enough, idols being produced in many forms, but savage relief work seldom calls for praise. The Kafir carves the handle of his spoon perhaps in the form of a giraffe, and in the round, with each leg cut separately and the four hoofs meeting at the bowl, hardly a comfortable form of handle to hold. The North American Indian shows a wider invention than some nations, the twist in various shapes being a favourite treatment say of pipe stems. The Papuan has quite a style of his own; he uses a scroll of the form familiar in Indian shawls, and in some cases the scroll entwines in a way which faintly suggests the guilloche. The native of New Guinea also employs the scroll for a motive, the flat treatment of which reminds one of a similar method in use in Scandinavian countries. The work of the New Zealander is greatly in advance of the average primitive type; he uses a very good scheme of scroll work for decorative purposes, the lines of the scrolls often being enriched with a small pattern in a way reminding one of the familiar Norman treatment, as for example the prows of his canoes. The

dark shading, but so far is this piece of local colour from being carried out in the rest of the composition that the important foreground figures, with their draperies, are shaded as if they were white statues.
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WOODCOCK (O. carve in high
the *Scolopax rusticula*[1] of ornithol in the same
prized both by the sportsman and for its exc ughtsmen
It has a long bill, short legs and large eyes- er. For
nocturnal or crepuscular habits—with mottled plu rk by
chestnut- and umber-brown, ashy-grey, buff and sh ing,
the last being confined to the tip of the lower side of the it
quills, but the rest intermixed for the most part in
combination. Setting aside the many extreme aberrations from the normal colouring which examples of this species occasionally present (and some of them are extremely curious, not to say beautiful), there is much variation to be almost constantly observed in the plumage of individuals, in some of which the richer tints prevail while others exhibit a greyer coloration. This variation is often, but not always, accompanied by a variation in size or at least in weight.[2] The paler birds are generally the larger, but the difference, whether in bulk or tint, cannot be attributed to age, sex, season or, so far as can be ascertained, to locality. It is, notwithstanding, a very common belief among sportsmen that there are two "species" of woodcock, and many persons of experience will have it that, beside the differences just named, the "little red woodcock" invariably flies more sharply than the other. However, a sluggish behaviour is not really associated with colour, though it may possibly be correlated with weight—for it is quite conceivable that a fat bird will rise more slowly, when flushed, than one which is in poor condition. Ornithologists are practically unanimous in declaring against the existence of two "species" or even "races," and, moreover, in agreeing that the sex of the bird cannot be determined from its plumage, though there are a few who believe that the young of the year can be discriminated from the adults by having the outer web of the first quill-feather in the wing marked with angular notches of a light colour, while the old birds have no trace of this "vandyke" ornament. Careful dissections, weighings and measurings seem to show that the male varies most in size; on an average he is slightly heavier than the female, yet some of the lightest birds have proved to be cocks.[3]

Though there are probably few if any counties in the United Kingdom in which the woodcock does not almost yearly breed, especially since a "close time" has been afforded by the legislature for the protection of the species, there can be no doubt that by far the greater number of those shot in the British Islands have come from abroad,—mostly, it is presumed, from Scandinavia. These arrive on the east coast in autumn—generally about the middle of October—often in an exhausted and impoverished state. If unmolested, they are soon rested, pass inland, and, as would appear, in a marvellously short time recover their condition. Their future destination seems to be greatly influenced by the state of the weather. If cold or frost stop their supply of food on the eastern side of Great Britain they press onward and, letting alone Ireland, into which the immigrant stream is pretty constant, often crowd into the extreme south-west, as Devonshire and Cornwall, and to the Isles of Scilly, while not a few betake themselves to the unknown ocean, finding there doubtless a watery grave, though instances are on record of examples having successfully crossed the Atlantic and reaching Newfoundland, New Jersey and Virginia.

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[1] By Linnaeus, and many others after him, misspelt *rusticola*. The correct form of Pliny and the older writers seems to have been first restored in 1816 by Oken (*Zoologie*, ii. p. 589).

[2] The difference in weight is very great, though this seems to have been exaggerated by some writers. A friend who has had much experience tells us that the heaviest bird he ever knew weighed 16¾ oz., and the lightest 9 oz. and a fraction.

[3] Cf. Dr Hoffmann's monograph *Die Waldschnepfe*, ed. 2, p. 35, published at Stuttgart in 1887.

With regard to the woodcock which breed in Britain, pairing takes place very early in February and the eggs are laid often before the middle of March. These are four in number, of a yellowish cream-colour blotched and spotted with reddish brown, and seldom take the pyriform shape so common among those of Limicoline birds. The nest—always made on the ground amid trees or underwood, and usually near water or at least in a damp locality—is at first little more than a slight hollow in the soil, but as incubation proceeds dead leaves are collected around its margin until a considerable mass is accumulated. During this season the male woodcock performs at twilight flights of a remarkable kind, repeating evening after evening (and it is believed at dawn also) precisely the same course, which generally describes a triangle, the sides of which may be a quarter of a mile or more long. On these occasions the bird's appearance on the wing is quite unlike that which it presents when hurriedly flying after being flushed, and though its speed is great the beats of the wings are steady and slow. At intervals an extraordinary sound is produced, whether from the throat of the bird, as is commonly averred, or from the plumage is uncertain. This characteristic flight is in some parts of England called "roading," and the track taken by the bird a "cock-road."[1] In England in former times advantage was taken of this habit to catch the simple performer in nets called "cock-shutts," which were hung between trees across the open glades or rides of a wood. A still more interesting matter in relation to the breeding of woodcocks is the fact, finally established on good evidence, that the old birds transport their newly hatched offspring, presumably to places where food is more accessible. The young are clasped between the thighs of the parent, whose legs hang down during the operation, while the bill is to some extent, possible only at starting, brought into operation to assist in adjusting the load if not in bearing it through the air.[2]

Woodcock inhabit suitable localities across the northern part of the Old World, from Ireland to Japan, migrating southward towards autumn. As a species they are said to be resident in the Azores and other Atlantic Islands; but they are not known to penetrate very far into Africa during the winter, though in many parts of India they are abundant during the cold weather, and reach even Ceylon and Tenasserim. The popular belief that woodcock live "by suction" is perhaps hardly yet exploded; but those who have observed them in confinement know that they have an almost insatiable appetite for earthworms, which the birds seek by probing soft ground with their highly sensitive and flexible bill.[3] This fact seems to have been first placed on record by Bowles,[4] who noticed it in the royal aviary at San Ildefonso in Spain, and it has been corroborated by other observers, and especially by Montagu, who discovered that bread and milk made an excellent substitute for their ordinary food. They also do well on chopped raw meat.

The eastern part of North America possesses a woodcock, much smaller than, though generally (and especially in habits) similar to, that of the Old continent. It is the *Scolopax minor* of most authors; but, chiefly on account of its having the outer three primaries remarkably attenuated, it has been placed in a separate genus, *Philohela*. In Java is found a distinct and curiously coloured species, described and figured by Horsfield (*Trans. Linn. Society*, xiii. p. 191, and *Zoolog. Researches*, pl.) as *S. saturata*. To this H. Seebohm (*Geographical Distribution of the Family Charadriidae*, p. 506) referred the *S. rosenbergi* of Schlegel (*Nederl. Tijds. v. d. Dierkunde*, iv. p. 54) from New Guinea. Another species is *S. rochusseni* from the Moluccas; this has, like the snipe, the lower part of the tibia bare of feathers. (A. N.)

WOOD ENGRAVING, the art of engraving (*q.v.*) on wood, by lines so cut that the design stands in relief. This method of engraving was historically the earliest, done for the purpose of taking impressions upon paper or other material. It is natural that wood engraving should have occurred first to the primitive mind, because the manner in which woodcuts are printed is the most obvious of all the kinds of printing. If a block of wood is inked with a greasy ink and then pressed on a piece of paper, the ink from the block will be transferred at once to the paper, on which we shall have a black patch exactly the size and shape of the inked surface. Now, suppose that the simple Chinese who first discovered this was ingenious enough to go a step further, it would evidently occur to him that if one of the elaborate signs, each of which in his own language stood for a word, were drawn upon the block of wood, in reverse, and then the whole of the white wood sufficiently cut away to leave the sign in relief, an image of it might be taken on the paper much more quickly than the sign could be copied with a camel-hair brush and Indian ink. No sooner had this experiment been tried and found to answer than block-printing was discovered, and from the printing of signs to the printing of rude images of things, exactly in the same manner, the step was so easy that it must have been made insensibly. Wood engraving, then, is really nothing but that primitive block-cutting which prepared for the printer the letters in relief now replaced by movable types, and the only difference between a delicate modern woodcut and the rude letters in the first printed books is a difference of artistic skill and knowledge. In Chinese and Japanese woodcuts we can still recognize traditions of treatment which come from the designing of their written characters. The main elements of a Chinese or a Japanese woodcut, uninfluenced by European example, are dashing or delicate outlines and markings of various thickness, exactly such as a clever writer with the brush would make with his Indian ink or vermilion. Often we get a perfectly black blot, exquisitely shaped and full of careful purpose, and these broad vigorous blacks are quite in harmony with the kind of printing for which wood engraving is intended.

It has not hitherto been satisfactorily ascertained whether wood engraving came to Europe from the East or was rediscovered by some European artificer. The precise date of the first European woodcut is also a matter of doubt, but here we have certain data which at least set limits to the possibility of error. European wood engraving dates certainly from the first quarter of the 15th century. It used to be believed that a cut of St Christopher (now in the Rylands library, Manchester), rudely executed and dated 1423, was the Adam of all our woodcuts, but since 1844 investigations have somewhat shaken this theory. There is a cut in the Brussels library, of the "Virgin and Child" surrounded by four saints, which is dated 1418, but the composition is so elegant and the drawing so refined and beautiful, that one has a difficulty in accepting the date, though it is received by many as authentic, while it is repudiated by others in the belief that the letters have been tampered with. The "Virgin and Child" of the Paris library is without date, but is supposed, apparently with reason, to be earlier than either of the two mentioned; and Delaborde proved that two cuts were printed in 1406. The "Virgin and Child" at Paris may be taken as a good representative specimen of very early European wood engraving. It is simple art, but not bad art. The forms are drawn in bold thick lines, and the black blot is used with much effect in the hollows and recesses of the design. Beyond this there is no shading. Rude as the work is, the artist has expressed exquisite maternal tenderness in the chief details of the design. The Virgin is crowned, and stands against a niche-like decoration with pinnacles as often seen in illuminated manuscripts. In the woodcut this architectural decoration is boldly but effectively drawn. Here, then, we have real art already, art in which appeared both vigour of style and tenderness of feeling.

The earliest wood engraving consisted of outlines and white spaces with smaller black spaces, cut with a knife, not with a graver, and shading lines are rare or absent. Before passing to shaded woodcuts we may mention a kind of wood engraving practised in the middle of the 15th century by a French engraver (often called Bernard Milnet, though his name is a matter of doubt) and by other engravers nearer the beginning of that century. This method is called the *criblé*, a word for which there is no convenient translation in English, unless we call it *drilled*. It means riddled with small holes, as a target may be riddled with small shot. The effect of light and dark is produced in this kind of engraving by sinking a great number of round holes of different diameters in the substance of the wood, which, of course, all come white in the printing; it is, in effect, a sort of stippling in white. When a more advanced kind of wood engraving had become prevalent the *criblé* was no longer used for general purposes, but it was retained for the grounds of decorative wood engraving, being used occasionally in borders for pages, in printers' marks and other designs, which were survivals in black and white of the ancient art of illuminating. Curiously enough, this kind of wood engraving, though long disused for purposes of art, was in recent times revived with excellent effect for scientific purposes, mainly as a method of illustration for astronomical books. The black given by the untouched wooden block represents the night sky, and the holes, smaller or larger, represent in white the stars and planets of lesser or greater magnitude. The process was perfectly adapted to this purpose, being cheap, rapid and simple. It has also been used in a spasmodic and experimental manner by one or two modern engravers.

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[1] The etymology and consequently the correct spelling of these expressions seem to be very uncertain. Some would derive the word from the French *rôder*, to rove or wander, but others connect it with the Scandinavian *rode*, an open space in a wood (see *Notes and Queries*, ser. 5, ix. p. 214, and ser. 6, viii. pp. 523, 524). Looking to the regular routine followed by the bird, the natural supposition would be that it is simply an application of the English word *road*.

[2] Cf. J. E. Harting, *Zoologist* (1879), pp. 433-440, and Mr Wolf's excellent illustration. Sir R. Payne-Gallwey, in the "Badminton Library" (*Shooting*, ii. p. 118, note), states that he himself has witnessed the performance.

[3] The pair of muscles said by Loche (*Expl. Scient. de l'Algérie*, ii. p. 293) to exist in the maxilla, and presumably to direct the movement of the bill, do not seem to have been precisely described.

[4] *Introduccion a la historia natural y a la geografia fiscia de España*, pp. 454, 455 (Madrid, 1775).

The earlier workmen turned their attention to woodcut in simple black lines, including outline and shading. In early work the outline is firm and very distinct, being thicker in line than the shading, and in the shading the lines are simple, without cross-hatchings, as the workmen found it easier and more natural to take out a white line-like space between two parallel or nearly parallel black lines than to cut out the twenty or thirty small white lozenges into which the same space would have been divided by cross-hatchings. The early work would also sometimes retain the simple black patch which we find in Japanese woodcuts, for example, in the "Christmas Dancers," of Wohlgemuth, all the shoes are black patches, though there is no discrimination of local colour in anything else. A precise parallel to this treatment is to be found in a Japanese woodcut of the "Wild Boar and Hare," given by Aimé Humbert in his book on Japan, in which the boar has a cap which is a perfectly black patch though all other local colour is omitted. The similarity of method between Wohlgemuth and the Japanese artist is close: they both take pleasure in drawing thin black lines at a little distance from the patch and following its shape like a border. In course of time, as wood engravers became more expert, they were not so careful to spare themselves trouble and pains, and then cross-hatchings were introduced, but at first more as a variety to relieve the eye than as a common method of shading. In the 16th century a simple kind of wood engraving reached such a high degree of perfection that the best work of that time has never been surpassed in its own way.

Wood engraving in the 16th century was much more conventional than it became in more recent times, and this very conventionalism enabled it to express what it had to express with greater decision and power. The wood engraver in those days was free from many difficult conditions which hampered his modern successor. He did not care in the least about aerial perspective, and nobody expected him to care about it; he did not trouble his mind about local colour, but generally omitted it, sometimes, however, giving it here and there, but only when it suited his fancy. As for light-and-shade, he shaded only when he wanted to give relief, but never worked out anything like a studied and balanced effect of light-and-shade, nor did he feel any responsibility about the matter. What he really cared for, and generally attained, was a firm, clear, simple kind of drawing, conventional in its indifference to the mystery of nature and to the poetic sentiment which comes to us from that mystery, but by no means indifferent to fact of a decided and tangible kind. The wood engraving of the 16th century was a singularly positive art, as positive as carving; indeed, most of the famous woodcuts of that time might be translated into carved panels without much loss of character. Their complete independence of pictorial conditions might be illustrated by many examples. In Dürer's "Salutation" the dark blue of the sky above the Alpine mountains is translated by dark shading, but so far is this piece of local colour from being carried out in the rest of the composition that the important foreground figures, with their draperies, are shaded as if they were white statues. Again, the sky itself is false in its shading, for it is without gradation, but the shading upon it has a purpose, which is to prevent the upper part of the composition from looking too empty, and the conventionalism of wood engraving was so accepted in those days that the artist could have recourse to this expedient in defiance alike of pictorial harmony and of natural truth. In Holbein's admirable series of small well-filled compositions, the "Dance of Death," the firm and matter-of-fact drawing is accompanied by a sort of light-and-shade adopted simply for convenience, with as little reference to natural truth as might be expected in a stained-glass window. There is a most interesting series of little woodcuts drawn and engraved in the 16th century by J. Amman as illustrations of the different handicrafts and trades, and entitled "The Baker," "The Miller," "The Butcher," and so on. Nothing is more striking in this valuable series than the remarkable closeness with which the artist observed everything in the nature of a hard fact, such as the shape of a hatchet or a spade; but he sees no mystery anywhere—he can draw leaves but not foliage, feathers but not plumage, locks but not hair, a hill but not a landscape. In the "Witches' Kitchen," a woodcut by Hans Baldung (Grün) of Strassburg, dated 1510, the steam rising from the pot is so hard that it has the appearance of two trunks of trees denuded of their bark, and makes a pendant in the composition to a real tree on the opposite side which does not look more substantial. Nor was this a personal deficiency in Grün. It was Dürer's own way of engraving clouds and vapour, and all the engravers of that time followed it. Their conceptions were much more those of a carver than those of a painter. Dürer actually did carve in high relief, and Grün's "Witches' Kitchen" might be carved in the same manner without loss. When the engravers were rather draughtsmen than carvers, their drawing was of a decorative character. For example, in the magnificent portrait of Christian III. of Denmark by Jacob Binck, one of the very finest examples of old wood engraving, the face and beard are drawn with few lines and very powerfully, but the costume is treated strictly as decoration, the lines of the patterns being all given, with as little shading as possible, and what shading there is is simple, without cross-hatching.

The perfection of simple wood engraving having been attained so early as the 16th century by the use of the graver, the art became extremely productive. During the 17th and 18th centuries it still remained a comparatively severe and conventional form of art, because the workmen shaded as much as possible either with straight lines or simple curves, so that there was never much appearance of freedom. Modern wood engraving is quite a distinct art, being based on different principles, but between the two stands the work of an original genius, Thomas Bewick (1753–1828). Although apprenticed to an engraver in 1767, he was never taught to draw, and got into ways and habits of his own which add to the originality of his work, though his defective training is always evident. His work is the more genuine from his frequent habit of engraving his own designs, which left him perfect freedom of interpretation; but the genuineness of it is not only of the kind which comes from independence of spirit, it is due also to his fidelity to the technical nature of the process, a fidelity very rare in the art.

The reader will remember that in wood engraving every cutting prints white, and every space left untouched prints black. Simple black lines are obtained by cutting out white lines or spaces between them, and crossed black lines have to be obtained by laboriously cutting out all the white lozenges between them. In Bewick's cuts white lines, which had appeared before him in the *Fables* of 1772, are abundant and are often crossed, but black lines are never crossed; he is also quite willing to utilize the black space, as the Japanese wood-engravers and Dürer's master Wohlgemuth used to do. The side of the frying-pan in the vignette of "The Cat and the Mouse" is treated precisely on their principles, so precisely indeed that we have the line at the edge for a border. In the vignette of "The Fisherman," at the end of the twentieth chapter of the *Memoir*, the space of dark shade under the bushes is left quite black, whilst the leaves and twigs, and the rod and line too, are all drawn in pure white lines. Bewick, indeed, was more careful in his adherence to the technical conditions of the art than any of the primitive woodcutters except those who worked in *criblé* and who used white lines as well as their dots. Such a thing as a fishing-net is an excellent test of this disposition. In the interesting series by J. Amman already mentioned there is a cut of a man fishing in a river, from a small punt, with a net. The net comes dark against the light surface of the river, and Amman took the trouble to cut a white lozenge for every mesh. Bewick, in one of his vignettes, represents a fisherman mending his nets by the side of a stream. A long net is hung to dry on four upright sticks, but to avoid the trouble of cutting out the lozenges. Bewick artfully contrives his arrangement of light and shade so that the net shall be in light against a space of black shade under some bushes. This permits him to cut every string of the net by a simple white line, according to his practice of using the white line whenever he could. He used it with great ability in the scales of his fish, but this was simply from a regard to technical convenience, for when he engraved on metal he marked the scales of his fish by black lines. These may seem very trifling considerations to persons unacquainted with the fine arts, who may think that it can matter little whether a fishing-net is drawn in black lines or in white, but the fact is that the entire destiny of wood engraving depended on preserving or rejecting the white line. Had it been generally accepted as it was by Bewick, original artists might have followed his example in engraving their own inventions, because then wood engraving would have been a natural and comparatively rapid art; but when the black line was preferred the art became a handicraft, because original artists have not time to cut out thousands of little white spaces. The reader may at once realize for himself the tediousness of the process by comparing the ease with which one writes a page of manuscript with the labour which would be involved in cutting away, with perfect accuracy, every space, however minute, which the pen had not blackened with ink.

Wood engraving in the first three quarters of the 19th century had no special character of its own, nothing like Bewick's work, which had a character derived from the nature of the process; but on the other hand, the modern art is set to imitate every kind of engraving and every kind of drawing. Thus we have woodcuts that imitate line engraving, others that copy etching and even mezzotint, whilst others try to imitate the crumbling touch of charcoal or of chalk, or the wash of water-colour, the greyness of pencil, or even the wash and the pen-line together. The art has been put to all sorts of purposes; and though it is not and cannot be free, it is made to pretend to a freedom which the old masters would have rejected as an affectation. Rapid sketches are made on the block with the pen, and the modern wood-engraver set himself patiently to cut out all the spaces of white, in which case the engraver is in reality less free than his predecessor in the 16th century, though the result has a false appearance of liberty. The woodcut is like a polyglot who has learned to speak many other languages at the risk of forgetting his own. And, wonderful as may be its powers of imitation, it can only approximate to the arts which it imitates; it can never rival each of them on its own ground. It can convey the idea of etching or water-colour, but not their quality; it can imitate the manner of a line engraver on steel, but it cannot give the delicacy of his lines. In its most modern development it has practically succeeded in imitating the grey tonalities of the photograph. Whatever be the art which the wood engraver imitates, a practised eye sees at the first glance that the result is nothing but a woodcut. Therefore, although we may admire the suppleness of an art which can assume so many transformations, it is certain that these transformations give little satisfaction to severe judges. At the same time, as the ultimate object was not only reproduction, but reduplication by the printing-press, the drawbacks mentioned are far outweighed by the practical advantages. In manual skill and in variety of resource modern wood engravers far excel their predecessors. A Belgian wood engraver, Stéphane Pannemaker, exhibited at the Salon of 1876 a woodcut entitled "La Baigneuse," which astonished the art-world by the amazing perfection of its method, all the delicate modelling of a nude figure being rendered by simple modulations of unbroken line. Both English and French publications have abounded in striking proofs of skill. The modern art, as exhibited in these publications, may be broadly divided into two sections, one depending upon line, in which case the black line of a pen or pencil sketch is carefully preserved, and the other depending upon tone, when the tones of a sketch with the brush are translated by the wood engraver into shades obtained in his own way by the burin. The first of these methods requires extreme care, skill and patience, but makes little demand upon the intelligence of the artist; the second leaves him more free to interpret, but he cannot do this rightly without understanding both tone and texture.

The woodcuts in Doré's *Don Quixote* are done by each method alternately, many of the designs having been sketched with a pen upon the block, whilst others are shaded with a brush in Indian ink and white, the latter being engraved by interpreting the shades of the brush. In the pen drawings the lines are Doré's, in the brush drawings the lines are the engraver's. In the night scenes Pisan usually adopted Bewick's system of white lines, the block being left untouched in its blackness wherever the effect permitted. English wood engraving showed to great advantage in such newspapers as the *Illustrated London News* and the *Graphic* of that day, and also in vignettes for book illustration. A certain standard of vignette engraving was reached by Edmund Evans in Birket Foster's edition of Cowper's *Task*, not likely to be surpassed in its own way, either for delicacy of tone or for careful preservation of the drawing.

An important extension of wood engraving was due to the invention of compound blocks by Charles Wells about the year 1860. Formerly a woodcut was limited in size to the dimensions of a block of boxwood cut across the grain, except in the primitive condition of the art, when commoner woods were used in the direction of the grain; but by this invention many small blocks were fitted together so as to form a single large one, sometimes of great size. They could be separated or joined together again at will, and it was this facility which rendered possible the rapid production of large cuts for the newspapers, many cutters working on the same subject at once, each taking his own section.

The process employed for wood engraving may be briefly described as follows. The surface of the block is lightly whitened with Chinese white so as to produce a light yellowish-grey tint, and on this the artist draws, either with a pen if the work is intended to be in line, or with a hard-pointed pencil and a brush if it is intended to be in shade. If it is to be a line woodcut the cutter simply digs out the whites with a sharp graver or scalpel (he has these tools of various shapes and sizes), and that is all he has to do; but if the drawing on the wood is shaded with a brush, then the cutter has to work upon the tones in such a manner that they will come relatively true in the printing. This is by no means easy, and the result is often a disappointment, besides which the artist's drawing is destroyed in the process. It therefore became customary to have the block photographed before the engraver touches it, when the drawing is specially worth preserving. This was done for Leighton's illustrations to *Romola*. By a later development the drawing, made upon paper, was by photography printed on the block, and the drawing remained untouched as a witness for or against the engraver.

In recent years the position of wood engraving in Great Britain has wholly changed. Up to 1880 and for a little while longer it was the chief means of book and newspaper illustration, and a frequent method of fine-art reproduction; but by the beginning of the 20th century it had been all but driven out of the field by "process" work of various kinds. It still flourishes in its commoner style for commercial and mechanical work; it is still occasionally maintained in its finest form by a sympathetic publisher here and there, who deplores and would arrest its decay. But the photograph and its facsimile reproduction have captivated the public, who want "illustration" and who do not want "art." The great body of the wood engravers have therefore found their occupation entirely gone, while the minority have found themselves forced to devote their skill to "retouching" the process-block—sometimes carrying their work so far that the print from the finished block is a close imitation of a wood engraving. This system has been carried farthest in America; it is rarely seen elsewhere.

It is not only to considerations of economy that is due the supersession of engraving by "process." The apparent superiority of truthfulness claimed by the photograph over the artist's drawing is a factor in the case—the public forgetting that a photographic print shows us what a thing or a scene looks like to the undiscriminating lens, rather than what it looks like to the two eyes of the spectator, who unconsciously selects that part of the scene which he specially wishes to see. The rank and file of the engravers—even those who can "engrave" after a picture as well as "cut" a "special artist's" sketch—succumbed not only to the public, but to the artists themselves, who frequently insisted upon the process-block for the translation of their work. They preferred the greater truth of outline (though not necessarily of tone) which is yielded by "process," to all the inherent charm of the beautiful (and expensive) art of xylography.

In Great Britain a few engravers of high rank and ability still followed the art which was raised to so high a pitch by W. J. Linton (d. 1898). Such were Mr Charles Roberts, Mr Biscombe Gardner, Mr Comfort, Mr Ulrich and a few more—the first two the better engravers for being also practising artists. But there is every reason to fear that if wood engraving as a craft, for ordinary purposes, ceases to exist, wood engraving as a fine art must disappear as well—as there would be nothing to support the young craftsman during the years of apprenticeship and practice required to make an "artist" of him, and nothing to compensate him if he fail to attain at once the highest accomplishment.

Another circumstance which has contributed to the overthrow of wood engraving in England is the rapture begotten of the extraordinary executive perfection to which the art had been brought in America. These engravings, published in magazines and books having wide circulation in England, awakened not an intelligent but a foolish appreciation among the public. Just as the over-refinement of engraving on steel of Finden and his school killed his art by stripping it of all interest, so the unsurpassable perfection of the American wood engraver, by the law of paradox, effectually stifled xylography in England, as it has since done to an almost equal degree in America. The reason is simple. With the object of "dis-individualizing" himself, as he called it, the engraver sought to suppress his own recognizable manner of craftsmanship when translating the work of the artist for the public; and the more he succeeded in effacing himself, and the more he refined and elaborated his technique and imitated textures, and the more he developed extreme minuteness and excessive dexterity (so as to secure faithfulness and smoothness), the more closely did the result approximate to a photograph and nothing more. The result, in fact, became the *reductio ad absurdum* of the passion for the minute and the perfection of mere technique. The result was amazing in its completeness, but curiously grey and monotonous; and matter-of-fact publishers and public alike preferred the photograph, which in their eyes did not differ so very much (except in being a little greyer and more monotonous) reproduced by the half-tone block, while the cost of the latter was but a fraction of that of the former. The extreme elaboration, satisfying a craving of an acrobatic kind, defeated its own end. The public were pleased for a time, and the result has been disastrous for the art.

In England, in spite of the International Society of Wood Engravers, of which little is now heard, there are no signs of a general revival, and it seems as if the art must be born again, so long as the public interest in photographs continues. Charles Ricketts and Miss Housman have gone back to a Düreresque, or Florentine, manner of the Early Renaissance woodcut, while others are striving to begin engraving where Bewick began it. If the true art is ever restored, the revival will rather be based on a revolt against the greyness of the process-block, and the offensively shiny surface of the chalk-coated paper on which it is printed, than on any aesthetic delight in intelligent wood engraving, its expressive line, its delicate, pearly tones, and its rich, fat blacks.

In America, where the power of resuscitation is great, the miraculous technical perfection brought about by Timothy Cole and Frederick Juengling, as leaders of the school, has promptly given way to a greater feeling for art and a lesser worship of mechanical achievement, and, within strict limits, wood engraving is saved. Curiously enough, Cole (an Englishman by birth) was equally a leader in recognizing the danger which his own brilliant proficiency had helped to bring about. The "decadent" *de luxe* who had overwhelmed his art in the refinements which threatened to destroy it, and who had been seconded by the splendid printing-presses of America (which might without exaggeration be called instruments of precision), gave up what may be termed hyper-engraving, and, surrendering his wonderful power of imitating surfaces and textures, changed his manner. He became broader in handling; his example was followed by others, and wood engraving in a very few hands still prospers in the United States.

In France, where the art has reached the highest perfection and the most consummate and logical development, it flourishes up to a certain point on the true artistic instinct of the engraver, on the taste of an intelligent and appreciative public, and on official recognition and encouragement. Nevertheless, it was found necessary to establish a "Society of Wood Engravers" (with a magazine of its own) to protect it against the inroad of the process-block. The art doubtless produces more engravers of skill than it can provide work for; but that is evidence rather of vitality than of decay. Lepère, Bande, Jonnard and Florian have been among the leaders who, in different styles of wood engraving, have sustained the extraordinarily high level which has been attained in France, and which is fairly well maintained by virtue of the encouragement on which it has thriven heretofore. Florian, who died in 1900, was a man who successfully sought to obtain effects of tone rather than line, leaving masses of unengraved surface to enhance the delicate beauty of his pearly greys. But in rebelling against the mechanical style formerly so much in vogue in Germany, of indicating roundness of form by curved lines carried as far as possible at right angles to the convexity, and in substituting more or less longitudinal lines of shading, he sacrificed a good deal of the logic of form-rendering, and started a method that has not been entirely successful.

In Germany the artistic standard is lower than in France. It is true that few outside Germany could model a head as finely as M. Klinkicht in his own style of a judicious mingling of the black line and the white line; but, as a rule, German engraving is far more precise, more mechanical, more according to formula, and heavier and more old-fashioned than that of either France or America. The art has been injured by the great "studios" or factories designed to flourish on strictly business principles, workshops which, in the education of the craftsman, to some extent annihilated the artist. A few there are, however, of great ability and taste. The attempt to print wood engravings in colours has done little to improve the status of the art. In other countries, however, "original" work helped to raise the standard. Thus the work of Elbridge Kingsley, who would sit down in the woods and engrave the scene before him directly on to the block, exercised no little influence in America. The similar ability of Lepère to engrave directly from nature, whether from the trees of Fontainebleau Forest or the palace of Westminster, has in its time been much appreciated in his own country and in England. The efforts at block-printing by Charpentier and others, not only with colour, but by reinforcing it with blocks that print neither lines nor colour but "blind" pattern, raised or depressed upon the paper, are evidence of the movement by which new methods have been sought to interest the public. The immediate results have not been very serious, yet the fact shows the existence of a vitality that gives some hope for the future. But while the practice of dry-printing upon "surface paper" is maintained, it is hopeless to expect in the immediate future, in Great Britain at least, any permanently good results from orthodox wood engraving.

See the works cited under ENGRAVING; and also J. Jackson, *Treatise on Wood-Engraving* (1839); Didot's *Essai sur l'histoire de la gravure sur bois* (1863); W. S. Baker, *American Engravers and their Work* (Philadelphia, 1875); J. Jackson and W. A. Chatto, *Treatise on Wood-Engraving* (Chatto, 1881); P. G. Hamerton, *The Graphic Arts* (Seeley, 1882); W. J. Linton, *History of Wood-Engraving in America* (Chatto, 1882); G. E. Woodberry, *History of Wood-Engraving* (S. Low, 1883); Sir W. M. Conway, *The Wood-cutters of the Netherlands in the 15th century* (Cambridge Press, 1884); W. J Linton, *Wood-Engraving* (G. Bell & Sons, London, 1884); Dr F. Lippmann, *Wood-Engraving in Italy in the 15th century* (Quaritch, 1888); John Ruskin, *Ariadne Florentina* (Allen, 1890); W. J. Linton, *The Masters of Wood-Engraving*: folio, issued to subscribers only (London, Stevens, Charing Cross, 1889 and 1892); P. G. Hamerton, *Drawing and Engraving* (A. & C. Black, 1892), an extended reprint of the article on "Engraving" in the 9th edition of the *Encyclopaedia Britannica*; Louis Fagan, *History of Engraving in England* (text and three portfolios of plates) (Low, 1893–1894); George and Edward Dalziel, *The Dalziel Brothers: a record of 50 years' work, 1848–1899* (Methuen, 1901). (P. G. H.; M. H. S.)

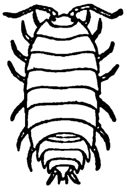
WOODFALL, HENRY SAMPSON (1739–1805), English printer and journalist, was born in London on the 21st of June 1739. His father, Henry Woodfall, was the printer of the newspaper the *Public Advertiser*, and the author of the ballad *Darby and Joan*, for which his son's employer, John Darby, and his wife, were the originals. H. S. Woodfall was apprenticed to his father, and at the age of nineteen took over the control of the *Public Advertiser*. In it appeared the famous letters of "Junius." Woodfall sold his interest in the *Public Advertiser* in 1793. He died on the 12th of December 1805. His younger brother, William Woodfall (1746–1803), also a journalist, established in 1789 a daily paper called the *Diary*, in which, for the first time, reports of the parliamentary debates were published on the morning after they had taken place.

WOODFORD, an urban district in the Walthamstow (S.W.) parliamentary division of Essex, England, 9 m. N.E. from Liverpool Street station, London, by a branch of the Great Eastern railway. Pop. (1901) 13,798. Its proximity to the southern outskirts of Epping Forest has brought it into favour both with residents and with holiday visitors from London. A converted mansion, Woodford Hall, forms a convalescent home. On high ground to the N. is the ecclesiastical parish (one of three) of Woodford Wells, where there is a mineral spring.

WOOD GREEN, an urban district in the Tottenham parliamentary division of Middlesex, England, suburban to London, 7 m. N. of St Paul's Cathedral, on the Great Northern railway. Pop. (1891) 25,831, (1901) 34,233. The name covers a populous residential district lying north of Hornsey and west of Tottenham. To the west lies Muswell Hill, with the grounds and building of the Alexandra Palace, an establishment somewhat similar to the Crystal Palace. It was opened in 1873, destroyed by fire almost immediately, and reopened in 1875. Muswell Hill took name from a holy well, of high repute for curative powers, over which an oratory was erected early in the 12th century, attached to the priory of St John of Jerusalem in Clerkenwell.

WOOD-LOUSE, a name commonly applied to certain terrestrial Crustacea of the order Isopoda (see MALACOSTRACA), which are found in damp places, under stones or dead leaves, or among decaying wood. They form the tribe Oniscoidea and are distinguished from all other Isopoda by their habit of living on land and breathing air, and by a number of structural characters, such as the small size of the antennules and the absence of the mandibular pulp. As in most Isopods, the body is flattened, and consists of a head, seven thoracic segments which are always free, and six abdominal segments which may be free or fused. The "telson" is not separated from the last abdominal segment The head bears a pair of sessile compound eyes as well as the minute antennules and the longer antennae. Each of the seven thoracic segments carries a pair of walking legs. The appendages of the abdomen (with the exception of the last pair) are flat membranous plates and serve as organs of respiration. In many cases their outer branches have small cavities opening to the outside by slit-like apertures, and giving rise internally to a system of ramifying tubules filled with air. From their similarity to the air tubes or tracheae of insects and other air-breathing Arthropods these tubules are known as "pseudo-tracheae."

The female wood-louse carries her eggs, after they are extruded from the body, in a pouch or "marsupium" which covers the under surface of the thorax and is formed by overlapping plates attached to the bases of the first five pairs of legs. The young, on leaving this pouch, are like miniature adults except that they are without the last pair of legs. Like all Arthropoda, they cast their skin frequently during growth. As a rule the skin of the hinder half of the body is moulted some days before that of the front half, so that individuals in process of moulting have a very peculiar appearance.


Common Wood-louse, *Oniscus asellus.*

Some twenty-four species of wood-lice occur in the British Islands. Some, like the very common slaty-blue *Porcellio scaber*, are practically cosmopolitan in their distribution, having been transported, probably by the unconscious agency of man, to nearly all parts of the globe. Equally common is the brown, yellow-spotted *Oniscus asellus*. *Armadillidium vulgare* belongs to a group which have the power of rolling themselves up into a ball when touched and resembles the millipede *Glomeris*. It was formerly employed in popular medicine as a ready-made pill. The largest British species is *Ligia oceanica*, which frequents the sea-shore, just above high-water mark. In many points of structure, for instance in the long, many-jointed antennae, it is intermediate, as it is in habits, between the truly terrestrial forms and their marine allies. Finally, one of the most interesting species is the little, blind, and colourless *Platyarthrus hoffmannseggi*, which lives as a guest or commensal in the nests of ants. (W. T. CA.)

WOODPECKER, a bird that pecks or picks holes in wood, and from this habit is commonly reputed to have its name; but it is in some parts of England also known as "Woodspeight" (erroneously written "Woodspite")—the latter syllable being cognate with Ger. *Specht* and Fr. *Épeiche*, possibly with Lat. *Picus*.[1] More than 300 species have been described, and they have been very variously grouped by systematists; but all admit that they form a very natural family *Picidae* of Coraciiform birds, their nearest allies being the toucans. They are generally of bright particoloured plumage, in which black, white, brown, olive, green, yellow, orange or scarlet—the last commonly visible on some part of the head—mingled in varying proportions, and most often strongly contrasted with one another, appear; while the less conspicuous markings take the form of bars, spangles, tear-drops, arrow-heads or scales. Woodpeckers inhabit most parts of the world, with the exception of Madagascar and the Australian Region, save Celebes and Flores, but it may be worth stating that no member of the group is known to have occurred in Egypt.

Of the three British species, the green woodpecker, *Gecinus* or *Picus viridis*, though almost unknown in Scotland or Ireland, is the commonest, frequenting wooded districts, and more often heard than seen, its laughing cry (whence the name "Yaffil" or "Yaffle," by which it is in many parts known), and undulating flight afford equally good means of recognition, even when it is not near enough for its colours to be discerned. About the size of a jay, its scarlet crown and bright yellow rump, added to its prevailing grass-green plumage, make it a sightly bird, and hence it often suffers at the hands of those who wish to keep its stuffed skin as an ornament. Besides the scarlet crown, the cock bird has a patch of the same colour running backward from the base of the lower mandible, a patch that in the hen is black.[2] Woodpeckers in general are very shy birds, and to observe the habits of the species is not easy. Its ways, however, are well worth watching, since the ease with which it mounts, almost always spirally, the vertical trunks and oblique arms of trees as it searches the interstices of the bark for its food, flying off when it reaches the smaller or upper branches—either to return to the base of the same tree and renew its course on a fresh line, or to begin upon another tree near by—and the care it shows in its close examination, will repay a patient observer. The nest almost always consists of a hole chiselled by the bird's strong beak, impelled by very powerful muscles, in the upright trunk or arm of a tree, the opening being quite circular, and continued as a horizontal passage that reaches to the core, whence it is pierced downward for nearly a foot. There a chamber is hollowed out in which the eggs, often to the number of six, white, translucent and glossy, are laid with no bedding but a few chips that may have not been thrown out.[3] The young are not only hatched entirely naked, but seem to become fledged without any of the downy growth common to most birds. Their first plumage is dull in colour, and much marked beneath with bars, crescents and arrowheads.

Of generally similar habits are the two other woodpeckers which inhabit Britain—the pied or greater spotted and the barred or lesser spotted woodpecker—*Dendrocopus major* and *D. minor*—each of great beauty, from the contrasted white, blue-black and scarlet that enter into its plumage. Both of these birds have an extraordinary habit of causing by quickly-repeated blows of their beak on a branch, or even on a small bough, a vibrating noise, louder than that of a watchman's rattle, and enough to excite the attention of the most incurious. Though the pied woodpecker is a resident in Britain, its numbers receive a considerable accession nearly every autumn.

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[1] The number of English names, ancient and modern, by which these birds are known is very great, and even a bare list of them could not be here given. The Anglo-Saxon was *higora* or *higere*, and to this may plausibly be traced "hickwall," nowadays used in some parts of the country, and the older "hickway," corrupted first into "highhaw," and, after its original meaning was lost, into "hewhole," which in North America has been still further corrupted into "high-hole" and more recently into "high-holder." Another set of names includes "whetile" and "woodwale," which, different as they look, have a common derivation perceptible in the intermediate form "witwale." The Mid. Eng. *wodehake* (= woodhack) is another name apparently identical in meaning with that commonly applied to woodpecker.

[2] A patch of conspicuous colour, generally red, on this part is characteristic of very many woodpeckers, and careless writers often call it "mystacial," or some more barbarously "moustachial." Considering that moustaches spring from above the mouth, and have nothing to do with the mandible or lower jaw, no term could be more misleading.

[3] It often happens that, just as the woodpecker's labours are over, a pair of starlings will take possession of the newly-bored hole, and, by conveying into it some nesting furniture, render it unfit for the rightful tenants, who thereby suffer ejectment, and have to begin all their trouble again. It has been stated of this and other woodpeckers that the chips made in cutting the hole are carefully removed by the birds to guard against their leading to the discovery of the nest. The present writer, however, had ample opportunity of observing the contrary as regards this species and, to some extent, the pied woodpecker next to be mentioned. Indeed there is no surer way of finding the nest of the green woodpecker than by scanning the ground in the presumed locality, for the tree which holds the nest is always recognizable by the chips scattered at its foot.

The three species just mentioned are the only woodpeckers that inhabit Britain, though several others are mistakenly recorded as occurring in the country—and especially the great black woodpecker, the *Picus martius* of Linnaeus, which must be regarded as the type of that genus.[1] This fine species considerably exceeds the green woodpecker in size, and except for its red cap is wholly black. It is chiefly an inhabitant of the fir forests of the Old World, from Lapland to Galicia and across Siberia to Japan. In North America this species is replaced by *Picus pileatus*, there generally known as the logcock, an equally fine species, but variegated with white; and farther to the southward occur two that are finer still, *P. principalis*, the ivory-billed woodpecker and *P. imperialis*. The *Picinae* indeed flourish in the New World, nearly one-half of the described species being American, but of the large number that inhabit Canada and the United States we can mention only a few.

From *Cambridge Natural History*, vol. ix., "Birds," by permission of Macmillan & Co., Ltd.

Lesser Spotted Woodpecker.

First of these is the Californian woodpecker, *Melanerpes formicivorus*, which has been said to display an amount of providence beyond almost any other bird in the number of acorns it fixes tightly in holes which it makes in the bark of trees, and thus "a large pine forty or fifty feet high will present the appearance of being closely studded with brass nails, the heads only being visible." This is not done to furnish food in winter, for the species migrates, and only returns in spring to the forests where its supplies are laid up. It has been asserted that the acorns thus stored are always those which contain a maggot, and, being fitted into the sockets prepared for them cup-end foremost, the enclosed insects are unable to escape, as they otherwise would, and are thus ready for consumption by the birds on their return from the south. But this statement has again been contradicted, and, moreover, it is alleged that these woodpeckers follow their instinct so blindly that "they do not distinguish between an acorn and a pebble," so that they "fill up the holes they have drilled with so much labor, not only with acorns but occasionally with stones" (cf. Baird, Brewer and Ridgway, *North American Birds*, ii. pp. 569-571).

The next North-American form deserving notice is the genus *Colaptes*, represented in the north and east by *C. auratus*, the golden-winged woodpecker or flicker, in most parts of the country a familiar bird, but in the south and west replaced by the allied *C. mexicanus*, easily distinguishable among other characteristics by having the shafts of its quills red instead of yellow. It is curious, however, that, in the valleys of the upper Missouri and Yellowstone rivers, where the range of the two kinds overlaps, birds are found presenting an extraordinary mixture of the otherwise distinctive features of each.

Other North American forms are the downy and hairy woodpeckers, small birds with spotted black and white plumage, which are very valuable as destroyers of harmful grubs and borers; the red-headed woodpecker, a very handsome form with strongly contrasted red, black and white plumage, common west of the Alleghany Mountains; and the yellow-bellied woodpecker ("sapsucker").

Some other woodpeckers deserve especial notice—the *Colaptes* or *Soroplex campestris*, which inhabits the treeless plains of Paraguay and La Plata; also the South-African woodpecker *Geocolaptes olivaceus*, which lives almost entirely on the ground or rocks, and picks a hole for its nest in the bank of a stream (*Zoologist*, 1882, p. 208).

The woodpeckers, together with the wrynecks (*q.v.*), form a very natural division of scansorial birds with zygodactylous feet, and were regarded by T. H. Huxley as forming a distinct division of birds to which he gave the name *Celeomorphae*, whilst W. K. Parker separated them from all other birds as *Saurognathae*. (A. N)

WOODS, SIR ALBERT (1816–1904), English herald, son of Sir William Woods, Garter king-of-arms from 1838 to his death in 1842, was born on the 16th of April 1816. In 1838 he became a member of the chapter of the Heralds' College, of which he was appointed registrar in 1866. In 1869 he was knighted and became Garter king-of-arms. In this capacity he was entrusted with many missions to convey the order to foreign sovereigns; he was also registrar from 1878 of the orders of the Star of India and of the Indian Empire; and from 1869 was king-of-arms of the order of St Michael and St George. He officiated at the coronations both of Queen Victoria and of King Edward VII., and his authority on questions of precedence was unique. His later distinctions were K.C.B. (1897), K.C.M.G. (1899) and G.C.V.O. (1903). He died on the 7th of January 1904.

WOODS, LEONARD (1774–1854), American theologian, was born at Princeton, Massachusetts, on the 19th of June 1774. He graduated at Harvard in 1796, and in 1798 was ordained pastor of the Congregational Church at West Newbury. He was prominent among the founders of Andover Theological Seminary, and was its first professor, occupying the chair of Christian theology from 1808 to 1846, and being professor emeritus until his death in Andover on the 24th of August 1854. He helped to establish the American Tract Society, the American Education Society, the Temperance Society and the American Board of Commissioners for Foreign Missions. He was an orthodox Calvinist and an able dialectician. His principal works (5 vols., Andover, 1849–50) were *Lectures on the Inspiration of the Scriptures* (1829), *Memoirs of American Missionaries* (1833), *Examination of the Doctrine of Perfection* (1841), *Lectures on Church Government* (1843), and *Lectures on Swedenborgianism* (1846); he also wrote a *History of Andover Seminary* (1848), completed by his son.

His son, Leonard Woods (1807–1878), was born in West Newbury, Mass., on the 24th of November 1807, and graduated at Union College in 1827 and at Andover Theological Seminary in 1830. His translation of Georg Christian Knapp's *Christian Theology* (1831–1833) was long used as a text-book in American theological seminaries. He was assistant Hebrew instructor (1832–1833) at Andover, and having been licensed to preach by the Londonderry Presbytery in 1830 was ordained as an evangelist by the Third Presbytery of New York in 1833. In 1834–1837 he edited the newly-established *Literary and Theological Review*, in which he opposed the "New Haven" theology. After being professor of sacred literature in the Bangor Theological Seminary for three years, he was president of Bowdoin College from 1839 to 1866, and introduced there many important reforms. From June 1867 to September 1868 Dr Woods worked in London and Paris for the Maine Historical Society, collecting materials for the early history of Maine; he induced J. G. Kohl of Bremen to prepare the first volume (1868) of the Historical Society's *Documentary History*, and he discovered a MS. of Hakluyt's *Discourse on Western Planting*, which was edited, partly with Woods's notes, by Charles Dean in 1877. He died in Boston on the 24th of December 1878. He was a remarkable linguist, conversationalist and orator, notable for his uncompromising independence, his opinion that the German reformation was a misfortune and that the reformation should have been within the church.

See E. A. Park, *Life and Character of Leonard Woods, Jr.* (Andover, 1880).

Alva Woods (1794–1887), a nephew of the elder Leonard and the son of Abel Woods (1765–1850), a Baptist preacher, graduated at Harvard in 1817 and at Andover Theological Seminary in 1821, and was ordained as a Baptist minister. In 1824–1828 he was professor of mathematics and natural philosophy at Brown University, acting as president in 1826–1827; in 1828–1831 was president of Transylvania University, Lexington, Kentucky; and in 1831–1837 was president of the University of Alabama at Tuscaloosa, where he organized the Alabama Female Athenaeum. After 1839 he lived in Providence, R.I.

WOODSTOCK, a town and port of entry of Oxford county, Ontario, Canada, 80 m. S.W. of Toronto by rail, on Cedar creek, the Thames river and the Grand Trunk and Canadian Pacific railways. Pop. (1901) 8833. It is in one of the best agricultural sections of the province, and has a large export trade in cheese, butter and farm produce. Organs, pianos and agricultural implements are manufactured. It contains a residential school, under the control of the Baptist church, affiliated with McMaster University, Toronto.

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[1] The expression *Picus martius* was by old writers used in a very general sense for all birds that climbed trees, not only woodpeckers, but for the nuthatch and tree-creeper (*qq.v.*) as well. The adjective *martius* loses all its significance if it be removed from *Picus*, as some even respectable authorities have separated it.

WOODSTOCK, a market town and municipal borough in the Woodstock parliamentary division of Oxfordshire, England, 72¾m. W.N.W. of London, the terminus (Blenheim and Woodstock) of a branch of the Great Western railway. Pop. (1901) 1684. The little river Glyme, in a steep and picturesque valley, divides the town into New and Old Woodstock. The church of St Mary Magdalene, in New Woodstock, is of Norman date, but has additions in the later styles, and a west tower built in 1785. The town-hall was erected in 1766 after the designs of Sir William Chambers. The picturesque almshouses were erected in 1798 by Caroline, duchess of Marlborough. The town is dependent chiefly on agriculture, but a manufacture of leather gloves (dating from the 16th century) is carried on. Woodstock is governed by a mayor, 4 aldermen, and 12 councillors. Area, 156 acres.

After the battle of Blenheim the manor of Woodstock was by Act 3 and 4 of Queen Anne, chap. 4, bestowed in perpetuity on John, duke of Marlborough. In 1723 it was destroyed, being already ruinous, and the site levelled after the erection of Blenheim House, a princely mansion erected by Parliament for the duke of Marlborough in consideration of his military services, and especially his decisive victory at Blenheim. The sum of £500,000 was voted for the purchase of the manor and the erection of the building, a huge pile built by Sir John Vanbrugh (*q.v.*), in a heavy Italo-Corinthian style. The greater part of the art treasures and curios were sold in 1886, and the great library collected by Charles Spencer, earl of Sunderland, the son-in-law of the first duke of Marlborough, in 1881. The magnificent park contains Fair Rosamund's well, near which stood her bower. On the summit of a hill stands a column commemorating the duke. Blenheim Park forms a separate parish.

Domesday describes Woodstock (*Wodestock, Wodestok', Wodestoh*) as a royal forest; it was a royal seat from early times and Æthelred is said to have held a council there, and Henry I. to have kept a menagerie in the park. Woodstock was the scene of Henry II.'s courtship of Rosamund Clifford ("Fair Rosamund"). It was a favourite royal residence until the Civil War, when the manor house was "almost totally destroyed."

In the Hundred Rolls of 1279 Woodstock is described as a vill, but a burgess is alluded to in the same document, and it returned two members to parliament as a borough in 1302 and 1305. A mayor of Woodstock was witness to a deed in 1398, but the earliest known charter of incorporation was that from Henry VI. in 1453, establishing the vill of New Woodstock a free borough, with a merchant gild and the same liberties and customs as New Windsor; and incorporating the burgesses under the title of the "Mayor and Commonalty of the Vill of New Woodstock." The mayor and a serjeant-at-mace were to be elected by the commonalty, and an independent borough court was established for the trial of all civil actions and criminal offences. The borough was also exempted from the burden of sending representatives to parliament, but it again returned two members in 1553 and then regularly from 1570 until 1881, when the representation was reduced to one member. In 1885 the borough was disfranchised. The charter of Henry VI. was confirmed by Henry VII., Edward VI. and Elizabeth, but before 1580, when an ordinance was drawn up for the government of the borough, the corporation had considerably developed, including a high steward, recorder, mayor, 6 aldermen, 20 common councillors, a town clerk and a crier of the court; and the new charter granted by Charles II. in 1665 did little more than confirm this corporation. The hamlet of Old Woodstock is said to have been founded by Henry I., and was never included within the borough. The existing Tuesday market is stated in the Hundred Rolls of 1279 to have been granted by Henry II. and the St Matthew's fair by John. The latter was confirmed in 1453, with the addition of a fair at the feast of St Mary Magdalen. Queen Elizabeth in 1565 granted to the mayor and commonalty a market on Friday, and two fairs of four days each at the feast of St Nicholas and Lady Day.

See Rev. E. Marshall, *Early History of Woodstock Manor* (Oxford, 1873); Adolphus Ballard, *Chronicles of Royal Borough of Woodstock*; *Victoria County History, Oxfordshire*.

WOODWARD, JOHN (1665–1728), English naturalist and geologist, was born in Derbyshire on the 1st of May 1665. At the age of sixteen he went to London, where he studied with Dr Peter Barwick, physician to Charles II. In 1692 he was appointed professor of physic in Gresham college. In 1693 he was elected F.R.S., in 1695 was made M.D. by Archbishop Tenison and also by Cambridge, and in 1702 became F.R.C.P. While still a student he became interested in botany and natural history, and during visits to Gloucestershire his attention was attracted by the fossils that are abundant in many parts of that county; and he began to form the great collection with which his name is associated. His views were set forth in *An Essay toward a Natural History of the Earth and Terrestrial Bodies, especially Minerals, &c.* (1695; 2nd ed. 1702, 3rd ed. 1723). This was followed by *Brief Instructions for making Observations in all Parts of the World* (1696). He was author also of *An Attempt towards a Natural History of the Fossils of England* (2 vols., 1728 and 1729). In these works he showed that the stony surface of the earth was divided into strata, and that the enclosed shells were originally generated at sea; but his views of the method of formation of the rocks were entirely erroneous. In his elaborate *Catalogue* he described his rocks, minerals and fossils in a manner far in advance of the age. He died on the 25th of April 1728, and was buried in Westminster Abbey.

By his will he directed that his personal estate and effects were to be sold, and that land of the yearly value of one hundred and fifty pounds was to be puchased and conveyed to the University of Cambridge. A lecturer was to be chosen, and paid £100 a year to read at least four lectures every year, on some one or other of the subjects treated of in his *Natural History of the Earth*. Hence arose the Woodwardian professorship of geology. To the same university he bequeathed his collection of English fossils, to be under the care of the lecturer, and these formed the nucleus of the Woodwardian museum at Cambridge. The specimens have since been removed to the new Sedgwick museum.

A full account of Woodward's life and views and a portrait of him are given in the *Life and Letters of the Rev. Adam Sedgwick*, by J. W. Clark and T. McK. Hughes, where it is mentioned that his paper, read before the Royal Society in 1699, entitled *Some Thoughts and Experiments concerning Vegetation*, "shows that the author should be ranked as a founder of experimental plant-physiology, for he was one of the first to employ the method of water-culture, and to make refined experiments for the investigation of plant-life."

See also *The Lives of the Professors of Gresham College*, by John Ward (1740).

WOODWARD, SAMUEL (1790–1838), English geologist and antiquary, was born at Norwich on the 3rd of October 1790. He was for the most part self-educated. Apprenticed in 1804 to a manufacturer of camlets and bombazines, a taste for serious study was stimulated by his master, Alderman John Herring and by Joseph John Gurney. Becoming interested in geology and archaeology, he began to form the collection which after his death was purchased for the Norwich museum. In 1820 he obtained a clerkship in Gurney's (afterwards Barclay's) bank at Norwich, and Hudson Gurney and Dawson Turner (of Yarmouth), both fellows of the Royal Society, encouraged his scientific work. He communicated to the *Archaeologia* articles on the round church towers of Norfolk, the Roman remains of the country, &c., and other papers on natural history and geology to the *Mag. Nat. Hist.* and *Phil. Mag.* He died at Norwich on the 14th of January 1838. He was author of *A Synoptical Table of British Organic Remains* (1830), the first work of its kind in Britain; *An Outline of the Geology of Norfolk* (1833); and of two works issued posthumously, *The Norfolk Topographer's Manual* (1842) and *The History and Antiquities of Norwich Castle* (1847).

His eldest son, Bernard Bolingbroke Woodward (1816–1869), was librarian and keeper of the prints and drawings at Windsor Castle from 1860 until his death. The second son, Samuel Pickworth Woodward (1821–1865), became in 1845 professor of geology and natural history in the Royal Agricultural College, Cirencester, and in 1848 was appointed assistant in the department of geology and mineralogy in the British Museum. He was author of *A Manual of the Mollusca* (in three parts, 1851, 1853 and 1856).

S. P., Woodward's son, Horace Bolingbroke Woodward (b. 1848), became in 1863 an assistant in the library of the Geological Society, and joined the Geological Survey in 1867, rising to be assistant-director. In 1893–1894 he was president of the Geologists' Association, and he published many important works on geology. Samuel Woodward's youngest son, Henry Woodward

(b. 1832) became assistant in the geological department of the British Museum in 1858, and in 1880 keeper of that department. He became F.R.S. in 1873, LL.D. (St Andrews) in 1878, president of the Geological Society of London (1894–1896), and was awarded the Wollaston medal of that society in 1906. He published a *Monograph of the British Fossil Crustacea, Order Merostomata* (Palaeontograph. Soc. 1866–1878); *A Monograph of Carboniferous Trilobites* (Pal. Soc. 1883–1884), and many articles in scientific journals. He was editor of the *Geological Magazine* from its commencement in 1864.

See Memoir of S. Woodward (with bibliography) in *Trans. Norfolk Nat. Soc.* (1879), and of S. P. Woodward (with portrait and bibliography), Ibid. (1882), by H. B. Woodward.

WOOL, WORSTED AND WOOLLEN MANUFACTURES. Wool is a modified form of hair, distinguished by its slender, soft and wavy or curly structure, and, as seen under the microscope, by its highly imbricated or serrated surface. At what point an animal fibre ceases to be hair and becomes wool it is impossible to determine, because the one by imperceptible gradations merges into the other, so that a continuous chain can be formed from the finest and softest merino to the rigid bristles of the wild boar. Thus the fine soft wool of the Australian merino merges into the cross-bred of New Zealand; the cross-bred of New Zealand merges into the long English and lustre wool, which in turn merges into alpaca and mohair-materials with clearly marked but undeveloped scale structure. Again, such animals as the camel and the Cashmere goat yield fibres, which it would perhaps be difficult to class rigidly as either wool or hair.

Wool in Britain.

Wool is one of the most important of the textile fibres. Owing to the ease with which it may be spun into thread, and the comfort derived from clothing made of wool, it would naturally be one of the first textiles used by mankind for clothing. Ancient records prove the high antiquity of wool textures and the early importance of the sheep. The different kinds of wool and the cloth made from them in antiquity are described by Pliny and referred to by other writers, and among the arts which the British Isles owe to the Romans not the least important is the spinning and weaving of wool. The sheep certainly was a domestic animal in Britain long before the period of the Roman occupation; and it is probable that some use was made of sheep skins and of wool. But the Romans established a wool factory whence the occupying army was supplied with clothing, and the value of the manufacture was soon recognized by the Britons, of whom Tacitus remarks, "Inde etiam habitus nostri honor et frequens toga" (*Agric.* c. 21). The product of the Winchester looms soon established a reputation abroad, it being remarked that "the wool of Britain is often spun so fine that it is in a manner comparable to the spider's thread." This reputation was maintained throughout the middle ages, and the fibre was in great demand in the Low Countries and other continental centres. There are many allusions to woollen manufactures in England in early times; but the native industry could not rival the products of the continent, although the troubles in various industrial centres, from time to time, caused skilled workers in wool to seek an asylum in England. In the time of William the Conqueror Flemish weavers settled under the protection of the queen at Carlisle, but subsequently they were removed to Pembrokeshire. At various subsequent periods there were further immigrations of skilled Flemish weavers, who were planted at different places throughout the country. The cloth fair in the church yard of the priory of St Bartholomew was instituted by Henry II.; gilds of weavers were established; and the exclusive privilege of exporting woollen cloth was granted to the city of London. Edward III. made special efforts to encourage wool industries. He brought weavers, dyers and fullers from Flanders; he himself wore British cloth; but to stimulate native industry he prohibited, under pain of life and limb, the exportation of English wool. Previous to this time English wool had been in large demand on the continent, where it had a reputation exceeded only by the wool of Spain. The customs duties levied on the export of wool were an important source of the royal revenue. Edward III.'s prohibitory law was, however, found to be unworkable, and the utmost that both he and his successors were able to effect was to hamper the export trade by vexatious restrictions and to encourage much smuggling of wool. Thus while Edward III. limited the right of exporting to merchant strangers, Edward IV. decreed that no alien should export wool and that denizens should export it only to Calais. Legislation of this kind prevailed till the reign of Elizabeth, when the free exportation of English wool was permitted; and Smith, in his *Memoirs of Wool*, points out that it was during this reign that the manufacture made the most rapid progress. In 1660 the absolute prohibition of the export of wool was again decreed, and it was not till 1825 that this law was finally repealed. The results of the prohibitory law were exceedingly detrimental; the production of wool far exceeded the consumption; the price of the raw material fell; wool-"running" or smuggling became an organized traffic; and the whole industry became disorganized. Extraordinary expedients were resorted to for stimulating the demand for woollen manufactures, among which was an act passed in the reign of Charles II. decreeing that all dead bodies should be buried in woollen shrouds—an enactment which remained in the Statute Book, if not in force, for a period of 120 years. On the opening up of the colonies, every effort was made to encourage the use of English cloth, and the manufacture was discouraged and even prohibited in Ireland.

It was not without reason that the attention of monarchs and legislators was so frequently directed to the wool industries. Wool was indeed "the flower and strength and revenue and blood of England," and till the development of the cotton trade, towards the end of the 18th century, the wool industries were, beyond comparison, the most important sources of wealth in the country. Towards the close of the 17th century the wool produced in England was estimated to be worth £2,000,000 yearly, furnishing £8,000,000 worth of manufactured goods, of which there was exported about £2,000,000 in value. In 1700 the official value of woollen goods exported was about £3,000,000, and in the third quarter of the century the exports had increased in value by about £500,000 only. In 1774 Dr Campbell (*Political Survey of Great Britain*) estimated the number of sheep in England at 10,000,000 or 12,000,000, the value of the wool produced yearly at £3,000,000, the manufactured products at £12,000,000, and the exports at £3,000,000 to £4,000,000. He also reckoned that the industry then gave employment to 1,000,000 persons. These figures, in the light of the dimensions of present-day industries, may appear small, but they bore a predominant relationship to the other great sources of employment and trade of the period. In 1800 the native crop of wool was estimated to amount to 96,000,000 lb; and, import duty not being imposed till 1802, the quantity brought from abroad was 8,600,000 lb, 6,000,000 lb of which came from Spain. In 1825 the importation of colonial wool became free, the duty leviable having been for several previous years as high as 6d. per lb, and in 1844 the duty was finally remitted on foreign wool also.

Wool in America.

Sheep were introduced at Jamestown in Virginia in 1609, and in 1633 the animals were first brought to Boston. Ten years later a fulling mill was erected at Rowley, Mass., "by Mr Rowley's people, who were the first that set upon making cloth in this western world." The factory woollen industry was, however, not established till the close of the 18th century, and it is recorded that the first carding machine put in operation in the United States was constructed in 1794 under the supervision of John and Arthur Schofield.

Merino wool.

For centuries the finer wools used for cloth-making throughout Europe had been obtained from Spain—the home of the famous merino breed developed from races of sheep originally introduced into the Peninsula by the Moors. Till early in the 19th century the superiority of Spanish merinos remained unchallenged, but the Peninsular War and its attendant evils produced a depreciation of quality concurrently with the introduction of Saxon and Silesian wools, which suddenly supplanted the product of Spain. The Spanish merino sheep had been introduced into Saxony by the elector in 1765, and by judicious crossing with the best native race developed the famous electoral breed. Merinos were carried to Hungary in 1775, and to France in 1776, and in 1786 Daubenton brought them to Rambouillet, whence a famous race developed. In 1802 the first merinos known to have left pure descendants were taken to the United States, and in 1809–1810 an importation (4000) of merino sheep was made.

Wool in Australasia.

Wool in Australia.

The introduction of the merino sheep into the United States was an important move, but its results are not to be compared with the results of the introduction of the merino sheep into Australasia about the end of the 18th century and into South America a little later. It is probable that the marked improvement in the appearance of the first sheep taken out by the early colonists suggested the possibilities of Australia as a wool-growing country. As has been noted above, marked endeavours were being made at this time to extend the merino breed of sheep, so that it was but natural that this breed should be given the first chance. That marked success did not attend the first endeavours is shown by the fact that the London Colonial Wool Sales originated in the necessity of selling Australian wools just for what they would bring under the hammer, as distinct from the private treaty method of selling and buying the more highly priced continental merinos. It should here be noted that the Australian fine wools were first shipped from Botany Bay, hence the now universal term "botany" for fine wools. The colonists were not to be repressed however, and eventually, through the endeavours of Captain MacArthur, Sir J. Banks, the Rev. Samuel Marsden and others, the merino breed became established on a firm basis, and in a comparatively short time Australian wools were no longer a drug on the market. The evolution was not to stop, however, with the development of merino flocks and the exporting of merino wool. No doubt early in the 19th century the possibilities of raising larger sheep on the better coastal pasturage was naturally suggested. Until about 1885 this tendency was largely repressed owing to the demand for merino as distinct from cross-bred wool. In other words wool was the dominating factor. But with the possibilities and the development of the frozen meat trade from 1880 to 1890 this condition was changed, and the tendency to breed a large sheep with a valuable carcass and mediocre wool grew apace. New Zealand was specially adapted for this development; thus New Zealand frozen mutton completely dominated New Zealand wool. In this manner it came about that cross-bred wool supplanted merino wool to a very considerable extent throughout Australasia. This change would have been serious for the wool comber and spinner had not the Bradford combers, spinners and manufacturers put their shoulder to the wheel and developed a world-wide renown for their cross-bred tops, yarns and fabrics. Again the change was not altogether for the bad so far as the Australian sheep was concerned. Sheep-breeding developed into a real science, and remarkable results were obtained with such crosses as Merino-Lincoln, Merino-Leicester, Merino-Shropshire; all probably originating in the first place in the desire to produce a large-bodied early-fattening sheep, but later developing into a strenuous endeavour to develop more useful types of wools. Thus the wool produced from the first cross Merino-Lincoln might be very defective judged from a pure merino standpoint, but by breeding back to the merino practically none of the useful merino characteristics were sacrificed, while length of staple was added and the weight of the fleece perhaps doubled.

A somewhat different evolution has taken place in later years with reference to the interior sheep stations. The merino sheep will thrive where a larger sheep would starve, hence its value for the stations where salt-bush dominates all vegetation. But the merino sheep is a "wool" sheep, not a "frozen mutton" sheep, hence all crossing here was carried out with the idea of veloping the weight of fleece and if possible retaining the merino wool characteristics. The most marked development in this direction was effected by the introduction of the United States merino or Vermont breed. Opinions differ as to the wisdom of this introduction. The weight of fleece carried per sheep has been remarkably increased, and the fact that up to the present weight multiplied by price per ℔ paid in London or elsewhere has been entirely in favour of first and second cross Vermonts, has undoubtedly influenced breeders in its favour Against this must be placed the fact that the Australian-Vermont merino cross produces a sheep of unstable physique, naturally unable to withstand drought, and—worst of all so far as London is concerned—producing a fleece very difficult to judge for yield of pure scoured wool. Again, the Australian-Vermont first cross is very liable to produce a very strong botany wool, while what is required is a long but fine wool technically termed a long and shafty 60's to 64's quality.

Wool in South America.

Hardly second in importance to Australia as a wool-growing country comes South America, or more correctly Argentina along with Patagonia, Punta Arenas and the Falkland Islands. In most years Australia has produced the greater bulk, but just occasionally S. America has come out top and is likely to do so more frequently in the future owing to the remarkable developments there taking place. The history of the introduction of the merino sheep into S. America may be briefly summed up as follows. In 1842 Henri Solanet, a Frenchman, began to shear the comparatively few sheep round Buenos Aires. His example was soon followed by Edouardo Olivera and José Planer. The idea almost at once came to these pioneers of importing well-bred rams, and as S. America is essentially a Latin country it was but natural that the French flocks of Rambouillet should be first drawn upon. With the development of the meat trade—just as in the case of Australia and New Zealand—a larger carcass was then sought after. This led to the introduction of the Lincoln ram and the development of cross-bred flocks about the year 1885. Perhaps this cross was favoured owing to the skill of the Bradford spinners, who made excellent use of the cross-bred wool produced. Flocks of sheep were first introduced into the Falkland Islands in 1867. The pasturage here being limited, the flocks have probably attained their limit, but from the Falkland Islands flocks have been passed on to Punta Arenas, where there is practically unlimited pasturage. The chief centres from which wool from S. America comes to Europe are Buenos Aires, which exports chiefly long and cross-bred wools, Montevideo, which exports chiefly merino wools, and the Falkland Islands and Punta Arenas, which export mostly wools of the finer type. The industry is largely in the hands of Englishmen. Unfortunately, however, the British manufacturer early took a dislike to the Buenos Aires, &c., wools, and consequently these wools go largely to the continent of Europe. To-day they by no means merit their previous bad name, and the Bradford comber and spinner are endeavouring to make up for lost opportunities.

Wool in South Africa.

Prior to the introduction of the merino sheep into Australia it had been introduced into S. Africa by the Dutch. There the climate was not so helpful as was that of Australia. The newly acclimatized sheep appears to have cast its wool at about the fifth generation and to have generally deteriorated, necessitating the reintroduction of fresh blood form Europe. In this manner have been developed the Cape flocks and the considerable Cape wool trade—largely centred at Port Elizabeth, East London, Cape Town, Mossel Bay and Port Natal. The country is evidently specially adapted for the rearing of the merino type of sheep, as cross-bred Cape wool is practically unknown. The term snow-white Cape wool, on the other hand, betokens a quality of whiteness no doubt due to the atmospheric and pasturage conditions. Cape wools are also known as non-felting wools, and consequently are largely employed in the manufacture of flannels. In 1907 most marked endeavours were being made to develop the Cape flocks by the introduction of some thousands of Australian merino sheep. The opinion of wool experts was that the Cape had a great future before it as a wool-producing country.

Wool in other countries.

Large quantities of wool also come from the East and from Russia, while even Iceland contributes its quota. It is interesting to note that, notwithstanding all the developments instanced, Europe still maintains its supremacy as the chief wool-producing continent, though, as the wool is largely manufactured locally, one hears little of European wools.

The following statistics give an idea of the development of the colonial and foreign wool trade as gauged by the London wool sales:

	Bales.		Bales.
1814	165	1870 . . .	673,314
1824	1,620	1890 . . .	1,509,666
1834	16,926	1901 . . .	1,602,726
1840	44,502	1903 . . .	1,319,365
1850	158,558		

It must not be forgotten, however, that a large quantity of S. American, W. Indian, Russian, &c., wools, along with mohair and alpaca, come through Liverpool, and consequently are not taken into account here.

British wools.

With reference to wools grown in the United Kingdom the truth seems to be that a fine short wool has never been produced. English wool is known the world over as being of a long and lustrous type, which was doubtless that so much in demand in the middle ages. That it was as long and lustrous as the typical Leicester or Lincoln of to-day is doubtful, as the new Leicester breed of sheep was only fully developed by Mr Bakewell after the year 1747, and the latter day Lincoln was even a later development of a similar character. What the exact type of English wool or wools was prior to the 18th century will probably never be decided, but from the closing years of that century there is no difficulty in being fairly precise. As already remarked, the long and lustrous wools are the typical English, being grown in Lincolnshire, Yorkshire, Nottinghamshire, Devonshire, &c., in fact in all those districts where the pasturage is rich and specially fitted for carrying a heavy sheep. It is claimed that the lustre upon the wool is a direct result of the environment, and that to take a Lincoln sheep into Norfolk means the loss of the lustre. This is partially true, but it is perhaps better to take a larger view and remember that the two influencing factors are race and environment: which is the more potent it is impossible to say. Attempts were made in the 18th century to develop a fine wool breed in England, George IV. importing a number of merino sheep from Spain. The discovery was soon made that it was impossible to maintain a breed of pure merinos in Great Britain, but the final outcome was by no means unsatisfactory. By crossing with the indigenous sheep a race of fairly fine woolled sheep was developed, of which the present day representative is the Southdown—a sheep which feeds naturally on the Downs of Sussex, &c., forming a marked contrast to the artificially turnip-fed Lincoln, Leicester, &c., sheep. Following the short, curly Southdown, but rather longer, come such as the Sussex, Oxford and Hampshire Down sheep; these are followed by such as the Shropshires and Shropshire crosses, Kent and Romney Marsh, until at last the chain from the Southdown to the Lincoln is completed. Of course there are several British wools not included in this chain. Scotch or black-face wool is long and rough, but well adapted for being spun into carpet yarns. Welsh wool has the peculiarity of early attaining its limit of shrinkage when washed, and hence is specially chosen for flannels. Shetland wool is of a soft nature specially suited for knitting yarns, while Cheviot wool—said to be a cross between merino sheep saved from the wreck of the Great Armada and the native Cheviot sheep—has made the reputation of the Scottish manufacturers for tweeds. North wool—wool from an animal of the Border Leicester and Cheviot breed—Ripon, Wensleydale and Teasdale wools are also specially noted as lustre wools, Ripon and Wensleydale wools being, by many judges, considered superior so far as lustre is concerned to Lincoln and Leicester.

Such remarkable advances have been made in the weights of fleeces carried by sheep of particular breeds that it is difficult to say if finality has been reached. The following list gives average weights:

Breed.	Weight of Average Fleece	Breed.	Weight of Average Fleece.
Merino (Australian)	6 lb	Southdown . .	6 lb
Merino (South American) . . .	6½ lb	Lincoln . . .	12 lb
Merino-Lincoln .	8-10 lb	Shetland . .	4 lb
		Cashmere . .	4 oz.

In 1885 the average weight of wool per sheep per year was about 5 lb, while 7 to 8 lb is now the average weight. Roughly speaking the weights of Australian fleeces are to-day about double as compared with 1885.

Physical characteristics of wool.

The prevailing colour of sheep's wool is white, but there are races with black, brown, fawn, yellow and grey shades of wool. For manufacturing purposes generally white wool is, of course, most valuable, but for the homespuns, which in earlier times absorbed the bulk of wool, natural colours were in many cases used with good effect. In domestic spinning, knitting, and weaving, natural colours are still largely taken advantage of, as in the cases of rough yarns, Shetland knitted shawls, Highland tweeds, &c.

As has already been indicated, the distinction between wool and hair lies chiefly in the great fineness, softness, and waved delicacy of woollen fibre, combined with a highly serrated surface. These peculiarities are precisely the characters which give wool its distinctive value as a textile fibre, the most distinctive characteristic of all being the serrated structure which specially belongs to wool and markedly aids the important property of felting, upon which many of its applications depend. The serrations of wool and the wavy structure it assumes are closely connected, those wools which have the greatest number of serrations being usually most finely waved in structure. The appearance presented by wool under the microscope is shown in figs. 1–6 (Plate). Under the influence of moisture and pressure, aided by alkalis or acids, masses of wool thoroughly mat together, by the mutual interlocking of the fibres. It is thus that the shrinking and thickening of woollen textures under washing is accounted for, the capacity of wool cloth for felting or fulling being due to this condition of the fibre, possibly along with a certain shrinkage of the true fibre mass. The serrations are most numerous, acute, pointed and distinct in fine merino wools, as many as 2800 per in. being counted in specimens of the finest Saxony wools. In the Leicester wool of England, on the other hand, which is a long bright staple, the serratures are not only much fewer in number, counting about 1800, but they are also less pronounced in character, so that the fibre presents a smoother, less waved character. In some inferior wools the serrations are not so many as 500 per in. A similar difference may be noted in the fineness of the fibres. The finest wool has a diameter of from $\frac{1}{3000}$ to $\frac{1}{1500}$ in., whilst coarse Algerian wools may rise to a maximum diameter of about $\frac{1}{275}$ in.

Other distinguishing qualities of good wool consist in uniformity and strength of fibre with freedom from tender or weak portions in its length, a condition which not unfrequently arises from ill health in the sheep, or is due to violent climatic changes. In ill-bred wool there may also be found intermingled "kemps" or dead hairs—straight, coarse, dull fibres which show conspicuously among the wool, and become even more prominent in the manufactured and dyed goods, as they will not take dye. Wool also possesses a softness of touch and an elasticity both in the raw and manufactured condition which distinguish it from all other fibres. In length of staple it varies very much, attaining in combing wools to a length of as much as 15 to 20 in.

Chemical characteristics of wool.

In dealing with wool from a practical point of view it must be recognized that it is by no means a simple body, but has a somewhat complex physical structure. Its composition in the raw state may be said to be threefold. Thus there is the wool-yolk—what may be termed a natural impurity; the wool-fat, which is not only present in the yolk but also permeates the fibre and seems to give it its plastic and soft handle; and the cell structure proper of the fibre. The natural impurity or wool-yolk is truly a skin product and is a protector of the wool-fibre rather than part of the true fibre substance. The wool-fat also may be regarded as independent of the true fibrous substance, but it is well to recognize that if the wool-fibre be entirely freed from the wool-fat it loses its plastic and elastic nature and is considerably damaged. In cleansing wool the true fibre mass may be disturbed and partially destroyed not only by dry but also by "wet" heat, and may be entirely disintegrated by means of alkalies, &c., with heat. The wool-fibre will almost free itself from the natural impurities—the yolk—in the presence of tepid water. This is taken advantage of in the various steeping machines placed on the market, which partially scour the wool by means of its own yolk—principally through the potash salts present.

According to Hummel the composition of the average wool-yolk is as follows:—

Moisture	4 to 24 %	Dirt	3 to 24 %
Yolk	12 „ 47 %	Wool-fibre	15 „ 72 %

The potash salts are usually recovered from the wash-water products and a marked economy thereby effected.

The natural wool-fat—popularly known as "lanoline"—may be partially got rid of in the steeping process, but it is almost invariably necessary to free the wool still further from it by actually scouring the wool on either the "emulsion" or "solvent" method, in either case the action being largely physical. As previously pointed out, however, all the wool-fat must not be taken away from the fibre, or the fibre will lose its "nature." According to Dr Bowman, the chemical composition of the cell structure of the average wool-fibre is:—

Carbon	50·8
Hydrogen	7·2
Nitrogen	18·5
Oxygen	21·2
Sulphur	2·3
	100·0

It is said to be a most complex body of which the probable formula is $C_{42}H_{157}N_5SO_{15}$.

If wool is burnt, it largely resolves itself into ammonia gas—whence it derives its characteristic odour—and carbon "beads" or "remains," which serve to distinguish wool from cotton, which, upon being burnt, does not smoulder but burns with a flash and leaves no beads. For further particulars on the organic nature of the wool-fibre see FIBRES.

Lamb, Hogg and Wether wool.

The bulk of the wool of commerce comes into the market in the form of fleece wool, the product of a single year's growth, cut from the body of the living animal. The first and finest clip, called lambs' wool, may be taken from the young sheep at about the age of eight months. When the animal is not shorn till it attains the age of twelve or fourteen months the wool is known as hogg or hogget, and, like lambs' wool, is fine and tapers to a point. All subsequently cut fleeces are known as wether wool, and possess relatively somewhat less value than the first clip. Fleece wool as it comes into the market is "in the grease," that is, unwashed, and with all the dirt which gathers to the surface of the greasy wool present; or it is received as "washed" wool, the washing being done as a preliminary to the sheep-shearing, or, in some few cases, it is scoured and is consequently stated as "scoured." Skin wool is that which is obtained from sheep which either die or are killed. Typical skin wool is that which has been removed by a sweating process. The worst type of skin wool—technically known as "slipe"—is removed from the skins by lime, which naturally affects the handle of the wool and renders it difficult to bring into a workable condition later. Mazamet in France is the great continental centre for skin wools.

Sheep washing.

Where there is abundance of water and other conveniences it is the practice to wash or half-wash sheep previous to shearing, and such wool comes into the market as washed or half-washed fleece. The surface of a fleece has usually a thick coating of dirt, and in the case of merino breeds the fleece surface is firmly caked together into solid masses, from the adhesion of dirt to the wool constantly moist with the exudation from the skin of the greasy yolk or "suint," so that in an unwashed very greasy fleece 30 % of weight may represent dirt, and about 40 % the greasy suint which lubricates the wool, while the pure wool is not more than one-third part of the whole. Where running streams exist, the sheep are penned by the side of the water, and taken one by one and held in the stream while they are washed, one man holding and the other washing. The operation is objectionable in many ways, as it pollutes the stream, and it dissipates no mean amount of potash salts, valuable for manure or for other chemical purposes. Sheep washing appliances are now largely employed, the arrangement consisting of a pen into which the sheep are driven and subjected to a strong spray of water either hot or cold, which soaks the fleece and softens the dirt. This done, they are caused to swim along a tank which narrows towards the exit, and just as they pass out of the pen they are caught and subjected to a strong douche of pure water. They should then be kept on grass land free from straw, sand, &c., so that the wool may be sheared free from vegetable matter, &c. After a few days the wool of a washed sheep is sufficiently dry for shearing or clipping.

The relative advantages of shipping wool in the greasy or washed state have been fiercely debated. Although there are naturally exceptions, the superiority of greasy wool is now generally recognized. This is not only because the wool more fully retains its nature, but because it is more readily judged for "yield" and its spinning qualities are, perhaps, more readily estimated.

The following list gives an idea of the yield in clean wool of the chief commercial varieties, from which it will be noted that roughly merino greasy wool yields about 50 % clean wool and English about 75 % clean wool.

Type of Wool.	Yield per cent of Clean Wool.
Australian Merino	50 %
Cape „	48 %
South American Merino	45 %
New Zealand Cross-bred	75 %
South American Cross-bred	75 %
English Southdown	80 %
„ Shropshire	80 %
„ Lincoln	75 %
Mohair	85 %
Alpaca	85 %

Sheep shearing.

A skilful shearer will clip the fleece from a sheep in one unbroken continuous sheet, retaining the form and relative positions of the mass almost as if the creature had been skinned. In this unbroken condition each fleece is rolled up by itself and tied with its own wool, which greatly facilitates the sorting or stapling which all wool undergoes for the separation of the several qualities which make up the fleece. Mechanical shears have almost revolutionized the shearing industry, a good shearer shearing from 100 to 200 sheep per day.

Wool classing.

On the great Australian sheep stations wool classing is one of the most important operations, largely taking the place of sorting in the English wool trade. This is no doubt due to the wonderful success which has attended the efforts of the Australian sheep breeders to breed a sheep of uniform staple throughout. Thus the fleeces as taken from the sheep are skirted and trimmed on one table and then passed on to the classer, who places them in the 56's, 60's, 64's, 70's, 80's or 90's class according to their fineness, these numbers approximately indicating the worsted counts to which it is supposed they will spin. The shorter Australian wools not coming under any of these heads are classed as super-clothing, ordinary clothing, &c., being more suitable for the woollen industry.

The art of sheep shearing, skirting, classing, packing and transporting has been brought up to a wonderful state of perfection in Australia, and the "get up" of the wool is usually much superior to the "get up" of the "home-clip." Of late there has been an outcry against the prevalence of vegetable matter in colonial wools, but it seems probable that with the adoption of a suitable woolpack, and the exercising of a little more care in sorting at the home end, this difficulty will be satisfactorily surmounted.

Wool sorting.

Sorting or stapling was formerly a distinct industry, and to some extent it is so still, though frequently the work is done on the premises of the comber or spinner. Carding wools are separated and classed differently from combing wools, and in dealing with fleeces from different breeds, the classification of the sorter varies. In the woollen trade short-staple wool is separated into qualities, known, in descending series from the finest to the most worthless, as picklock, prime, choice, super, head, seconds, abb and breech, and the proportions in which the higher and lower qualities are present are determined by the "class" of the fleece. In the worsted trade the classification goes, also in descending series, from fine, blue, neat, brown, breech, downright, seconds, to abb for English wools. The last three are short and not commonly used in the worsted trade. The greater proportion of good English long wool will be classified as blue, neat and brown; it is only in exceptional cases that more than from 5 to 8 % is "fine" on the one hand, or of lower quality than breech on the other. Generally speaking, the best portion of a fleece is from the shoulders and side of the animal. The quality decreases towards the tail end of the sheep, the "britch" being frequently long, strong and irregular. The belly wool is short, worn and dirty, as is also the front of the throat, while on the head and shins the product is short, stiff and straight, more like hair than wool and is liable to contain grey hairs. The colonial wools come "classed," and consequently are only as a rule sorted into three or four qualities. Thus a 60's fleece may be sorted into 56's, ordinary 60's, super 60's and skirtings.

The sorter works at a table or frame covered with wire netting through which dust and dirt fall as he handles the wool. Fleeces which have been hard packed in bales, especially if unwashed, go into dense hard masses, which may be heated till the softening of the yolk and the swelling of the fibres make them pliable and easily opened up. When the fleece is spread out the stapler first divides it into two equal sides; then he picks away all straws, large burrs, and tarry fragments which are visible; and then with marvellous precision and certainty he picks out his separate qualities, throwing each lot into its allotted receptacle. Sorting is very far removed from being a mere mechanical process of selecting and separating the wool from certain parts of the fleece, because in each individual fleece qualities and proportions differ, and it is only by long experience that a stapler is enabled, almost as it were by instinct, rightly to divide up his lots, so as to produce even qualities of raw material. Cleanliness is most essential if the wool sorter is to keep his health and not succumb to the dread disease known as "anthrax" or "wool-sorters' disease." Certain wools such as Persian, Van mohair, &c., are known to be very liable to carry the anthrax bacilli, and must be sorted under the conditions imposed by government for "dangerous wools." Ordinary or non-dangerous wools are perfectly harmless from this point of view.

Scouring.

The washing which a fleece may have received on the live sheep is not sufficient for the ordinary purposes of the manufacturer. On the careful and complete manner in which scouring is effected much depends. The qualities of the fibre may be seriously injured by injudicious treatment, while, if the wool is imperfectly cleansed, it will dye unevenly, and the manufacturing operations will be more or less unsatisfactory. The water used for scouring should be soft and pure, both to save soap and still more because the insoluble lime soap formed in dissolving soap in hard water is deposited on the wool fibres and becomes so fixed that its removal is a matter of extreme difficulty. In former times stale urine was a favourite medium in which to scour wool; but that is now a thing of the past, and a specially prepared potash soap is the detergent principally relied on. Excess of alkali has to be guarded against, since uncombined caustic acts energetically on the wool fibre—especially in the presence of heat—and is indeed a solvent of it. A soap solution of too great strength leaves the wool harsh and brittle, and the same detrimental result arises when the soapy solution is applied too hot.

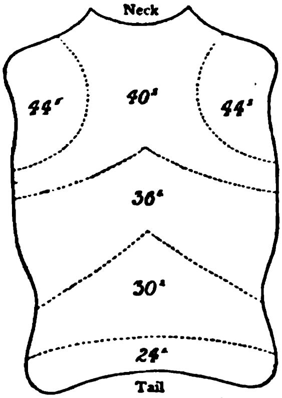


FIG. 7.—Qualities of Wool in a Lincoln Fleece.

The numbers indicate the quality of wool taken from the respective sections of the fleece. Thus the finest quality —44's—is found on the shoulders, while the coarsest "britch" is found on the hind-quarters of the sheep.

In former days, when the method of hand-scouring prevailed, the wool to be washed was placed with hot soap-sud in a large scouring "bowl" or vat, and two men with long poles kept stirring it gently about till the detergent loosened and separated the dirt and dissociated the grease. The wool was then lifted out and drained, after which it was rinsed in a current of clean water to remove the "scour" and then dried. These operations are now performed in scouring machines. Many firms now steep the wool previous to the true scouring operation, the object being to scour the wool with its own potash salts, to obtain wash-waters so fully charged with the potash salts that these salts, &c., may be readily extracted and put to some good use, and lastly to save the artificial scouring agent employed in the true scouring operation. The scouring of wool has passed through many vicissitudes during the past fifty years, but to-day the principle upon which all scouring machines are based is that wool naturally opens out in water. The mechanical arrangementsof the machines are such as to ensure the passage of the wool without undue lifting and "stringing," to obviate the mixing of wool grease, sand, dirt, &c., once taken out of the wool with that wool again, to give time for the thorough action of the scouring agents, so that neither too strong a solution nor too great a heat be employed, and to allow of the ready cleansing of the machines so that there is no unnecessary waste of time. In England the recognized type of merino wool-washing machine is the fork-frame bowl. Three to five of these machines are employed. The "scour" is strongest and hottest in the first bowl (unless this is used as a "steeper") as the wool at first is protected from the caustic by the wool-fat, &c., present. The last bowl is simply a rinsing bowl. With modern "nip rollers" botany wool is sufficiently dry to be passed on directly—say by pneumatic conveyers—to the carding. This the worsted spinner does, thereby saving time and money. The woollen spinner, however, may require the wool for blending, and so may require it dry and in a fit state for oiling. He, therefore, will employ one or other of the drying processes to be immediately described. For English and cross-bred wools more agitation in the scouring bath may be desirable. If so, the eccentric fork action machine is employed, in which the agitation of the bath is satisfactorily controlled by the setting of the forks which propel the wool forward. An average wool will be in the scouring liquor about eight minutes, the temperature will vary from 120° F. to 110° F., and the length of bath through which it will have passed will be from 48 to 60 ft.

It is interesting to note that the "emulsion" method of wool scouring as described above is practically universal in England. In the United States of America the "solvent" method is largely in use, for the two points aimed at are quantity of production and cheapness. Quality is sacrificed to quantity and cheapness results from the ease with which the agent employed—say carbon disulphide —is recovered by volatilizing and condensing, thus being used over and over again.

Botany wools should leave the wool-washing machine in a fit condition to be fed immediately on to the carder, provided that the first cylinders are clothed with galvanized wire. Cross-bred and English wool, however, require artificially drying.

Wool drying.

The more gently and uniformly the drying can be effected the better is the result attained; over-drying of wool has to be specially guarded against. By some manufacturers the wool from the squeezing rollers is whizzed in a hydro-extractor, which drives out so much of the moisture that the further drying is easily effected. The commonest way, however, of drying is to spread the wool as uniformly as possible over a framework of wire netting, under or over which is a range of steam-heated pipes. A fan blast blows air over these hot pipes, and the heated air passes up and is forced upwards through the layer of wool which rests on the netting or downwards, as the case may be. In this case, unless the wool is spread with great evenness, it gets unequally dried, and at points where the hot air escapes freely it may be much over-dried. A more rapid and uniform result may be obtained by the use of the mechanical wool drier, a close chamber divided into horizontal compartments, the floors of which have alternate fixed and movable bars. Under the chamber is a tubular heating apparatus, and a fan by which a powerful current of heated air is blown up the side of the chamber, and through all the shelves or compartments successively, either following or opposing the wool in its passage through the machine. The wool is introduced by a continuous feed at one side of the chamber; the strength of the blast carries it up and deposits it on the upper shelf, and by the action of the movable bars, which are worked by cranks, it is carried forward to the opposite end, whence it drops to the next lower shelf, and so on it travels till at the extremity of the lower shelf it passes out by the delivery lattice well and equally dried. Another drying machine in extensive use is what is known as the "Jumbo Dryer." This consists of a large revolving cylinder or churn which turns over the wool—as a churn turns butter—and owing to its inclination passes it from one end to the other. A hot air blast follows the wool through the machine. In this and in all drying machines it is more important to get the moisture laden air away from the wool than to develop a great heat.

Teasing.

The dried wool may be in a partially matted condition. If so, it must be opened out and the whole material brought into a uniformly free and loose condition. This is effected in the Willey, which consists of a large drum and three small cylinders mounted in an enclosed frame. The drum is armed with ranges of powerful hooked teeth or spikes, and is geared to rotate with great rapidity, making about 500 revolutions per minute. The smaller cylinders, called workers, are also provided with strong spikes; they are mounted over the drum and revolve more slowly in a direction contrary to the drum, the spikes of which just clear those of the workers. The wool is fed into the drum, which carries it round with great velocity; but, as it passes on, the locks are caught by the spikes of the workers, and in the contest for possessing the wool the matted locks are torn asunder till the whole wool is delivered in a light, free and disentangled condition. It is a debatable point as to whether willowing should precede scouring. Some scourers always willow prior to scouring, while others never subject the wool to this operation, which is advantageous in some cases and not in others.

Burring.

For certain classes of wool, notably Buenos Aires, still another preparing operation is essential at this stage—that is, the removal of burrs or small persistently adherent seeds and other fragments of vegetable matter which remain in the wool. Two methods of effecting this—one chemical, the other mechanical—may be pursued. The chemical treatment consists in steeping the wool in a dilute solution of sulphuric acid (or other carbonizing agent), draining off the dilute acid by means of the hydro extractor, and then heat-drying in a temperature of about 250° F. The acid leaves the wool practically uninjured, but is concentrated on the more absorbent vegetable matter, and the high heat causes it to act so that the vegetable matter becomes completely carbonized. The burrs are then crushed and the wool washed in water rendered sufficiently alkaline to neutralize any free acid which may remain, and dried. The same burr-removing effect is obtained by the use of a solution of chloride of aluminium, a method said to be safer for the wool and less hurtful to the attendant workmen than is the sulphuric acid process. For mechanical removing of burrs, a machine something like the Willey in appearance is employed. The main feature of this apparatus is a large drum or swift armed with fine short spikes curved slightly in the direction in which it rotates. By a series of beaters and circular brushes the wool is carried to and fed on these short spikes, and in its rotation the burrs, owing to their weight, hang out from the swift. The swift as it travels round is met by a series of three burring rollers rotating in an opposite direction, the projecting rails of which knock the burrs off the wool. The burrs fall on a grating and are ejected, with a certain amount of wool adhering to them, by another rotating cylinder. With wools not too burry the worsted spinner largely depends upon burring rollers placed upon the first cylinder of the "carder," and possibly to one or other of the patent pulverizing processes applied further on in the card. In the latter process a complete pulverizing of the burrs is aimed at, this being effected by the introduction of specially constructed pulverizing rollers between the first doffer and the last swift of the carding engine.

Woollens and worsteds.

The processes hitherto described are common to merino, cross-bred or botany wools be they intended for woollen or worsted yarns. From this point, however, differentiation starts. Wool may now be manipulated with the idea of converting it into felt (*q.v.*), woollen or worsted fabrics. In a general way it may be said that woollen yarns are those made from short wools possessed of high felting qualities, which are prepared by the process of carding; whereby the fibres are as far as possible crossed and interlaced with each other, and that the carded-slivers, though perhaps hard spun on the mule frame, form a light fluffy yarn, which suits the conditions when woven into cloth for being brought into the semi-felted condition by milling which is the distinguishing characteristic of woollen cloth. On the other hand, worsted yarns are generally made from the long lustrous varieties of wool; the fibres are so combed as to bring them as far as possible parallel to each other; the spinning is usually effected on the frame, and the yarn is spun into a compact, smooth and level thread, which, when woven into cloth, is not necessarily milled or felted. At all points, however, woollen and worsted yarns as thus defined overlap each other, some woollens being made from longer wool than certain worsteds, and some worsteds made from short staple wool, carded as well as combed. Worsted yarn is now largely spun on the mule frame, while milling or felting is a process done in all degrees—woollen being sometimes not at all milled, while to some worsteds a certain milled finish is given. The fundamental distinction between the two rests in the crossing and interlacing of the fibres in preparing woollen yarn—an operation confined to this alone among all textiles, while for worsted yarn the fibres are treated, as in the case of all other textile materials, by processes designed to bring them into a smooth parallel relationship to each other.

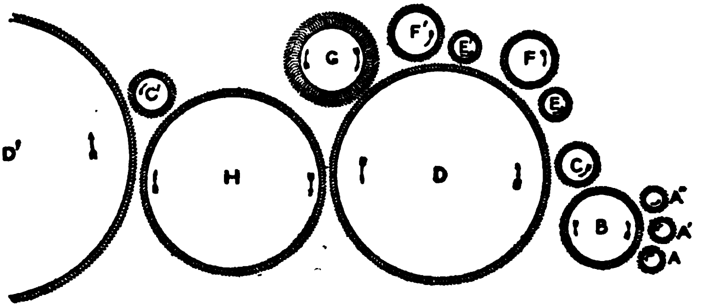


FIG. 8.—Sectional View of Carder; illustrating the principles of carding.

Woollen yarn manufacture.

To obtain a sliver which can be satisfactorily spun into a typical woollen thread the following operations are necessary: willowing, oiling and blending, teasing, carding (two or three operations), condensing and roving. Spinning upon the woollen mule completes the series of operations all of which are designed to lead up to the desired result. Of the foregoing operations the carding is perhaps the most important as it is certainly one of the most interesting. At the same time it must be fully realized that deficiencies in any one of these operations will result in bad work at every subsequent process. For example, let an unsatisfactory combination of materials be blended together and there will be trouble in both carding and spinning. The roving operation included above is not always necessary. In the old days, if a really fine thread were required, roving was absolutely necessary, as the carder could not turn off a sliver fine enough to be spun at one operation. To-day, however, with the "tape" condensers, such fine slivers can be turned off the condenser that there is no difficulty in spinning directly to the required count. In some few cases, however, it may be cheaper to rove than to condense fine; again, certain physical characteristics appertain to the roved thread, as distinct from the condensed thread, which may occasionally be of use to the cloth constructor.

Blending and oiling.

At the beginning of the 19th century woollen cloths were made of wool—some of them of the very finest wool obtainable. To-day woollen cloths are made from any and every kind of material, of which the following are the most important: noils (botany, cross-bred, English, alpaca and mohair), mungo, shoddy, extract, flocks, fud (short mill waste), cotton sweeping, silk waste, &c., &c.; in fact it is said that anything which has two ends to it can be incorporated into a woollen thread and cloth. It does not follow, however, that all woollen cloth is cheap and nasty. On the contrary the west of England still produces the finest woollen fabrics of really marvellous texture and beauty, and Batley, Dewsbury, &c., produce many fabrics which are certainly cheap and yet anything but nasty. The first essential for blending is that the materials to be blended should be fairly finely divided. This is effected by passing each material, if necessary, through the willow or through the "fearnaught"—a machine coming between the willow and card—prior to beginning the "blend-stack." may be that a blending of different colours of wools to " colour mixture " is necessary, more often it will be a blending of various materials, such as noils, mungo, cotton, &c., to obtain a cheap blend which may be spun into a satisfactory warp or weft yarn. The blender proceeds as follows: first a layer of No. 1 material—say wool—is spread over the required area on the floor; it is then lightly oiled. A layer of No. 2 material—say noils—is now added to the first layer; then another layer of wool with rather more oiling; then No. 2, then No. 1 with still more oil until all the material is built up into layers in the stack. The stack is now beaten down sideways with sticks, and then the more or less mixed mass is passed through the willow and fearnaught still further to mix it prior to carding, where the true and really fine mixing takes place. After passing through the fearnaught the material is sheeted and left to "mellow," this no doubt consisting in the oil applied distributing itself throughout the material. If wool and cotton are blended together the wool must be oiled first, or the blend will not work to the greatest advantage. The oil may be best Gallipoli olive oil—which should not turn rancid—but there are many good oils—and unfortunately many bad oils—placed on the market at a reasonable rate which the really skilled judge may use to advantage. The percentage of oil varies from 2 % to 10 %—this remark applies both to the woollen and worsted trades—and there is no guide as to the amount required, saving and excepting experience, observation and common sense. Automatic oiling arrangements have been applied in the woollen trade with only a moderate amount of success, the sprinkling of the oil by means of a watering-can on the stack, made as described above, still being most in favour. The oil serves to lubricate the fibres, and to render them more plastic and consequently more workable, and to bind the fibrous mass together and thus prevent "fly" during the passage through the cards.

Carding.

Carding was originally effected by hand, two flat boards with convenient handles, covered with teeth or card clothing, serving as a means of teasing out lock by lock, fibre by fibre, reversing root to tip and tip to root, so that a perfect mixing of the fibres resulted. It was but natural that, when an attempt was made to render the carding operation more mechanical, the operation should be converted into a continuous one through the adoption of rollers in place of flats. Flats combined with rollers still maintain their position in cotton carding, but in wool carding the pure roller card is employed. The factors of carding are size of rollers, speeds of rollers, inclination of teeth and density of card clothing. Probably no operation in the textile industries is so little understood as carding. Thus the long wool carder would think a man an idiot who suggested the running of the teeth of the various cylinders actually into one another, while the short mungo carder regularly carries out this idea, and so on. The underlying principle of carding, however, is shown in fig. 8, in which a sectional drawing of part of a card is given. The wool is carried into the machine on a travelling lattice and delivered to the feed rollers A, A', A" of which A and A" in turn are stripped by the licker-in B working at a greater speed point to smooth side. This in turn is stripped by the angle stripper C again working at a greater speed point to smooth side, which in its turn is stripped by the swift D—the "carrying-forward" and swiftest carding cylinder in the machine. The swift carries the wool forward past the stripper E—which as a matter of fact is stripped by the swift still working point to smooth side—into the slowly retreating teeth of the first worker F, which, being set a fair distance from the swift, just allows well laid-down wool to pass, but catches any projecting and uncarded staples. The worker in its turn is stripped by the stripper E', which in turn is stripped by the swift as already described. The passage of the wool forward through the machine depends upon its being carried past each worker in turn. Thus from beginning to end of a machine the workers are set closer and closer to the swift, so that the last worker only allows completely carded wool to pass it. Immediately on passing the last worker F' the wool is brushed up on the surface of the swift by the "fancy" G—as a rule the only cylinder whose teeth actually work into the teeth of the swift and the only cylinder with a greater surface speed than the swift. The swift then throws its brushed-up coating of wool into the slowly retreating teeth of the doffer [illegible] which carries it forward until angle stripper C′ strips the doffer, [illegible] in its turn stripped by swift D′ and so on. The speeds of the cylinders are in the first place obviously dependent upon the principle [illegible] carding adopted, the greater speed always stripping (save in the case of the fancy). As to whether the speed shall be obtained by actual revolutions or by a larger diameter of cylinder depends upon the nature of the wool to be carded (long or short), the part which each cylinder has to play in the card, and upon the question of wear of clothing and power consumed. As a rule the strippers are all driven from a smaller circumference of the swift to obtain conveniently the necessary reduction in speed, and the slowly revolving workers are chain driven from the doffer, which indirectly receives its motion from the swift. The principles involved in the relative inclinations of teeth are very apparent, but the principles involved in the relative densities of teeth on the respective cylinders are again much involved and little understood.

A complete scribbler or first card engine consists of a breast, or small swift, and two swifts with the accompanying workers, strippers, fancies, doffers, &c. The wool is stripped from this card as a thin film by means of the doffing comb. This is usually weighed off to the next machine—whether intermediate or condenser—a given weight giving a definite count of condensed sliver. Should an intermediate be employed, there must be an automatic feed, taking the wool, as stripped from the last doffer of the intermediate, and feeding it perfectly evenly on to the feed sheet of the condenser. The condenser is usually a one-swifted card, the only difference in principle being that, whereas the sliver comes out of the scribbler or intermediate in one broad film, it is broken up into a number of small continuous slivers or films, each one of which will ultimately be drafted or drawn out and twisted into a more or less perfect thread. These slivers—which are delicate and pith-like in substance—are wound on to light bobbins, and these bobbins are placed on the mule for the final roving and spinning operations. There are many forms of condensing mechanisms such as the single-doffer, the double-doffer and the tape-condensers, but their construction is too complex to be described here. Whatever the type may be, the result is that noted above, but it should be noted that the tape enables a much finer sliver to be taken from the card than is possible with either the single- or double-doffer condenser.

Mule spinning.

The principles involved in mule spinning are comparatively simple, but the necessary machinery is very complex; indeed it is questionable if a more ingenious machine than the mule exists. The pith-like slivers received from the card-loom must be attenuated until the correct count of yarn is obtained; they must be twisted while this attenuation or drafting is in process, otherwise they would at once break; and after being attenuated to the required fineness the requisite number of turns must be inserted. Great stress must be laid on the effects of what is termed the "drafting-twist" noted above; it is probably this simultaneous drafting and twisting which develops the most pronounced characteristics of the woollen yarn and cloth, and differentiates it entirely from the worsted yarn and cloth. The mule (see fig. 9) consists of the delivery cylinders A, upon which the sliver bobbins B from the condenser are placed, which deliver the slivers as required to the front delivery rollers C (these rollers controlling perfectly the delivery of sliver for each stretch of the carriage), and the carriage EE carrying the spindles which may be run close up to the front delivery rollers and about two yards away from them to effect the "spin," which is of an intermittent character. The spindles D are turned by bands passing round a tin drum K in the carriage, but this motion, and every other motion in the mule, is controlled perfectly from the headstock. In brief, the operation of spinning is as follows: as the carriage begins to recede from the delivery rollers these rollers deliver condensed sliver at about the same rate as the carriage moves out, the spindles putting in a little twist. When the carriage has perhaps completed half its traverse (say 36″) away from the front rollers these suddenly stop delivering the condensed sliver, the carriage goes more and more slowly outwards until it completes its traverse, drafting the sliver out to perhaps double the length. This drafting could not be effected but for the "drafting-twist," which, running into the thin parts of the yarn during drafting,

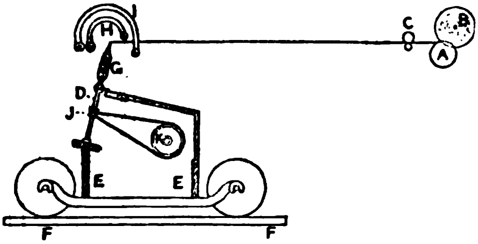
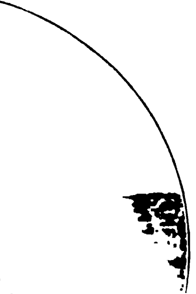


FIG. 9.—Sectional View of the Woollen Mule.

[illegible] th[illegible] fallers [illegible] now run [illegible] conjun[illegible] cop or [illegible]

Woollen [illegible] varying pitch [illegible] to follow a set [illegible] required to spin [illegible] finer than ordinary, [illegible] up the sliver delivered [illegible] details which require [illegible] spindles, for example, [illegible] And when all the mechan[illegible] the necessity of correct judg[illegible] hand, for in this case perhaps [illegible] must be adjusted to the material [illegible]



—New Zealand Cross-Bred Wool.

[illegible] textile industries.

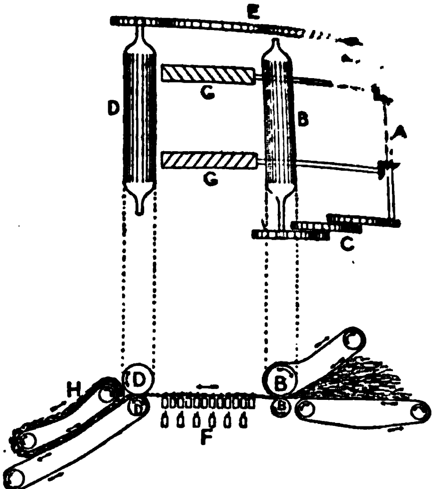


FIG. 10.—Plan and Section of a Preparing Box (Sheeter).

A is the back-shaft receiving its motion from the driving shaft upon which are the pulleys. This back-shaft A drives the back-rollers B at a slow speed by the reducing train of wheels C; also the front rollers D at a much quicker speed through the train of wheels E, and the fallers F at an intermediary speed by means of the levels and screws G. G. The wool is "made up" on the feed sheet and on emerging from the front rollers is built up layer by layer into the lap H, which is finally broken across and feeds up at the next machine.

The yarn as delivered by the mule is "single" and will serve as warp or weft for the great bulk of woollen cloths, warp being as a rule twisted harder than weft. Sometimes for strength, sometimes for colour, however, it will be necessary to twist two or more of these single strands together. This is best effected on a twisting frame of the ring type, which consists of delivery rollers, to deliver a specified length of yarn in relationship to the turns of the spindles, and the spindles, which serve to put in twist and to wind the yarn upon the bobbin or tube, which they carry by reason of the retarding action of the traveller. Fancy twists such as knops, loops, slubs, &c., may also be produced if the frame is fitted up with two pairs of delivery rollers and two or three special but simple appliances.

Worsted yarn manufacture.

The essential feature of a worsted yarn is straightness of fibre. Prior to the introduction of automatic machinery there was little difficulty in attaining this characteristic, as long wool was invariably employed and the sliver was made up by hand and then twisted. With the introduction of Arkwright's "water frame" or "throstle" the necessity for prepared slivers became apparent, and with the later introduction of cap and mule spinning the necessity for perfectly prepared slivers has been so accentuated that the preparatory machinery has quite

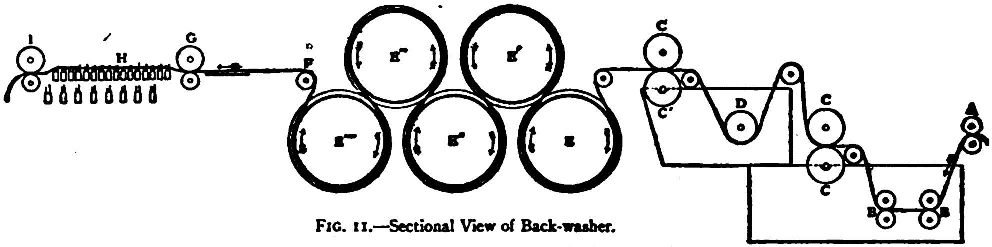


FIG. 11.—Sectional View of Back-washer.

A are the delivering rollers, B, B are the immersing rollers in the first tank, C, C are the press rollers to squeeze out superfluous liquors, D is the immersing roller in the second tank, and C', C' are the press rollers for the second tank. Drying cylinders E to E'''' may be arranged as "live-heat" cylinders, as secondary heated cylinders or as air drying cylinders. The roller F directs the slivers into the back rollers G of the gill-box, which in turn delivers up the slivers to the fallers H, which in turn delivers the wool to the front rollers I.

exceeded the actual spinning machine in extent and complexity. To-day there are three distinct methods of producing worsted yarn. Firstly, there is the preparing and spinning of the true worsted thread, this being made from long English and colonial wool. In this class should also be included mohair and alpaca. Secondly, there is the preparing and spinning of what are known as cross-bred and botany yarns, these being made from cross-bred and botany wools. Thirdly, there is the preparing and spinning of short botany wools on the French system. There is a fourth class of worsted yarns, principally carpet and knitting yarns, which are treated in a much readier manner than any of the foregoing, but as the treatment is analogous—with the elimination of certain processes—to the second of the foregoing, it is not necessary to refer specially to it.

To obtain a sliver or "roving" which can be satisfactorily spun into a typical worsted thread the following operations are necessary:—preparing (five or six operations), back-washing, straightening, combing, straightening and drawing (say six operations), and finally spinning on the flyer frame.

After long wool has been scoured and dried it is necessarily considerably entangled, and if it were to be combed straight away a large proportion of the long fibres would be broken and combed out as "noil" or short fibre. To obviate this the wool is fed as straight as possible into a sheeter gill-box; after this it passes through other two sheeter gill-boxes, then through say three can gill-boxes. As shown in fig. 10 the main features of a preparing or gill-box are the following: the feed sheet upon which the wool is "made up," the back rollers B which take hold of the wool and deliver it to the fallers F which, working away from the back rollers more quickly than the wool is delivered, comb it out. The fallers in turn deliver the wool to the front rollers D, which, taking in the wool more quickly than the fallers delivering it, again draft and comb it, but with a reversing of the former combing operation. The wool emerges from the front rollers as thin attenuated continuous fibre about 12 in. wide, which is wound upon an endless leather sheet H from which the box takes its name. When a sliver of sufficient thickness has been wound upon the sheet, it is broken across and fed up at the next gill-box. The fourth gill-box delivers into cans instead of on to a sheet. A number of cans are then placed behind the fifth box and the slivers from these fed up into the back rollers, and similarly with the sixth. The primary object of "preparing" or gilling is to straighten and parallelize the fibres in the sliver. This is effected by means of the combining or doubling and drafting to which the slivers are subjected. In addition to this, however, a level sliver suitable for combing is formed by the combined action of the drafting and doubling which has taken place at each box.

Preparing.

Oil will have been added to the wool at the first preparing-box to cause the fibres to work well. Were this all, there would perhaps not be the necessity for back-washing. But the slivers during their passage through the preparing-boxes become sullied naturally, and in addition, owing to the opening out of the locks of wool, dirt which was not "got at" in the scouring now works out and further sullies the slivers. It is consequently necessary to scour the slivers again, this being effected in what is termed a back-washing machine. This machine as shown in fig. 11 usually consists of two scouring tanks with immersing rollers, drying cylinders, a gill-box and oiling motion. The slivers on emerging from this machine should be clean, fairly straight and in good condition for combing. Their condition may be further improved by passing them through

Back-washing

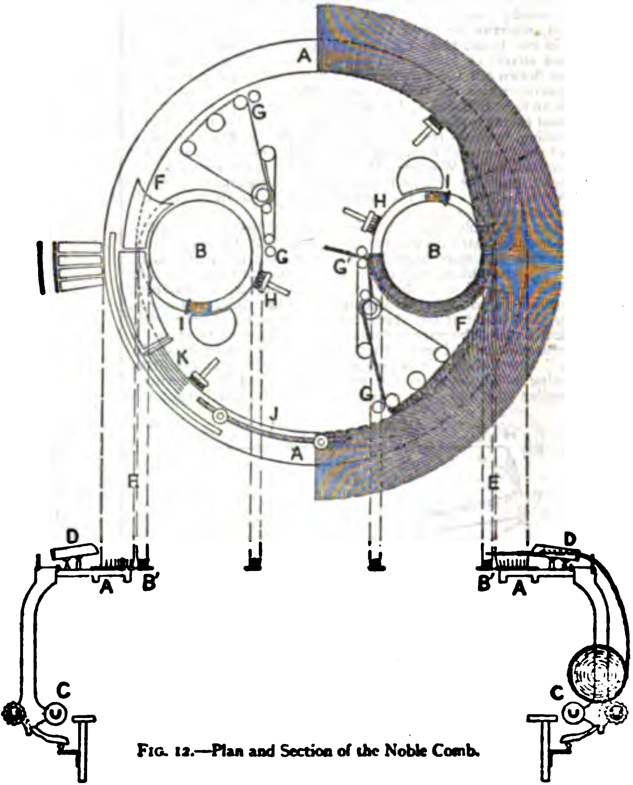


FIG. 12.—Plan and Section of the Noble Comb.

A, A is the large comb circle and B, B' the two small comb circles. The slivers are delivered by the mechanism C to the feed boxes D, being thrown across the pins of the large and small circles at position E. A stroke at F suitably directs the fringes of fibre as the circles separate and the combed fibres are taken hold of by drawing-off rollers G and G' and combined to form the "top." The brushes H, H and the noil knives I clear the small circles of the "noil." The feed knife J in conjunction with the inclined planes at K are instrumental in feeding a previously directed length of sliver over the two circles as they practically touch one another at the point E, and so the process is continued.

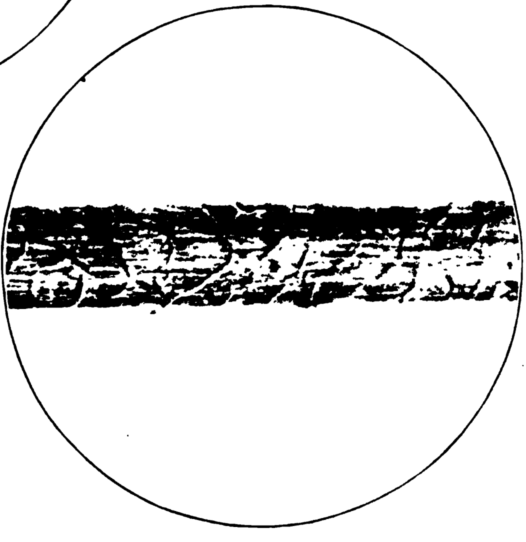


Fig. 1.—Mohair.

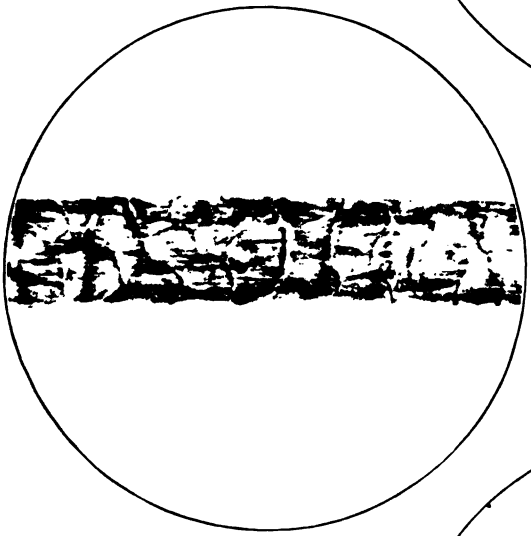


Fig. 2.—Leicester Wool.

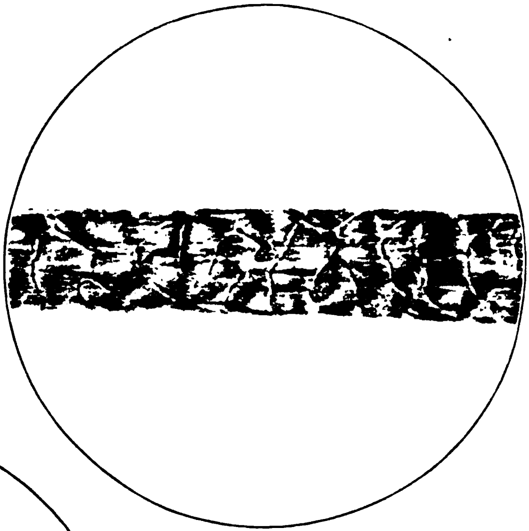


Fig. 3.—New Zealand Cross-Bred Wool.

Photomicrographs of the most representative hairs and wools used in the textile industries.

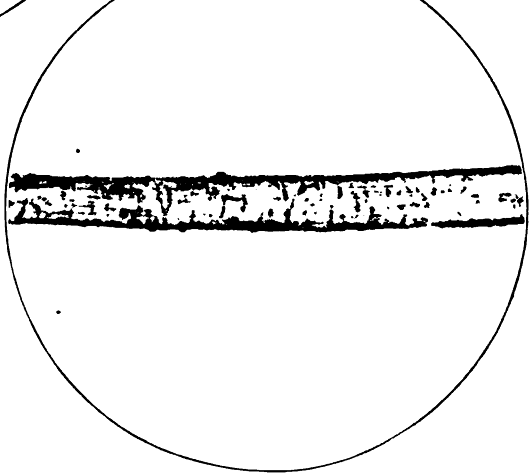


Fig. 4.—Alpaca Wool Hair.

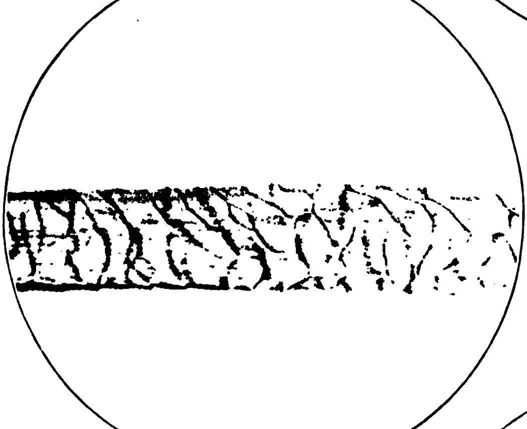


Fig. 5.—Down Wool.

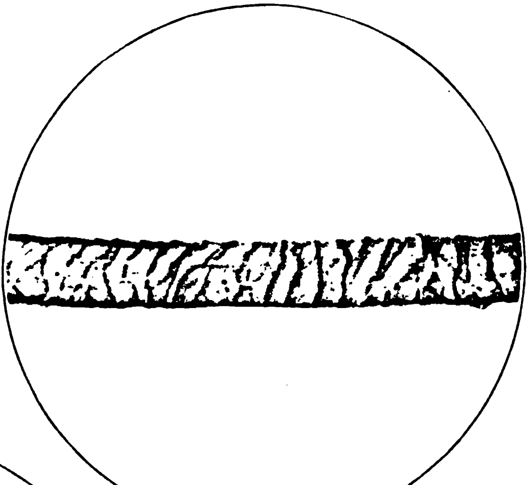


Fig. 6.—Australian Merino Wool.

Photomicrographs of the most representative hairs and wools used in the textile industries.

one or two more gill-boxes, prior to combing, to ensure straightness of fibre and even distribution of the lubricant.

Combing.

Prior to the mechanical era wool was combed immediately after scouring; there was no preparatory process. As a matter of fact the first combing process took the place of the processes just described and was termed "straightening," the "combing proper" following. Prior to the invention of a really satisfactory mechanical comb, between 1850 and 1860, the combing operation was the limitation of the worsted trade. English wools could be satisfactorily combed by hand, and perhaps the results of combing botany or fine wools by hand were satisfactory so far as quality of result was concerned, but the cost was largely prohibitive. The history of the colonial wool trade is inextricably bound up with the combing industry How eventually botany wools were combed by machinery and how the wool industry was thereby revolutionized can only be briefly referred to here. About 1779 Dr Edmund Cartwright invented two distinct types of combs, the vertical and the horizontal circular. The former type was developed on the continent by Heilmann and others, and has only within the last five years taken its rightful place as a successful short wool comb in this country. The latter type was worked upon by Donisthorpe, Noble, Lister, the Holdens and others, and largely through the "driving" force of Lister (later Lord Masham) was made a truly practical success about the year 1850. Latter-day combs of this type may be readily grouped under three heads. The Lister or "nip" comb is specially suitable for long wools and mohair and alpaca. The Holden or square-motion comb is specially suited for short and very good quality wools. The last type, the Noble, is the most popular of all and, by a change of large and small circles, may be adapted to the combing of long, medium or short wools. As the great bulk of crossbred and a considerable proportion of botany wool is combed upon the Noble comb a brief description is here called for. The object of all wool combing is to straighten the long fibres and to comb out from the slivers treated all the fibres under a certain length, leaving the long fibres or "top" to form the sliver which is eventually spun into the worsted yarn. The Noble comb, which so effectually accomplishes this, consists in the main of a large revolving circle A inside which revolve two smaller circles B, B′ as shown in fig. 12, each of which touches the larger comb circle at one point only. At this point the slivers of wool to be carded are firmly dabbed into the pins of both the large and small circles. As the circles continue to revolve they naturally begin to separate, combing the wool fibres between them, the short fibres or "noil" being retained in the teeth of both small and large circles, the long fibres hanging on the inside of the large circle and on the outside of the small circle. A stroker or air blast at F now directs these long fibres into the vertical rollers, G and G′, shown here in plan, which draw them out, thus separating them from the short fibres. There are at least four pairs of drawing-off rollers in a comb, and the fibres drawn off by each—be it noted continuously—are united to form a sliver which is passed through a revolving funnel into a can. The short fibres, or "noil," are lifted out of the pins of the small circle by "noil knives." The continuous slivers, the ends of which remain in the pins of the large circle after the drawing-off rollers have been passed, are now lifted up until these ends are above the pins, at the same time an additional length of sliver being drawn into the comb, so that, as they reach the second small circle, they are ready to be again dabbed into the pins of both circles and the combing operation repeated. Thus the combing on a Noble comb is absolutely continuous. All the movements of this machine—with the exception of the dabbing-brush motion—are circular, so that mechanically it is an almost perfect machine. As illustrating the extent of the combing industry, it is interesting to note that even the making of dabbing-brushes is a separate and by no means unimportant trade.

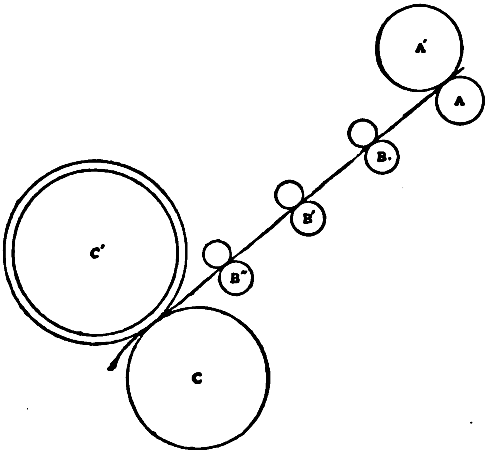


FIG. 13.—Section of Wool Drawing Rollers.

A, A′ are the back-rollers in a drawing box of which A is positively driven and A′ driven by friction which may be varied at will. Carriers B, B′, B″ simply control the fibres of which the sliver is composed during drafting. The front rollers C, C′—of which C is positively driven and C′ driven by friction—running at a greater speed than A, A′ draft or elongate the slivers as required. The carriers B, B′, B″ should be speeded to run at a suitable rate to assist the drafting operation, more by support than by direct aid. Rollers A, A′ must hold the sliver, hence they are fluted. Rollers C, C′ must pull the sliver somewhat severely, hence roller C′ is covered with leather. The yarn delivered by the front rollers is slightly twisted and wound into a double-headed bobbin of convenient size on the "flyer-system."

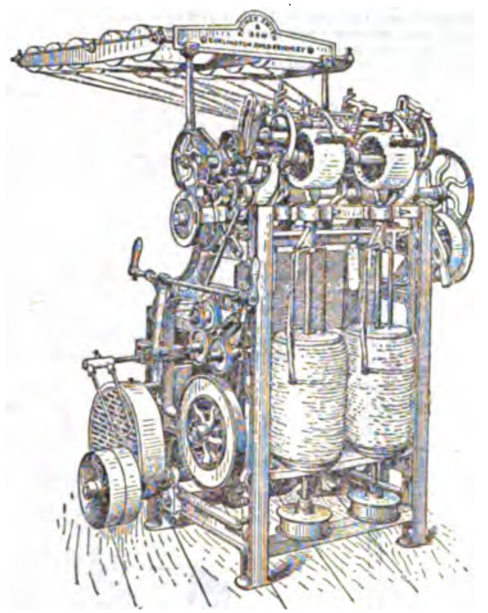


FIG. 14.—Two-Spindle Drawing-Box.

After combing it is usual to pass the "top" through two gill-boxes termed "finishers." The last of these boxes, and often the first, delivers the "top" in the form of a ball, thus it is often spoken of as a "balling gill-box." This stage marks one of the great divisions of the worsted trade, the comber taking the wool up to this point, but now handing it forward in the shape of top to the "worsted spinner," who draws and spins the slivers into the most desirable worsted yarns.

Drawing.

English tops are usually prepared for spinning by seven or eight operations. Three of these operations are effected in gill-boxes of a somewhat similar type to the preparing-box, only lighter in build. The remaining four are drawing-boxes, *i.e.* as shown in figs. 13 and 14, they consist of back and front rollers with small carrying-rollers—not gills—to support the wool in between. Thus an English set of drawing usually consists of a single-can gill-box, a double-can gill-box, a two-spindle gill-box, a four-spindle drawing-box, a four-spindle weigh-box, a six-spindle drawing-box, two six-spindle finishers and three thirty-spindle rovers. About fifteen flyer frames of 160 spindles each will be required to follow this set, although the balance varies partly in accordance with the counts spun to, in this case 1/32's English being the standard.

The object of drawing is to obtain firstly a level sliver from which an even thread may be spun, and secondly to reduce the comparatively thick top down to a relatively thin roving from which the required count of yarn may be spun. Of course parallelism of fibres must be retained throughout, so far as possible. To accomplish these objects doubling and drafting is resorted to. Thus the ends put up at the back of the above boxes will be 6, 6, 4, 4, 3, 3, 2 respectively, while the drafts may be 5, 6, 8, 8, 6, 9, 9 approximately.

As the drafts markedly preponderate over the doublings, so in exactly this proportion will the sliver be reduced in thickness.

Spinning.

The flyer spinning frame is very similar to the drawing frame, consisting of back rollers, carriers and front rollers, with the necessary spindle and flyer to put twist into the yarn and to wind it upon the bobbin. From the two-spindle gill-box to the spinning frame the spindle, bobbin and flyer combination is employed with the object just mentioned. From fig. 15 the action of this combination will be clearly understood. Drafting takes place as usual between the back and front rollers, the carriers controlling the yarn between the two. On emerging from the front rollers the yarn usually passes through an eyelet, to centre it over the centre of the spindle, it then takes a turn or two round the flyer leg, through the twizzle or eyelet on the flyer and on to the bobbin F. The flyer may be freely rotated by means of the wharl J and through the spindle G upon the top of which it is screwed. The bobbin fits loosely over the spindle and rests upon the lifter plate I; this latter, being controlled by the lifter mechanism, slowly raises and lowers the bobbin during the "spin" past the fixed plane of delivery of the yarn, *i.e.* the eyelet of the revolving flyer. Now, if for one moment it be considered that the bobbin may not revolve on the spindle but may be slid up and down by the lifter motion, then, if the front rollers deliver the necessary yarn, the flyer will wrap it in successive layers upon the bobbin—but no twist will be inserted. On the other hand, if the bobbin is perfectly free upon the spindle and the front rollers cease delivering yarn, then the flyer, by means of the yarn, will pull the bobbin round at the same speed as it goes itself, and the yarn will be twisted but not wound upon the bobbin. By obtaining an action in between these two extremes both twisting and winding on to the bobbin is effected. The speed of the bobbin is suitably retarded by washers placed between it and the lifter plate, so that it just drags sufficiently to wind up the yarn "paid out" by the front rollers. The turns per inch are in proportion to the yarn delivered and the revolutions of the flyer. Thus if, while 1 in. of yarn is delivered, the flyer revolves twelve times the turns per inch will be approximately twelve. This in brief is the theory of the spindle, flyer and bobbin action.

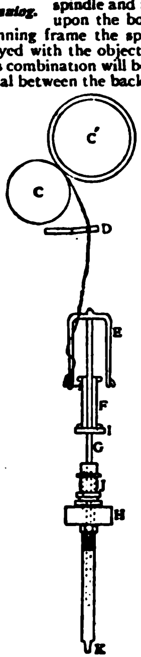


Fig. 15.—Section of Flyer Spindle.

C, C' are the front rollers of a drawing or spinning frame, delivering the sliver to a centring board D, containing an eye for each sliver, from which the sliver passes to the flyer E and finally to the bobbin F, which rests on the lifter-plate I and is traversed up and down by this plate according to the length of bobbin employed. The flyer E is screwed on to the spindle G which is suitably held by the sheath, bolster, &c., shown at H, and in the footstep at K. The spindle is turned by a tape passing round the wharl J and thence to an ordinary tin-drum.

Carding of medium and short wools for worsted yarns.

Wools not more than 7 in. long are usually prepared for combing by the operation of carding. On first thought it might be imagined that carding would result in broken fibres and a poor yield of top. That this is not so is evident from the fact that there is a tendency to card wools from 7 to 10 in. long, this tendency being due to the relative cheapness of carding as compared with preparing. If long wools were fed directly on to a swift, no doubt serious breakage of fibre would occur, but it is customary to place before the first swift of a worsted card a series of four opening rollers and dividers—with their accompanying "burring rollers"—to open out the wool gradually, so that when it eventually reaches the first swift it is so opened out that further opening out instead of breakage occurs. Some carders use a breast or small swift in place of those opening rollers—mostly on account of economy The swift is usually surmounted with four workers and strippers and is very similar to the woollen carder, save that the workers and doffer are larger, thereby effecting more of a combing action and working economically by reason of the greater wearing surface brought into play As botany wool is usually brought directly from the wash bowl to the feed sheet of the card, it is usual to clothe the first cylinders with galvanized wire clothing.

Combing medium and fine wools.

After the carding the wool is back-washed and gilled—on similar lines to English wool—and then is ready for combing The largest combers of botany wools, Messrs Isaac Holden & Co., employ the square-motion comb, in fact this comb is known in the trade as the Holden comb. Other combers, however, almost without exception employ the Noble comb with a fine "set over," *i.e.* fine spinning of the comb circles After combing, the tops are "finished" by being passed through two finisher-boxes, the last of which "balls" the tops ready for marketing.

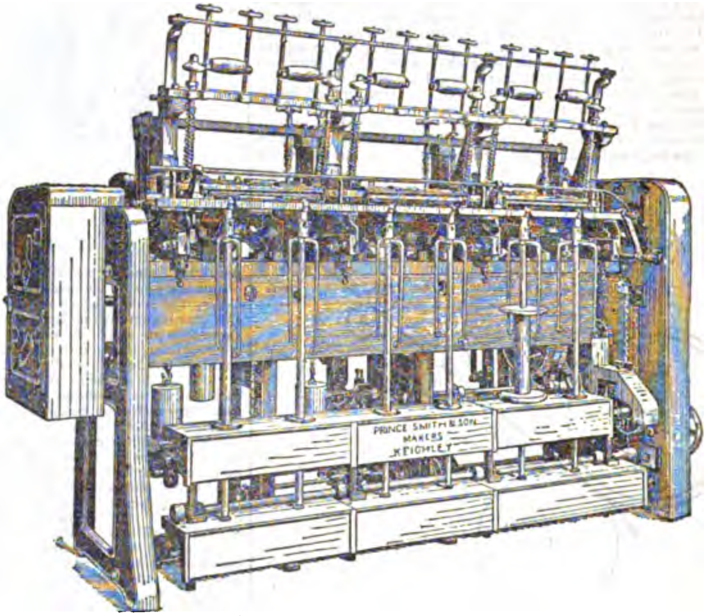


Fig. 16.—Spindle Cone Drawing-Box.

Drawing and spinning.

Short wools are drawn and spun on very similar lines to the longer wools, save that the boxes are more in number and are in some cases lighter in build. The boxes usually employed in a botany set are as follows: two double-head can gill-boxes, two two-spindle gill-boxes, a four-spindle drawing-box, a six-spindle weigh-box, an eight-spindle drawing-box, two eight-spindle finishing-boxes, two twenty-four-spindle second finishers, three thirty-two-spindle dandy reducers, ten thirty-two-spindle dandy rovers, with ten two-hundred-spindle cap spinners to follow.

The doublings as a rule are about 7, 6, 6, 6, 5, 5, 5, 4, 4, 2 and the drafts 5, 6, 6, 7, 7, 7, 8, 8, 8 at the respective boxes, an endeavour as a rule being made to obtain a roving of which 40 yds. =2 drams, as this is the most convenient size for being spun into fine botany count of yarn.

Following the lead of the cotton trade endeavours have been made to positively control the driving and speed of both flyer and bobbin in all the drawing frames of such sets as that described above. Such control is usually effected by a pair of cones, from which this system has taken its name, viz. "cone" drawing. In fig. 16 a usual type of cone drawing-box is illustrated. The chief advantages of this system seem to be the possibilities of employing larger bobbins, and thus obtaining greater production, the consumption of relatively less power, and more particularly the production of a softer sliver with less twist, partaking more of the character of a French roving.

Spinning is usually effected upon the cap frame (see fig. 17)—a frame in which the bobbin, resting upon a fixed spindle, is itself driven at say 5000 revolutions per minute to put in the twist, while the friction of the yarn on the cap which covers the bobbin enables the bobbin to wind up upon itself the yarn as delivered by the front rollers. The weakness and the strength of the cap frame is that to make reasonably hard bobbins the bobbins must be driven at a high speed.

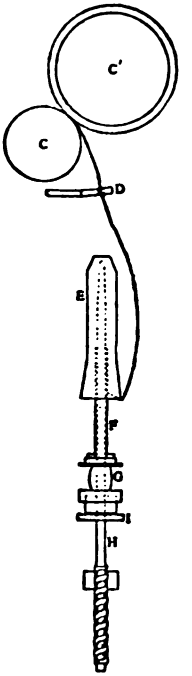


FIG. 17.—Section of Cap Spindle.

C, C' are the front rollers of a cap spinning frame delivering the yarn through the centring board D under the edge of the cap E to the bobbin F, which rests upon the tube and wharl G, which in turn rest upon the lifter-rail I, which effects the necessary traversing. The spindle H is simply screwed into the framework, and does not revolve, but simply acts as a support for the cap and as a centre of motion for the tube and bobbin.

French drawing and spinning.

The French are noted for a special system of worsted spinning, which, producing soft botany yarns of a marked type, is worthy of more than passing comment. The preparation is very similar to the preparation of botany yarns for the English system save that as a rule the order of the operations are carding, gilling, combing, back-washing and finishing. The characteristic features of the method lie in the subsequent drawing and spinning. The drawing-box as shown in fig. 18 consists of back rollers, porcupine or revolving gill, front rollers, rubbers and winding-up arrangement. Thus there is no twist inserted, the slivers being treated softly and openly right away through the processes. A set of this type usually consists of two gill-boxes preparing for combing, comb, back-washing machine and two finishing gill-boxes, first drawing frame, second drawing frame, the slubbing frame, the roving frame and the self-acting mule. After leaving the last box as a fine soft pith-like sliver, spinning is effected upon the worsted mule. The main differences between the worsted and the woollen mule are firstly, the worsted mule is fitted with preliminary drafting rollers, and secondly, there is little or no spindle draft. As the mule is an intermittent worker it is natural to contrast it with the cap frame, which runs continuously. What the real advantage is it is difficult to say, but the mule-spun worsted yarn trade is becoming yearly of more importance, and it is pleasing to note that English spinners are at last doing a fair share of this business.

Doubling, twisting, etc.

Upon whichever system the yarns have been spun it will frequently be necessary to twofold them and sometimes to three- and fourfold them. Again the fashion sometimes runs upon fancy twists, and then it is necessary to be able to produce the various styles of cloud, loop, curl, knop, &c., yarns. Twofolding is done upon the flyer, cap and ring frames. The main difference between the cap and the ring frame is that in the latter a small bent piece of wire, termed a traveller, revolved round a ring by the pull of the spindle through the yarn, serves as the retarder to enable the bobbin to wind the yarn, delivered by the front rollers on to itself (see fig. 19). Fancy twisters are almost universally on the ring system.

Yarns.

Yarns are placed on the market in eight forms, viz. in hank, on spools, on paper tubes, on bobbins, on cops, in cheeses, in the warp ball form and dressed upon the loom beam. Thus the manufacturer can order the yarn which he requires in the form best suited to his purpose.

Weaving.

Although in some few cases special means must be employed for the weaving of woollens, worsteds and stuff goods, still the main principles are the same for all classes of goods (see WEAVING). Attention may here be concentrated on the characteristic principles of woollen and worsted manufacture.

Finishing processes.

The characteristic feature of wool and of wool yarns and cloths is the quality of "felting." This quality has always been made use of in woollen cloths, but in worsted cloths, until comparatively recently, it has been largely ignored. To-day, however, cloths are made, ranging from the truest woollen to the typical worsted, of which it would be impossible to indicate the type of yarn employed without very careful analysis. As it is obviously impossible to give here every variety of finish employed, the two typical styles for woollen and worsted cloths are dealt with in detail, and further to elucidate the matter the finishing of a Bradford "stuff" or "lustre" piece is also given in outline.

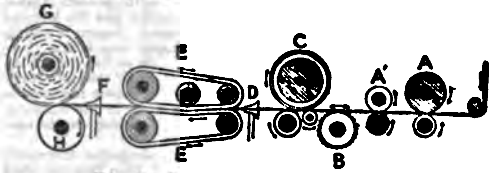


FIG. 18.—Section of French Drawing-Box.

A, A', delivery rollers which control the slivers during the drafting operation. B is the porcupine (or circular gill) and C are the front drafting rollers. D is the funnel through which the slivers pass to the consolidating rubbers E, E, F is a second funnel and G is the condensed sliver wound up at a uniform rate on the roller H.

Woollen cloth finishing.

The fabric on leaving the loom is first mended and then scoured. The operation of scouring is effected in a "dolly," and must thoroughly clear the piece so that it is free to take the desired finish. The piece is now soaped and "milled," *i.e.* felted. Milling may be effected either in the stocks or in the milling machine. The stocks, the main features of which are huge hammers which are caused to fall or are driven positively into the cloth, exert a bursting action eliminating the thread structure. The milling machine acts more by compression, arrangements being made to compress the cloth in length or breadth at will. After milling scouring follows to clear the cloth thoroughly of the milling agents previous to the finishing proper. The cloth is now taken in a damp state to the tentering machine and, being hooked upon a frame running into a heated chamber, is stretched in width and dried in this condition. Raising follows, this being effected by subjecting the surface of the fabric to the action of "teazles" fixed on a large revolving cylinder, the whole machine being termed a "gig." After raising the fabric is "cropped" by being passed over a blade near which revolving knives work, on the principle of a lawn-mower, shearing and levelling the piece. Sometimes fabrics are raised wet, especially if a velvet finish is required. Brushing follows to clear the piece of all stray fibres. The fabric is now ready for "crabbing," which consists in winding it tightly on to a perforated roller through which steam may be blown or upon which the piece may be boiled. The pieces are then rewound and the operation repeated at least once, to obtain even distribution of finish. Being now ready for pressing, the fabric is cuttled, usually with press papers between each cuttle, and placed in the hydraulic

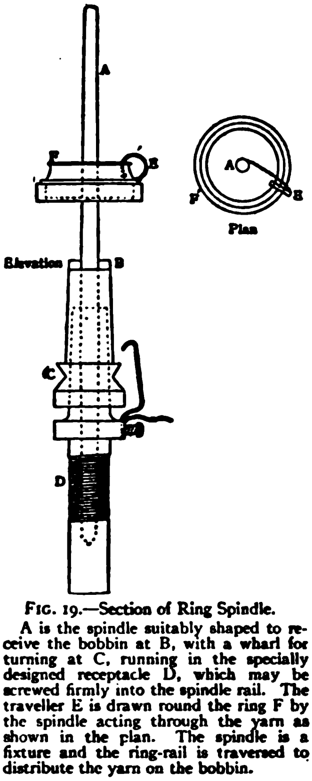


FIG. 19.—Section of Ring Spindle.

A is the spindle suitably shaped to receive the bobbin at B, with a wharl for turning at C, running in the specially designed receptacle D, which may be screwed firmly into the spindle rail. The traveller E is drawn round the ring F by the spindle acting through the yarn as shown in the plan. The spindle is a fixture and the ring-rail is traversed to distribute the yarn on the bobbin.

press either hot or cold. After pressing dry steaming is frequently necessary to take away cakiness and a certain false lustre which sometimes developes. Final cuttling completes the finishing operations.

Worsted cloth finishing.

Worsted cloth finishing is very similar to woollen cloth finishing save that some of the operations are less severe. Mending, scouring, milling and tentering are similar. The raising as a rule is effected by brushing, although it is by no means uncommon to raise worsteds on the gig. Cropping, crabbing, pressing and steaming are the same as for woollen fabrics. Of course the real difference between the woollen and the worsted cloth is due to the selection of the right material, to correct roving, spinning and fabric structure: finishing simply comes as a "developer" in the case of the woollen fabric, while in the case of the typical worsted fabric it simply serves as a "clearer," the cloth really being made in the loom. A woollen cloth as it leaves the loom is unsightly and in a sense may be said to be made in the finishing, although it is truer to say "developed" in the finishing: in the case of the worsted cloth it is altogether otherwise.

Lustre finishing.

A cotton warp, lustre weft style, is treated altogether differently from either of the foregoing. It is first crabbed, then steamed, then scoured and dried, then singed by being passed over a red-hot copper plate or through gas jets, then scoured again, and if necessary dyed. It is then washed, dried, then tentered and finally pressed. Of course these operations are applied with discrimination to the varied styles of goods made in the Bradford district. Thus, for instance, the finishing of an "Italian" may be considerably varied from the foregoing, being more complex, while other styles, such as plain all-wool goods, are treated very simply.

Varieties of woollens and worsteds.

It will be gathered from the foregoing remarks that the varieties of wool textures are many and very different in character. This is perhaps realized best by contrasting a heavy melton cloth weighing say 24–30 oz. per yard with a fine mohair texture weighing say 2–3 oz. per yard. None the less remarkable is the difference in appearance of varieties of wool textures. A rough Harris tweed, for example, contrasts strangely with a smooth fine wool Italian. Of course these differences are not created in any one process or merely by the selection of the raw material or yarn. Every process of manufacture must be directed to attain the desired end, and it is well to realize that huge businesses have been built up upon what, by the outsider, would only be regarded as unimportant details.

The principal styles of woollen cloth are tweeds, meltons, Venetians, beavers, doeskins, buckskins, cassimeres and diagonals. The largest class is the tweed, as this ranges from very expensive coatings and trouserings to the cheap styles made of the re-manufactured materials. Tweeds for ladies' wear also form a large class.

The principal styles of worsted cloths are coatings and trouserings, delaines, voiles, merinos, cashmeres, lastings, crêpe-de-chines, amazons, Orleans, lustres of various types (plain and figured), alpacas, Italians, moreens, &c., &c. Many of these are made entirely of worsted yarns, but others are compound so far as material or yarn is concerned. Thus amazons are made from mule-spun worsted warp and a woollen weft. Lustres are made from fine hard spun cotton warp and English or mohair weft, and so on. Perhaps the most interesting point to note is the skill developed by English designers during recent years. Fifty years ago the continental designer ruled the market. To-day the English designer can at least claim an equality with and in some respects is already considered as superior to his continental rival.

Wool tops, yarns and fabrics.

Prior to the development of native ingenuity and skill England was remarkable as a wool-growing country, most of the wool being shipped to the continent, so that it may be said that the wool of England met the skill of southern Europe in Flanders, which thus became the great textile centre so far as wool was concerned. With the development of native skill under the fostering care of several of the English monarchs—notably Edward III. and James I.—it was but natural to expect that endeavours would be made to manufacture English wool at home and export the woven cloth. With the remarkable colonial developments of the 17th, 18th and 19th centuries, in conjunction with the invention of the spinning frame and power-loom, this expectation was most fully realized, at least so far as ordinary wearing fabrics were concerned. Latterly, however, with the development of skill in newly developed countries, the tendency has been to partially revert to the old conditions. Thus in 1850 Bradford's chief export was cloth, in 1875 the yarn trade had markedly developed, in 1900 the top trade was well established, and to-day Bradford has a large wool export trade. Fabrics are made for the home and general export trade; yarns are exported mostly to the continent; tops and wool mostly to the United States of America.

Statistics.

The following tables give a useful idea of (*a*) the sources of supply of the raw material, wool, also of the changes which have taken place in the trade since 1800; (*b*) the changes in monetary value of the chief sorts of wool during recent years; (*c*) the number of factories and of persons employed in the textile industries during the past half-century; (*d*) growth of the export trade in woollens and worsteds of the United Kingdom during the past century. For further details see Hooper's admirable tables now issued by the Bradford Chamber of Commerce.

Centres of industry.

Prior to the development of the factory system and the remarkable development in textile appliances at the end of the 18th and beginning of the 19th centuries, the textile industries were scattered all over the country, only in some few cases more or less accidental centralizing occurring. To-day it may be said that the wool industry is centralized where the coal supply of south Yorkshire meets the wool supply of north Yorkshire, *i.e.* in the Bradford and Leeds districts, though much of the wool dealt with in this district is imported and consequently can only be said to follow the trend already established. Of course there are wool manufacturing districts other than those mentioned. Scotland is noted for its Scotch tweeds manufactured in the Hawick and Galashiels district, the West of England still makes some magnificent all-wool cloths; Norwich guards a remnant of its once flourishing worsted industry and Leicester has developed a remarkable hosiery trade. Again, firms whose existence is due to individual enterprise are still studded up and down the country, and manage to compete fairly well with the main manufacturing districts. Since about 1856, however, there can be no doubt that the English wool trade has been centring more and more round Bradford, while the remanufactured materials and the blanket trade is centred round Batley and Dewsbury. Wales retains only a fragment of its once large flannel trade, this trade now being located in Yorkshire, with the exception of one or two individual firms elsewhere. The carpet trade is centred in Halifax, Kidderminster and Glasgow. Whether further centralization may be looked for is questionable. Specialization undoubtedly favours Bradford, as there the wool, top, yarn and fabric branches of the industry are individually developed to great advantage; but the development of means of communication and some such factor as electric or water power may radically disturb the present balance of the industry. (A. F. B.)

Imports of Wool into the United Kingdom from the Principal Countries, Foreign and Colonial.

Country.		1800.	1820.	1840.	1860.	1880.	1900.	1905.	1907.
New South Wales }	Bales	..	..	..	..	..	248,408	240,922	308,628
Queensland }		658	213	25,820	46,092	224,777	124,401	148,059	130,128
Victorian		..	..	..	78,186	306,817	255,131	261,724	330,326
Tasmanian		..	180	11,721	16,731	23,653	18,225	13,770	22,147
South Australian		..	..	3,484	23,554	109,917	50,720	76,469	89,637
West Australian		..	..	..	1,992	9,211	26,317	44,623	41,467
New Zealand		..	..	..	17,870	189,441	395,693	394,390	442,973
Cape and Natal		..	29	3,477	55,711	190,614	102,268	192,210	259,691
Total Colonial	Bales	658	422	44,502	240,136	1,054,430	1,221,163	1,327,167	1,624,997
East Indian and Persian		..	..	7,611	62,226	112,716	142,518	153,841	159,818
Chinese		..	..	..	119	1,672	4,151	7,284	15,060
German		1,170	14,609	63,278	19,681	28,119	9,126	6,636	11,533
Spanish		30,318	17,681	5,273	4,199	14,603	896	1,732	4,077
Portuguese		9,622	475	1,569	24,503	14,356	5,242	11,018	10,214
Russian		25	150	11,776	22,150	45,417	28,018	7,404	15,889
Turkish, Egyptian and North African		76	380	5,492	17,545	49,853	39,108	43,104	51,725
Peruvian and Chilean		..	25	40,004	69,068	52,876	70,423	55,163	53,493
Buenos Aires and Montevidean		..	..	..	5,058	9,852	22,077	52,839	70,348
Falkland Islands and Punta Arenas		..	..	..	..	4,700	28,784	34,903	53,249
Italian and Trieste		84	334	4,055	719	2,565	2,768	3,889	2,761
Sundry		487	1,479	2,519	15,172	35,973	37,150	46,485	43,176
Goat's Wool		..	..	..	11,915	57,449	69,445	101,712	109,077
al Bales		42,440	35,555	186,079	492,491	1,484,581	1,680,869	1,853,177	2,225,417

Prices per lb in each Year of some Colonial, Foreign and English Wools, also of Alpaca and Mohair.

Material.	1874.[1]	1880.	1885.	1890.	1895.	1900.	1901.[2]	1902.[2]	1905.
	d.	d.	d.	d.	d.	d.	d.	d.	d.
Port Philip—Greasy	14½	13½	10	10½	8½	11½	9½	13	13½
Adelaide—Greasy	11½	10½	6¾	7½	5¾	7½	6½	8½	9
Cape—Greasy	16½	12½	9	9½	7	9¾	7	9½	10½
Buenos Aires—Greasy	7½	7½	4½	5¼	4½	4¾	4½	5¾	6½
British Wool	22	16½	9½	10	9½	7½	6 1/16	6	11½
Alpaca	33-35	13-15½	12½-14½	22-14½	14½-27	16-13	12½-16	15½-19½	15½-17½
Mohair	35-45	27-35-21	14-19	18-13½	14-30	20½-17	19-17	15	13½-16

[1] Year of the highest values of wools ever reached within recent times.
[2] Years of the lowest values of wools ever reached within recent times.

Summary of Woollen and Worsted Factories and of Persons employed in the same in the United Kingdom.

	1867	1874.	1885.	1889.	1901.	1904.
Factories	2,649	2,617	2,751	2,517	..	2,382
Rag grinding machines	..	..	..	..	..	900
Woollen carding sets	..	..	..	..	..	6,700
Worsted combing machines	1,038	1,276	..	..	..	2,924
Spinning spindles	6,455,879	5,449,495	5,375,102	5,604,535	..	5,625,477
Doubling spindles	519,629	558,914	769,492	969,812	..	1,059,049
Power looms	118,875	140,274	139,902	131,506	..	104,514
Children (half timers)	33,054	38,416	24,636	22,940	7,475	..
Persons working full time—						
Males	94,838	106,005	112,935	120,441	102,876	..
Females	134,368	135,712	145,684	158,175	149,558	..

Summary of Exports of Wool, Wool Waste, Noils, Tops, Yarns and Fabrics from the United Kingdom.

	1840.	1882.	1890.	1900.	1907.
	lb	lb	lb	lb	lb
British Wool	5,000,000	13,800,000	19,500,000	24,900,000	34,500,000
Foreign and Colonial	2,000,000	264,100,000	342,200,000	197,500,000	314,200,000
Waste	..	..	2,397,600	1,593,100	8,937,100
Noils	..	..	10,234,700	7,897,400	12,689,700
Tops	..	..	9,016,000	28,031,200	35,580,000
Worsted Yarn	..	29,840,300	39,510,100	56,075,900	55,521,700
Mohair, &c., Yarn	..	8,752,200	12,959,600	10,397,700	17,782,800
Woollen Yarn	..	1,992,400	1,572,700	1,088,300	2,576,100
Cloths	..	£18,768,634	£20,418,482	£15,682,154	£22,153,680
Apparel	..	£1,380,000	£1,700,000	£1,700,000	£2,550,546

WOOLLETT, WILLIAM (1735–1785), English engraver, was born at Maidstone, of a family which came originally from Holland, on the 15th of August 1735. He was apprenticed to John Tinney, an engraver in Fleet Street, London, and studied in the St Martin's Lane academy. His first important plate was from the "Niobe" of Richard Wilson, published by Boydell in 1761, which was followed in 1763 by a companion engraving from the "Phaethon" of the same painter. After West he engraved his fine plate of the "Battle of La Hogue" (1781), and the "Death of General Wolfe" (1776), which is usually considered Woollett's masterpiece. In 1775 he was appointed engraver-in-ordinary to George III.; and he was a member of the Incorporated Society of Artists, of which for several years he acted as secretary. He died in London on the 23rd of May 1785.

In his plates, which unite work with the etching-needle, the dry-point and the graver, Woollett shows the greatest richness and variety of execution. In his landscapes the rendering of water is particularly excellent. In his portraits and historical subjects the rendering of flesh is characterized by great softness and delicacy. His works rank among the great productions of the English school of engraving. Louis Fagan, in his *Catalogue Raisonné of the Engraved Works of William Woollett* (1885), has enumerated 123 plates by this engraver.

WOOLMAN, JOHN (1720–1772), American Quaker preacher, was born in Northampton, Burlington county; New Jersey, in August 1720. When he was twenty-one he went to Mount Holly, where he was a clerk in a store, opened a school for poor children and became a tailor. After 1743 he spent most of his time as an itinerant preacher, visiting meetings of the Friends in various parts of the colonies. In 1772 he sailed for London to visit Friends in the north of England, especially Yorkshire, and died in York of smallpox on the 7th of October. He spoke and wrote against slavery, refused to draw up wills transferring slaves, induced many of the Friends to set their negroes free, and in 1760 at Newport, Rhode Island, memorialized the Legislature to forbid the slave trade. In 1763 at Wehaloosing (now Wyalusing), on the Susquehanna, he preached to the Indians; and he always urged the whites to pay the Indians for their lands and to forbid the sale of liquor to them.

Woolman wrote *Some Considerations on the Keeping of Negroes* (1754; part ii., 1762); *Considerations on Pure Wisdom and Human Policy, on Labor, on Schools, and on the Right Use of the Lord's Outward Gifts* (1768); *Considerations on the True Harmony of Mankind, and How it is to be Maintained* (1770); and *A Word of Remembrance and Caution to the Rich* (1793); and the most important of his writings, *The Journal of John Woolman's Life and Travels in the Service of the Gospel* (1775), which was begun in his thirty-sixth year and was continued until the year of his death. The best-known edition is that prepared, with an introduction, by John G. Whittier in 1871. *The Works of John Woolman* appeared in two parts at Philadelphia, in 1774–1775, and have often been republished; a German version was printed in 1852.

WOOLNER, THOMAS (1825–1892), British sculptor and poet, was born at Hadleigh, Suffolk, on the 17th of December 1825. When a boy he showed talent for modelling, and when barely thirteen years old was taken as an assistant into the studio of William Behnes, and trained during four years. In December 1842 Woolner was admitted a student in the Royal Academy, and in 1843 exhibited his "Eleanor sucking Poison from the Wound of Prince Edward." In 1844, among the competitive works for decorating the Houses of Parliament was his life-size group of "The Death of Boadicea." In 1846 he had at the Royal Academy a graceful bas-relief of Shelley's "Alastor." Then came (1847) "Feeding the Hungry," a bas-relief, at the Academy; and at the British Institution a brilliant statuette of "Puck" perched upon a toadstool and with his toe rousing a frog. "Eros and Euphrosyne" and "The Rainbow" were seen at the Academy in 1848.

Woolner became, in the autumn of 1848, one of the seven Pre-Raphaelite Brethren, and took a leading part in *The Germ* (1850), the opening poem in which, called "My Beautiful Lady," was written by him. He had already modelled and exhibited portraits of Carlyle, Browning and Tennyson. Unable to make his way in art as he wished, Woolner in 1852 tried his luck as a gold-digger in Australia. Failing in this, he returned to England in 1857, where during his absence his reputation had been increased by means of a statue of "Love" as a damsel lost in a day-dream. Then came his second portraits of Carlyle, Tennyson and Browning, the figures of Moses, David, St John the Baptist and St Paul for the pulpit of Llandaff cathedral, the medallion portrait of Wordsworth in Grasmere church, the likenesses of Sir Thomas Fairbairn, Rajah Brooke of Sarawak, Mrs Tennyson, Sir W. Hooker and Sir F. Palgrave. The fine statue of Bacon in the New Museum at Oxford was succeeded by full-size statues of Prince Albert for Oxford, Macaulay for Cambridge, William III. for the Houses of Parliament, London, and Sir Bartle Frere for Bombay, busts of Tennyson, for Trinity College, Cambridge, Dr Whewell, and Archdeacon Hare; statues of Lord Lawrence for Calcutta, Queen Victoria for Birmingham, Field for the Law Courts, London, Palmerston for Palace Yard, the noble colossal standing figure of Captain Cook that overlooks the harbour of Sydney, New South Wales, which is Woolner's masterpiece in that class; the recumbent effigy of Lord F. Cavendish (murdered in Dublin) in Cartmel church, the seated Lord Chief Justice Whiteside for the Four Courts, Dublin, and John Stuart Mill for the Thames Embankment, London; Landseer, and Bishop Jackson for St Paul's, Bishop Fraser for Manchester, and Sir Stamford Raffles for Singapore. Among Woolner's busts are those of Newman, Darwin, Sedgwick, Huxley, Cobden, Professor Lushington, Dickens, Kingsley, and Sir William Gull, besides the repetition, with variations, of Gladstone for the Bodleian, Oxford, and Mansion House, London, and Tennyson. The last was acquired for Adelaide, South Australia. Woolner's poetic and imaginative sculptures include "Elaine with the Shield of Lancelot," three fine panels for the pedestal of the Gladstone bust at Cambridge, the noble and original "Moses" which was commissioned in 1861 and is on the apex of the gable of the Manchester Assize Courts, and two other works in the same building; "Ophelia," a statue (1869); "In Memoriam"; "Virgilia sees in a vision Coriolanus routing the Volsces"; "Guinevere", "Mercury teaching a shepherd to sing," for the Royal College of Music; "Ophelia," a bust (1878); "Godiva," and "The Water Lily."

In 1864 he married Alice Gertrude Waugh, by whom he had two sons and four daughters. He was elected an associate of the Royal Academy in 1871, and a full member in 1874. Woolner wrote and published two amended versions of "My Beautiful Lady" from *The Germ*, as well as "Pygmalion" (1881), "Silenus" (1884), "Tiresias" (1886), and "Poems" (1887) comprising "Nelly Dale" (1886) and "Children." Having been elected professor of sculpture in the Royal Academy, Woolner began to prepare lectures, but they were never delivered, for he resigned the office in 1879. He died suddenly on the 7th of October 1892, and was buried in the churchyard of St Mary's, Hendon.

WOOLSACK, *i.e.* a sack or cushion stuffed with wool, a name more particularly given to the seat of the lord chancellor in the House of Lords. It is a large square cushion of wool, without back or arms, covered with red cloth. It is stated to have been placed in the House of Lords in the reign of Edward III. to remind the peers of the importance of the wool trade of England. The earliest legislative mention, however, is in an act of Henry VIII. (c. 10 s. 8): "The lord chancellor, lord treasurer and all other officers who shall be under the degree of a baron of a parliament shall sit and be placed at the uppermost part of the sacks in the midst of the said parliament chamber, either there to sit upon one form or upon the uppermost sack." The woolsack is technically outside the precincts of the house, and the lord chancellor, wishing to speak in a debate, has to advance to his place as a peer.

WOOLSEY, THEODORE DWIGHT (1801–1889), American educationalist, was born in New York City on the 31st of October 1801. He was the son of a New York merchant, a nephew of Timothy Dwight, president of Yale, and a descendant of Jonathan Edwards. He graduated at Yale in 1820; was a tutor at Yale in 1823–1825, studied Greek at Leipzig, Berlin and Bonn in 1827–1830, became professor of Greek language and literature at Yale in 1831, and was elected president of the college and entered the Congregational ministry in 1846 He resigned the presidency in 1871, and died on the 1st of July 1889 in New Haven. During his administration the college grew rapidly, the scientific school and the school of fine arts were established, and the scholarly tone of the college was greatly improved. Much of his attention in his last years was devoted to the American commission for the revision of the authorized version of the New Testament, of which he was chairman (1871–1881). He prepared excellent editions of *Alcestis* (1834), *Antigone* (1835), *Prometheus* (1837) and *Gorgias* (1843). He published several volumes of sermons and wrote for the *New Englander*, of which he was a founder, for the *North American Review*, for the *Princeton Review* and for the *Century*, and his *Introduction to the Study of International Law, designed as an Aid in Teaching and in Historical Studies* (1860) and his *Divorce and Divorce Legislation* (1882) went through many editions. He also wrote *Political Science, or the State Theoretically and Practically Considered* (1877), and *Communism and Socialism, in their History and Theory* (1880). His son, Theodore Salisbury Woolsey (b. 1852), became professor of international law at Yale in 1878. He was one of the founders of the *Yale Review* (1892, a continuation of the *New Englander*), and is the author of *America's Foreign Policy* (1892).

WOOLSTON, THOMAS (1669–1731), English deist, born at Northampton in 1669, the son of a "reputable tradesman," entered Sidney College, Cambridge, in 1685, studied theology, took orders and was made a fellow of his college. After a time, by the study of Origen, he became possessed with the notion of the importance of an allegorical interpretation of Scripture, and advocated its use in the defence of Christianity both in his sermons and in his first book, *The Old Apology for the Truth of the Christian Religion against the Jews and Gentiles Revived* (1705). For many years he published nothing, but in 1720–1721 the publication of letters and pamphlets in advocacy of his notions, with open challenges to the clergy to refute them, brought him into trouble. It was reported that his mind was disordered, and he lost his fellowship. From 1721 he lived for the most part in London, on an allowance of £30 a year from his brother and other presents. His influence on the course of the deistical controversy began with his book, *The Moderator between an Infidel and an Apostate* (1725, 3rd ed. 1729). The "infidel" intended was Anthony Collins (*q.v.*), who had maintained in his book alluded to that the New Testament is based on the Old, and that not the literal but only the allegorical sense of the prophecies can be quoted in proof of the Messiahship of Jesus; the "apostate" was the clergy who had forsaken the allegorical method of the fathers. Woolston denied absolutely the proof from miracles, called in question the fact of the resurrection of Christ and other miracles of the New Testament, and maintained that they must be interpreted allegorically, or as types of spiritual things. Two years later he began a series of *Discourses* on the same subject, in which he applied the principles of his *Moderator* to the miracles of the Gospels in detail. The *Discourses*, 30,000 copies of which were said to have been sold, were six in number, the first appearing in 1727, the next five 1728–1729, with two *Defences* in 1729–1730. For these publications he was tried before Chief Justice Raymond in 1729 and sentenced (November 28) to pay a fine of £25 for each of the first four *Discourses*, with imprisonment till paid, and also to a year's imprisonment and to give security for his good behaviour during life. He failed to find this security, and remained in confinement until his death on the 21st of January 1731.

Upwards of sixty more or less weighty pamphlets appeared in reply to his *Moderator* and *Discourses*. Amongst the abler and most popular of them may be mentioned Z. Pearce's *The Miracles of Jesus Vindicated* (1729); T. Sherlock's *The Tryal of the Witnesses of the Resurrection of Jesus* (1729, 13th ed. 1755); and N. Lardner's *Vindication of Three of Our Saviour's Miracles* (1729). Lardner being one of those who did not approve of the prosecution of Woolston (see Lardner's Life by Kippis, in Lardner's *Works*, vol. i.).

See *Life* of Woolston prefixed to his *Works* in five volumes (London, 1733); *Memoirs of Life and Writings of William Whiston* (London, 1749, pp. 231-235); Appendix to *A Vindication of the Miracles of our Saviour, &c.*, by J. Ray (2nd ed., 1731); J. Cairns, *Unbelief in the Eighteenth Century* (1880); Sayous, *Les Déistes anglais* (1882); and the article DEISM, with its bibliography.

WOOLWICH, a S.E. metropolitan borough of London, England, bounded W. by Greenwich and Lewisham, and extending N., E. and S., to the boundary of the county of London. Pop. (1901) 117,178. Area, 8276·6 acres. Its N. boundary is in part the river Thames, but it includes two separate small areas on the N. bank, embracing a portion of the district called N. Woolwich. The area is second to that of Wandsworth among the metropolitan boroughs, but is not wholly built over. The most populous part is that lying between Shooter's Hill Road (the Roman Watling Street) and the river, the site falling from an elevation of 418 ft. at Shooter's Hill to the river level. To the E. lies Plumstead, with the Plumstead marshes bordering the river to the N., and in the S. of the borough is Eltham. A large working population is employed in the Royal Arsenal, which occupies a large area on the river-bank, and includes the Royal Gun Factory, Royal Carriage Department, Royal Laboratory and Building Works Department. The former Royal Dockyard was made over to the War Office in 1872 and converted into stores, wharves for the loading of troopships, &c. The Royal Artillery Barracks, facing Woolwich Common, originally erected in 1775, has been greatly extended at different times, and consists of six ranges of brick building, including a church in the Italian Gothic style erected in 1863, a theatre, and a library in connexion with the officers' mess-room. Opposite the barracks is the memorial to the officers and men of the Royal Artillery who fell in the Crimean War, a bronze figure of Victory cast out of cannon captured in the Crimea. Near the barracks is the Royal Artillery Institution, with a fine museum and a lecture hall. On the W. of the barrack field is the Royal Military Repository, within the enclosure of which is the Rotunda, originally erected in St James's Park for the reception of the allied sovereigns in 1814, and shortly afterwards transferred to its present site. It contains models of the principal dockyards and fortifications of the British empire, naval models of all dates, and numerous specimens of weapons of war from the remotest times to the present day. On the Common is the Royal Military Academy, a castellated building erected from the design of Sir J. Wyatville in 1801, where cadets are trained for the artillery and engineer services. There are a number of other barracks. At the S.E. extremity of the Common is the Herbert Military Hospital. Among several military memorials, one in the Academy grounds was erected to the Prince Imperial of France, for two years a student in the Academy. Other institutions include the Woolwich polytechnic and the Brook fever hospital, Shooter's Hill. The parish church of St Mary Magdalene was rebuilt, in 1726–1729, near the site of the old one dating from before the 12th century. Woolwich Common (142 acres) is partly within this borough, but mainly in Greenwich. South of it is Eltham Common (37 acres), and in the E. of the borough are Plumstead Common (103 acres) and Bostall Heath (134 acres). Behind the Royal Military Academy is a mineral well, the "Shooter's Hill waters" mentioned by Evelyn. Near Woolwich Common there are brick and tile kilns and sand and chalk pits, and there are extensive market-gardens in the locality. The parliamentary borough of Woolwich returns one member. The borough council consists of a mayor, 6 aldermen, and 60 councillors. It was only by the London Government Act 1899 that Woolwich was brought into line with other London districts, for in 1855, as it had previously become a local government district under a local board, it was left untouched by the Metropolis Management Act.

Woolwich (Wulewich) is mentioned in a grant of land by King Edward in 964 to the abbey of St Peter at Ghent. In Domesday the manor is mentioned as consisting of 63 acres of land. The Roman Watling Street crossed Shooter's Hill, and a Roman cemetery is supposed to have occupied the site of the Royal Arsenal, numerous Roman urns and fragments of Roman pottery having been dug up in the neighbourhood. Woolwich seems to have been a small fishing village until in the beginning of the 16th century it rose into prominence as a dockyard and naval station. There is evidence that ships were built at Woolwich in the reign of Henry VII., but it was with the purchase by Henry VIII. of two parcels of land in the manor of Woolwich, called Boughton's Docks, that the foundation of the town's prosperity was laid, the launching of the "Harry Grâce de Dieu," of 1000 tons burden, making an epoch in its history. Woolwich remained the chief dockyard of the English navy until the introduction of iron ship building, but the dockyard was closed in 1869. The town became the headquarters of the Royal Artillery on the establishment of a separate branch of this service in the reign of George I. Land was probably acquired for a military post and store depôt at Woolwich in 1667, in order to erect batteries against the invading Dutch fleet, although in 1664 mention is made of storehouses and sheds for repairing ship carriages. In 1668 guns, carriages and stores were concentrated at Woolwich, and in 1695 the laboratory was moved hither from Greenwich. Before 1716 ordnance was obtained from private manufacturers and proved by the Board of Ordnance. In 1716 an explosion took place at the Moorfields Foundry, and it was decided to build a royal brass foundry at the "Tower Place," as the establishment at Woolwich was called until 1805. Founders were advertised for, and records show that Andrew Schalch of Douai was selected. In 1741 a school of instruction for the military branch of the ordnance was established here. It was not until 1805, however, that the collection of establishments at Woolwich became the Royal Arsenal.

See C. H. Grinling, T. A. Ingram and B. C. Polkinghorne, *Survey and Record of Woolwich and West Kent* (Woolwich, 1909).

WOOLWICH-AND-READING BEDS, in geology, a series of argillaceous and sandy deposits of lower Eocene age found in the London and Hampshire basins. By the earlier geologists this formation was known as the "Plastic Clay" so called by T. Webster in 1816 after the *Argile plastique* of G. C. F. D. Cuvier and A. Brongniart. It was called the "Mottled Clay" by J. Prestwich in 1846, but in 1853 he proposed the name "Woolwich-and-Reading Beds" because the other terms were not applicable to the different local aspects of the series.

Three distinct types of this formation are recognized: (1) The Reading type, a series of lenticular mottled clays and sands, here and there with pebbly beds and masses of fine sand converted into quartzite. These beds are generally unfossiliferous. They are found in the N. and W. portions of the London Basin and in the Hampshire Basin. (2) The Woolwich type, grey clays and pale sands, often full of estuarine shells and in places with a well-marked oyster bed. At the base of the shell-bearing clays in S.E. London there are pebble beds and lignitic layers. The Woolwich beds occur in W. Kent, the E. borders of Surrey, the borders of E. Kent, in S. Essex and at Newhaven in Sussex. (3) A third type consisting of light-coloured false-bedded sands with marine fossils occurs in E. Kent. Where it rests on the Thanet beds it is an argillaceous greensand with rounded flint pebbles; where it rests on the Chalk it is more clayey and the flints are less rounded and are green-coated. Except in the Hampshire basin the Woolwich-and-Reading beds usually rest on the Thanet beds, but they are found on the Chalk near Bromley, Charlton, Hungerford, Hertford, Reading, &c. In Dorsetshire the Reading beds appear on the coast at Studland Bay and at other points inland. The "Hertfordshire Pudding Stone" is a well-known rock from near the base of the formation; it is a flint pebble conglomerate in a siliceous matrix. The fossils, estuarine, freshwater and marine, include *Corbicula cuneiformis*, *C. tellinella*, *Ostrea bellovacina*, *Viviparus lentus*, *Planorbis hemistoma*, *Melania* (*Melanatria*) *inquinata*, *Neritina globulus*, and the remains of turtles, crocodiles, sharks, birds (*Gastornis*) and the mammal *Coryphodon*. Bricks, tiles and coarse pottery and occasionally firebricks have been made from the clay beds in this formation.

See EOCENE; also J. Prestwich, *Q.J.G.S.* (1854), x.; W. Whitaker, "Geology of London," *Mem. Geol. Survey*, i. and ii. (1889) and *Sheet Memoir*, No. 268.

WOONSOCKET, a city of Providence county, Rhode Island, U.S.A., on both banks of the Blackstone river, about 16 m. N. by W. of Providence. Pop. (1900) 28,204; (1905, state census) 32,196 (13,734 foreign-born, including 8939 French Canadians and 1369 Irish), (1910) 38,125. Woonsocket is served by the New York, New Haven & Hartford railway and by an interurban electric line. Among its institutions are the Sacred Heart College and the Harris Institute Public Library, founded (1863) by Edward Harris, a local manufacturer. Woonsocket has ample water power from the Blackstone river and its tributaries, the Mill and the Peters rivers. The value of its factory products in 1905 was $19,260,537. Worsted and woollen yarns are manufactured in Woonsocket by the French and Belgian processes. Other manufactures are cotton goods and yarns, rubber goods, clothes wringers, silks, bobbins and shuttles, and foundry products.

The first settlement in the vicinity was made apparently about 1666 by Richard Arnold, who at about that time built a saw-mill on the bank of the Blackstone river. Woonsocket was set off from Cumberland and was incorporated as a township in 1867; was enlarged by the addition of a part of Smithfield in 1871, and was chartered as a city in 1888.

WOOSTER, a city and the county-seat of Wayne county, Ohio, U.S.A., on Killbuck Creek, about 50 m. S. by W. of Cleveland. Pop. (1900) 6063 (407 foreign-born); (1910) 6136. Wooster is served by the Baltimore & Ohio and the Pennsylvania railways. It is the seat of the university of Wooster (co-educational; Presbyterian; founded in 1866 and opened in 1870), which in 1909 had 37 instructors and 1547 students. The Ohio Agricultural Experiment Station is in the city, which also has various manufactures. Wooster was laid out in 1808, was incorporated as a town in 1817, and became a city of the second class in 1869. It was named in honour of General David Wooster (1710–1777), who was killed in the War of Independence.

WOOTTON BASSETT, a market town in the N. parliamentary division of Wiltshire, England, 83 m. W. of London by the Great Western railway. Pop. (1901) 2200. It is the junction of the direct railway (1903) between London and the Severn tunnel with the main line of the Great Western system. The town has large cattle markets and an agricultural trade.

Wootton Bassett (*Wodeton, Wotton*) was held in the reign of Edward the Confessor by one Levenod, and after the Norman Conquest was included in the fief of Miles Crispin. About a century later the manor was acquired by the Basset family. The town received its first charter from Henry VI., and returned members to parliament from 1446–1447 until the passing of the Reform Act of 1832. In 1571 Elizabeth granted to the town a market on Tuesday and two fairs each to last two days, at the feasts of St George the Martyr and the Conception of the Virgin. In 1679 the town received a charter from Charles II., and the corporation consisted of a mayor, two aldermen and 12 capital burgesses, until abolished by the Municipal Corporations Act of 1886, under which the property is now vested in seven trustees, one of whom is appointed by the lord of the manor, and there are also two aldermen and four elected members. In 1836 fairs were instituted on the Tuesday before the 6th of April and on the Tuesday before the 11th of October, which are still maintained, and a large cattle market is held on the first Wednesday of every month. The manufacture of broadcloth was formerly carried on, but is now entirely decayed.

WORCESTER, EARLS AND MARQUESSES OF. Urso de Abitot, constable of Worcester castle and sheriff of Worcestershire, is erroneously said to have been created earl of Worcester in 1076. Waleran de Beaumont (1104–1166), count of Meulan in France, a partisan of King Stephen in his war with the empress Matilda, was probably earl of Worcester from 1136 to 1145. He was deprived of his earldom, became a crusader and died a monk. From 1397 to 1403 the earldom was held by Sir Thomas Percy (*c.* 1343–1403), a brother of Henry Percy, 1st earl of Northumberland. Percy served with distinction in France during the reign of Edward III.; he also held an official position on the Scottish borders, and under Richard II. he was the admiral of a fleet. He deserted Richard II. in 1399, and was employed and trusted by Henry IV., but in 1403 he joined the other Percies in their revolt; he was taken prisoner at Shrewsbury, and subsequently beheaded, the earldom becoming extinct. The title of earl of Worcester was revived in 1421 in favour of Richard Beauchamp, Lord Abergavenny, but lapsed on his death in 1422. The next earl was John Tiptoft, or Tibetot, a noted Yorkist leader during the wars of the Roses, who was executed in 1470 (see below). On the death of his son, Edward, in 1485 the earldom reverted to the crown.

In February 1514 the earldom was bestowed by Henry VIII. on Charles Somerset (*c.* 1460–1526), a bastard son of Henry Beaufort, duke of Somerset. Having married Elizabeth, daughter of William Herbert, earl of Huntingdon, he was styled Baron Herbert in right of his wife, and in 1506 he was created Baron Herbert of Ragland, Chepstow and Gower. He was chamberlain of the household to Henry VIII. His son Henry, 2nd earl (*c.* 1495–1548), obtained Tintern Abbey after the dissolution of the monasteries. The title descended in direct line to Henry, the 5th earl (1577–1646), who advanced large sums of money to Charles I. at the outbreak of the Great Rebellion and was created marquess of Worcester in 1643.

Edward Somerset, 2nd marquess of Worcester (1601–1667), is better known by the title of earl of Glamorgan, this earldom having been conferred upon him, although somewhat irregularly, by Charles I. in 1644. He became very prominent in 1644 and 1645 in connexion with Charles's scheme for obtaining military help from Ireland and abroad, and in 1645 he signed at Kilkenny, on behalf of Charles, a treaty with the Irish Roman Catholics; but the king was obliged by the opposition of Ormonde and the Irish loyalists to repudiate his action. Under the Commonwealth he was formally banished from England and his estates were seized. At the Restoration his estates were restored, and he claimed the dukedom of Somerset promised to him by Charles I., but he did not obtain this, nor was his earldom of Glamorgan recognized. He was greatly interested in mechanical experiments, and his name is intimately connected with the early history of the steam-engine (*q.v.*). His *Century of the Names and Scantlings of such Inventions as at present I can call to mind to have tried and perfected* (1663) has often been reprinted. He died on the 3rd of April 1667.

See Henry Dircks, *Life, Times and Scientific Labours of the 2nd Marquess of Worcester* (1865); Sir J. T. Gilbert, *History of the Irish Confederation and the War in Ireland* (Dublin, 1882–1891).

His only son Henry (1629–1700), the 3rd marquess, abandoned the Roman Catholic religion and was a member of one of Cromwell's parliaments. But he was quietly loyal to Charles II., who in 1682 created him duke of Beaufort. As the defender of Bristol, the duke took a considerable part in checking the progress of the duke of Monmouth in 1685, but in 1688 he surrendered the city to William of Orange. He inherited Badminton, still the residence of the dukes of Beaufort, and died there on the 21st of January 1700. The Worcester title was henceforth merged in that of Beaufort (*q.v.*). Henry, the 7th duke (1792–1853), was one of the greatest sportsmen of his day, and the Badminton hunt owed much to him and his successors, the 8th duke (1824–1899) and 9th duke (b. 1847).

WORCESTER, JOHN TIPTOFT, Earl of (1427–1470), was son of John Tiptoft (1375–1443), who was Speaker of the House of Commons in 1406, much employed in diplomacy by Henry V., a member of the council during the minority of Henry VI., and created Baron Tiptoft in 1426. The younger Tiptoft was educated at Oxford, where John Rous says that he was one of his fellow-students; he is stated to have been a member of Balliol College. He married Cicely, daughter of Richard Neville, earl of Salisbury, and widow of Henry Beauchamp (d. 1445), duke of Warwick. In 1449 he was created earl of Worcester. His wife died in 1450, but he continued the association with the Yorkist party. During York's protectorate he was treasurer of the exchequer, and in 1456–1457 deputy of Ireland. In 1457 and again in 1459 he was sent on embassies to the pope. He was abroad three years, during which he made a pilgrimage to Jerusalem; the rest of the time he spent in Italy, at Padua, where he studied law and Latin; at Ferrara, where he made the acquaintance of Guarino of Verona; and at Florence, where he heard the lectures of John Argyropoulos, the teacher of Greek. He returned to England early in the reign of Edward IV., and on the 7th of February 1462 was made constable of England. In this office he had at once to try the earl of Oxford, and judged him by "lawe padoue" (*sc.* of Padua; Warkworth, 5). In 1463 he commanded at sea, without success. In the following year as constable he tried and condemned Sir Ralph Grey and other Lancastrians. In 1467 he was again appointed deputy of Ireland.

During a year's office there he had the earl of Desmond attainted, and cruelly put to death the earl's two infant sons. In 1470, as constable, he condemned twenty of Warwick's adherents, and had them impaled, "for which ever afterwards the earl was greatly hated among the people, for their disordinate death that he used contrary to the law of the land" (Warkworth, 9). On the Lancastrian restoration Worcester fled into hiding, but was discovered and tried before the earl of Oxford, son of the man whom he had condemned in 1462. He was executed on Tower Hill on the 18th of October 1470.

Worcester was detested for his brutality and abuse of the law, and was called "the butcher of England" (Fabyan, 659). More than any of his contemporaries in this country he represents the combination of culture and cruelty that was distinctive of the Italians of the Renaissance. Apart from his moral character he was an accomplished scholar, and a great purchaser of books in Italy, many of which he presented to the university of Oxford. He translated Cicero's *De amicitia* and Buonaccorso's *Declaration of Nobleness*, which were printed by Caxton in 1481. Caxton in his epilogue eulogized Worcester as superior to all the temporal lords of the kingdom in moral virtue as well as in science. Worcester is also credited with a translation of Caesar's *Commentaries* printed in 1530. His "ordinances for justes and triumphes," made as constable in 1466, are printed in Harrington's *Nugae antiquae*. Worcester was a patron of the early English humanist John Free, and his Italian friends included, besides those already mentioned, Lodovico Carbo of Ferrara, and the famous Florentine bookseller Vespasiano da Bisticci.

AUTHORITIES.—For Worcester's English career see especially the contemporary accounts in *Three Fifteenth Century Chronicles*, *Collections of a London Citizen* (Gregory's *Chronicle*), and Warkworth's *Chronicle*—all three published by the Camden Society. Vespasiano da Bisticci gave an account of him in his *Vite di uomini illustri*, i. 322-326, ap. *Opere inedite o rare nella provincia dell' Emilia*. See also Blades' *Life of Caxton*, i. 79, ii. 73. (C. L. K.)

WORCESTER, WILLIAM (*c.* 1415–*c.* 1482), English chronicler, was a son of William of Worcester, a Bristol citizen, and is sometimes called William Botoner, his mother being a daughter of Thomas Botoner. He was educated at Oxford and became secretary to Sir John Fastolf. When the knight died in 1459, Worcester, although one of his executors, found that nothing had been bequeathed to him, and with one of his colleagues, Sir William Yelverton, he disputed the validity of the will. However, an amicable arrangement was made and Worcester obtained some lands near Norwich and in Southwark. He died about 1482. Worcester made several journeys through England, and his *Itinerarium* contains much information. The survey of Bristol is of the highest value to antiquaries. Portions of the work were printed by James Nasmith in 1778, and the part relating to Bristol is in James Dallaway's *Antiquities of Bristowe* (Bristol, 1834).

Worcester also wrote *Annales rerum Anglicarum*, a work of some value for the history of England under Henry VI. This was published by T. Hearne in 1728, and by Joseph Stevenson for the "Rolls" series with his *Letters and Papers illustrative of the Wars of the English in France during the Reign of Henry VI.* (1864). Stevenson also printed here collections of papers made by Worcester respecting the wars of the English in France and Normandy. Worcester's other writings include the last *Acta domini Johannis Fastolf*. See the *Paston Letters* edited by J. Gairdner (1904); and F. A. Gasquet, *An Old English Bible and other Essays* (1897).

WORCESTER, a town of the Cape province, S. Africa, 109 m. by rail (58 in a direct line) N.E. of Cape Town, and the starting point of the railway to Mossel Bay and Port Elizabeth. Pop. (1904) 7885. It lies in the Little Karroo, about 800 ft. above the sea at the foot of the Hex River mountains. Tanning and wagon-building are among the industries, but the surrounding country is one of the largest wine and brandy producing districts in the province. At Brandvlei, 9 m. S., near the Breede river are thermal springs with a temperature of 145° F.

WORCESTER, an episcopal city and county of a city, municipal, parliamentary, and county borough, and county town of Worcestershire, England, on the river Severn, 120½ m. W.N.W. of London. Pop. (1901) 46,624. It is served by the Great Western railway and by the Bristol-Birmingham line of the Midland railway. Branches of the Great Western diverge to Malvern and Hereford, and to Leominster. Worcester lies mainly upon the left (E.) bank of the Severn, which is here a broad and placid river, the main part of the city lying on a ridge parallel with its banks. The city is governed by a mayor, 12 aldermen and 36 councillors. Area 3242 acres.

The cathedral church of Our Lord and the Blessed Virgin Mary is beautifully placed close to the river. The see was founded by the advice of Archbishop Theodore of Canterbury about 679 or 680, though, owing to the opposition of the bishop of Lichfield it was not finally established till 780. In its formation the tribal division was followed, and it contained the people of the Hwiccas. The bishop's church of St Peter's, with its secular canons, was absorbed by Bishop Oswald into the monastery of St Mary. The canons became monks, and in 983 Oswald finished the building of a new monastic cathedral. After the Norman Conquest the saintly bishop of Worcester, Wulfstan, was the only English prelate who was left in possession of his see, and it was he who first undertook the building of a great church of stone according to the Norman pattern. Of the work of Wulfstan, the outer walls of the nave, aisles, a part of the walls of the transepts, some shafts and the crypt remain. The crypt (1084) is one of the four apsidal crypts in England, the others being those in Winchester, Gloucester and Canterbury cathedrals. Wulfstan's building seems to have extended no farther than the transepts, but the nave was continued, though much of it was destroyed by the fall of the central tower in 1175. The two W. bays of the nave date from about 1160. In 1203 Wulfstan, who had died in 1095, was canonized, and on the completion and dedication of the cathedral in 1218, his body was placed in a shrine, which became a place of pilgrimage, and thereby brought wealth to the monks. They devoted this to the building of a lady chapel at the E. end, extending the building by 50 ft.; and in 1224 was begun the rebuilding of the choir, in its present splendid Early English style. The nave was remodelled in the 14th century, and, excepting the W. bays, shows partly Decorated but principally early Perpendicular work. The building is cruciform, and is without aisles in the transepts, but has secondary choir-transepts. A Jesus chapel (an uncommon feature) opens from the N. nave aisle, from which it is separated by a very beautiful modern screen of stone, in the Perpendicular style. Without, the cathedral is severely plain, with the exception of the ornate tower, which dates from 1374, and is 196 ft. in height. The principal dimensions of the cathedral are—extreme length 425 ft. (nave 170 ft., choir 180 ft.), extreme width 145 ft. (choir 78 ft.), height of nave 68 ft. The monastic remains lie to the S. The cloisters are of Perpendicular work engrafted upon Norman walls, being entered from the S. through a fine Norman doorway. In them the effect of the warm red sandstone is particularly beautiful. An interesting Norman chapter house adjoins them on the E., its Perpendicular roof supported on a central column, while on the S. lies the Refectory, a fine Decorated room (1372) now devoted to the uses of the Cathedral School. There are also picturesque ruins of the Guesten Hall (1320). A very extensive restoration was begun in 1857, upwards of £100,000 being spent. Among the monuments in the cathedral, that of King John, in the choir, is the earliest sepulchral effigy of an English king in the country. There is an altar tomb, in a very fine late Perpendicular chantry chapel, of Arthur, Prince of Wales, son of Henry VII., who died in 1502. There are also monuments of John Gauden, the bishop who wrote *Icon basilike*, often attributed to Charles I., of Bishop Hough by Roubillac, and of Mrs Digby by Chantrey.

Of the eleven parish churches, St Alban's has considerable Norman remains, St Peter's contains portions of all Gothic styles, St Helen's, with a fine peal of bells commemorating the victories of Marlborough, has also Gothic portions, but the majority were either rebuilt in the 18th century, or are modern. St Andrews has a beautiful spire, erected in 1751 155 ft. 6 in. in height. Holy Trinity preserves the ancient roof of the Guesten Hall. St John's in Bedwardine was made a parish church in 1371.

There are no remains of the old castle of Worcester; it adjoined the monastery so closely that King John gave its yard to the monks, and after that time it ceased to be a stronghold. The Commandery, founded by St Wulfstan in 1085, was a hospital, and its name appears to lack authority. It was rebuilt in Tudor times, and there remains a beautiful hall, with music gallery, canopied dais, and a fine bay window, together with other parts. The wood-carving is exquisite. There are many old half-timbered houses. The guild-hall (1723) is an admirable building in the Italian style; it contains a portrait of George III., by Sir Joshua Reynolds, presented by the king to commemorate his visit to the city at the triennial musical festival in 1788. This, the Festival of the Three Choirs, is maintained here alternately with Gloucester and Hereford. The corporation possesses some interesting old charters and manuscripts, and good municipal regalia. Public buildings include the shire-hall (1835), Corn Exchange and market-house. Fairs are held thrice annually. The Victoria Institute includes a library, museum and art gallery. The cathedral school was founded by Henry VIII. in 1541, Queen Elizabeth's, in a modern building, in 1563; there are also a choir school, and municipal art, science and technical schools. In the vicinity of the city there is a large Benedictine convent, at Stanbrook Hall, with a beautiful modern chapel. The Clothiers' Company possesses a charter granted by Queen Elizabeth; but the great industries are now the manufacture of gloves and of porcelain. A company of glovers was incorporated in 1661. The manufacture of porcelain is famous. The materials employed are china clay and china stone from Cornwall, felspar from Sweden, fire-clay from Stourbridge and Broseley, marl, flint and calcined bones. The Royal Porcelain works cover 5 acres. Among Worcester's other trades are those of iron, iron goods and engineering works, carriage making, rope spinning, boat building, tanning and the production of chemical manures and of cider and perry. There is a considerable carrying trade on the Severn.

The charities are numerous, and include St Oswald's hospital, Nash's almshouses, Wyatt's almshouses, the Berkeley hospital, Goulding hospital, Shewring's hospital, Inglethorpe's almshouses, Waldgrave's almshouses, Moore's blue-coat school, Queen Elizabeth's charity, and others.

Traces of British and Roman occupation have been discovered at Worcester (*Wigeran Ceaster*, *Wigornia*), but its history begins with the foundation of the episcopal see. Being the chief city on the borders of Wales, Worcester was frequently visited by the kings of England. In 1139 it was taken by the Empress Maud and retaken and burnt by Stephen in 1149. It surrendered to Simon de Montfort in 1263. In 1642, during the Great Rebellion, a handful of cavaliers was besieged here, and in spite of an attempted relief by Prince Rupert, the city was pillaged, as it was again in 1646. In 1651 Charles II. with the Scottish army marched into Worcester, where he was welcomed by the citizens. Cromwell took up his position on the Red Hill just outside the city gates. Lambert succeeded in passing the Severn at Upton, and drove back the Royalist troops towards Worcester. Charles, seeking an advantage of this division of the enemy on opposite sides of the river, attacked Cromwell's camp. At first he was successful, but Cromwell was reinforced by Lambert's troops in time to drive back Charles's foot, who were not supported by the Scottish horse, and the rout of the King's force was complete.

In the reign of King Alfred, Æthelred and Æthelflead, ealdorman and lady of the Mercians, at the request of the bishop "built a burgh at Worcester" and granted to him half of their rights and privileges there "both in market and street within the borough and without." Richard I. in 1189 granted the town to the burgesses at a fee-farm of £24, and Henry III. in 1227 granted a gild merchant and exemption from toll, and raised the farm to £30. The first incorporation charter was granted by Philip and Mary in 1554 under the title of bailiffs, aldermen, chamberlains and citizens, but James I. in 1622 made the city a separate county and granted a corporation of a mayor, 6 aldermen, and a common council consisting of one body of 24 citizens, including the mayor and aldermen, and another body of 48, who elected the mayor from among the 24. By the Municipal Reform Act of 1835 the government was again altered. The burgesses returned two members to parliament from 1295 to 1885, when the number was reduced to one. As early as 1203 the men of the town paid 100s. for licence to buy and sell cloth as they had done in the time of Henry III., and in 1590 the weavers, walkers and clothiers received an incorporation charter, but the trade had already begun to decline and by 1789 had ceased to exist. Its place was taken by the manufacture of porcelain, introduced in 1751 by Dr Wall, and by the increasing manufacture of gloves, a trade in which is known to have been carried on in the 15th century.

See *Victoria County History, Worcester*; John Noake, *Worcester in Olden Times* (1849); Valentine Green, *The History and Antiquities of the City and Suburbs of Worcester* (1796).

WORCESTER, a city and the county-seat of Worcester county, Massachusetts, U.S.A., about 44 m. W. of Boston on the Blackstone river, a branch of the Providence river. Pop. (1900) 118,421 (37,652 foreign-born); (1905, state census) 128,135; (1910) 145,986. Area, 39 sq. m. Worcester is served by the Boston & Albany, the New York, New Haven & Hartford and the Boston & Maine railways, and is connected with Springfield and Boston by interurban electric lines. The park system of the city comprises about twenty tracts with a total area of more than 1100 acres; among them are Elm Park (88 acres) in the W. including Newton Hill (670 ft. above sea-level), and Green Hill Park (500 acres) in the N.E. Other parks are Institute Park (18 acres) and Boynton Park (113 acres) in the N.W. on Salisbury Pond, given to the city by Stephen Salisbury; Dodge Park (13 acres, N.); Burncoat Park (42 acres, N.E.); Chandler Hill Park (80 acres, E.); Hadwen (50 acres), University (14 acres) and Crompton Park (15·25 acres) in the S.W. and S.; and Greenwood (12·65 acres), Beaver Brook (15·5 acres), Tatnuck (2·94 acres), Kendrick (14·87 acres) and Vernon Hill (16·4 acres). Two miles N.E. of the centre of the city lies lake Quinsigamond, 4 m. long, from which flows the river of the same name, a branch of the Blackstone. On its shores is Lake Park (110 acres). Fronting the Common, a wooded square in the centre of the city, is the City Hall, near which is a bronze statue, by D. C. French, of G. F. Hoar. On the Common there is a monument, designed by Randolph Rogers, to the soldiers and sailors of the Civil War, and one to Colonel Timothy Bigelow (1739–1790), one of Worcester's soldiers of the War of Independence. The E. side of the Common was the site of an old burying ground, and the W. side of the First Church, built in 1663. About ½ m. N. of the Common is Lincoln Square, adjacent to which is the granite Court House; in front of it is a statue of General Charles Devens (1820–1891) by French. The old Salisbury mansion, dating back to Colonial days, stands in this square. At Salisbury Street and Park Avenue are the library and museum (1910) of the American Antiquarian Society, established in 1812 by Isaiah Thomas, with a collection of interesting portraits, a library of 99,000 vols. and many thousands of pamphlets, particularly rich in *Americana*. The Art Museum was erected and endowed (1899–1903) by Stephen Salisbury, and contains a fine collection of casts, many valuable paintings, and the Bancroft Collection of Japanese art. The city has many fine churches.

Worcester is an important educational centre. Clark University was established here in 1889 by Jonas Gilman Clark as a purely graduate institution. In 1902 Clark College was opened for undergraduate work under the presidency of Carroll D. Wright, with a separate endowment of $1,300,000. In 1910 it had 30 teachers and 177 students. The university in 1910 had 15 instructors, 103 students and a library of 50,000 volumes. Under G. Stanley Hall, who was made president in 1888, the university became well known for its work in child-psychology. Worcester Polytechnic Institute (founded in 1865 by John Boynton of Templeton, Massachusetts; opened in 1868) is one of the best-equipped technical schools of college rank in the country; in 1910 it had 49 instructors, 515 students and a library of 12,700 vols.; the buildings are near Institute Park.

On Packachoag Hill or Mt. St James (690 ft.) is the Jesuit college of the Holy Cross, with a preparatory school, founded in 1843 by Benedict J. Fenwick, bishop of Boston, and chartered in 1865; in 1910 it had 30 instructors and 450 students. There is a State Normal School (1874), and connected with it a kindergarten training school (1910).

The city library (175,000 vols.), founded in 1859, was one of the first in the country to be open on Sunday. There are four daily newspapers, one printed in French. From 1775 to 1848 was published here the weekly edition of the *Worcester Spy*, established by Isaiah Thomas in 1770 in Boston as the *Massachusetts Spy* and removed by him to Worcester at the outbreak of the War of Independence; a daily edition was published from 1845 to 1904. Early in the 19th century the city was an important publishing centre.

Worcester is one of the most important manufacturing centres in New England: in 1905 the value of the factory product was $52,144,965, ranking the city third among the cities of the state. Manufacturers of hardware and tools at an early date laid the foundation for the present steel and other metal industries, in which 42 8% of all the workers were employed in 1905. A large proportion are employed in the wire and wire-working industries, one plant, that of the American Steel and Wire Company, employing about 5000 hands; in 1905 the total value of wire-work was $1,726,088, and of foundry and machine shop products $7,327,095.

The first grant of land in this part of the Blackstone Valley was made in 1657, and the town, Quansigamond (or Quinsigamond) Plantation, was laid out in October 1668. In 1675, on the outbreak of King Philip's War, it was temporarily abandoned. In 1684 it was settled again and its name was changed to Worcester because several leaders in the settlement were natives of Worcester, England. In 1713 the vicinity was opened up to settlement, a tavern and a mill were constructed, and a turnpike road was built to Boston. Worcester was incorporated as a town in 1722. In 1755 a small colony of the exiled Acadians settled here. At the outbreak of the War of Independence Worcester was little more than a country market town. During Shays's Rebellion it was taken by the rebels and the courts were closed. The first real impetus to its growth came in 1835 with the construction of the Boston & Worcester railway, and it received a city charter in 1848. The strong anti-slavery sentiment of the city led in 1854 to a serious riot, owing to an apparent attempt to enforce the Fugitive Slave Law. In Worcester, or within a radius of a dozen miles of it, were the homes of Elias Howe, inventor of the sewing machine; Eli Whitney, inventor of the cotton gin; Erastus Bigelow (1814–1879), inventor of the carpet weaving machine; Dr Russell L. Hawes, inventor of an envelope machine; Thomas Blanchard (1788–1864), inventor of the machine for turning irregular forms; Samuel Crompton (1753–1827) and Lucius James Knowles (1819–1884), the perfectors of the modern loom; and Draper Ruggles, Joel Nourse and J. C. Mason, perfectors of the modern plough and originators of many inventions in agricultural machinery.

See F. E. Blake, *Incidents of the First and Second Settlements of Worcester* (Worcester, 1884); Wm. Lincoln, *History of Worcester to 1836* (Worcester, 1837); also same extended to 1862 by Charles Hersey (Worcester, 1862); D. H. Hurd, *History of Worcester County* (Worcester, 2 vols., 1889); I. N. Metcalf, *Illustrated Business Guide to City of Worcester* (Worcester, 1880); C. F. Jewett, *History of Worcester County* (2 vols., Worcester, 1879); the *Collections and Proceedings* (1881 sqq.) of the Worcester Society of Antiquity (instituted in 1877).

WORCESTERSHIRE, a midland county of England, bounded N. by Staffordshire, E. by Warwickshire, S. by Gloucestershire, W. by Herefordshire, and N.W. by Shropshire. The area is 751 sq. m. It covers a portion of the rich valleys of the Severn and Avon, with their tributary valleys and the hills separating them. The Severn runs through the county from N. at Bewdley to S. near Tewkesbury, traversing the Vale of Worcester. Following this direction it receives from the E. the Stour at Stourport, the Salwarpe above Worcester, and the Avon, whose point of junction is just outside the county. The Avon valley is known in this county as the Vale of Evesham, and is devoted to orchards and market gardening. The Cotteswold Hills rise sharply from it on the S.E., of which Bredon Hill, within this county, is a conspicuous spur. The Avon forms the county boundary with Gloucestershire for a short distance above its mouth. The Teme joins the Severn from the W. below Worcester, and forms short stretches of the W. boundary. Salmon and lampreys are taken in the Severn; trout and grayling abound in the Teme and its feeders. Besides the Cotteswolds, the most important hills are the Malvern and the Lickey or Hagley ranges. The Malverns rise abruptly from the flat Vale of Worcester on the W. boundary, being partly in Herefordshire, and reach a height of 1395 ft. in the Worcester Beacon, and 1114 in the Hereford Beacon. They are divided by the Teme from a lower N. continuation, the Abberley Hills. The Lickey Hills cross the N.E. corner of the county, rarely exceeding 1000 ft. Their N. part is called the Clent Hills. Partly within the county are the sites of two ancient forests. That of Wyre, bordering the Severn on the W. in the N. of Worcestershire and in Shropshire, retains to some extent its ancient character; but Malvern Chase, which clothed the slopes of the Malvern Hills, is hardly recognizable.

Geology.—Archean gneisses and schists (Malvernian) and volcanic rocks (Uriconian) form the core of the Malvern Hills; being the most durable rocks in the district, they form the highest ground. Similarly tuffs and volcanic grits (Barnt Green rocks) crop out in the Lickey Hills near Bromsgrove. They are succeeded by the Cambrian rocks (Hollybush Sandstone and Malvern Shales), which are well developed at the S. end of the Malvern Hills, where in places the Archean rocks have been thrust over them. The Lickey Quartzite, probably of the same age as the Hollybush Sandstone, is extensively quarried for roadstone. Strata of Ordovician age being absent in Worcestershire, the Silurian rocks rest unconformably on the earlier formations; they include the Upper Llandovery, Wenlock and Ludlow series. These dip steeply W. from the Malvern and Abberley axis and plunge under the Old Red Sandstone; some of the lower beds are represented at the Lickey, while the Wenlock Limestone forms some sharp anticlines at Dudley. The Silurian strata are rich in marine fossils, and the included limestones (Woolhope, Wenlock and Aymestry) are all represented in the Malvern district. The Old Red Sandstone succeeds the Silurian on the W. borders of the county. The Carboniferous Limestone and Millstone Grit were not deposited, so that the Coal Measures rest unconformably on the older rocks. These are represented in the Wyre Forest coalfield near Bewdley and in the S. end of the S. Staffordshire coalfield near Halesowen; they contain rich seams of coal and ironstone and several intrusions of basalt (dhustone, Rowley-rag). The so-called Permian red rocks are now grouped with the Coal Measures; some intercalated breccias cap the Clent Hills (1036 ft.). The Triassic red rocks—unconformable to all below—cover the centre of the county, and on the W. are faulted against the older rocks of the Malverns; they include the Bunter sandstones and pebble-beds, and the Keuper sandstones and marls, the beds of rock-salt in the latter yielding brine-springs (Droitwich, Stoke Prior). A narrow and seldom-exposed outcrop of Rhaetic beds introduces the marine Liassic formation which occupies most of the S.E. of the county; the Lower Lias consists of blue clays and limestones; the latter are burnt for lime and yield abundant ammonites. The sands and limestones of the Middle Lias and the clays of the Upper Lias are present in the lower slopes of Bredon Hill and of the Cotteswolds, and are succeeded by the sands and oolitic limestones of the Inferior Oolite. Glacial deposits—boulder-clay, isolated boulders, sand and gravel—are met with in many parts of the county, while later valley-gravels have yielded remains of mammoth, rhinoceros, &c. Coal, ironstone, salt, limestone and roadstone are the chief mineral products.

Climate and Agriculture.—The climate is generally equable and healthy, and is very favourable to the cultivation of fruit, vegetables and hops, for which Worcestershire has long held a high reputation, the red marls and the rich loams being good both for market gardens and tillage. About five-sixths of the area of the county is under cultivation, and of this about five-eighths is in permanent pasture. Orchards are extensive, and there are large tracts of woodland. Wheat and oats are the principal grain crops. Turnips are grown on about one-third of the green crop acreage, and potatoes on about one-fourth. There is a considerable acreage under beans. In the neighbourhood of Worcester there are large nurseries.

Industries.—In the N. Worcester includes a portion of the Black Country, one of the most active industrial districts in England. Dudley, Netherton and Brierley Hill, Stourbridge, Halesowen, Oldbury and the S. and W. suburbs of Birmingham, have a vast population engaged in iron-working in all its branches, from engineering works to nail-making, in the founding and conversion, galvanising, finishing and extracting of metals, in chemical and glass works. Worcester is famous for porcelain, Kidderminster for carpets and

Redditch for needles, fish-hooks, &c. Salt is produced from brine at Droitwich and Stoke. The fire-clays and limestone of the N. unite with the coal measures to form a basis of the industries in the Black Country. Furniture, clothing and paper-making and leather-working are also important.

Communications.—The Great Western railway serves Evesham, Worcester, Droitwich and Kidderminster, with branches from Worcester to Malvern and into Herefordshire, from Kidderminster to Tenbury and the W., and from the same junction to Dudley and Birmingham. The London & North-Western system touches Dudley. The Midland company's line between Derby, Birmingham and Bristol runs from N. to S. through the county, with a branch diverging through Droitwich and Worcester, another serving Malvern from Ashchurch, and an alternative route from Birmingham to Ashchurch by Redditch and Evesham. The Severn is an important highway; the Avon, though locked up to Evesham, is little used save by pleasure-boats. Canals follow the courses of the Stour and the Salwarpe, and serve the towns of the Black Country.

Administration and Population.—The area of the ancient county is 480,560 acres, with a population in 1901 of 488,338. The area of the administrative county is 480,059 acres. The county is of very irregular shape, and has detached portions enclaved in Herefordshire, Staffordshire, Warwickshire and Gloucestershire. It comprises five hundreds. The municipal boroughs are Bewdley (2866), Droitwich (4201), Dudley (48,733), Evesham (7101), Kidderminster (24,681) and Worcester (46,624). Dudley and the city and county town of Worcester are county boroughs. The urban districts are Bromsgrove (8418), King's Norton and Northfield (57,122; forming a S. suburb of Birmingham), Lye and Wollescote (10,976; adjacent to Stourbridge), Malvern (16,449), North Bromsgrove (5688), Oldbury (25,191), Redditch (13,493), Stourbridge (16,302) and Stourport (4529). Halesowen (4057), Pershore (3348), Tenbury (2080) and Upton-upon-Severn (2225) may be mentioned among other towns. The county is in the Oxford circuit, and assizes are held at Worcester. It has one court of quarter-sessions, and is divided into 17 petty sessional divisions. Worcester and Dudley have separate courts of quarter-sessions, and all the boroughs have commissions of the peace. The total number of civil parishes is 239. The ancient county, which is mostly in the diocese of Worcester, with a few parishes in that of Hereford, contains 231 ecclesiastical parishes or districts wholly or in part. The county contains five parliamentary divisions—West or Bewdley, East, South or Evesham, Mid or Droitwich, and North or Oldbury. The parliamentary boroughs of Kidderminster and Worcester return one member each, and parts of the boroughs of Dudley and Birmingham are included in the county.

History.—The earliest English settlers in the district now known as Worcestershire were a tribe of the Hwiccas of Gloucestershire, who spread along the Severn and Avon valleys in the 6th century. By 679 the Hwiccan kingdom was formed into a separate diocese with its see at Worcester, and the Hwiccas had made themselves masters of the modern county, with the exception of the N.W. corner beyond the Abberley Hills. From this date the town of Worcester became not only the religious centre of the district, but the chief point of trading and military communication between England and Wales. A charter of the reign of Alfred alludes to the erection of a "burh" at Worcester by Edward and Æthelflead, and it was after the recovery of Mercia from the Danes by Edward that the shire originated as an administrative area. The first political event recorded by the *Saxon Chronicle* in Worcestershire is the destruction of Worcester by Hardicanute in 1041 in revenge for the murder of two of his tax-gatherers by the citizens.

In no county has the monastic movement played a more important part than in Worcestershire. Foundations existed at Worcester, Evesham, Pershore and Fladbury in the 8th century; at Great Malvern in the 11th century, and in the 12th and 13th centuries at Little Malvern, Westwood, Bordesley, Whistones, Cookhill, Dudley, Halesowen and Astley. At the time of the Domesday Survey more than half Worcestershire was in the hands of the church. The church of Worcester held the triple hundred of Oswaldslow, with such privileges as to exclude the sheriff's jurisdiction entirely, the profits of all the local courts accruing to the bishop, whose bailiffs in 1276 claimed to hold his hundred outside Worcester, at Dryhurst, and at Wimborntree. The two hundreds owned by the church of Westminster, and that owned by Pershore, had in the 13th century been combined to form the hundred of Pershore, while the hundred of Evesham owned by Evesham Abbey had been converted into Blakenhurst hundred; and the irregular boundaries and outlying portions of these hundreds are explained by their having been formed out of the scattered endowments of their ecclesiastical owners. Of the remaining Domesday hundreds, Came, Clent, Cresselaw and Esch had been combined to form the hundred of Halfshire by the 13th century, while Doddingtree remained unchanged. The shire-court was held at Worcester.

The vast possessions of the church prevented the growth of a great territorial aristocracy in Worcestershire, and Dudley Castle, which passed from William Fitz-Ansculf to the families of Paynel and Someri, was the sole residence of a feudal baron. The Domesday fief of Urse d'Abitot the sheriff, founder of Worcester Castle, and of his brother Robert le Despenser passed in the 12th century to the Beauchamps, who owned Elmley and Hanley Castles. The possessions of William Fitz Osbern in Doddingtree hundred and the Teme valley fell to the crown after his rebellion in 1074 and passed to the Mortimers. Hanley Castle and Malvern Chase were granted by Henry III. to Gilbert de Clare, with exemption from the sheriff's jurisdiction.

The early political history of Worcestershire centres round the city of Worcester. In the Civil War of the 17th century Worcestershire was conspicuously loyal. On the retreat of Essex from Worcester in 1642 the city was occupied by Sir William Russell for the king, and only surrendered in 1646. In 1642 Prince Rupert defeated the parliamentary troops near Powick. Sudeley Castle surrendered in 1644, and Dudley and Hartlebury by command of the king in 1646.

The Droitwich salt-industry was very important at the time of the Domesday Survey, Bromsgrove alone sending 300 cartloads of wood yearly to the salt-works. In the 13th and 14th centuries Bordesley monastery and the abbeys of Evesham and Pershore exported wool to the Florentine and Flemish markets, and in the 16th century the Worcestershire clothing industry gave employment to 8000 people; fruit-culture with the manufacture of cider and perry, nail-making and glass-making also flourished at this period. The clothing industry declined in the 17th century, but the silk-manufacture replaced it at Kidderminster and Blockley. Coal and iron were mined at Dudley in the 13th century.

As early as 1295 Worcestershire was represented by sixteen members in parliament, returning two knights for the shire and two burgesses each for the city of Worcester and the boroughs of Bromsgrove, Droitwich, Dudley, Evesham, Kidderminster and Pershore. With the exception of Droitwich, however, which was represented until 1311 and again recovered representation in 1554, the boroughs ceased to make returns. Evesham was re-enfranchised in 1604, and in 1606 Bewdley returned one member. Under the Reform Act of 1832 the county returned four members in two divisions; Droitwich lost one member; Dudley and Kidderminster were re-enfranchised, returning one member each. In 1867 Evesham lost one member.

Antiquities.—Remains of early camps are scarce, but there are examples at Berrow Hill near the Teme, W. of Worcester, at Round Hill by Spetchley, 3 m. E. of Worcester, and on the Herefordshire Beacon. Roman remains have been discovered on a few sites, as at Kempsey on the Severn, S. of Worcester, at Ripple, in the S. near Upton, and at Droitwich. There are remains of the great abbeys at Evesham and Pershore, and the fine priory church at Malvern, besides the cathedral at Worcester. There are further monastic remains at Halesowen and at Bordesley near Redditch, and there was a Benedictine priory at Astley, 3 m. S.W. of Stourport. There are fine churches in several of the larger towns, as Bromsgrove. The village churches are generally of mixed styles. Good Norman work remains in those of Martley, 8 m. N.W. of Worcester, Astley, Rous Lench in the Evesham district, Bredon near Pershore, and Bockleton in the N.W. of the county; while the Early English churches of Kempsey and Ripple are noteworthy. In domestic architecture, the half-timbered style adds to the picturesqueness of many streets in the towns and villages; and among country houses this style is well exemplified in Birts Morton Court and Eastington Hall, in the district S. of Malvern, in Elmley Lovett Manor between Droitwich and Kidderminster, and in Pirton Court near

Kempsey. Westwood Park is a mansion of the 16th and 17th centuries, with a picturesque gatehouse of brick; the site was formerly occupied by a Benedictine nunnery. Madresfield Court, between Worcester and Malvern, embodies remains of a fine Elizabethan moated mansion.

See *Victoria County History, Worcestershire*; T. R. Nash, *Collections for the History of Worcestershire* (2 vols., London, 1781–1799); Sir Charles Hastings, *Illustrations of the Natural History of Worcestershire* (London, 1834); W. D. Curzon, *Manufacturing Industries of Worcestershire* (Birmingham, 1883); W. S. Brassington, *Historic Worcestershire* (Birmingham, 1893). See also publications of the Worcester Historical Society.

WORDSWORTH, CHARLES (1806–1892), Scottish bishop, son of Christopher Wordsworth, Master of Trinity, was born in London on the 22nd of August 1806, and educated at Harrow and Christ Church, Oxford. He was a brilliant classical scholar, and a famous cricketer and athlete; he was in the Harrow cricket eleven in the first regular matches with Eton (1822) and Winchester (1825), and is credited with bringing about the first Oxford and Cambridge match in 1827, and the first university boat-race in 1828, in both of which he took part. He won the Chancellor's Latin verse at Oxford in 1827, and the Latin essay in 1831, and took a first-class in classics. From 1830 to 1833 he had as pupils a number of men (including W. E. Gladstone and H. E. Manning) who afterwards became famous. He then travelled abroad during 1833–1834, and after a year's work as tutor at Christ Church (1834–1835) was appointed second master at Winchester. He had previously taken holy orders, though he only became priest in 1840, and he had a strong religious influence with the boys. In 1839 he brought out his *Greek Grammar*, which had a great success. In 1846, however, he resigned; and then accepted the wardenship of Trinity College, Glenalmond, the new Scottish Episcopal public school and divinity college, where he remained from 1847 to 1854, having great educational success in all respects; though his views on Scottish Church questions brought him into opposition at some important points to W. E. Gladstone. In 1852 he was elected bishop of St Andrews, Dunkeld and Dunblane, and was consecrated in Aberdeen early next year. He was a strong supporter of the establishment, but conciliatory towards the Free churches, and this brought him into a good deal of controversy. He was a voluminous writer, and one of the company of revisers of the New Testament (1870–1881), among whom he displayed a conservative tendency. He died at St Andrews on the 5th of December 1892. He was twice married, first in 1835 to Charlotte Day (d. 1839), and secondly in 1846 to Katherine Mary Barter (d. 1897). He had thirteen children altogether.

See his *Annals of my Early Life* (1891), and *Annals of My Life*, edited by W. Earl Hodgson (1893); also *The Episcopate of Charles Wordsworth*, by his nephew John, bishop of Salisbury (1899).

WORDSWORTH, CHRISTOPHER (1774–1846), English divine and scholar, youngest brother of the poet William Wordsworth, was born on the 9th of June 1774, and was educated at Trinity College, Cambridge, where he became a fellow in 1798. Twelve years later he received the degree of D.D. He took holy orders, and obtained successive preferments through the patronage of Manners Sutton, bishop of Norwich, afterwards (1805) archbishop of Canterbury, to whose son Charles (afterwards Speaker of the House of Commons, and viscount Canterbury) he had been tutor. He had in 1802 attracted attention by his defence of Granville Sharp's then novel canon "on the uses of the definitive article" in New Testament textual criticism. In 1810 he published an *Ecclesiastical Biography* in 6 volumes. On the death of Bishop Mansel, in 1820, he was elected Master of Trinity, and retained that position till 1841, when he resigned. He is regarded as the father of the modern "classical tripos," since he had, as vice-chancellor, originated in 1821 a proposal for a public examination in classics and divinity, which, though then rejected, bore fruit in 1822. Otherwise his mastership was undistinguished, and he was not a popular head with the college. He died on the 2nd of February 1846, at Buxted. In his *Who wrote Ikon Basilike?* (1824), and in other writings, he advocated the claims of Charles I. to its authorship; and in 1836 he published, in 4 volumes, a work of *Christian Institutes*, selected from English divines. He married in 1804 Miss Priscilla Lloyd (d. 1815), a sister of Charles Lamb's friend Charles Lloyd; and he had three sons, John W. (1805–1839), Charles (*q.v.*), and Christopher (*q.v.*); the two latter both became bishops, and John, who became a fellow and classical lecturer at Trinity College, Cambridge, was an industrious and erudite scholar.

WORDSWORTH, CHRISTOPHER (1807–1885), English bishop and man of letters, youngest son of Christopher Wordsworth, Master of Trinity, was born in London on the 30th of October 1807, and was educated at Winchester and Trinity, Cambridge. He, like his brother Charles, was distinguished as an athlete as well as for scholarship. He became senior classic, and was elected a fellow and tutor of Trinity in 1830; shortly afterwards he took holy orders. He went for a tour in Greece in 1832–1833, and published various works on its topography and archaeology, the most famous of which is "Wordsworth's" *Greece* (1839). In 1836 he became Public Orator at Cambridge, and in the same year was appointed headmaster of Harrow, a post he resigned in 1844. He then became a canon of Westminster, and from 1850 to 1870 he held a country living in Berkshire. In 1865 he was made archdeacon of Westminster, and in 1869 bishop of Lincoln. He died on the 20th of March 1885. He was a man of fine character, with a high ideal of ecclesiastical duty, and he spent his money generously on church objects. As a scholar he is best known for his edition of the Greek New Testament (1856–1860), and the *Old Testament* (1864–1870), with commentaries; but his writings were many in number, and included a volume of devotional verse, *The Holy Year* (1862), *Church History up to A.D. 451* (1881–1883), and *Memoirs* of his uncle the poet (1851), to whom he was literary executor. His *Inscriptiones Pompeianae* (1837) was an important contribution to epigraphy. He married in 1838 Susanna Hartley Frere (d. 1884), and had a family of seven; the eldest son was John (b. 1843), bishop of Salisbury (1885), and author of *Fragments of Early Latin* (1874); the eldest daughter, Elizabeth (b. 1840), was the first principal (1879) of Lady Margaret Hall, Oxford.

His *Life*, by J. H. Overton and Elizabeth Wordsworth, was published in 1888.

WORDSWORTH, DOROTHY (1771–1855), English writer and diarist, was the third child and only daughter of John Wordsworth of Cockermouth and his wife, Anne Cookson-Crackanthorpe. The poet William Wordsworth was her brother and a year her senior. On the death of her father in 1783, Dorothy found a home at Penrith, in the house of her maternal grandfather, and afterwards for a time with a maiden lady at Halifax. In 1787, on the death of the elder William Cookson, she was adopted by her uncle, and lived in his Norfolk parish of Forncett. She and her brother William, who dedicated to his sister the *Evening Walk* of 1792, were early drawn to one another, and in 1794 they visited the Lakes together. They determined that it would be best to combine their small capitals, and that Dorothy should keep house for the poet. From this time forth her life ran on lines closely parallel to those of her great brother, whose companion she continued to be till his death. It is thought that they made the acquaintance of Coleridge in 1797.

From the autumn of 1795 to July 1797 William and Dorothy Wordsworth took up their abode at Racedown, in Dorsetshire. At the latter date they moved to a large manor-house, Alfoxden, in the N. slope of the Quantock hills, in W. Somerset, S. T. Coleridge about the same time settling near by in the town of Nether Stowey. On the 20th of January 1798 Dorothy Wordsworth began her invaluable *Journal*, used by successive biographers of her brother, but first printed in its quasi-entirety by Professor W. Knight in 1897. The Wordsworths, Coleridge, and Chester left England for Germany on the 14th of September 1798; and of this journey also Dorothy Wordsworth preserved an account, portions of which were published in 1897. On the 14th of May 1800 she started another *Journal* at Grasmere, which she kept very fully until the 31st of December of the same year. She resumed it on the 1st of January 1802 for another twelve months, closing on the 11th of January 1803. These were printed first in 1889. She composed *Recollections of a Tour in Scotland*, in 1803, with her brother and Coleridge; this was first published in 1874. Her next contribution to the family history was her *Journal of a Mountain Ramble*, in November 1805, an account of a walking tour in the Lake district with her brother. In July 1820 the Wordsworths made a tour on the continent of Europe, of which Dorothy preserved a very careful record, portions of which were given to the world in 1884, the writer having refused to publish it in 1824 on the ground that her "object was not to make a book, but to leave to her niece a neatly-penned memorial of those few interesting months of our lives." Meanwhile, without her brother, but in the company of Joanna Hutchinson, Dorothy Wordsworth had travelled over Scotland in 1822, and had composed a *Journal* of that tour. Other MSS. exist and have been examined carefully by the editors and biographers of the poets, but the records which we have mentioned and her letters form the principal literary relics of Dorothy Wordsworth. In 1829 she was attacked by very serious illness, and was never again in good health. After 1836 she could not be considered to be in possession of her mental faculties, and became a pathetic member of the interesting household at Grasmere. She outlived the poet, however, by several years, dying at Grasmere on the 25th of January 1855.

It would be difficult to exaggerate the importance of Dorothy Wordsworth's companionship to her illustrious brother. He has left numerous tributes to it, and to the sympathetic originality of her perceptions. "She," he said,

> "gave me eyes, she gave me ears;
> And humble cares, and delicate fears;
> A heart the fountain of sweet tears;
> And love, and thought, and joy."

The value of the records preserved by Dorothy Wordsworth, especially in earlier years, is hardly to be over-estimated by those who desire to form an exact impression of the revival of English poetry. When Wordsworth and Coleridge refashioned imaginative literature at the close of the 18th century, they were daily and hourly accompanied by a feminine presence exquisitely attuned to sympathize with their efforts, and by an intelligence which was able and anxious to move in step with theirs. "S. T. C. and my beloved sister," William Wordsworth wrote in 1832, "are the two beings to whom my intellect is most indebted." In her pages we can put our finger on the very pulse of the machine; we are present while the New Poetry is evolved, and the sensitive descriptions in her prose lack nothing but the accomplishment of verse. Moreover, it is certain that the sharpness and fineness of Dorothy's observation, "the shooting lights of her wild eyes," actually afforded material to the poets. Coleridge, for instance, when he wrote his famous lines about "The one red leaf, the last of its clan," used almost the very words in which, on the 7th of March 1798, Dorothy Wordsworth had recorded "One only leaf upon the top of a tree . . . danced round and round like a rag blown by the wind."

It is not merely by the biographical value of her notes that Dorothy Wordsworth lives. She claims an independent place in the history of English prose as one of the very earliest writers who noted, in language delicately chosen, and with no other object than to preserve their fugitive beauty, the little picturesque phenomena of homely country life. When we speak with very high praise of her art in this direction, it is only fair to add that it is called forth almost entirely by what she wrote between 1798 and 1803, for a decline similar to that which fell upon her brother's poetry early invaded her prose; and her later journals, like her *Letters*, are less interesting because less inspired. A *Life* by E. Lee was published in 1886; but it is only since 1897, when Professor Knight collected and edited her scattered MSS., that Dorothy Wordsworth has taken her independent place in literary history. (E. G.)

WORDSWORTH, WILLIAM (1770–1850), English poet, was born at Cockermouth, on the Derwent, in Cumberland, on the 7th of April 1770. He was the son of John Wordsworth (1741–1783), an attorney, law agent to the first earl of Lonsdale, a prosperous man in his profession, descended from an old Yorkshire family of landed gentry. On the mother's side also Wordsworth was connected with the middle territorial class: his mother, Anne Cookson, was the daughter of a well-to-do mercer in Penrith, but her mother was Dorothy Crackanthorpe, whose ancestors had been lords of the manor of Newbiggin, near Penrith, from the time of Edward III. He thus came of "gentle" kin, and was proud of it. The country squires and farmers whose blood flowed in Wordsworth's veins were not far enough above local life to be out of sympathy with it, and the poet's interest in the common scenes and common folk of the North country hills and dales had a traceable hereditary bias. William Wordsworth was one of a family of five, the others being Richard (1768–1816), Dorothy (*q.v.*), John (1772–1805), and Christopher (*q.v.*).

Though his parents were of sturdy stock, both died prematurely, his mother when he was eight years old, his father when he was thirteen. At the age of eight Wordsworth was sent to school at Hawkshead, in the Esthwaite valley in Lancashire. His father died while he was there, and at the age of seventeen he was sent to St John's College, Cambridge. He did not distinguish himself in the studies of the university, and for some time after taking his degree of B.A., in January 1791, he showed what seemed to his relatives a most perverse reluctance to adopt any regular profession. His mother had noted his "stiff, moody and violent temper" in childhood, and it seemed as if this family judgment was to be confirmed in his manhood. After taking his degree, he was pressed to take holy orders, but would not; he had no taste for the law; he idled a few months aimlessly in London, a few months more with a Welsh college friend, with whom he had made a pedestrian tour in France and Switzerland during his last Cambridge vacation; then in the November of 1791 he crossed to France, ostensibly to learn the language, made the acquaintance of revolutionaries, sympathized with them vehemently, and was within an ace of throwing in his lot with the Girondins. When it came to this, his relatives cut off his supplies, and he was obliged to return to London towards the close of 1792. But still he resisted all pressure to enter any of the regular professions, published his poems *An Evening Walk* and *Descriptive Sketches* in 1793, and in 1794, still moving about to all appearance in stubborn aimlessness among his friends and relatives, had no more rational purpose of livelihood than drawing up the prospectus of a periodical of strictly republican principles to be called "The Philanthropist."

But all the time from his boyhood upwards a great purpose had been growing and maturing in his mind. *The Prelude* expounds in lofty impassioned strain how his sensibility for nature was "augmented and sustained," and how it never, except for a brief interval, ceased to be "creative" in the special sense of his subsequent theory. But it is with his feelings towards nature that *The Prelude* mainly deals; it says little regarding the history of his ambition to express those feelings in verse. It is the autobiography, not of the poet of nature, but of the worshipper and priest. The salient incidents in the history of the poet he communicated in prose notes and in familiar discourses. Commenting on the couplet in the *Evening Walk*—

> "And, fronting the bright west, yon oak entwines
> Its darkening boughs and leaves in stronger lines—"

he said:

> "This is feebly and imperfectly exprest; but I recollect distinctly the very spot where this first struck me. It was on the way between Hawkshead and Ambleside, and gave me extreme pleasure. The moment was important in my poetical history; for I date from it my consciousness of the infinite variety of natural appearances which had been unnoticed by the poets of any age or country, so far as I was acquainted with them; *and I made a resolution to supply in some degree the deficiency*. I could not at that time have been above fourteen years of age."

About the same time he wrote, as a school task at Hawkshead, verses that show considerable acquaintance with the poets of his own country at least, as well as some previous practice in the art of verse-making.[1] The fragment that stands at the beginning of his collected works, recording a resolution to end his life among his native hills, was the conclusion of a long poem written while he was still at school. And, undistinguished as he was at Cambridge in the contest for academic honours, the *Evening Walk*, his first publication, was written during his vacations.[1] He published it in 1793, to show, as he said, that he could do something, although he had not distinguished himself in university work. There are touches here and there of the bent of imagination that became dominant in him soon afterwards, notably in the moral aspiration that accompanies his *Remembrance of Collins* on the Thames:—

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[1] *Memoirs of William Wordsworth*, by Canon Wordsworth, vol. i. pp. 10, 11. According to his own statement in the memoranda dictated to his biographer, it was the success of this exercise that "put it into his head to compose verses from the impulse of his own

> " O glide, fair stream! for ever so
> Thy quiet soul on all bestowing,
> Till all our minds for ever flow
> As thy deep waters now are flowing."

But in the main this first publication represents the poet in the stage described in the twelfth book of *The Prelude*:—

> " Bent overmuch on superficial things,
> Pampering myself with meagre novelties
> Of colour and proportion; to the moods
> Of time and season, to the moral power,
> The affections, and the spirit of the place
> Insensible."

But, though he had not yet found his distinctive aim as a poet, he was inwardly bent upon poetry as " his office upon earth."

In this determination he was strengthened by his sister Dorothy (*q.v.*), who with rare devotion consecrated her life henceforward to his service. A timely legacy enabled them to carry their purpose into effect. A friend of his, whom he had nursed in a last illness, Raisley Calvert, son of the steward of the duke of Norfolk, who had large estates in Cumberland, died early in 1795, leaving him a legacy of £900. It may be well to notice how opportunely, as De Quincey half-ruefully remarked, money always fell in to Wordsworth, enabling him to pursue his poetic career without distraction. Calvert's bequest came to him when he was on the point of concluding an engagement as a journalist in London. On it and other small resources he and his sister, thanks to her frugal management, contrived to live for nearly eight years. By the end of that time Lord Lonsdale, who owed Wordsworth's father a large sum for professional services, and had steadily refused to pay it, died, and his successor paid the debt with interest. His wife, Mary Hutchinson, whom he married on the 4th of October 1802, brought him some fortune; and in 1813, when in spite of his plain living his family began to press upon his income, he was appointed stamp-distributor for Westmorland, with an income of £500, afterwards nearly doubled by the increase of his district. In 1842, when he resigned his stamp-distributorship, Sir Robert Peel gave him a Civil List pension of £300.

To return, however, to the course of his life from the time when he resolved to labour with all his powers in the office of poet. The first two years, during which he lived with his self-sacrificing sister at Racedown, in Dorset, were spent in half-hearted and very imperfectly successful experiments, satires in imitation of Juvenal, the tragedy of *The Borderers*,[2] and a poem in the Spenserian stanza, now entitled *Guilt and Sorrow*. How much longer this time of self-distrustful endeavour might have continued is a subject for curious speculation, an end was put to it by a fortunate incident, a visit from Coleridge, who had read his first publication, and seen in it, what none of the public critics had discerned, the advent of " an original poetic genius."

mind." The resolution to supply the deficiencies of poetry in the exact description of natural appearances was probably formed while he was in this state of boyish ecstasy at the accidental revelation of his own powers. The date of his beginnings as a poet is confirmed by the lines in *The Idiot Boy*, written in 1798—

> " I to the Muses have been bound
> *These fourteen years* by strong indentures "

Stubborn and independent as Wordsworth was, he needed some friendly voice from the outer world to give him confidence in himself. Coleridge rendered him this indispensable service. He had begun to seek his themes in

> " Sorrow, that is not sorrow, but delight;
> And miserable love, that is not pain
> To hear of, for the glory that redounds
> Therefrom to human kind, and what we are."

He read to his visitor one of these experiments, the story of the ruined cottage, afterwards introduced into the first book of *The Excursion*.[3] Coleridge, who had already seen original poetic genius in the poems published before, was enthusiastic in his praise of them as having " a character, by books not hitherto reflected."

June 1797 was the date of this memorable visit. So pleasant was the companionship on both sides that, when Coleridge returned to Nether Stowey, in Somerset, Wordsworth at his instance changed his quarters to Alfoxden, within a mile and a half of Coleridge's temporary residence, and the two poets lived in almost daily intercourse for the next twelve months. During that period Wordsworth's powers rapidly expanded and matured; ideas that had been gathering in his mind for years, and lying there in dim confusion, felt the stir of a new life, and ranged themselves in clearer shapes under the fresh quickening breath of Coleridge's swift and discursive dialectic.

The *Lyrical Ballads* were the poetic fruits of their companionship. Out of their frequent discussions of the relative value of common life and supernatural incidents as themes for imaginative treatment grew the idea of writing a volume together, composed of poems of the two kinds. Coleridge was to take the supernatural; and, as his industry was not equal to his friend's, this kind was represented by the *Ancient Mariner* alone. Among Wordsworth's contributions were *The Female Vagrant*, *We are Seven*, *Complaint of a Forsaken Indian Woman*, *The Last of the Flock*, *The Idiot Boy*, *The Mad Mother* (" Her eyes are wild "), *The Thorn*, *Goody Blake and Harry Gill*, *The Reverie of Poor Susan*, *Simon Lee*, *Expostulation and Reply*, *The Tables Turned*, *Lines left upon a Yew-tree Seat*, *An Old Man Travelling* (" Animal Tranquillity and Decay "), *Lines above Tintern Abbey*. The volume was published by Cottle of Bristol in September 1798.

It is necessary to enumerate the contents of this volume in fairness to the contemporaries of Wordsworth, for their cold or scoffing reception of his first distinctive work. Those Wordsworthians who give up *The Idiot Boy*,[4] *Goody Blake* and *The Thorn* as mistaken experiments have no right to triumph over the first derisive critics of the *Lyrical Ballads*, or to wonder at the dullness that failed to see at once in this humble issue from an obscure provincial press the advent of a great master in literature. It is true that *Tintern Abbey* was in the volume, and that all the highest qualities of Wordsworth's imagination and of his verse could be illustrated from the lyrical ballads proper in this first publication; but clear vision is easier for us than it was when the revelation was fragmentary and incomplete.

Although Wordsworth was not received at first with the respect to which he was entitled, his power was not entirely without recognition. There is a curious commercial evidence of this, which ought to be noted, because a perversion of the fact is sometimes used to exaggerate the supposed neglect of Wordsworth at the outset of his career. When the Longmans took over Cottle's publishing business in 1799, the value of the copyright of the *Lyrical Ballads*, for which Cottle had paid thirty guineas, was assessed at *nil*. Cottle therefore begged that it might be excluded altogether from the bargain, and presented it to the authors. But in 1800, when the first edition was exhausted, the Longmans offered Wordsworth £100 for two issues of a new edition with an additional volume and an explanatory preface. The sum was small compared with what Scott and Byron soon afterwards received, but it shows that the public neglect was not quite so complete as is sometimes represented. Another edition was called for in 1802, and a fourth in 1805. The new volume in the 1800 edition was made up of poems composed during his residence at Goslar in Germany (where he went with Coleridge) in the winter of 1798–1799, and after his settlement at Grasmere in December 1799. It contained a large portion of poems now universally accepted:—*Ruth, Nutting, Three Years She Grew, A Poet's Epitaph, Hartleap Well, Lucy Gray, The Brothers, Michael, The Old Cumberland Beggar, Poems on the Naming of Places*. But it contained also the famous Preface, in which he infuriated critics by presuming to defend his eccentricities in an elaborate theory of poetry and poetic diction.

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[1] In *The Prelude*, book iv., he speaks of himself during his first vacation as " harassed with the toil of verse, much pains and little progress."

[2] Not published till 1842. For the history of this tragedy see *Memoirs*, vol. i. p. 113; for a sound, if severe, criticism of it, A. C. Swinburne's *Miscellanies*, p. 118. And yet it was of the blank verse of *The Borderers* that Coleridge spoke when he wrote to Cottle that " he felt a little man by the side of his friend."

[3] The version read to Coleridge, however, must have been in Spenserian stanzas, if Coleridge was right in his recollection that it was in the same metre with *The Female Vagrant*, the original title of *Guilt and Sorrow*

[4] The defect of *The Idiot Boy* is really rhetorical, rather than poetic. Wordsworth himself said that " he never wrote anything with so much glee," and, once the source of his glee is felt in the nobly affectionate relations between the two half-witted irrational old women and the glorious imbecile, the work is seen to be executed with a harmony that should satisfy the most exacting criticism. Poetically, therefore, the poem is a success. But rhetorically this particular attempt to "breathe grandeur upon the very humblest face of human life" must be pronounced a failure, inasmuch as the writer did not use sufficiently forcible means to disabuse his readers of vulgar prepossessions.

This document (and let it be noted that *all* Wordsworth's *Prefaces* are of the utmost interest in historical literary criticism) is constantly referred to as a sort of revolutionary proclamation against the established taste of the 18th century. For one who has read Wordsworth's original, hundreds have read Coleridge's brilliant criticism, and the fixed conception of the doctrines put forth by Wordsworth is taken from that.[1] It is desirable, therefore, considering the celebrity of the affair, that Wordsworth's own position should be made clear. Coleridge's criticism of his friend's theory proceeded avowedly "on the assumption that his words had been rightly interpreted, as purporting that the proper diction for poetry in general consists altogether in a language taken, with due exceptions, from the mouths of men in real life, a language which actually constitutes the natural conversation of men under the influence of natural feelings." Coleridge assumed further that, when Wordsworth spoke of there being "no essential difference between the language of prose and metrical composition," he meant by language not the mere words but the style, the structure and the order of the sentences; on this assumption he argued as if Wordsworth had held that the metrical order should always be the same as the prose order. Given these assumptions, which formed the popular interpretation of the theory by its opponents, it was easy to demonstrate its absurdity, and Coleridge is very generally supposed to have given Wordsworth's theory in its bare and naked extravagance the *coup de grâce*. But the truth is that neither of the two assumptions is warranted; both were expressly disclaimed by Wordsworth in the Preface itself. There is not a single qualification introduced by Coleridge that was not made by Wordsworth himself in the original statement.[2] In the first place, it was not put forward as a theory of poetry in general, though from the vigour with which he carried the war into the enemy's country it was naturally enough for polemic purposes taken as such; it was a statement and defence of the principles on which his own poems of humbler life were composed. Wordsworth also assailed the public taste as "depraved," first and mainly in so far as it was adverse to simple incidents simply treated, being accustomed to "gross and violent stimulants," "craving after extraordinary incident," possessed with a "degrading thirst after outrageous stimulation," "frantic novels, sickly and stupid German tragedies, and deluges of idle and extravagant stories in verse." This, and not adherence to the classical rule of Pope, which had really suffered deposition a good half century before, was the first count in Wordsworth's defensive indictment of the taste of his age. As regards the "poetic diction," the liking for which was the second count in his indictment of the public taste, it is most explicitly clear that, when he said that there was no essential difference between the language of poetry and the language of prose, he meant words, plain and figurative, and not structure and order, or, as Coleridge otherwise puts it, the "ordonnance" of composition. Coleridge says that if he meant this he was only uttering a truism, which nobody who knew Wordsworth would suspect him of doing; but, strange to say, it is as a truism, nominally acknowledged by everybody, that Wordsworth does advance his doctrine on this point. Only he adds—"if in what I am about to say it shall appear to some that my labour is unnecessary, and that I am like a man fighting a battle without enemies, such persons may be reminded that, whatever be the language outwardly holden by men, a practical faith in the opinions which I am wishing to establish is almost unknown."

What he wished to establish was the simple truth that what is false, unreal, affected, bombastic or nonsensical in prose is not less so in verse. The form in which he expresses the theory was conditioned by the circumstances of the polemic, and readers were put on a false scent by his purely incidental and collateral and very much overstrained defence of the language of rustics, as being less conventional and more permanent, and therefore better fitted to afford materials for the poet's selection. But this was a side issue, a paradoxical retort on his critics, seized upon by them in turn and made prominent as a matter for easy ridicule; all that he says on this head might be cut out of the Preface without affecting in the least his main thesis. The drift of this is fairly apparent all through, but stands out in unmistakable clearness in his criticism of the passages from Johnson and Cowper:—

> "But the sound of the church-going bell
> These valleys and rocks never heard,
> Ne'er sighed at the sound of a knell
> Or smiled when a Sabbath appeared."

The epithet "church-going" offends him as a puritan in grammar; whether his objection is well founded or ill founded, it applies equally to prose and verse. To represent the valleys and rocks as sighing and smiling in the circumstances would appear feeble and absurd in prose composition, and is not less so in metrical composition; "the occasion does not justify such violent expressions." These are examples of all that Wordsworth meant by saying that "there is no essential difference between the language of prose and metrical composition." So far is Wordsworth from contending that the metrical order should always be the same as the prose order, that part of the Preface is devoted to a subtle analysis of the peculiar effect of metrical arrangement. What he objects to is not departure from the structure of prose, but the assumption, which seemed to him to underlie the criticisms of his ballads, that a writer of verse is not a poet unless he uses artificially ornamental language, not justified by the strength of the emotion expressed. The furthest that he went in defence of prose structure in poetry was to maintain that, if the words in a verse happened to be in the order of prose, it did not follow that they were prosaic in the sense of being unpoetic—a side-stroke at critics who complained of his prosaisms for no better reason than that the words stood in the order of prose composition. Wordsworth was far from repudiating elevation of style in poetry. "If," he said, "the poet's subject be judiciously chosen, it will naturally, and upon fit occasion, lead him to passions the language of which, if selected truly and judiciously, must necessarily be dignified and variegated, and alive with metaphors and figures."

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[1] Sir Henry Taylor, one of the most acute and judicious of Wordsworth's champions, came to this conclusion in 1834.

[2] Although Coleridge makes the qualifications more prominent than they were in the original statement, the two theories are at bottom so closely the same that one is sometimes inclined to suspect that parts, at least, of the original emanated from the fertile mind of Coleridge himself. The two poets certainly discussed the subject together in Somerset when the first ballads were written, and Coleridge was at Grasmere when the Preface was prepared in 1800. The diction of the Preface is curiously Hartleian, and, when they first met, Coleridge was a devoted disciple of Hartley, naming his first son after the philosopher, while Wordsworth detested analytic psychology. If Coleridge did contribute to the original theory in 1798 or 1800, he was likely enough to have forgotten the fact by 1814. At any rate, he evidently wrote his criticism without making a close study of the Preface, and what he did in effect was to restate the original theory against popular misconceptions of it.

Such was Wordsworth's theory of poetic diction. Nothing could be more grossly mistaken than the notion that the greater part of Wordsworth's poetry was composed in defiance of his own theory, and that he succeeded best when he set his own theory most at defiance. The misconception is traceable to the authority of Coleridge. His just, sympathetic and penetrating criticism on Wordsworth's work as a poet did immense service in securing for him a wider recognition; but his proved friendship and brilliant style have done sad injustice to the poet as a theorist. It was natural to assume that Coleridge, if anybody, must have known what his friend's theory was; and it was natural also that readers under the charm of his lucid and melodious prose should gladly grant themselves a dispensation from the trouble of verifying his facts in the harsh and cumbrous exposition of the theorist himself.[1]

The question of diction made most noise, but it was far from being the most important point of poetic doctrine set forth in the Preface. If in this he merely enunciated a truism, generally admitted in words but too generally ignored in practice, there was real novelty in his plea for humble subjects, and in his theory of poetic composition. Wordsworth's remarks on poetry in general, on the supreme function of the imagination in dignifying humble and commonplace incidents, and on the need of active exercise of imagination in the reader as well as in the poet, are immeasurably more important than his theory of poetic diction. Such sayings as that poetry "takes its origin from emotion recollected in tranquillity," or that it is the business of a poet to trace "how men associate ideas in a state of excitement," are significant of Wordsworth's endeavour to lay the foundations of his art in an independent study of the feelings and faculties of men in real life, unbiased as far as possible by poetic custom and convention. This does not mean that the new poet was to turn his back on his predecessors and never look behind him to what they had done. Wordsworth was guilty of no such extravagance. He was from boyhood upwards a diligent student of poetry, and was not insensible to his obligations to the past. His purpose was only to use real life as a touchstone of poetic substance. The poet, in Wordsworth's conception, is distinctively a man in whom the beneficent energy of imagination, operative as a blind instinct more or less in all men, is stronger than in others, and is voluntarily and rationally exercised for the benefit of all in its proper work of increase and consolation. Not every image that the excited mind conjures up in real life is necessarily poetical. It is the business of the poet to select and modify for his special purpose of producing immediate pleasure.

There were several respects in which the formal recognition of such elementary principles of poetic evolution powerfully affected Wordsworth's practice. One of these may be indicated by saying that he endeavoured always to work out an emotional motive from within. Instead of choosing a striking theme and working at it like a decorative painter, embellishing, enriching, dressing to advantage, standing back from it and studying effects, his plan was to take incidents that had set his own imagination spontaneously to work, and to study and reproduce with artistic judgment the modification of the initial feeling, the emotional motive, within himself. To this method he owed much of his strength and also much of his unpopularity. By keeping his eye on the object, as spontaneously modified by his own imaginative energy, he was able to give full and undistracted scope to all his powers in poetic coinage of the wealth that his imagination brought. On the other hand, readers whose nature or education was different from his own, were repelled or left cold and indifferent, or obliged to make the sympathetic effort to see with his eyes, which he refused to make in order that he might see with theirs.

"He is retired as noontide dew
Or fountain in a noon-day grove,
And you must love him ere to you
He will seem worthy of your love."

From this habit of taking the processes of his own mind as the standard of the way in which "men associate ideas in a state of excitement," and language familiar to himself as the standard of the language of "real men," arises a superficial anomaly in Wordsworth's poetry, an apparent contradiction between his practice and his theory. His own imagination, judged by ordinary standards, was easily excited by emotional motives that have little force with ordinary men. Most of his poems start from humbler, slighter, less generally striking themes than those of any other poet of high rank. But his poetry is not correspondingly simple. On the contrary, much of it, much of the best of it—for example, the *Ode to Duty*, and that on the *Intimations of Immortality*—is intricate, elaborate and abstruse. The emotional motive is simple; the passion has almost always a simple origin, and often is of no great intensity; but the imaginative structure is generally elaborate, and, when the poet is at his best, supremely splendid and gorgeous. No poet has built such magnificent palaces of rare material for the ordinary everyday homely human affections. It is because he has invested our ordinary everyday principles of conduct, which are so apt to become threadbare, with such imperishable robes of finest texture and richest design that Wordsworth holds so high a place among the great moralists in verse.

His practice was influenced also, and not always for good, by his theory that poetry "takes its origin from emotion recollected in tranquillity." This was a somewhat doubtful corollary from his general theory of poetic evolution. A poem is complete in itself; there must be no sting in it to disturb the reader's content with the whole; through whatever agitations it progresses, to whatever elevations it soars, to this end it must come, otherwise it is imperfect as a poem. Now the imagination in ordinary men, though the process is not expressed in verse, and the poet's special art has thus no share in producing the effect, reaches the poetic end when it has so transfigured a disturbing experience, whether of joy or grief, that this rests tranquilly in the memory, can be recalled without disquietude, and dwelt upon with some mode and degree of pleasure, more or less keen, more or less pure or mixed with pain. True to his idea of imitating real life, Wordsworth made it a rule for himself not to write on any theme till his imagination had operated upon it for some time involuntarily; it was not in his view ripe for poetic treatment till this transforming agency had subdued the original emotion to a state of tranquillity.[2] Out of this tranquillity arises the favourable moment for poetic composition, some day when, as he contemplates the subject, the tranquillity disappears, an emotion kindred to the original emotion is reinstated, and the poet retraces and supplements with all his art the previous involuntary and perhaps unconscious imaginative chemistry.

When we study the moments that Wordsworth found favourable for successful composition, a very curious law reveals itself, somewhat at variance with the common conception of him as a poet who derived all his strength from solitary communion with nature. We find that the recluse's best poems were written under the excitement of some break in the monotony of his quiet life—change of scene, change of companionship, change of occupation. The law holds from the beginning to the end of his poetic career. An immense stimulus was given to his powers by his first contact with Coleridge after two years of solitary and abortive effort. *Above Tintern Abbey* was composed during a four days' ramble with his sister; he began it on leaving Tintern, and concluded it as he was entering Bristol. His residence amidst strange scenes and "unknown men" at Goslar was particularly fruitful. *She Dwelt among the Untrodden Ways, Ruth, Nutting, There was a Boy, Wisdom and Spirit of the Universe*, all belong to those few months of unfamiliar environment. The breeze that met him as he issued from the city gates on his homeward journey brought him the first thought of *The Prelude*.

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[1] Wordsworth was not an adroit expositor in prose, and he did not make his qualifications sufficiently prominent, but his theory of diction taken with those qualifications left him free without inconsistency to use any language that was not contrary to "true taste and feeling." He acknowledged that he might occasionally have substituted "particular for general associations," and that thus language charged with poetic feeling to himself might appear trivial and ridiculous to others, as in *The Idiot Boy* and *Goody Blake*, he even went so far as to withdraw *Alice Fell*, first published in 1807, from several subsequent editions; but he argued that it was dangerous for a poet to make alterations on the simple authority of a few individuals or even classes of men, because if he did not follow his own judgment and feelings his mind would infallibly be debilitated.

[2] *The Prelude* contains a record of his practice, after the opening lines of the first book—

"Thus far, O friend! did I, not used to make
A present joy the matter of a song,
Pour forth," &c.

At the end of 1799 he was settled at Grasmere, in the Lake District, and seeing much of Coleridge. The second year of his residence at Grasmere was unproductive; he was "hard at work" then on *The Excursion*, but the excitement of a tour on the Continent in the autumn of 1802, combined perhaps with a happy change in his pecuniary circumstances and the near prospect of marriage, roused him to one of his happiest fits of activity. His first great sonnet, the *Lines on Westminster Bridge*, was composed on the roof of the Dover coach; the first of the splendid series "dedicated to national independence and liberty," the most generally impressive and universally intelligible of his poems, *Fair Star of Evening, Once did She hold the Gorgeous East in Fee, Toussaint; Milton, thou shouldst be Living at this Hour; It is not to be Thought of that the Flood, When I have Borne in Memory what has Tamed*, were all written in the course of the tour, or in London in the month after his return. A tour in Scotland in the following year, 1803, yielded the *Highland Girl* and *The Solitary Reaper*. Soon after his return he resumed *The Prelude*; and *The Affliction of Margaret* and the *Ode to Duty*, his greatest poems in two different veins, were coincident with the exaltation of spirit due to the triumphant and successful prosecution of the long-delayed work. The *Character of the Happy Warrior*, which he described to Harriet Martineau as "a chain of extremely *valooable* thoughts," though it did not fulfil "poetic conditions,"[1] was the product of a calmer period. The excitement of preparing for publication always had a rousing effect upon him; the preparation for the edition of 1807 resulted in the completion of the ode on the *Intimations of Immortality*, the sonnets *The World is too much with us, Methought I saw the Footsteps of a Throne, Two Voices are there*, and *Lady, the Songs of Spring were in the Grove*, and the *Song at the Feast of Brougham Castle*. After 1807 there is a marked falling off in the quality, though not in the quantity, of Wordsworth's poetic work. It is significant of the comparatively sober and laborious spirit in which he wrote *The Excursion* that its progress was accompanied by none of those casual sallies of exulting and exuberant power that mark the period of the happier *Prelude*. The completion of *The Excursion* was signalized by the production of *Laodamia* The chorus of adverse criticism with which it was received inspired him in the noble sonnet to Haydon—*High is our Calling, Friend*. He rarely or never again touched the same lofty height.

It is interesting to compare with what he actually accomplished the plan of life-work with which Wordsworth settled at Grasmere in the last month of 1799.[2] The plan was definitely conceived as he left the German town of Goslar in the spring of 1799. Tired of the wandering unsettled life that he had led hitherto, dissatisfied also with the fragmentary occasional and disconnected character of his lyrical poems, he longed for a permanent home among his native hills, where he might, as one called and consecrated to the task, devote his powers continuously to the composition of a great philosophical poem on "Man, Nature and Society." The poem was to be called *The Recluse*, "as having for its principal subject the sensations and opinions of a poet living in retirement." He communicated the design to Coleridge, who gave him enthusiastic encouragement to proceed. But, though he had still before him fifty years of peaceful life amidst his beloved scenery, the work in the projected form at least was destined to remain incomplete. Doubts and misgivings soon arose, and favourable moments of felt inspiration delayed their coming. To sustain him in his resolution he thought of writing as an introduction, or, as he put it, an antechapel to the church which he proposed to build, a history of his own mind up to the time when he recognized the great mission of his life. One of the many laughs at his expense by unsympathetic critics has been directed against his saying that he wrote this *Prelude* of fourteen books about himself out of diffidence. But in truth the original motive was distrust of his own powers. He turned aside to prepare the second volume of the *Lyrical Ballads* and write the explanatory Preface, which as a statement of his aims in poetry had partly the same purpose of strengthening his self-confidence. From his sister's *Journal* we learn that in the winter of 1801–1802 he was "hard at work on *The Pedlar*"—the original title of *The Excursion*. But this experiment on the larger work was also soon abandoned. It appears from a letter to his friend Sir George Beaumont that his health was far from robust, and in particular that he could not write without intolerable physical uneasiness. His next start with *The Prelude*, in the spring of 1804, was more prosperous; he dropped it for several months, but, resuming again in the spring of 1805, he completed it in the summer of that year. In 1807 appeared two volumes of collected poems. It was not till 1814 that the second of the three divisions of *The Recluse*, ultimately named *The Excursion*, was ready for publication; and he went no further in the execution of his great design.

The derisive fury with which *The Excursion* was assailed upon its first appearance has long been a stock example of critical blindness, yet the error of the first critics is seen to lie not in their indictment of faults, but in the prominence they gave to the faults and their generally disrespectful tone towards a poet of Wordsworth's greatness. Jeffrey's petulant "This will never do," uttered, professedly at least, more in sorrow than in anger, because the poet would persist in spite of all friendly counsel in misapplying his powers, has become a byword of critical cocksureness. But *The Excursion* has not "done," and even Wordsworthians who laugh at Jeffrey are in the habit of repeating the substance of his criticism.

Jeffrey, it will be seen, was not blind to the occasional felicities and unforgetable lines celebrated by Coleridge, and his general judgment on *The Excursion* has been abundantly ratified.[3] It is not upon *The Excursion* that Wordsworth's reputation as a poet can ever rest. The two "books" entitled *The Churchyard among the Mountains* are the only parts of the poem that derive much force from the scenic setting; if they had been published separately, they would probably have obtained at once a reception very different from that given to *The Excursion* as a whole. The dramatic setting is merely dead weight, not because the chief speaker is a pedlar—Wordsworth fairly justifies this selection—but because the pedlar, as a personality to be known, and loved, and respected, and listened to with interest, is not completely created.

There can be little doubt that adverse criticism had a depressing influence on Wordsworth's poetical powers, notwithstanding his nobly expressed defiance of it and his determination to hold on in his own path undisturbed. Its effect in retarding the sale of his poems was a favourite topic with him in his later years;[4] but the absence of general appreciation, and the ridicule of what he considered his best and most distinctive work, contributed in all probability to a still more unfortunate result—the premature depression and deadening of his powers.

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[1] This casual estimate of his own work is not merely amusing but also instructive, as showing—what is sometimes denied—that Wordsworth himself knew well enough the difference between "poetry" and such "valuable thoughts" as he propounded in *The Excursion*.

[2] Wordsworth's residences in the Lake District were at Dove Cottage, Townend, Grasmere, from December 1799 till the spring of 1808; Allan Bank, from 1808 to 1811; the parsonage at Grasmere, from 1811 to 1813; Rydal Mount, for the rest of his life. Dove Cottage was bought in 1891 as a public memorial, and is held by trustees.

[3] Ward's *English Poets*, iv. 13.

[4] Matthew Arnold heard him say that "for he knew not how many years his poetry had never brought him in enough to buy his shoe-strings" (preface to *Selections*, p. v.). The literal facts are that he received £100 from the Longmans in 1800, and nothing more till he was sixty-five, when Moxon bought the copyright of his writings for £1000 (*Prose Works*, iii. 437).

For five years after the condemnation of *The Excursion* Wordsworth published almost nothing that had not been composed before. The chief exception is the *Thanksgiving Ode* of 1816. In 1815 he published a new edition of his poems, in the arrangement according to faculties and feelings in which they have since stood; and he sought to explain his purposes more completely than before in an essay on "Poetry as a Study." In the same year he was persuaded to publish *The White Doe of Rylstone*, written mainly eight years before. In purely poetic charm *The White Doe* ought to be ranked among the most perfect of Wordsworth's poems. But Jeffrey, who was too busy to enter into a vein of poetry so remote from common romantic sentiment, would have none of *The White Doe*: he pronounced it "the very worst poem ever written," and the public too readily endorsed his judgment. Two other poems, with which Wordsworth made another appeal, were not more successful. *Peter Bell*, written in 1798, was published in 1819; and at the instigation of Charles Lamb it was followed by *The Waggoner*, written in 1805. Both were mercilessly ridiculed and parodied. These tales from humble life are written in Wordsworth's most unconventional style, and with them emphatically "not to sympathize is not to understand."

Meantime, the great design of *The Recluse* languished. The neglect of what Wordsworth himself conceived to be his best and most characteristic work was not encouraging; and there was another reason why the philosophical poem on man, nature, and society did not make progress. Again and again in his poetry Wordsworth celebrates the value of constraint, and the disadvantage of "too much liberty," of "unchartered freedom."[1] The formlessness of the scheme prevented his working at it continuously. Hence his "philosophy" was expressed in casual disconnected sonnets, or in sonnets and other short poems connected by the simplest of all links, sequence in time or place. He stumbled upon three or four such serial ideas in the latter part of his life, and thus found beginning and end for chains of considerable length, which may be regarded as fragments of the project which he had not sufficient energy of constructive power to execute. The *Sonnets on the River Duddon*, written in 1820, follow the river from its source to the sea, and form a partial embodiment of his philosophy of nature. The *Ecclesiastical Sonnets*, written in 1820–1821, trace the history of the church from the Druids onwards, following one of the great streams of human affairs, and exhibit part of his philosophy of society. A tour on the continent in 1820, a tour in Scotland in 1831, a tour on the west coast in 1833, a tour in Italy in 1837, furnished him with other serial forms, serving to connect miscellaneous reflections on man, nature and society; and his views on the punishment of death were strung together in still another series in 1840.

It was Coleridge's criticism in the *Biographia Literaria* (1817), together with the enthusiastic and unreserved championship of Wilson in *Blackwood's Magazine* in a series of articles between 1819 and 1822 (*Recreations of Christopher North*), that formed the turning-point in Wordsworth's reputation. From 1820 to 1830 De Quincey says it was militant, from 1830 to 1840 triumphant. On the death of Southey in 1843 he was made poet laureate. He bargained with Sir Robert Peel, before accepting, that no official verse should be required of him; and his only official composition, an ode on the installation of the Prince Consort as chancellor of Cambridge university in 1847, is believed to have really been written either by his son-in-law Edward Quillinan or by his nephew Christopher (afterwards bishop of Lincoln). He died at Rydal Mount, after a short illness, on the 23rd of April 1850, and was buried in Grasmere churchyard. His wife survived him till 1859, when she died in her 90th year. They had five children, two of whom had died in 1812; the two surviving sons, John (d. 1875) and William (d. 1883), had families; the other child, a daughter, Dora, Wordsworth's favourite, married Edward Quillinan in 1841 and died in 1847.

Professor Knight brought out in 1882–1886 an eight-volume edition of the *Poetical Works*, and in 1889 a *Life* in three volumes. The *Memoirs* of the poet were published (1851) by his nephew, Bishop Christopher Wordsworth. The "standard text" of the works is the edition of 1849–1850. The "Aldine" edition (1892) is edited by Edward Dowden. The one-volume "Oxford" edition (1895), edited by Thomas Hutchinson, contains every piece of verse known to have been published or authorized by Wordsworth, his *Prefaces*, &c., and a useful chronology and notes. Among critics of Wordsworth especially interesting for various reasons we may mention De Quincey (*Works*, vols. ii. and v.), Sir Henry Taylor (*Works*, vol. v.), Matthew Arnold (preface to *Selection*), Swinburne (*Miscellanies*), F. W. H. Myers ("Men of Letters" series), Leslie Stephen (*Hours in a Library*, 3rd series, "Wordsworth's Ethics"), Walter Pater (*Appreciations*), Walter Raleigh (*Wordsworth*, 1903). Wordsworth's writings in prose were collected by Dr Grosart (London, 1876). This collection contained the previously unpublished *Apology for a French Revolution*, written in 1793, besides the scarce tract on the *Convention of Cintra* (1809) and the political addresses *To the Freeholders of Westmoreland* (1818). Wordsworth's *Guide to the Lakes* originally appeared in 1810 as an introduction to Wilkinson's *Select Views*, and was first published separately in 1822. (W. M.; H. Ch.)

WORKINGTON, a municipal borough, seaport and market town in the Cockermouth parliamentary division of Cumberland, England, 34 m. S.W. of Carlisle, served by the Cockermouth, Keswick & Penrith, the London & North-Western and the Cleator & Workington Junction railways. Pop. (1901) 26,143. It lies on the S. bank of the river Derwent, at its outflow into the Irish Sea. The harbour is safe, being protected by a stony beach and by a breakwater. The Lonsdale dock is 4½ acres in extent. The port was made subordinate to that of Maryport in 1892. There are large collieries in the neighbourhood of the town, the workings in some cases extending beneath the sea, and blast-furnaces, engineering works, cycle and motor works, shipbuilding yards and paper mills. The borough is under a mayor, 7 aldermen and 21 councillors. Area, 2245 acres. Near the town is Workington Hall, a castellated structure retaining some of the ancient rooms, including that in which Mary, queen of Scots, is said to have slept when she escaped to England after the battle of Langside in May 1568.

WORKS AND PUBLIC BUILDINGS, BOARD OF, an administrative department in England. In 1832 the public works and buildings of Great Britain were for the first time placed under the control of a responsible minister of the crown, and were assigned to the commissioners of woods and forests. In 1851 the department of public works was erected into a board under the name of Office of Works and Public Buildings. The first commissioner of works is the head of the board, and has the custody of the royal palaces and parks and of all public buildings not specially assigned to other departments; he is a member of the government and frequently has a seat in the cabinet.

WORKSOP, a market town in the Bassetlaw parliamentary division of Nottinghamshire, England, on the Great Central and the Midland railways, and on the Chesterfield Canal, 15½ m. E.S.E. of Sheffield. Pop. of urban district (1901) 16,112. To the S. lies that portion of Sherwood Forest popularly known as the dukeries. The church of St Mary and St Cuthbert is an old priory church, once divided internally into two parts, the E. dedicated to St Mary being for the use of the canons, and the W. dedicated to St Cuthbert for the parishioners. At the Reformation only the W. portion of the church was spared, and for many years it was in a dilapidated condition until it was restored with Perpendicular additions. Behind it are the ruins of the lady chapel, containing some fine Early English work. The priory gatehouse, chiefly in the Decorated style, now forms the entrance to the precincts of the church. It is supposed to have been built early in the 14th century by the 3rd Lord Furnival, when the market was established. Of the priory itself the only remains are a wall at the N.W. corner of the church which includes the cloister gateway. There was formerly a Norman keep on the castle hill. The manor-house, built by John Talbot, 1st earl of Shrewsbury, and occasionally occupied by Mary, queen of Scots, during her captivity under the 6th earl, was in great part destroyed by fire in 1761, and when the estate came into the possession of the duke of Newcastle in 1840 the ruined portion was removed and a smaller mansion built.

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[1] See the Sonnet, *Nuns fret not*, &c., *The Pass of Kirkstone* and the *Ode to Duty*.

The town hall and free library are the principal public buildings of Worksop. Malting is the principal industry. A large corn market and a cattle and horse fair are held. The town also possesses brass and iron foundries, agricultural implement works, saw-mills and chemical works; and there is a considerable trade in Windsor chairs and wood for packing-cases for Sheffield cutlery. There are collieries at Shireoaks, 3 m. W.

WORLD, a word which has developed a wide variety of meanings from its original etymological sense of the "age of man," "course of man's life." In O. Eng. it appears under its true form *weoruld*, being a compound of *wer*, man (cf. Lat. *vir*), and *yldo*, age, from *eald*, *eld*, old. Of the various meanings the principal are the earth (*q.v.*), as a planet, or a large division of the earth, such as the "old world," the eastern, the "new world," the western hemisphere; the whole of created things upon the earth, particularly its human inhabitants, mankind, the human race, or a great division of mankind united by a common racial origin, language, religion or civilization, &c. A derived meaning is that of social life, society, as distinct from a religious life.

WORM,[1] a term used popularly to denote almost any kind of elongated, apparently limbless creature, from a lizard, like the blindworm, to the grub of an insect or an earthworm. Linnaeus applied the Latin term *Vermes* to the modern zoological divisions *Mollusca*, *Coelentera*, *Protozoa*, *Tunicata*, *Echinoderma* (*qq.v.*), as well as to those forms which more modern zoologists have recognized as worms. As a matter of convenience the term *Vermes* or *Vermidea* is still employed, for instance in the *International Catalogue of Zoological Literature* and the *Zoological Record*, to cover a number of wormlike animals. In systematic zoology, however, the use of a division *Vermes* has been abandoned, as it is now recognized that many of the animals that even a zoologist would describe as worms belong to different divisions of the animal kingdom. The so-called flatworms (Platyelmia, *q.v.*), including the Planarians (*q.v.*), Flukes (see TREMATODES), Cestodes (see TAPEWORM) and the curious Mesozoa (*q.v.*), are no doubt related. The marine Nemertine worms (see NEMERTINA) are isolated. The thick-skinned round worms, such as the common horse-worm and the threadworms (see NEMATODA), together with the Nematomorpha (*q.v.*), *Chaetosomatida* (*q.v.*), Desmoscolecida (*q.v.*) and Acanthocephala (*q.v.*), form a fairly natural group. The Rotifera (*q.v.*), with probably the Kinorhyncha (*q.v.*) and Gastrotricha (*q.v.*), are again isolated. The remaining worms are probably all coelomate animals. There is a definite Annelid group (see ANNELIDA), including the Archiannelida, the bristleworms (see CHAETOPODA), of which the earthworm (*q.v.*) is the most familiar type, the Myzostomida (*q.v.*), Hirudinea (see LEECH) and the armed Gephyreans (see ECHIUROIDEA). The unarmed Gephyreans (see GEPHYREA) are now separated from their former associates and divided into two groups of little affinity, the *Sipunculoidea* and the *Priapuloidea* (*qq.v.*). The *Phoronidea* (*q.v.*) are now associated with Hemichordata (*q.v.*) in the line of vertebrate ancestry, whilst the *Chaetognatha* (*q.v.*) remain in solitary isolation.

Mention is made under TAPEWORM of the worms of that species inhabiting the human body as parasites, and it will be convenient here to mention other parasitic varieties. The most common human parasite is the *Ascaris lumbricoides* or round worm, found chiefly in children and occupying the upper portion of the intestine. They are usually few in number, but occasionally occur in such large numbers that they cause intestinal obstruction. Unlike the tapeworm no intermediate host is required for the development of this worm. It develops from direct ingestion of the larvae. Various symptoms, such as diarrhoea, anaemia, intermittent fever, restlessness, irritability and convulsions are attributed to these worms. The treatment is the administration of santonin, followed by a purgative. The threadworm or *Oxyuris vermicularis* is a common parasite infecting the rectum. The larvae of this worm are also directly swallowed, and infection probably takes place through water, or possibly through lettuces and watercress. The symptoms caused by threadworms are loss of appetite, anaemia and intense irritation and itching. The treatment consists in the use of enemata containing quassia, carbolic acid, vinegar or turpentine or even common salt. In addition mild purgatives should be given.

WORMS, a city of Germany, in the grand-duchy of Hesse-Darmstadt, situated in a fertile plain called the Wonnegau, on the left bank of the Rhine, 25 m. S. of Mainz, 20 m. N.W. of Heidelberg, and 9 m. by rail N.W. of Mannheim. Pop. (1895) 28,636; (1905) 43,841, about a third of whom are Roman Catholics. The town is irregularly built, and some of the old walls and towers still remain, but its general aspect is modern. The principal church and chief building is the spacious cathedral of SS. Peter and Paul, which ranks beside those of Spires and Mainz among the noblest Romanesque churches of the Rhine (see ARCHITECTURE: *Romanesque and Gothic in Germany*). This magnificent basilica, with four round towers, two large domes, and a choir at each end, has a specially imposing exterior, though the impression produced by the interior is also one of great dignity and simplicity, heightened by the natural colour of the red sandstone of which it is built. Only the ground plan and the lower part of the western towers belong to the original building consecrated in 1110; the remainder was mostly finished by 1181, but the west choir and the vaulting were built in the 13th century, the elaborate south portal was added in the 14th century, and the central dome has been rebuilt. The ornamentation of the older parts is simple to the verge of rudeness; and even the more elaborate later forms show no high development of workmanship. The baptistery contains five remarkable stone reliefs of the late 15th century. The cathedral is 358 ft. long, and 89 ft. wide, or including the transepts, which are near the west end, 118 ft. (inside measurements). It belongs to the Roman Catholic community, who possess also the church of St Martin and the church of Our Lady (*Liebfrauenkirche*), a handsome Gothic edifice outside the town, finished in 1467. The principal Protestant place of worship is the Trinity church, built in 1726. Second in interest to the cathedral is the church of St Paul, also in the Romanesque style, and dating from 1102–1116, with a choir of the early 13th century, cloisters and other monastic buildings. This church has been converted into an interesting museum of national antiquities. The late Romanesque church of St Andrew is not used. The old synagogue, an unassuming building erected in the 11th century and restored in the 13th, is completely modernized. The Jewish community of Worms (about 1300 in number) claims to be the most ancient in Germany and to have existed continuously since the Christian era, though the earliest authentic mention of it occurs in 588. A curious tradition, illustrating the efforts of the dispersed people to conciliate their oppressors, asserts that the Jews of Worms gave their voice against the crucifixion, but that their messenger did not arrive at Jerusalem until after the event.

The town hall was rebuilt in 1884. The Bischofshof, in which the most famous diet of Worms (1521) was held, is now replaced by a handsome modern residence. The Luginsland is an old watch-tower of the 13th century. In the Lutherplatz rises the imposing Luther monument (unveiled in 1868), on a platform 48 ft. sq. In the centre the colossal statue of Luther rises, on a pedestal at the base of which are sitting figures of Peter Waldo, Wycliffe, Hus and Savonarola, the heralds of the Reformation; at the corners of the platform, on lower pedestals, are statues of Luther's contemporaries, Melanchthon, Reuchlin, Philip of Hesse, and Frederick the Wise of Saxony, between which are allegorical figures of Magdeburg (mourning), Spires (protesting) and Augsburg (confessing). The greater part of the work, which took nine years to execute, was designed by Rietschel, and carried out after his death in 1861 by Gustav Kietz (1826–1908), Adolf von Donndorf (b. 1835) and Johannes Schilling (b. 1828). The "Rosengarten" on the opposite bank of the Rhine associated with the stories of the wooing of Kriemhild (see *infra*), has been laid out in keeping with the old traditions and was opened with great festivities in 1906. Extensive burial-grounds, ranging in date from neolithic to Merovingian times, have recently been discovered near the city.

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[1] The O. Eng. *wyrm* represents a word common to Teutonic languages for a snake or worm, cf. Ger. *Wurm*, Dan. and Swed. *orm*, Du. *Worm*. The Lat. *vermis* must be connected. The Sanskrit word is *krimi*, which has given kermes, the cochineal insect, whence "crimson." Skeat takes the ultimate root to be *kar*, to move, especially in a circular motion, seen in "curve," "circle," &c. The word "worm" is applied to many objects resembling the animals in having a spiral shape or motion, as the spiral thread of a screw, or the spiral pipe through which vapour is passed in distillation (*q.v.*). As a term of disparagement and contempt the word is also used of persons, from the idea of wriggling or creeping on the ground, partly, too, perhaps, with a reminiscence of Genesis iii. 14.

The trade and industry of Worms are important, and not the least resource of the inhabitants is vine-growing, the most famous vintage being known as Liebfraumilch, grown on vineyards near the Liebfrauenkirche. The manufacture of patent leather employs about 5000 hands. Machinery, wool, cloth, chicory, slates, &c., are also produced. Worms possesses a good river harbour, and carries on a considerable trade by water.

Worms was known in Roman times as Borbetomagus, which in the Merovingian age became Wormatia, afterwards by popular etymology connected with *Wurm*, a dragon. The name Borbetomagus indicates a Celtic origin for the town, which had, however, before Caesar's time become the capital of a German tribe, the Vangiones. Drusus is said to have erected a fort here in 14 B.C. In 413 the emperor Jovinus permitted the Burgundians under their king Guntar or Guntiar to settle on the left bank of the Rhine between the Lauter and the Nahe. Here they founded a kingdom with Worms as its capital. Adopting Arianism they came into conflict with the Romans, and under their king Gundahar or Gundicar (the Gunther of the *Nibelungenlied*) rose in 435 against the Roman governor Aetius, who called in the Huns against them. The destruction of Worms and the Burgundian kingdom by the Huns in 436 was the subject of heroic legends afterwards incorporated in the *Nibelungenlied* (*q.v.*) and the *Rosengarten* (an epic probably of the late 13th century). In the *Nibelungenlied* King Gunther and Queen Brunhild hold their court at Worms, and Siegfried comes hither to woo Kriemhild.

Worms was rebuilt by the Merovingians, and became an episcopal see, first mentioned in 614, although a bishop of the Vangiones had attended a council at Cologne as early as 347. There was a royal palace from the 8th century, in which the Frankish kings, including Charlemagne, occasionally resided. The scene of the graceful though unhistorical romance of Einhard and Emma, the daughter of Charlemagne, is laid here.

Under the German kings the power of the bishops of Worms gradually increased, although they never attained the importance of the other Rhenish bishops. Otto I. granted extensive lands to the bishop, and in 979 Bishop Hildbold acquired comital rights in his city. Burchard I. (bishop from 1000 to 1025) destroyed the castle of the Franconian house at Worms, built the cathedral and laid the foundations of the subsequent territorial power of the see. There were frequent struggles between the bishops and the citizens, who espoused the cause of the emperors against them, and were rewarded by privileges which fostered trade. Hemy IV. granted a charter to Worms in 1074, and held a synod there in 1076, by which Pope Gregory VII. was declared deposed. Henry V. acquired Worms in 1121 by the treaty of Würzburg, built a castle and granted privileges to the city, which retained its freedom until 1801, in spite of the bishops, who ruled a small territory south of the city, on both sides of the Rhine, and resided at Ladenburg near Mannheim till 1622.

The city of Worms was frequently visited by the imperial court, and won the title of "Mother of Diets." The concordat of Worms closed the investiture controversy in 1122. The "perpetual peace" (*ewiger Landfriede*) was proclaimed by the emperor Maximilian I. at the diet of 1495, and Luther appeared before the famous diet of 1521 to defend his doctrines in the presence of Charles V. Four years later, Worms formally embraced Protestantism, and religious conferences were held there in 1540 and 1557. It suffered severely during the Thirty Years' War. After being sacked in turn by Mansfeld, Tilly and the Spaniards, it was taken by Oxenstierna in 1632, who held a convention here with his German allies. The imperialists again took Worms in 1635, and it admitted the French under Turenne in 1644. The French under Mélac burnt the city almost entirely in 1689, and it has only fully recovered from this blow in recent years. Thus the population, which in its prosperous days is said to have exceeded 50,000, had sunk in 1815 to 6250.

By the treaty of Worms in 1743 an offensive alliance was formed between Great Britain, Austria and Sardinia. The French under Custine took the city by surprise in 1792 and it was annexed by the peace of Lunéville in 1801 to France, together with the bishop's territories on the left bank of the Rhine. The remaining episcopal dominions were secularized in 1803 and given to Hesse-Darmstadt, which acquired the whole by the Vienna Congress in 1815. In 1849 the Baden revolutionaries seized Worms, but were overthrown by the Mecklenburgers and Prussians in May of that year.

See Zorn, *Wormser Chronik* (Stuttgart, 1857); Fuchs, *Geschichte der Stadt Worms* (Worms, 1868); F. Soldan, *Der Reichstag zu Worms, 1521* (Worms, 1883); *Beiträge zur Geschichte der Stadt Worms* (Worms, 1896); G. Wolf, *Zur Geschichte der Juden in Worms* (Breslau, 1862); Nover, *Das alte und neue Worms* (Worms, 1895).

WORMWOOD, the popular name for an aromatic herb known botanically as *Artemisia Absinthium*, a member of the family Compositae. It grows from 1 to 3 ft. high and is silkily hairy; the leaves are small and much cut, and the flowers are small yellow hemispherical heads among the leaves at the end of the branches. It grows in waste places. It is a tonic and vermifuge and used to flavour drinks. A closely allied species is *A. vulgaris*, mugwort, also an aromatic herb, with larger and broader leaves, which are white woolly beneath, and erect woolly heads of reddish-yellow flowers.

WORSBOROUGH, an urban district in the Holmfirth parliamentary division of the W. Riding of Yorkshire, England, 3 m. S. of Barnsley, near the Sheffield & Barnsley branch of the Great Central railway, and on a branch of the Dearne & Dove canal. Pop. (1901) 10,336. The church of St Mary is an interesting structure with remains of Norman work, but chiefly of Early English date. There are extensive collieries and gunpowder mills near, and in the town iron and steel works and corn mills.

WORSHIP (*i.e.* "worth-ship," O. Eng. *weorðscipe*), honour, dignity, reverence, respect. The word is used in a special sense of the service, reverence and honour paid, by means of devotional words or acts, to God, to the gods, or to hallowed persons, such as the Virgin Mary or the saints, and hallowed objects, such as holy images or relics. In this sense, however, it must be borne in mind that the Roman Catholic Church distinguishes three kinds of worship: (1) *latria*, the worship due to God alone (from Gr. λατρεία, service, esp. the service of the gods, worship), and (2) *hyperdulia*, the worship or adoration due to the Virgin Mary as the Mother of God (from Gr. ὑπέρ, above, and δουλεία, service), and (3) *dulia*, that due to the saints. (See also ADORATION.) The public service of God in church is known as "divine worship" or "divine service" (see LITURGY). In the sense of "revere" or "respect," the verb "to worship" occurs in the English Prayer-book, in the phrase "with my body I thee worship" in the Marriage Service. In this sense the term "worship" is also used as a title of honour in speaking of or addressing other persons of position. Thus a mayor is spoken of as "his worship the mayor," or "the worshipful the mayor." Magistrates are addressed as "your worship."

WORSLEY, PHILIP STANHOPE (1835–1866), English poet, son of the Rev. Charles Worsley, was born on the 12th of August 1835, and was educated at Highgate grammar school and Corpus Christi College, Oxford, where he won the Newdigate prize in 1857 with a poem on "The Temple of Janus." In 1861 he published a translation of the *Odyssey*, followed in 1865 by a translation of the first twelve books of the *Iliad*, in both of which he employed the Spenserian stanza with success. In 1863 appeared a volume of *Poems and Translations*. Worsley died on the 8th of May 1866. His translation of the *Iliad* was completed after his death by John Conington.

WORSLEY, an urban district in the Eccles parliamentary division of Lancashire, England, 6 m. W.N.W. of Manchester by the London & North-Western railway. Pop. (1901) 12,462. Its growth is a result of the development of the cotton manufacture and of the neighbouring collieries.

WORTH, CHARLES FREDERICK (1825–1895), the famous dressmaker, was born at Bourne, Lincolnshire, in 1825. His father, a country solicitor, having lost his money in speculation, Charles was sent to London as an apprentice to Swan & Edgar, drapers. Thence, in 1846, he went to Paris, without capital or friends, and after twelve years in a wholesale silk house he began business as a dressmaker in partnership with a Swede named Dobergh. His originality and skill in design won the patronage of the empress Eugénie, and, through her, of fashionable Paris. After the Franco-German War, during which he turned his house into a military hospital, his partner retired, and Worth continued the business, which employed 1200 hands, with his two sons John and Gaston—both naturalized Frenchmen. For more than thirty years he set the taste and ordained the fashions of Paris, and extended his sway over all the civilized and much of the uncivilized world. He died on the 10th of March 1895.

WÖRTH, a village of Alsace, on the Sauer, 6 m. N. of Hagenau, which gives its name to the battle of the 6th of August 1870, fought between the Germans under the crown prince of Prussia and the French under Marshal MacMahon. The battle is also called Reichshoffen and Fröschweiler.

The events which led up to the engagement, and the general situation on the 6th are dealt with under Franco-German War. During the 5th of August the French concentrated in a selected position running nearly N. and S. along the Sauer Bach on the left front of the German III. army which was moving S. to seek them. The position is marked from right to left by Morsbronn, the Niederwald, the heights W. of Wörth and the woods N.E. of Fröschweiler. E. of the Sauer the German III. army was moving S. towards Hagenau, when their cavalry found the French position about noon. Thereafter the German vedettes held the French under close observation, while the latter moved about within their lines and as far as the village of Wörth as if in peace quarters, and this notwithstanding the defeat of a portion of the army at Weissenburg on the previous day. The remnant of the force which had been engaged, with many of its wounded still in the ranks, marched in about noon with so soldierly a bearing that, so far from their depressing the *morale* of the rest, their appearance actually raised it.

About 5 p.m. some horses were watered at the Sauer, as in peace, without escort, though hostile scouts were in sight. A sudden swoop of the enemy's hussars drove the party back to camp. The alarm was sounded, tents were struck and the troops fell in all along the line and remained under arms until the confusion died down, when orders were sent to fall out, but not to pitch the tents. The army therefore bivouacked, and but for this incident the battle of the next day would probably not have been fought. A sudden and violent storm broke over the bivouacs, and when it was over, the men, wet and restless, began to move about, light fires, &c. Many of them broke out of camp and went into Wörth, which was unoccupied, though Prussians were only 300 yds. from the sentries. These fired, and the officer commanding the Prussian outposts, hearing the confused murmur of voices, ordered up a battery, and as soon as there was light enough dropped a few shells into Wörth. The stragglers rushed back, the French lines were again alarmed, and several batteries on their side took up the challenge.

The Prussian guns, as strict orders had been given to avoid all engagement that day, soon withdrew and were about to return to camp, when renewed artillery fire was heard from the S. and presently also from the N. In the latter direction, the II. Bavarian corps had bivouacked along the Mattstall-Langensulzbach road with orders to continue the march if artillery were heard to the S. This order was contrary to the spirit of the III. army orders, and moreover the V. Prussian corps to the S. was in ignorance of its having been given.

The outpost battery near Wörth was heard, and the Bavarians at once moved forward. Soon the leading troops were on the crest of the ridge between the Sauer and the Sulzbach, and the divisional commander anxious to prove his loyalty to his new allies—his ene [illegible] ed his troops to attack, giving the spire of [illegible] is visible over the woods, as the point of direction. The French, however, were quite ready and a furious fusillade broke out, which was multiplied by the echoes of the forest-clad hills out of all proportion to the numbers engaged. The Prussian officers of the V. corps near Dieffenbach, knowing nothing of the orders the Bavarians had received, were amazed, but at length when about 10.30 a.m. their comrades were seen retiring, in some cases in great disorder, the corps commander, General von Kirchbach, decided that an effort must at once be made to relieve the Bavarians. His chief of staff had already ordered up the divisional and corps artillery (84 guns in all), and he himself communicated his intention of attacking to the XI. corps (General von Bose) on his left and asked for all available assistance. A report was also despatched to the crown prince at Sulz, 5 m. away.

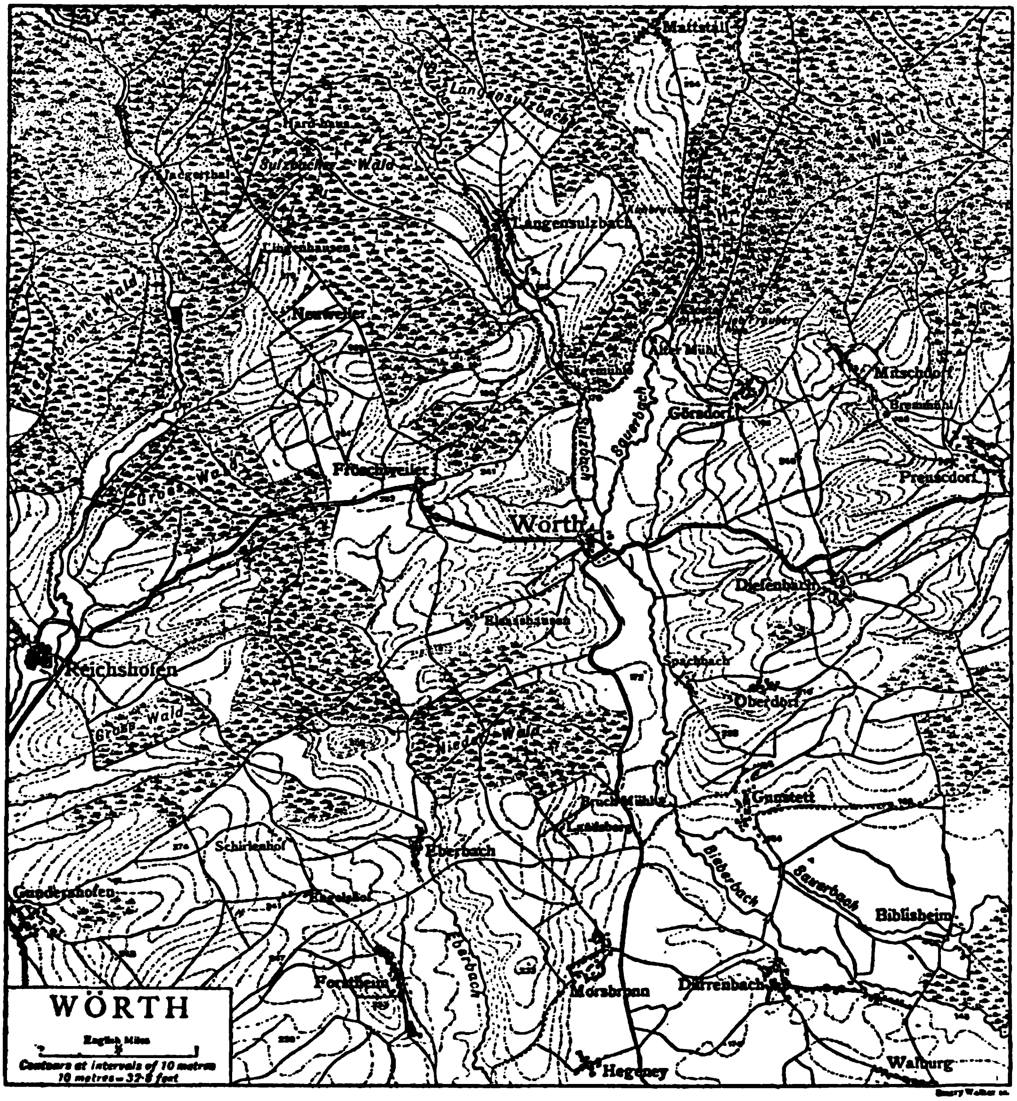
Meanwhile the XI. corps had become involved in an engagement. The left of the V. corps' outposts had over night occupied Gunstett and the bank of the Sauer, and the French shortly after daylight on the 6th sent down an unarmed party to fetch water. As this appeared through the mist, the Prussians naturally fired upon it, and the French General Lartigue (to whose division the party belonged), puzzled to account for the firing, brought up some batteries in readiness to repel an attack. These fired a few rounds only, but remained in position as a precaution.

Hearing the firing, the XI. corps' advanced guard, which had marched up behind in accordance with the general movement of the corps in changing front to the west, and had halted on reaching the Kreuzhecke Wood, promptly came up to Spachbach and Gunstett. In this movement across country to Spachbach some bodies appear to have exposed themselves, for French artillery at Elsasshausen suddenly opened fire, and the shrapnel bursting high, sent showers of bullets on to the house roofs of Spachbach, in which village a battalion had just halted. As the falling tiles made the position undesirable, the major in command ordered the march to be resumed, and as he gave the order, his horse ran away with him towards the Sauer. The leading company, seeing the battalion commander gallop, moved off at the double, and the others of course followed. Coming within sight of the enemy, they drew a heavy shell fire, and, still under the impression that they were intended to attack, deployed into line of columns and doubled down to the river, which they crossed. One or two companies in the neighbourhood had already begun to do so, and the stream being too wide for the mounted officers to jump, presently eight or ten companies were across the river and out of superior control. By this time the French outposts (some 1500 rifles), lining the edge of the Niederwald, were firing heavily. The line of smoke was naturally accepted by all as the objective, and the German companies with a wild rush reached the edge of the wood.

The same thing had happened at Gunstett. A most obstinate struggle ensued and both sides brought up reinforcements. The Prussians, with all their attention concentrated on the wood in their front, and having as yet no superior commanders, soon exhibited signs of confusion, and thereupon General Lartigue ordered a counter attack towards the heights of Gunstett, when all the Prussians between the Niederwald and the Sauer gave way. The French followed with a rush, and, fording the Sauer opposite Gunstett, for a moment placed the long line of German guns upon the heights in considerable danger. At this crisis a fresh battalion of the XI. corps arrived by the road from Surburg to Gunstett, and attacked the French on one flank whilst the guns swept the other. The momentum of the charge died out, and the French drifted backwards after an effort which compelled the admiration of both sides.

In the centre the fight had been going badly for the V. corps. As soon as the 84 guns between Dieffenbach and Spachbach opened fire the French disappeared from sight. There was no longer a target, and, perhaps to compel his adversary to show himself, von Kirchbach ordered four battalions to cross the river. These battalions, however, were widely separated, and coming under fire as soon as they appeared, they attacked in two groups, one from Wörth towards Fröschweiler, the other from near Spachbach towards the Calvary spur, E. of

Elsasshausen. Both were overpowered by infantry fire. A fraction of the S. party maintained itself all day in the elbow of the Hagenau chaussee, which formed a starting-point for subsequent attacks. But the rest were driven back in great confusion. Once more the dashing counter-attack of the French was thrown into confusion by the Prussian shell fire, and as the French fell back the Prussian infantry, now reinforced, followed them up (about 1 p.m.). The commander-in-chief of the German III. army (the crown prince Frederick) now appeared on the field and ordered Kirchbach to stand fast until the pressure of the XI. corps and Württemberg division could take effect against the French right wing. The majority of these troops had not yet reached the field. Von Bose, however, seeing the retreat of the troops of the V. corps, had independently determined to renew the attack against the Niederwald with such of his forces as had arrived, and had ordered General von Schkopp's brigade, which was then approaching, to join the troops collecting to the east of Gunstett. Schkopp, however, seeing that his present line of advance led him direct on to the French right about Morsbronn and kept him clear of the confusion to be seen around Gunstett, disregarded the order and continued to advance on Morsbronn. This deliberate acceptance of responsibility really decided the battle, for his brigade quietly deployed as a unit and compelled the French right wing to fall back.



To cover the French retreat Michel's brigade of cavalry was ordered to charge. The order was somewhat vague, and in his position under cover near Eberbach, General Michel had no knowledge of the actual situation. Thus it came about that, without reconnoitring or manœuvring for position, the French cavalry rode straight at the first objective which offered itself, and struck the victorious Prussians as they were crossing the hills between the Albrechtshaüserhof and Morsbronn. Hence the charge was costly and only partly successful. However, the Prussians were ridden over here and there, and their attention was sufficiently absorbed while the French infantry rallied for a fresh counter-stroke. This was made about 1.20 P.M. with the utmost gallantry, and the Prussians were driven off the hillsides between the Albrechtshaüserhof and Morsbronn which they had already won. But the counter-attack soon came under the fire of the great artillery mass above Gunstett, and, von Bose having at length concentrated the main body of the XI. corps in the meadows between the Niederwald and the Sauer, the French had to withdraw. Their withdrawal involved the retreat of the troops who had fought all day in defence of the Niederwald.

By 3 P.M. the Prussians were masters of the Niederwald and the ground S. of it on which the French right wing had originally stood, but they were in indescribable confusion after the prolonged fighting in the dense undergrowth. Before order could be restored came another fierce counter-stroke. As the Prussians emerged from the N. edge of the wood, the French reserves suddenly came out from behind the Elsasshausen heights, and striking due S. drove the Prussians back. It was a grave crisis, but at this moment von Schkopp, who throughout all this had kept two of his battalions intact, came round the N.W. corner of the Wald, and these fresh battalions again brought the French to a standstill. Meanwhile von Kirchbach, seeing the progress of the XI. corps, had ordered the whole of his command forward to assault the French centre, and away to the right the two Bavarian corps moved against the French left, which still maintained its original position in the woods N.E. of Fröschweiler.

MacMahon, however, was not beaten yet. Ordering Bonnemains' cavalry division to charge, by squadrons to gain time, he brought up his reserve artillery, and sent it forward to case-shot range to cover a final counter-stroke by his last intact battalions. But from his position near Fröschweiler he could not see into the hollow between Elsasshausen and the Niederwald. The order was too late, and the artillery unlimbered just as the counter attack on the Niederwald alluded to above gave way before von Schkopp's reserve. The guns were submerged in a flood of fugitives and pursuers. Elsasshausen passed into the hands of the Germans. To rescue the guns the nearest French infantry attacked in a succession of groups, charging home the bayonet with the utmost determination. Before each attack the Prussians immediately in front gave way, but those on the flanks swung inwards and under this converging fire each French attempt died out, the Prussians following up their retreat. In this manner, step by step, in confusion which almost defies analysis, the Prussians conquered the whole of the ground to the S. of the Fröschweiler-Wörth road, but the French still held on in the village of Fröschweiler itself and in the woods to the N. of the road, where throughout the day they had held the two Bavarian corps in check with little difficulty. To break down this last stronghold, the guns of the V. and XI. corps, which had now come forward to the captured ridge of Elsasshausen, took the village as their target; and the great crowd of infantry, now flushed with victory but in the direst confusion, encouraged by the example of two horse artillery batteries which galloped boldly forward to case-shot range, delivered one final rush which swept all resistance before it.

The battle was won and cavalry only were needed to reap its consequences, but the Prussian cavalry division had been left behind without orders and did not reach the battlefield till late at night. The divisional cavalry squadrons did their best, but each pursued on its own account, and the results in prisoners and guns fell far short of what the opportunity offered. Under cover of darkness the French escaped, and on the following day the cavalry division was quite unable to discover the direction of [illegible]t.

[illegible] no support from the neighbouring French [illegible]RMAN WAR). The battle was won by overpowering weight of numbers. The Prussian general staff were able to direct upon the field no fewer than 75,000 infantry, 6000 cavalry, and 300 guns, of which 71,000 rifles, 4250 sabres and 234 guns came into action, against 32,000 rifles, 4850 sabres and 101 guns on the French side. The superiority of the French chassepot to the needle guns may reasonably be set against the superior number of rifles on the German side, for though the Germans were generally, thanks to their numbers, able to bring a converging fire upon the French, the latter made nearly double the number of hits for about the same weight of ammunition fired, but the French had nothing to oppose to the superior German artillery, and in almost every instance it was the terrible shell fire which broke up the French counter attack. All of these attacks were in the highest degree honourable to the French army, and many came nearer to imperilling the ultimate success of the Germans than is generally supposed. One other point deserves special attention. As soon as the fighting became general, all order in the skirmisher lines disappeared on both sides, and invariably, except where the Prussian artillery fire intervened, it was the appearance of closed bodies of troops in rear of the fighting line which determined the retreat of their opponents. Even in the confused fighting in the Niederwald, the mere sound of the Prussian drums or the French bugles induced the adversary to give way even though drums and bugles frequently appealed to non-existent troops.

The losses of the Germans were 9270 killed and wounded and 1370 missing, or 13%; those of the French were about 8000 killed and wounded, and perhaps 12,000 missing, and prisoners, representing a total loss of about 41%. Some French regiments retained a semblance of discipline after suffering enormous losses. The 2nd Turcos lost 93%, 13th hussars 87%, and thirteen regiments in all lost over 50% of their strength.

See the French and German official histories of the war; H. Bonnal, *Fröschwiller* (1899); H. Kunz, *Schlacht von Wörth* (1891) and *Kriegsgesch. Beispiele*, Nos. 13-18; R. Tournès, *De Gunstett au Niederwald* and *Le Calvaire*; and Commandant Grange, "Les Réalités du champ de bataille," *Revue d'infanterie* (1908–1910). (F. N. M.)

WORTHING, a municipal borough and seaside resort in the Lewes parliamentary division of Sussex, England, 61 m. S. by W. from London by the London, Brighton & South Coast railway. Pop. (1901) 20,015. It has a fine marine parade, and a promenade pier, and there is a long range of firm sands. A public park, 21 acres in extent, was opened in 1881. The principal buildings are several modern churches, the town hall (1834), municipal buildings, free library, literary institute, infirmary and convalescent homes. The mother parish of Worthing is Broadwater, the church of which, 1 m. north of Worthing, is a cruciform building, and a fine example of transitional Norman work. A Roman villa, evidence of the existence of pottery works, and a so-called mile-stone, have been discovered at Worthing. The town was incorporated in 1890, and is under a mayor, 8 aldermen and 24 councillors. Area, 1439 acres.

WOTTON, SIR HENRY (1568–1639), English author and diplomatist, son of Thomas Wotton (1521–1587) and grand-nephew of the diplomatist Nicholas Wotton (*q.v.*), was born at Bocton Hall in the parish of Bocton or Boughton Malherbe, Kent.[1] He was educated at Winchester School and at New College, Oxford, where he matriculated on the 5th of June 1584. Two years later he removed to Queen's College, graduating B.A. in 1588. At Oxford he was the friend of Albericus Gentilis, then professor of Civil Law, and of John Donne. During his residence at Queen's he wrote a play, *Tancredo*, which has not survived, but his chief interests appear to have been scientific. In qualifying for his M.A. degree he read three lectures *De oculo*, and to the end of his life he continued to interest himself in physical experiments. His father, Thomas Wotton, died in 1587, leaving to his son the very inadequate maintenance of a hundred marks a year. About 1589 Wotton went abroad, with a view probably to preparation for a diplomatic career, and his travels appear to have lasted for about six years. At Altdorf he met Edward, Lord Zouch, to whom he later addressed a series of letters (1590–1593) which contain much political and other news. These (*Reliquiae Wottonianae*, pp. 585 et seq. 1685) provide a record of the journey. He travelled by way of Vienna and Venice to Rome, and in 1593 spent some time at Geneva in the house of Isaac Casaubon, to whom he contracted a considerable debt. He returned to England in 1594, and in the next year was admitted to the Middle Temple. While abroad he had from time to time provided Robert Devereux, second earl of Essex, with information, and he now definitely entered his service as one of his agents or secretaries. It was his duty to supply intelligence of affairs in Transylvania, Poland, Italy and Germany. Wotton was not, like his unfortunate fellow-secretary, Henry Cuffe, who was hanged at Tyburn in 1601, actually involved in Essex's downfall, but he thought it prudent to leave England, and within sixteen hours of his patron's apprehension he was safe in France, whence he travelled to Venice and Rome. In 1602 he was resident at Florence, and a plot to murder James VI. of Scotland having come to the ears of the grand-duke of Tuscany, Wotton was entrusted with letters to warn him of the danger, and with Italian antidotes against poison. As "Ottavio Baldi" he travelled to Scotland by way of Norway. He was well received by James, and remained three months at the Scottish court, retaining his Italian incognito. He then returned to Florence, but on receiving the news of James's accession hurried to England. James knighted him, and offered him the embassy at Madrid or Paris; but Wotton, knowing that both these offices involved ruinous expense, desired rather to represent James at Venice. He left London in 1604 accompanied by Sir Albertus Morton, his half-nephew, as secretary, and William Bedell, the author of an Irish translation of the Bible, as chaplain. Wotton spent most of the next twenty years, with two breaks (1612–1616 and 1619–1621), at Venice. He helped the Doge in his resistance to ecclesiastical aggression, and was closely associated with Paolo Sarpi, whose history of the Council of Trent was sent to King James as fast as it was written. Wotton had offended the scholar Caspar Schoppe, who had been a fellow student at Altdorf. In 1611 Schoppe wrote a scurrilous book against James entitled *Ecclesiasticus*, in which he fastened on Wotton a saying which he had incautiously written in a friend's album years before. It was the famous definition of an ambassador as an "honest man sent to lie abroad for the good of his country." It should be noticed that the original Latin form of the epigram did not admit of the double meaning. This was adduced as an example of the morals of James and his servants, and brought Wotton into temporary disgrace. Wotton was at the time on leave in England, and made two formal defences of himself, one a personal attack on his accuser addressed to Marcus Welser of Strassburg, and the other privately to the king. He failed to secure further diplomatic employment for some time, and seems to have finally won back the royal favour by obsequious support in parliament of James's claim to impose arbitrary taxes on merchandise. In 1614 he was sent to the Hague and in 1616 he returned to Venice. In 1620 he was sent on a special embassy to Ferdinand II. at Vienna, to do what he could on behalf of James's daughter Elizabeth, queen of Bohemia. Wotton's devotion to this princess, expressed in his exquisite verses beginning "You meaner beauties of the night," was sincere and unchanging. At his departure the emperor presented him with a jewel of great value, which Wotton received with due respect, but before leaving the city he gave it to his hostess, because, he said, he would accept no gifts from the enemy of the Bohemian queen. After a third term of service in Venice he returned to London early in 1624 and in July he was installed as provost of Eton College. This office did not relieve him from his pecuniary embarrassments, and he was even on one occasion arrested for debt, but he received in 1627 a pension of £200, and in 1630 this was raised to £500 on the understanding that he should write a history of England. He did not neglect the duties of his provostship, and was happy in being able to entertain his friends lavishly. His most constant associates were Izaak Walton and John Hales. A bend in the Thames below the Playing Fields, known as "Black Potts," is still pointed out as the spot where Wotton and Izaak Walton fished in company. He died at the beginning of December 1639 and was buried in the chapel of Eton College.

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[1] His elder half-brother, Edward Wotton (1548–1626), entered the service of Sir Francis Walsingham, and in 1585 was sent on an important errand to James VI. of Scotland. In 1602 he was made comptroller of the royal household, and in 1603 he was created Baron Wotton of Marley. The peerage became extinct on the death of his son Thomas, the 2nd baron (1588–1630).

Sir Henry Wotton was [illegible] writings are very [illegible] printed in *Reliquiae Wottonianae* [illegible] But of those fifteen two have [illegible] known poems in the language, [illegible] his Mistris, the Queen of Bohemia," and [illegible] Happy Life."

During his lifetime he published only *The Elements of* [illegible] (1624), which is a paraphrase from [illegible] Latin prose address to the king on his [illegible] In 1651 appeared the *Reliquiae Wottonianae*, [illegible] *Life*. An admirable *Life and Letters*, [illegible] material, by Logan Pearsall Smith, was published [illegible] A. W. Ward, *Sir Henry Wotton, a Biographical Sketch* [illegible]

WOTTON, NICHOLAS (*c.* 1497–1567), English [illegible] was a son of Sir Robert Wotton of Boughton Malherbe, Kent, and a descendant of Nicholas Wotton, lord mayor of London in 1415 and 1430, and member of parliament for the city from 1406 to 1429. He early became vicar of Boughton Malherbe and of Sutton Valence, and later of Ivychurch, Kent; but, desiring a more worldly career, he entered the service of Cuthbert Tunstall, bishop of London. Having helped to draw up the *Institution of a Christian Man*, Wotton in 1539 went to arrange the marriage between Henry VIII and Anne of Cleves and the union of Protestant princes which was to be the complement of this union. He crossed over to England with the royal bride, but, unlike Thomas Cromwell, he did not lose the royal favour when the king repudiated Anne, and in 1541, having already refused the bishopric of Hereford, he became dean of Canterbury and in 1544 dean of York. In 1543 he went on diplomatic business to the Netherlands, and for the next year or two he had much intercourse with the emperor Charles V. He helped to conclude the treaty of peace between England and France in 1546, and was resident ambassador in France from 1546 to 1549. Henry VIII. made Wotton an executor of his will and left him £300, and in 1549, under Edward VI., he became a secretary of state, but he only held this post for about a year. In 1550 he was again sent as envoy to Charles V., and he was ambassador to France during the reign of Mary, doing valuable work in that capacity. He left France in 1557, but in 1558 he was again in that country, helping to arrange the preliminaries of the treaty of Cateau Cambrésis. In 1560 he signed the treaty of Edinburgh on behalf of Elizabeth, and he had again visited the Netherlands before his death in London on the 26th of January 1567.

His brother, Sir Edward Wotton (1489–1551), was made treasurer of Calais in 1540, and was one of those who took part in the overthrow of the protector Somerset. His son, Thomas Wotton (1521–1587) was the father of Sir Henry Wotton (*q.v.*)

WOTTON, WILLIAM (1666–1727), English scholar, son of the Rev. Henry Wotton, was born in his father's parish of Wrentham, Suffolk, on the 13th of August 1666. He was not yet ten years old when he was sent to Catherine Hall, Cambridge, having by this time a good knowledge of Latin, Greek and Hebrew. He obtained a fellowship at St John's College, and was elected an F.R.S. in 1687. Wotton is chiefly remembered for his share in the controversy about the respective merits of ancient and modern learning. In his *Reflections upon Ancient and Modern Learning* (1694, and again 1697) he took the part of the moderns, although in a fair and judicial spirit, and was attacked by Swift in the *Battle of the Books*. During some of his later years Wotton resided in Wales and gave himself to the study of Celtic, making a translation of the laws of Howel Dda, which was published after his death (1730). Having taken holy orders, he was a prebend of Salisbury from 1705 until his death at Buxted, Essex, on the 13th of February 1727.

Wotton wrote a *History of Rome* (1701) and *Miscellaneous Discoveries relating to the Traditions and Usages of the Scribes and Pharisees* (1718).

WOUND (O. Eng. *wund*, connected with a Teutonic verb, meaning to strive, fight, suffer, seen in O. Eng. *winnan*, whence Eng. "win"), a solution in the continuity of the soft parts of the body. Contused wounds, or bruises, are injuries to the cellular tissues in which the skin is not broken. In parts where the tissues are lax the signs of swelling and discoloration are more noticeable than in the tenser tissues. The discoloration is caused by haemorrhage into the tissues (*ecchymosis*), and passes from dark purple through green to yellow before it disappears. If a considerable amount of blood is poured forth into the injured tissues it is termed a *haematoma*. The treatment of a bruise consists in the application of cold lotion, preferably an evaporating spirit-lotion, to limit the subcutaneous bleeding. The haemorrhage usually becomes absorbed of its own accord even in haematomata, but should suppuration threaten an incision must be made and the cavity aseptically evacuated.

Open wounds are divided into incised, lacerated, punctured and gunshot wounds. *Incised* wounds are made by any sharp instrument and have their edges evenly cut. In these wounds there is usually free haemorrhage, as the vessels are cleanly divided. *Lacerated* wounds are those in which the edges of the wound are torn irregularly. Such injuries occur frequently from accidents with machinery or blunt instruments, or from bites by animals. The haemorrhage is less than from incised wounds, and the edges may be bruised. *Punctured* wounds are those in which the depth is greater than the external opening. They are generally produced by sharp-pointed instruments. The chief danger arises from puncture of large blood-vessels, or injury to important structures such as occur in the thorax and abdomen. It is also difficult to keep such wounds surgically clean and to obtain apposition of their deeper parts, and septic germs are often carried in with the instrument.

The treatment of incised wounds is to arrest the bleeding (see. HAEMORRHAGE), cleanse the wound and its surroundings, removing all foreign bodies (splinters, glass, &c.), and obtain apposition of the cut surfaces. This is usually done by means of sutures or stitches of silk, catgut, silkwormgut or silver wire. If the wound can be rendered aseptic, incised wounds usually heal by first intention. In lacerated wounds there is danger of suppuration, sloughing, erysipelas or tetanus. These wounds do not heal by first intention, and there is consequently considerable scarring. The exact amount of time occupied in the repair depends upon the presence or not of septic material, as lacerated wounds are very difficult to cleanse properly. Carbolic acid lotion should be used for cleansing, while torn or ragged portions should be cut away and provision made for free drainage. It is not always possible to apply sutures at first, but the wound may be packed with iodoform gauze, and later, when a clean granulating surface has been obtained, skin-grafting may be required. In extensive lacerated wounds, where the flesh has been stripped from the bones, where there is spreading gangrene, or in such wounds in conjunction with comminuted fractures or with severe sepsis supervening, amputation of a limb may be called for. Punctured wounds should be syringed with carbolic lotion, and all splinters and foreign bodies removed. The location of needles is rendered comparatively easy by the use of the Röntgen rays; the wound can then be packed with gauze and drained. If a large vessel should have been injured, the wound may have to be laid open and the bleeding vessel secured. Should paralysis indicate that a large nerve has been divided, the wound must also be laid open in order to suture the injured structure.

It is only possible here to mention some of the special characteristics of *gunshot* wounds. In the modern small-bore rifle (Lee-Metford, Mauser) the aperture of entry is small and the aperture of exit larger and more slit-like. There is usually but little haemorrhage. Should no large vessel be torn, and should no portion of septic clothing be carried in, the wound may heal by first intention. Such bullets may be said to disable without killing. They may drill a clean hole in a bone without a fracture, but sometimes there is much splintering. Abdominal wounds may be so small that the intestine may be penetrated and adhesions of neighbouring coils of intestine cover the aperture. Martini-Henry bullets make larger apertures, while soft-nosed or "dum-dum" bullets spread out as soon as the bullet strikes, causing great mutilation and destruction of the tissues. Shell wounds cause extensive lacerations. Small shot may inflict serious injury should one of the pellets enter the eye. In gunshot wounds at short distance the skin may be blackened owing to the particles of carbon lodging in it. The chief dangers of gunshot wounds are haemorrhage, shock and the carrying in of septic material or clothing into the wound.

WOUWERMAN, PHILIP (1619–1668), Dutch painter of battle and hunting scenes, was born at Haarlem in May 1619. He learned the elements of his art from his father, Paul Joosten Wouwerman, an historical painter of moderate ability, and he then studied with the landscape painter, Jan Wynants (1620–1679). Returning to Haarlem, he became a member of its gild of painters in 1642, and there he died in May 1668. About 800 pictures were enumerated in John Smith's *Catalogue raisonné* (1840) as the work of Philip Wouwerman, and in C. Hofstede de Groot's enlarged *Catalogue*, vol. ii. (1909), the number exceeds 1200; but probably many of these are the productions of his brothers Peter (1623–1682) and Jan (1629–1666), and of his many other imitators. His authentic works are distinguished by great spirit and are infinitely varied, though dealing recurrently with cavalry battle-pieces, military encampments, cavalcades, and hunting or hawking parties. He is equally excellent in his vivacious treatment of figures, in his skilful animal painting, and in his admirable and appropriate landscape backgrounds. Three different styles have been observed as characteristic of the various periods of his art. His arlier works are marked by the prevalence of a foxy-brown colouring, and by a tendency to angularity in draughtsmanship; the productions of his middle period have greater purity and brilliancy; and his latest and greatest pictures possess more of force and breadth, and are full of a delicate silvery-grey tone.

See the *Catalogue raisonné of the works of the most eminent Dutch and Flemish Painters of the 17th Century*, by De Groot, vol. ii. (1909), referred to above.

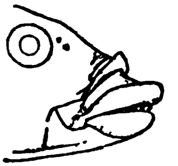
WRAITH, a general term in popular parlance for the appearance of the spirit of a living person. (See "Phantasms of the Living," under PSYCHICAL RESEARCH.)

WRANGEL, FRIEDRICH HEINRICH ERNST, COUNT VON (1784–1877), Prussian general field marshal, was born at Stettin, on the 13th of April 1784. He entered a dragoon regiment in 1796, became cornet in 1797, and second lieutenant in 1798. He fought as a subaltern against Napoleon, especially distinguishing himself as Heilsberg in 1807, and receiving the order *pour le mérite*. In the reorganization of the army, Wrangel became successively first lieutenant and captain, and won distinction and promotion to lieutenant-colonel in the War of Liberation in 1813, won the Iron Cross at Wachau near Leipzig, and became colonel in 1815. He commanded a cavalry brigade in 1821, and two years later was promoted major-general. He commanded the 13th Division, with headquarters at Münster, in Westphalia, in 1834, when riots occurred owing to differences between the archbishop of Cologne and the crown, and the determination and resolution with which he treated the clerical party prevented serious trouble. He was promoted lieutenant-general, received many honours from the court, enjoyed the confidence of the Junker party, and commanded successively at Königsberg and Stettin. In 1848 he commanded the II. Corps of the German Federal army in the Schleswig-Holstein campaign, was promoted general of cavalry, and won several actions. In the autumn he was summoned to Berlin to suppress the riots there. As governor of Berlin and commander-in-chief of the Mark of Brandenburg (appointments which he held till his death) he proclaimed a state of siege, and ejected the Liberal president and members of the Chamber. Thus on two occasions in the troubled history of Prussian revival Wrangel's uncompromising sternness achieved its object without bloodshed. From this time onwards he was most prominent in connexion with the revival of the Prussian cavalry from the neglect and inefficiency into which it had fallen during the years of peace and poverty after 1815. In 1856, having then seen sixty years' service, he was made a field marshal. At the age of eighty he commanded the Austro-Prussian army in the war with Denmark in 1864 and though he was too old for active work, and often issued vague or impracticable orders (he himself had always desired that the young and brilliant "Red Prince," Frederick Charles, should have the command), the prestige of his name, and the actual good work of Frederick Charles, Moltke and Vogel von Falckenstein among the Prussian, and of Gablenz among the Austrian generals, made the campaign a brilliant success. After the capture of Düppel he resigned the command, was created a count, and received other honours. In 1866 "Papa" Wrangel assisted in the Bohemian campaign, but without a command on account of his great age. He took a keen interest in the second reorganization of the cavalry arm 1866–1870, and in the war with France in 1870–71. He died at Berlin on the 2nd of November 1877. On the seventieth anniversary of his entering the army his regiment, the 3rd Cuirassiers, was given the title "Graf Wrangel."

See supplement to *Militär Wochenblatt* (1877), and lives by von Köppen and von Maltitz (Berlin, 1884).

WRANGEL, KARL GUSTAV VON (1613–1676), Swedish soldier, was descended from a family of Esthonian origin, branches of which settled in Sweden, Russia and Germany. His father, Hermann von Wrangel (1587–1643), was a Swedish field marshal in Gustavus Adolphus's wars. Karl Gustav was born near Upsala on the 23rd of December 1613, and at the age of twenty distinguished himself as a cavalry captain in the war against the Army of the League. Three years later he was colonel, and in 1638 major-general, still serving in Germany. In 1644 he commanded a fleet at sea, which defeated the Danes at Fehmarn on the 23rd of October. In 1646 he returned to Germany as a field marshal and succeeded Torstensson as commander-in-chief of the Swedish army in Germany, which post he held during the last three campaigns of the Thirty Years' War. Under Wrangel and Turenne the allied Swedish and French armies marched and fought in Bavaria and Württemberg. At the outbreak of a fresh Polish war in 1655 Wrangel commanded a fleet, but in 1656 he was serving on land again and commanding, along with the Great Elector of Brandenburg, in the three days' battle of Warsaw. In 1657 he invaded Jutland and in 1658 passed over the ice into the islands and took Kronborg. In 1657 he was appointed admiral and in 1664 general of the realm, and as such he was a member of the regency during the minority of Charles XI. But his last campaign was unfortunate. Commanding, ineffectively owing to his broken health, in the war against Brandenburg, he was recalled after his stepbrother Waldemar, Freiherr von Wrangel (1647–1676), had been defeated at Fehrbellin. He died at Rügen shortly afterwards, on the 5th of July 1676.

WRASSE, a name given to the fishes of the family Labridae generally, and more especially to certain members of the family. They are very abundant in the tropical zone, less so in the temperate, and disappear altogether in the Arctic and Antarctic Circles. Their body is generally compressed, like that of a carp, covered with smooth (cycloid) scales; they possess one dorsal fin only, the anterior portion of which consists of numerous spines. Many wrasses are readily recognized by their thick lips, the inside of which is sometimes curiously folded, a peculiarity which has given to them the German name of "lip-fishes." The dentition of their jaws consists of strong conical teeth, of which some in front, and often one at the hinder end of the upper jaw, are larger than the others. But the principal organs with which they crush shell-fish, crustaceans and other hard substances are the solid and strongly-toothed pharyngeal bones, of which the lower are coalesced into a single flat triangular plate. All wrasses are surface fishes, and rocky parts of the coast overgrown with seaweed are their favourite haunts in the temperate, and coral-reefs in the tropical seas. Some 450 species of wrasses (including parrot-wrasses) are known, chiefly from the tropics.



Lips of *Labrus festivus*.

Of the British wrasses the ballan wrasse (*Labrus maculatus*) and the striped or red or cook wrasse (*Labrus mixtus*) are the most common. Both belong to the genus *Labrus*, in which the teeth stand in a single series, and which has a smooth edge of the praeoperculum and only three spines in the anal fin. The ballan wrasse is the larger, attaining to a length of 18 in., and, it is said, to a weight of 8 lb; its colours are singularly variegated, green or brownish, with red and blue lines and spots; the dorsal spines are twenty in number. The cook wrasse offers an instance of well-marked secondary sexual difference—the male being ornamented with blue streaks or a blackish band along the side of the body, whilst the female has two or three large black spots across the back of the tail. This species possesses only from sixteen to eighteen spines in the dorsal fin. The goldsinny or corkwing (*Crenilabrus melops*) is much more frequent on the S. coasts of England and Ireland than farther N., and rarely exceeds a length of 10 in. As in other wrasses, its colours are beautiful, but variable; but it may be readily distinguished from the two preceding species by the toothed edge of the praeoperculum. The three other British wrasses are much scarcer and more local, viz. Jago's goldsinny (*Ctenolabrus rupestris*), with a large black spot on the anterior dorsal spines and another on the base of the upper caudal rays; *Acantholabrus palloni*, which is so rarely captured that it lacks a vernacular name, but may be easily recognized by its five anal spines and by the teeth in the jaws forming a band; and the rock-cook (*Centrolabrus exoletus*), which also has five anal spines, but has the jaws armed with a single series of teeth.

On the Atlantic coasts of the N. states of the United States the wrasses are represented by the genus *Tautoga*. The only species of this genus, known by the names of tautog or blackfish, is much esteemed as food. It is caught in great numbers, and generally sold of a weight of about 2 lb.

WRAXALL, SIR NATHANIEL WILLIAM (1751–1831), English author, was born in Queen's Square, Bristol, on the 8th of April 1751. He was the son of a Bristol merchant, Nathaniel Wraxall, and his wife Anne, great niece of Sir James Thornhill the painter. He entered the employment of the East India Company in 1769, and served as judge-advocate and paymaster during the expeditions against Guzerat and Baroche in 1771. In the following year he left the service of the company and returned to Europe. He visited Portugal and was presented to the court, of which he gives a curious account in his *Historical Memoirs*; and in the N. of Europe he made the acquaintance of several Danish nobles who had been exiled for their support of the deposed Queen Caroline Matilda, sister of George III. Wraxall at their suggestion undertook to endeavour to persuade the king to act on her behalf. He was able to secure an interview with her at Zell in September 1774. His exertions are told in his *Posthumous Memoirs*. As the queen died on the 11th of May 1775, his schemes came to nothing and he complained that he was out of pocket, but George III. took no notice of him for some time. In 1775 he published his first book, *Cursory Remarks made in a Tour through some of the Northern Parts of Europe*, which reached its fourth edition by 1807, when it was renamed *A Tour Round the Baltic*. In 1777 he travelled again in Germany and Italy. As he had by this time secured the patronage of important people, he obtained a complimentary lieutenant's commission from the king on the application of Lord Robert Manners, which gave him the right to wear uniform though he never performed any military service. In this year he published his *Memoirs of the Kings of France of the Race of Valois*, to which he appended an account of his tour in the Western, Southern and Interior Provinces of France. In 1778 he went again on his travels to Germany and Italy, and accumulated materials for his *Memoirs of the Courts of Berlin, Dresden, Warsaw and Vienna* (1799). In 1780 he entered parliament and sat till 1794 for Hinton in Wiltshire, Ludgershall and Wallingford, in succession. He published in 1795 the beginning of a *History of France from the Accession of Henry III. to the Death of Louis XIV.*, which was never completed. Little is known of his later years except that he was made a baronet by the prince regent in 1813. His *Historical Memoirs* appeared in 1815. Both they and the *Posthumous Memoirs* (1836) are very readable and have real historical value. Wraxall married Miss Jane Lascelles in 1789, and died suddenly at Dover on the 7th of November 1831. His grandson, Sir F. C. Lascelles Wraxall (1828–1865), was a miscellaneous writer of some note.

See preface to *The Historical and Posthumous Memoirs of Sir N. W. Wraxall*, by H. B. Wheatley (London, 1884).

WREATH (O. Eng. *wrǣð*, from *wrīðan*, to twist), a band of leaves, flowers or metal, twisted into a circular form, and used either as a chaplet or diadem for the head or as an ornament to be hung upon or round an object. For the ancient usages of crowning victors in the games with wreaths, and the bestowal of them as marks of honour see CROWN and CORONET.

WRECK, a term which in its widest sense means anything without an apparent owner that is afloat upon, sunk in, or cast ashore by the sea; in legal phraseology, as appears below, it has a narrower meaning. Old Norman forms of the word, *varec* and *veresc*, are to be found in charters of 1181 and later date; and the former is still in use in Normandy. Latinized it becomes *wreccum*, *wreckum* or *warectum*; and such phrases as *maris ejectum*, *jactura maris*, *adventura maris*, *shipbrycke*, are all used as descriptions of wreck. In Anglo-Saxon charters *sǽ-upwyrp*, and in the charters of the Cinque Ports *inventiones*, a translation of "findalls," probably a local word, are synonymous with wreck. Formerly an appreciable source of revenue to the crown, afterwards a valuable addition to the income of a landowner on the sea coast, wreck has almost within modern times ceased to be a perquisite of either, or to enrich the casual finder at the expense of its rightful owner. The history of the law as sketched below will indicate how this has come about.

History.—Of old it seems to have been the general rule in the civilized maritime countries of Europe that the right to wreck belonged to the sovereign, and formed part of the royal revenue. This was so under the Roman, French and feudal law; and in England the common law set out in the statute *De praerogativa regis* (17 Edw. II., 1324), provided that the king has wreck of the sea, whales and sturgeons taken in the sea and elsewhere within the kingdom, except in certain places privileged by the king. This right, which it is said had for its object the prevention of the practice of destroying the property of the shipwrecked, was, however, gradually relaxed; and the owner of wreck was allowed to recover it if he made claim to it, and gave proof of his ownership within a certain time—fixed at a year or a year and a day alike by a decree of Antonine the Great, the feudal law, the general maritime law, the law of France and English law. Richard I. released his prerogative right to wreck to the extent of allowing children, or if there were none, brothers and sisters of a perishing owner, to have his goods; and Henry III., by a charter of 1236, allowed the owner of wrecked goods to have his property again if he claimed within three months, provided that any man or beast escaped from the ship. The statute of Westminster the First (1276, 3 Edw. I.) provided that where a man, a dog or a cat escape alive out of the ship, such ship or barge or anything in it shall not be adjudged wreck, but the goods shall be saved and kept by view of the sheriff, coroner or the king's bailiff, and delivered into the hands of such as are of the town where the goods were found, so that if any one sue for those goods and prove that they were his, or perished within his keeping, within a year and a day, they shall be restored to him without delay, and if not they shall remain to the king or to such others to whom the wreck belonged. In 1277 the statute *De officio coronatoris* made provision for the safe custody of wreck, but coroners were relieved of their duties in respect of wreck by the Coroners Act 1887. An act of 1353 provided for the delivery to the merchants of goods coming to land which may not be said to be wreck, on payment of salvage. In Scotland, a statute of Alexander II., similar to that of Westminster, declared that where any creature escapes alive from a wrecked vessel, the goods cast away are not accounted wreck, but are to be preserved by the sheriff for those who within a year shall prove their property therein; otherwise they shall escheat to the crown. For a long time the view of English law was that the right to recover wrecked property depended on the fact of a live creature escaping, though in Hale's words, "because it was *lex odiosa* to add affliction to the afflicted, it was bound up with as many limits and circumstances, and restricted to as narrow a compass as might be"; and the admiralty records illustrate the statement. Thus in 1382 the prior of Wymondham claimed as wreck a ship which came ashore with no one on board, the men having left her for fear of their lives because of an enemy ship which was about to capture her; but the king's council, before whom it came, by certiorari from the admiral of the north, decided against the claim. In 1543, ships grounded on the Goodwins were held to be waif and wreck, although their crews to save their lives made their way to shore; and in 1637 a ship in the Cinque Ports was proceeded against in admiralty and condemned, "no man or dog being on board, but only a dead man with his head shot off." Upon the institution of the office of lord high admiral early in the 15th or at the close of the 14th century, it became usual for the crown to grant to the lord admiral by his patent of appointment, amongst other *proficua et commoditates* appertaining to his office, wreck of the sea; and when, early in the reign of Henry VIII., vice-admirals of the coast were created, the lord admiral by patent under his own hand delegated to them his rights and duties in the several counties, including those in connexion with wreck. He did not, however, part with the whole of his emoluments; his vice-admirals were required to render an account of the proceeds of wreck, and to hand over to him a part, usually one-half, of their gains. This system, depending not upon any statute, but apparently upon an arrangement between the lord-admiral and his vice-admirals, continued until the year 1846. In that year an act (9 & 10 Vict. c. 99) was passed forbidding the vice-admirals to intermeddle with wreck, and it required the receivers of droits of admiralty to receive all wreck from the finders and to detain it for twelve calendar months; at the end of that period it was to be sold and the proceeds carried to the credit of the consolidated fund. The transfer to this fund of the hereditary casual revenues of the crown had previously been effected by legislation in the first years of the reigns of William IV. and Victoria, by which the civil list was instituted. The last lord-admiral, however, who beneficially enjoyed the proceeds of wreck was the duke of Buckingham in the reign of Charles I. Prince George of Denmark, Queen Anne's husband and lord-admiral, took wreck by his patent, but by a collateral instrument he surrendered the greater part of the revenues of his office to the crown. Notwithstanding this arrangement, the vice-admirals of counties, who, in the absence of a lord high admiral, received their appointments sometimes from the crown and sometimes from the commissioners of the admiralty, appear to have taken the whole or part of the proceeds of wreck until the passing of the act of 1846. The ancient law by which the unfortunate owner was deprived of his property, if no living thing escaped from the wreck, had during the 16th and 17th centuries been gradually but tacitly relaxed; it required, however, a decision of Lord Mansfield and the king's bench in 1771 (*Hamilton* v. *Davis*, 5 Burr. 2732) to settle the law definitely that, whether or no any living creature escaped, the property in a wreck remains in the owner. In Scotland it seems that the same law had been laid down in 1725, and there are indications that upon the continent of Europe there had before this date been a relaxation of the old law in the same direction. As early as 1269 a treaty with Norway provides that owners of ships wrecked upon the coasts of England or Norway should not be deprived of their goods (Rym. Foed. 1450). The system under which the lord-admiral and the vice-admirals of counties had for more than three centuries taken charge of wreck never worked well. Their interest was directly opposed to their duty; for it was to the interest of every one concerned, except the owners and crews of ships in distress, that nothing should land alive. Apart from this, the system discouraged legitimate salvors. The admirals and vice-admirals had by degrees assumed that all salvage operations were exclusively their business; they took possession of wreck brought or cast ashore, whether it was legal wreck or not, and this often gave rise to conflicts with outside working salvors. It was not until the 17th century that working salvors established the right, which they now have, to a lien upon property saved as a security for adequate remuneration of their exertions in saving it; and if the vice-admirals restored to its owners wreck that had come to their hands, they did so only upon payment of extravagant demands for salvage, storage and often legal expenses. A curious side light is thrown upon their practices by the case of an English ship that went ashore on the coast of Prussia in 1743. Frederick the Great restored her to her owners, but before doing so he exacted from them a bond for the full value of ship and cargo, and the condition of the bond was that the owners would within six months produce a certificate under seal of the English admiralty that by the law of England no "salvage" was payable to the crown or to the admiral of England in the like case of a Prussian ship going ashore upon an English coast. The records of the admiralty court show that Frederick's action in this case was intended as a protest, not against the payment of a fair reward to salvors of Prussian ships, but against exactions by English vice-admirals and their officers. Stories of wilful wrecking of ships and of even more evil deeds are probably exaggerations, but modern research has authenticated sufficient abuses to show that further legislation was necessary to regulate the taking possession of wreck and ships in distress by "sea-coasters." Previously to the passing of the act of 1846 the only substantial protection against plunder which owners of a wrecked ship could get was to apply to the admiralty judge for a commission enabling them or their agents to take possession of what came ashore; but to obtain such a commission took time and cost money, and before the commissioners arrived at the scene of the wreck a valuable cargo would have disappeared and been dispersed through the country. Plunder of wrecks was common, and the crowds that collected for the purpose set law at defiance. The vice-admirals, even if they had been able, did little to protect the ship wrecked. Complaints from the lord-admiral that they neglected to render accounts of their profits were constant; and although the crown and the lord-admiral profited little by wreck, there is reason to think that the gains of vice-admirals and their officers, and also of landowners and dwellers on the coast, were more considerable. Many of the vice-admirals' accounts of the 17th and following centuries are extant. Most of them are for trifling sums, but occasionally the amounts are considerable. A vice-admiral for Cornwall charges himself in his account for the years 1628–1634 with a sum of £29,253, and in 1624 the duke of Buckingham found it worth his while to buy out the rights of the warden of the Cinque Ports over wreck within his jurisdiction for £1000 in addition to an annuity of £500 for the warden's life. At the close of the 17th century the vice-admirals were required to make affidavits as to the amount of their gains; in 1709 twenty of them swore that their office was worth less than £50 in the year.

The right of the warden of the Cinque Ports to wreck, above alluded to, was derived from charters granted to the ports by Edward I. and his successors; many other seaports enjoyed a similar right under early charters. It would seem that these rights were of some value, for in 1829 the little towns of Dunwich and Southwold litigated at a cost of £1000 the question whether a tub of whisky picked up at sea belonged to the admiralty jurisdiction of the one town or the other; and the town of Yarmouth is said to have spent no less than £7000 upon a similar question. It was partly in order to put an end to all dealings with wreck by local admiralty courts that the Municipal Corporations Act of 1835 was passed, abolishing all of them, except that of the Cinque Ports.

Grants of wreck to individuals are earlier than those to towns. Even before the conquest it seems to have been not unusual for grantees from the crown of lands adjoining the sea to get the franchise of wreck included in their grants. A charter purporting to be of the year 1023 contains a grant by King Canute to the abbot of Canterbury of wreck found at sea below low-water mark as far as a man could by wading touch it with a sprit (Kemble, Cod. Dipl., No. 737). There is reason to think that before the end of the reign of Henry II. the crown had granted away its right to wreck round a great part of the coast of England. Although a landowner of the present day, who under such a grant is entitled to wreck, will, in respect of wreck itself, derive no substantial benefit, nevertheless the grant may be of great value as evidence of his right to the foreshore; and even where no grant of wreck can be produced, if he can show that he and his predecessors have been accustomed to take possession of wreck on the foreshore, it is strong evidence as against the crown of his right to the foreshore, and a lost grant may be presumed. As to these grants of wreck Hale says that "though wreck of the sea doth *de jure communi* belong to the king, yet it may belong to a subject by charter or by prescription.... Sometime wreck hath belonged to an honour by prescription, as in the honour of Arundel, sometimes to the owner of a county. The lords of all counties palatine regularly had *wreccum maris* within their counties palatine as part of their *jura regalia*, but yet inferior lords might prescribe for wreck belonging to their several manors within a county palatine. The earl of Cornwall had *wreccum maris per totum comitatum Cornubiae*; for though Cornwall was not a county palatine, it had many royalties belonging to it, viz. as against the king, though particular lords might prescribe for wreck against the earl" (*De jure maris*, i. vii.; Hargrave, 41). In the Isle of Man unreclaimed wreck, whether cast on shore or found in the sea, within the headlands of Man, belongs to the lord, now the crown by purchase from the duke of Athol; in the Channel Islands all wreck cast on shore or within reach of a person standing on shore, except certain valuables which go to the crown, belongs to the lord of the manor if not reclaimed within a year and a day; while in Wales the old law made everything thrown on shore belong to the king, for "the sea is a packhorse of the king" (*A. G.* v. *Jones*, 2 H. & C. 347). In Scotland, as in England, unclaimed wreck belonged to the crown and was often granted to subjects, generally under the style of "wrak, waith and ware," the last two words signifying derelict and seaweed. It was so granted to the earl of Orkney in 1581. It was occasionally dealt with by the Scottish parliament. Thus by an act of 1426, ships wrecked on the coast of Scotland were to be escheat to the king if they belonged to a country observing a similar law, otherwise to have the favour shown to ships of Scotland. In France under the name of *droit de bris* or *droit d'épave* similar grants were made to feudal seigneurs.

From early times a distinction was made in English law between wreck cast ashore and wreck that is floating or sunken below low-water mark. Wreck proper, or common law wreck, *ejectum maris*, is what is cast by the sea upon the shore; for "nothing shall be said to be *wreccum maris*, but such goods as are cast or left upon the land" (*Sir H. Constable's Case*, 1599, 5 Rep. 106), and this belonged to the king *jure coronae*, and was dealt with by the common law. Floating and sunken wreck belonged to the crown as *inter regalia*, but was granted to the lord-admiral *jure regis*. Even when the office of lord high admiral is in abeyance, and the duties performed by commissioners, as now, these rights are distinguished from the other royal revenues as belonging to the crown in its office of admiralty, or, as they are commonly known, droits of the admiralty. From early times the lord-admiral tried to usurp, and there are several instances of his actually usurping jurisdiction over wreck proper; and in the reign of Richard II. special statutes (which were only declaratory of the common law) were passed for the purpose of confining his jurisdiction to its proper limits. One of these (15 Ric. II.) declared that "of all manner of contracts, pleas and quereles, and all other things arising within the bodies of the counties as well by land as by water and also of wreck of the sea, the admiral's court shall have no manner of cognizance, power nor jurisdiction, but all such manner of contracts, pleas and quereles, and all other things rising within the bodies of counties as well by land as by water as afore, and also wreck of the sea, shall be tried by the laws of the land and not before nor by the admiral nor his lieutenant in any wise."

In spite of this statute, instances still occurred of the admiralty court exercising this jurisdiction, until by frequent prohibition by the common law courts, especially in the 17th century, and by the admission of the admiralty judges themselves, it was recognized as beyond the scope of their authority. These admiralty droits are classified as flotsam, jetsam, lagan and derelict. In Lord Coke's words, flotsam is "when a ship sinks or otherwise perishes, and the goods float on the sea"; jetsam is "when goods are cast out of a ship to lighten her when in danger of sinking, and afterwards the ship perishes"; and ligan, or lagan, is "when heavy goods are, to lighten the ship, cast out and sunk in the sea tied to a buoy or cork, or something that will not sink, in order that they may be found again and recovered." Derelict is a ship or cargo, or part of it, abandoned by its master and crew *sine spe recuperandi et sine animo revertendi*. "None of these goods," adds Coke, "which are so called, are called wreck so long as they remain in or upon the sea; but if any of them by the sea be put upon the land then they shall be said to be wreck" (*Sir H. Constable's Case*, 1599, 5 Rep. 106; and 2 Inst. 167). Hale says "they are not wreck of the sea but of another nature, neither do they pass by *wreccum maris* as is recorded in Sir Henry Constable's case and the case of the 3 Edw. II., where they are styled *adventurae maris*. And as they are of another nature, so they are of another cognizance or jurisdiction, viz. the admiral jurisdiction. Flotsam, jetsam and lagan, and other sea estrays, if they are taken up in the wide ocean, belong to the taker of them if the owner cannot be known. But if they be taken up within the narrow seas that do belong to the king, or in any haven, port or creek or arm of the sea, they do *prima facie* and of common right belong to the king, in case where the ship perisheth or the owner cannot be known.... But if the owner can be known he ought to have his goods again, for the casting them overboard is not a loss of his property. Although the right of these adventures of the sea within the king's seas belongs to him where the owner cannot be known, yet the king hath little advantage of it, for by the custom of the English seas the one moiety of what is gained belongs to him that saves it [this is not the present rule].... A subject may be entitled to these as he may be entitled to wreck—(1) by charter; (2) by prescription" (*De jure maris*; Hargrave, 41, 42). The difference between these two kinds of wreck is clearly brought out in *R.* v. *49 Casks of Brandy* (1836, 3 Hagg. Ad. 257; and *R.* v. *2 Casks of Tallow*, *ibid.* 294)—a dispute between the crown and a grantee of wreck, where it was decided that objects picked up below low-water mark, and within 3 m. of it, as also objects afloat between high- and low-water marks, never having touched the ground, are droits of the crown, whereas objects picked up aground between high- and low-water marks, or though aground, yet covered by the waves, are wreck.

The distinction that Hale draws in the above passage between sea waifs or estrays taken on the high seas, and those taken in the seas of the realm, seems to be founded on the *occupatio* of the civil law; but although favoured by the similar rule existing in the case of royal fish, it has not been recognized by the courts, which have always held that in both cases they are droits of the crown in its office of admiralty, and, subject to the right of the salvor to reward and the right of the owner to reclaim them in a year and a day, go to the royal revenue (Lord Stowell, *The Aquila*, 1798, 1 C. Rob. 37). Lord Stowell bases this prerogative right "on the general rule of civilized countries that what is found derelict on the seas is acquired beneficially for the sovereign, if no owner shall appear." It seems that this was also Coke's view (2 Inst. 168).

The provisions of the Merchant Shipping Act 1894, mentioned below, upon the subject of droits of admiralty are not clear. In practice the only droits of the admiralty that are commonly dealt with are anchors that have been slipped or parted from in heavy weather. In the Downs and other roadsteads these are "swept" for by creepers towed over the sea bottom, and in former days sweeping for anchors was a common industry. In the Downs large sums have been made after gales in this way. In the 17th century it became customary to obtain from the crown grants of the right to fish for sunken wreck and treasure not only upon English coasts but all over the world.

Although a ship on board which, or by means of which a man was killed, might be a deodand (*q.v.*), yet *qua* wreck she was not subject to forfeiture as deodand.

Present British Law.—From the above sketch of the development of the law of wreck it will be seen that it owes little to the legislature. After the act of 1353 no statute dealt with the subject until 1712. In that year a salvage act was passed, but it made no material alteration in the law; and although during the 18th and early 19th centuries several acts were passed dealing fragmentarily with wreck and salvage, the act of 1846, above mentioned, is the only one that calls for notice. That act was embodied in and added to by the Merchant Shipping Act 1854, which again was repealed, re-enacted and added to by the Merchant Shipping Act 1894. The last mentioned act contains the whole of the existing statute law upon the subject of wreck within the territorial waters of the United Kingdom. For its purposes wreck includes jetsam, flotsam, lagan and derelict, found in or on the shores of the sea or any tidal water. The term does not extend to a barge adrift in the Thames, nor a raft of timber adrift; it must be the hull, cargo or appurtenances of a vessel. Under the Sea Fisheries Act 1883, passed to give effect to the North Sea Fisheries Convention, the provisions of the Merchant Shipping Act as to wreck apply to fishing boats with their rigging and gear.

The provisions of the Merchant Shipping Act dealing with wreck (ninth part) may be summarized as follows: The Board of Trade (as the receiver-general of droits of admiralty) has the general superintendence of wreck in the United Kingdom, and appoints receivers of wreck for the whole coast, who are paid by fees. Where a British or foreign vessel is wrecked, stranded or in distress, at any place on or near the coasts or any tidal water within the limits of the kingdom, it is the duty of the receiver for the district to proceed there and give directions for preserving the ship, the lives on board her and her cargo and apparel. He can require the assistance of any person, especially the master of any vessel, or the use of any waggons, carts or horses, near at hand; and for this purpose any person may unless there is a public road equally convenient, pass and repass with or without horses or carriages over any adjoining lands without the owner's or occupier's consent, doing as little damage as possible, and may also deposit there any things recovered from the ship; any damage so done is a charge on the ship, cargo or articles, and is recoverable like salvage (*q.v.*). Penalties are imposed on any owner or occupier hindering the operations. The receiver has power to suppress any plundering or disorder, or any hindering of the preservation of the ship, persons, cargo or apparel. Where any vessel, wrecked or in distress as above, is plundered, damaged or destroyed, by any riotous or tumultuous assembly ashore or afloat, compensation must be made to her owner in England and Scotland by the same authority which would be liable to pay compensation in cases of riot (*q.v.*), and in Ireland in cases of malicious injuries to property. In the absence of the receiver, his powers may be exercised by the following officers or persons in successive order, viz. a chief officer of customs, principal officer of coast-guard, inland revenue officer, sheriff, justice of the peace, and naval or military officer on full pay. These persons act as the receiver's agent and put the salvage in his custody, but they are not entitled to any fees nor are they deprived of any right to salvage by so doing. An examination is also directed to be held, in cases of ships in distress on the coasts of the kingdom, by a wreck receiver, wreck commissioner or his deputy, at the request of the Board of Trade or a justice of the peace, by evidence on oath as to the name and description of ship, name of master, shipowner and owner of cargo, ports to and from which the ship was bound, the occasion of the ship's distress, the services rendered and the like. The act provides as follows for dealing with wreck: Any one finding wreck, if he is the owner of it, must give notice of his having done so to the receiver of the district, and if he is not the owner he must deliver it to that officer as soon as possible, except for reasonable cause, *e.g.* if, as a salvor, he retains it with the knowledge of the receiver. No articles belonging to a wrecked ship found at the time of the casualty must be taken or kept by any person, whether their owner or not, but must be handed over to the receiver. The receiver taking possession of any wreck must give notice of it, with a description, at the nearest custom-house; and if the wreck is in his opinion worth more than £20, also to Lloyd's. The owner of any wreck in the hands of a receiver must establish his claim to it within a year, and on so doing, and paying all expenses, is entitled to have it restored to him. Where a foreign ship has been wrecked on or near the coast, and any articles forming part of her cargo are found on or near the coast, or are brought into any port, the consular officer of the foreign country to which the ship or cargo belongs is deemed to be the agent for the owner so far as the custody and disposal of the articles is concerned. The receiver may in certain cases, *e.g.* where the value is small, sell the wreck and hold the proceeds till claimed. The right to unclaimed wreck belongs to the crown, except in places where the crown has granted that right to others. Persons so entitled, such as admirals—vice-admirals are mentioned in the act (*sed quaere*)—lords of manors and the like, are entitled, after giving the receiver notice and particulars of their title, to receive notice from the receiver of any wreck there found. Where wreck is not claimed by an owner within a year after it was found, and has been in the hands of a receiver, it can be claimed by the person entitled to wreck in the place where it was found, and he is entitled to have it after paying expenses and salvage connected with it; if no such person claims it, it is sold by the receiver, and the net proceeds are applied for the benefit of the crown, either for the duchy of Lancaster or the duchy of Cornwall; or if these do not claim it, it goes to the crown. Where the title to unclaimed wreck is disputed, the dispute may be settled summarily as in cases of salvage; either party, if dissatisfied, may within three months after a year since the wreck came into the hands of the receiver proceed in any competent court to establish his title. Delivery of unclaimed wreck by the receiver discharges him from liability, but does not prejudice the title thereto. The Board of Trade has power to purchase rights of wreck. No person exercising admiralty jurisdiction as grantee of wreck may interfere with wreck otherwise than in accordance with the act. Duties are payable on wrecked goods coming into the United Kingdom or Isle of Man as if they had been imported thither; and goods wrecked on their homeward voyage may be forwarded to their original destination, or, if wrecked on their outward voyage, to their port of shipment, on due security being taken for the protection of the revenue. Wreck commissioners may be appointed by the lord chancellor to hold investigations into shipping casualties, to act as judges of courts of survey, and to take examinations in respect of ships in distress.

The owner of a wrecked ship, sunk by his negligence in a navigable highway, so as to be an obstruction to navigation, if he retains the ownership of her, is liable in damages to the owner of any other ship which without negligence runs into her. If, however, the owner has taken steps to indicate her position, or the harbour authority at his request has undertaken to do so, no action lies against him for negligence either *in rem* or *in personam*. He may, however (whether the sinking was due to his negligence or not), abandon the ship, and can thus free himself from any further liability in respect of her. If he abandons her to any other person—*e.g.* an underwriter—who pays for her as for a total loss, that person does not become liable for her unless he takes possession or control in any way. Harbour authorities generally have by local statute, as they have by the general Harbours, Docks and Piers Clauses Act 1847 (if incorporated in their own act), the power of removing the wreck in such a case, and recouping themselves for their expenses from its proceeds. The general act also gives a personal right of action against the owner for any balance of expense over the value of the wreck; but if the owner has abandoned it, and no one else has taken it, neither he nor any one else is liable. A particular or local act (as *e.g.* one of the State of Victoria) may, however, fasten this liability on the person who is owner at the time when the ship is wrecked, and then he cannot free himself of it. A harbour authority is not obliged to remove a wreck because it has power to do so, unless it takes dues from vessels using the harbour where the wreck lies, or in some way warrants that the harbour is safe for navigation, in which case it is under an obligation to do so. Further statutory provision is now made in this respect by the Merchant Shipping Act, which empowers harbour authorities to raise, remove or destroy (and meantime buoy or light), or to sell and reimburse themselves out of the proceeds of any vessel or part of a vessel, her tackle, cargo, equipment and stores, sunk, stranded or abandoned in any water under their control, or any approach thereto, which is an obstruction or danger to navigation or lifeboat service. They must first give due notice of such intention, and must allow the owner to have the wreck on his paying the fair market value. The act gives similar powers to lighthouse authorities, with a provision that any dispute between a harbour and lighthouse authority in this respect is to be determined finally by the Board of Trade. Provision is also made by statute for the burial of bodies cast on shore from the sea by wreck or otherwise within the limits of parishes, or, in extra-parochial places, by the parish officers or constables at the cost of the county; and lords of manors entitled to wreck may defray part of the cost of burial of bodies cast up within the manor, as evidence of their right of wreck.

The method of dealing with wreck outside territorial waters (which does not come within the scope of the act) is governed by the previous general law relating to droits of admiralty. The Board of Trade, as receiver-general, in its instructions to receivers, directs that wreck picked up at sea out of the limits of the United Kingdom, or brought to it by British ships, is to be taken possession of by the receiver and held by him on behalf of the owners, or, if the owners do not claim it, on behalf of the crown. Derelict ships picked up at sea outside territorial limits and brought into British ports must be delivered to the receiver and kept by him until the owner can be found (but not longer than a year and a day). Wreck picked up out of territorial limits by a foreign ship need not be interfered with by the receiver, unless upon application by a party interested. For the receiver's rights with respect to property in distress and its liability to salvage, see SALVAGE.

By an act of 1896 it is the duty of the master of a British ship to report to Lloyd's agent, or to the secretary of Lloyd's, any floating derelict ship which he may fall in with at sea. Under the Merchant Shipping Act, it is a felony to take wreck found in territorial limits to a foreign port, and it is punishable by fine to interfere with a wreck. The receiver has power, by means of a search warrant from a justice, to search for wreck which he has reason to believe is concealed. By the general criminal law in Scotland plundering wreck is punishable at common law; and in England and Ireland it is a felony to plunder or steal any wreck or part thereof, to destroy any wreck or part thereof, to prevent or impede any person on board a wreck from saving himself, and to exhibit any false signal with the intent of endangering any ship, or to do anything tending to the immediate loss or destruction of a ship for which no other punishment is provided.

AUTHORITIES.—Du Cange, *Glossarium*, tit. "Wreckum"; Chief-Justice Hale, *De jure maris*; Hargrave, *Tracts* (London, 1787); Palmer, *Law of Wreck*, Law Tracts (London, 1843); Marsden, *Select Pleas of Admiralty*, Selden Society (London, 1892 and 1897); *Records of the Admiralty and of the High Court of Admiralty*, Public Record Office (London); *Victoria County History, Cornwall*, and other seaboard counties; *Maritime History*, by M. Oppenheim (1906, &c.); *Board of Trade Instructions as to Wreck and Salvage* (London).

(R. G. M.; G. G. P.*)

WREDE, KARL PHILIPP, PRINCE VON (1767–1838), Bavarian field-marshal, was born at Heidelberg on the 29th of April 1767, and educated for the career of a civil official under the Palatinate government, but on the outbreak of the campaign of 1799 he raised a volunteer corps in the Palatinate and was made its colonel. This corps excited the mirth of the well-drilled Austrians with whom it served, but its colonel soon brought it into a good condition, and it distinguished itself during Kray's retreat on Ulm. At Hohenlinden Wrede commanded one of the Palatinate infantry brigades with credit, and after the peace of Lunéville he was made lieutenant-general in the Bavarian army, which was entering upon a period of reforms. Wrede soon made himself very popular, and distinguished himself in opposing the Austrian invasion of 1805. The Bavarians were for several years the active allies of Napoleon, and Wrede was engaged in the campaign against Prussia, winning especial distinction at Pultusk. But the contemptuous attitude of the French towards the Bavarian troops, and accusations of looting against himself, exasperated the general's fiery temper, and both in 1807 and in 1809 even outward harmony was only maintained by the tact of the king of Bavaria. In the latter year, under Lefebvre, Wrede conducted the rearguard operations on the Isar and the Abens, commanded the Bavarians in the bitter Tirolese war, was wounded in the decisive attack at Wagram, and returned to Tirol in November to complete the subjection of the mountaineers. Napoleon made him a count of the Empire in this year. But after a visit to France, recognizing that Napoleon would not respect the independence of the Rhine states, and that the empire would collapse under the emperor's ambitions, he gradually went over to the anti-French party in Bavaria, and though he displayed his usual vigour in the Russian campaign, the retreat convinced him that Napoleon's was a losing cause and he left the army. At first his resignation was not accepted, but early in 1813 he was allowed to return to Bavaria to reorganize the Bavarian army. But he had no intention of using that army on Napoleon's side, and when the king of Bavaria resolved at last to join Napoleon's enemies, Wrede's army was ready to take the field. In concert with Schwarzenberg Wrede threw himself across Napoleon's line of retreat from Germany at Hanau, but on the 30th of October he was driven off the road with heavy losses. Next year, after recovering from a dangerous wound, he led a corps in the invasion of France, and supported Blücher's vigorous policy. In 1815 the Bavarians took the field but were not actively engaged. After Waterloo, Wrede, who had been made a prince in 1814, played a conspicuous part in Bavarian politics as the opponent of Montgelas, whom he succeeded in power in 1817, and in 1835 he was made head of the council of regency during the king's absence. He died on the 12th of December 1838.

See lives by Riedel (1844) and Heilmann (1881).

WREN, SIR CHRISTOPHER (1632–1723), English architect, the son of a clergyman, was born at East Knoyle, Wiltshire, on the 20th of October 1632; he entered at Wadham College, Oxford, in 1646, took his degree in 1650, and in 1653 was made a fellow of All Souls. While at Oxford Wren distinguished himself in geometry and applied mathematics, and Newton, in his *Principia*, p. 19 (ed. of 1713), speaks very highly of his work as a geometrician. In 1657 he became professor of astronomy at Gresham College, and in 1660 was elected Savilian professor of astronomy at Oxford. It is, however, as an architect that Wren is best known, and the great fire of London, by its destruction of the cathedral and nearly all the city churches, gave Wren a unique opportunity. Just before the fire Wren was asked by Charles II. to prepare a scheme for the restoration of the old St Paul's. In May 1666 Wren submitted his report and designs (in the All Souls collection), for this work; the old cathedral was in a very ruinous state, and Wren proposed to remodel the greater part, as he said, "after a good Roman manner," and not, "to follow the Gothick Rudeness of the old Design." According to this scheme only the old choir was left; the nave and transepts were to be rebuilt after the classical style, with a lofty dome at the crossing—not unlike the plan eventually carried out.

In September of the same year (1666) the fire occurred, and the old St Paul's was completely gutted. From 1668 to 1670 attempts were being made by the chapter to restore the ruined building; but Dean Sancroft was anxious to have it wholly rebuilt, and in 1668 he had asked Wren to prepare a design for a wholly new church. This first design, the model for which is preserved in the South Kensington Museum, is very inferior to what Wren afterwards devised. In plan it is an immense rotunda surrounded by a wide aisle, and approached by a double portico; the rotunda is covered with a dome taken from that of the Pantheon in Rome; on this a second dome stands, set on a lofty drum, and this second dome is crowned by a tall spire. But the dean and chapter objected to the absence of a structural choir, nave and aisles, and wished to follow the medieval cathedral arrangement. Thus, in spite of its having been approved by the king, this design was happily abandoned—much to Wren's disgust; and he prepared another scheme with a similar treatment of a dome crowned by a spire, which in 1675 was ordered to be carried out. Wren apparently did not himself approve of this second design, for he got the king to give him permission to alter it as much as he liked, without showing models or drawings to any one, and the actual building bears little resemblance to the approved design, to which it is very superior in almost every possible point. Wren's earlier designs have the exterior of the church arranged with one order of columns; the division of the whole height into two orders was an immense gain in increasing the apparent scale of the whole, and makes the exterior of St Paul's very superior to that of St Peter's in Rome, which is utterly dwarfed by the colossal size of the columns and pilasters of its single order. The present dome and the drum on which it stands, masterpieces of graceful line and harmonious proportion, were very important alterations from the earlier scheme. As a scientific engineer and practical architect Wren was perhaps more remarkable than as an artistic designer. The construction of the wooden external dome, and the support of the stone lantern by an inner cone of brickwork, quite independent of either the external or internal dome, are wonderful examples of his constructive ingenuity. The first stone of the new St Paul's was laid on the 21st of June 1675; the choir was opened for use on the 2nd of December 1697; and the last stone of the cathedral was set in 1710.

Wren also designed a colonnade to enclose a large piazza forming a clear space round the church, somewhat after the fashion of Bernini's colonnade in front of St Peter's, but space in the city was too valuable to admit of this. Wren was an enthusiastic admirer of Bernini's designs, and visited Paris in 1665 in order to see him and his proposed scheme for the rebuilding of the Louvre. Bernini showed his design to Wren, but would not let him copy it, though, as he said, he "would have given his skin" to be allowed to do so.

After the destruction of the city of London Wren was employed to make designs for rebuilding its fifty burnt churches, and he also prepared a scheme for laying out the whole city on a new plan, with a series of wide streets radiating from a central space. Difficulties arising from the various ownerships of the ground prevented the accomplishment of this scheme.

Among Wren's city churches the most noteworthy are St Michael's, Cornhill; St Bride's, Fleet Street, and St Mary-le-Bow, Cheapside, the latter remarkable for its graceful spire; and St Stephen's, Walbrook, with a plain exterior, but very elaborate and graceful interior. In the design of spires Wren showed much taste and wonderful power of invention. He was also very judicious in the way in which he expended the limited money at his command; he did not fritter it away in an attempt to make the whole of a building remarkable, but devoted it chiefly to one part or feature, such as a spire or a rich scheme of internal decoration. Thus he was in some cases, as in that of St James's, Piccadilly, content to make the exterior of an almost barnlike plainness.

The other buildings designed by Wren were very numerous. Only a few of the principal ones can be mentioned:—the Custom House, the Royal Exchange, Marlborough House, Buckingham House, and the Hall of the College of Physicians—now destroyed; others which exist are—at Oxford, the Sheldonian theatre, the Ashmolean museum, the Tom Tower of Christ Church, and Queen's College chapel; at Cambridge, the library of Trinity College and the chapel of Pembroke, the latter at the cost of Bishop Matthew Wren, his uncle. The western towers of Westminster Abbey are usually attributed to Wren, but they were not carried out till 1735–1745, many years after Wren's death, and there is no reason to think that his design was used. Wren (D.C.L. from 1660) was knighted in 1673, and was elected president of the Royal Society in 1681. He was in parliament for many years, representing Plympton from 1685, Windsor from 1689, and Weymouth from 1700. He occupied the post of surveyor of the royal works for fifty years, but by a shameful cabal was dismissed from this office a few years before his death.

He died in 1723, and is buried under the choir of St Paul's; on a tablet over the inner north doorway is the well-known epitaph—*Si monumentum requiris, circumspice*.

For further information the reader should consult the *Parentalia*, published by Wren's grandson in 1750, an account of the Wren family and especially of Sir Christopher and his works; also the two biographies of Wren by Elmes and Miss Phillimore; Milman, *Annals of St Paul's* (1868); and Longman, *Three Cathedrals dedicated to St Paul in London* (1873), pp. 77 seq. See also Clayton, *Churches of Sir C. Wren* (1848–1849); Taylor, *Towers and Steeples of Wren* (London, 1881); Niven, *City Churches* (London, 1887), illustrated with fine etchings; A. H. Mackmurdo, *Wren's City Churches* (1883); A. Stratton, *The Life, Work and Influence of Sir Christopher Wren* (1897); Lena Milman, *Sir Christopher Wren* (1908). In the library of All Souls at Oxford are preserved a large number of drawings by Wren, including the designs for almost all his chief works, and a fine series showing his various schemes for St Paul's Cathedral. (J. H. M.)

WREN (O. Eng. *wrénna*, Mid. Eng. *wrenne*; Icel. *rindill*), the popular name for birds of the Passerine family Troglodytidae, of which the best known example is *Troglodytes parvulus*, the little brown bird—with its short tail, cocked on high—inquisitive and familiar, that braves the winter of the British Islands, and even that of the European continent. Great interest is taken in this bird throughout all European countries, and, though in Britain comparatively few vernacular names have been applied to it, two of them—"jenny" or "kitty-wren"—are terms of endearment. M. Rolland records no fewer than 139 local names for it in France; and Italy, Germany and other lands are only less prolific. Many of these carry on the old belief that the wren was the king of birds, a belief connected with the fable that once the fowls of the air resolved to choose for their leader that one of them which should mount highest. This the eagle seemed to do, and all were ready to accept his rule, when a loud burst of song was heard, and perched upon him was seen the wren, which unseen had been borne aloft by the giant. The curious association of this bird with the Feast of the Three Kings, on which day in S. Wales, or, in Ireland and in the S. of France, on or about Christmas Day, men and boys used to "hunt the wren," addressing it in a song as "the king of birds," is remarkable.

The better known forms in the United States are the house-wren, common in the eastern states; the winter-wren, remarkable for its resonant and brilliant song; the Carolina-wren, also a fine singer, and the marsh-wren, besides the cactus wrens and the cañon-wrens of the western states.

Wrens have the bill slender and somewhat arched: their food consists of insects, larvae and spiders, but they will also take any small creatures, such as worms and snails, and occasionally eat seeds. The note is shrill. The nest is usually a domed structure of ferns, grass, moss and leaves, lined with hair or feathers, and from three to nine eggs are produced, in most of the species white.

The headquarters of the wrens are in tropical America, but they reach Greenland in the N. and the Falkland Islands in the S. Some genera are confined to the hills of tropical Asia, but *Troglodytes*, the best known, ranges over N. and S. America, Asia and Europe.

The Troglodytidae by no means contain all the birds to which the name "wren" is applied. Several of the *Sylviinae* (cf. Warbler) bear it, especially the beautiful little golden-crested wren (cf. Kinglet) and the group commonly known in Britain as "willow-wrens"—forming the genus *Phylloscopus*. Three of these are habitual summer-visitants. The largest, usually called the wood-wren, *P. sibilatrix*, is more abundant in the N. than in the S. of England, and chiefly frequents woods of oak or beech. It has a loud and peculiar song, like the word *twēē*, sounded very long, and repeated at first slowly, but afterwards more quickly, while at uncertain intervals comes another note, which has been syllabled as *chea*, uttered about three times in succession. The willow-wren proper, *P. trochilus*, is in many parts of Great Britain the commonest summer-bird, and is the most generally dispersed. The third species, *P. collybita* or *minor* (frequently but most wrongly called *Sylvia rufa* or *P. rufus*), commonly known as the chiffchaff, from the peculiarity of its constantly repeated two-noted cry, is very numerous in the S. and W. of England, but seems to be scarcer N. These three species make their nest upon or very close to the ground, and the building is always domed. Hence they are commonly called "oven-birds," and occasionally, from the grass used in their structure, "hay-jacks," a name common to the white-throat (*q.v.*) and its allies. (A. N.)

WRESTLING (O. Eng. *wrǽstlian*), a sport in which two persons strive to throw each other to the ground. It is one of the most primitive and universal of sports. Upon the walls of the temple-tombs of Beni Hasan, near the Nile, are sculptured many hundred scenes from wrestling matches, depicting practically all the holds and falls known at the present day, thus proving that wrestling was a highly developed sport at least 3000 years before the Christian era. As the description of the bout between Odysseus and Ajax in the 23rd book of the *Iliad*, and the evolutions of the classic Greek wrestlers, tally with the sculptures of Beni Hasan and Nineveh, the sport may have been introduced into Greece from Egypt or Asia. In Homer's celebrated description of the match between Ajax and Odysseus the two champions wore only a girdle, which was, however, not used in the classic Greek games. Neither Homer nor Eustathius, who also minutely depicted the battle between Ajax and Odysseus, mentions the use of oil, which, however, was invariable at the Olympic games, where wrestling was introduced during the 18th Olympiad. The Greek wrestlers were, after the application of the oil, rubbed with fine sand, to afford a better hold.

Wrestling was a very important branch of athletics in the Greek games, since it formed the chief event of the *pentathlon*, or quintuple games (see Games, Classical). All holds were allowed, even strangling, butting and kicking. Crushing the fingers was used especially in the *pancration*, a combination of wrestling and boxing. Wrestlers were taught to be graceful in all their movements, in accordance with the Greek ideas of aesthetics. There were two varieties of Greek wrestling, the πάλη ὀρθή, or upright wrestling, which was that generally practised, and the ἀλίνδησις (κύλισις, *lucta volutatoria*) or squirming contest after the contestants had fallen, which continued until one acknowledged defeat. It was this variety that was employed in the *pancration*. The upright wrestling was very similar to the modern catch-as-catch-can style. In this three falls out of five decided a match. A variation of this style was that in which one of the contestants stood within a small ring and resisted the efforts of his adversary to pull him out of it. Other local varieties existed in the different provinces. The most celebrated wrestler of ancient times was Milo of Crotona (*c.* 520 B.C.), who scored thirty-two victories in the different national games, six of them at Olympia. Greek athletic sports were introduced into Rome in the last quarter of the 2nd century B.C., but it never attained to the popularity that it enjoyed in Greece.

Among the Teutonic peoples wrestling, at least as a method of fighting, was of course always known; how popular it had become as a sport during the middle ages is proved by the voluminous literature which appeared on the subject after the invention of printing, the most celebrated work being the *Ringer-Kunst* of Fabian von Auerswald (1539). Albrecht Dürer made 119 drawings illustrating the different holds and falls in vogue in the 15th and 16th centuries. These singularly resembled those used in the Greek games, even to certain brutal tricks, which, however, were considered by the German masters as not *geselliglich* (friendly) and were not commonly used. Wrestling was adopted by the German *Turnvereine* as one of their exercises, but with the elimination of tripping and all holds below the hips. At present the most popular style in Europe is the so-called Graeco-Roman.

In Switzerland and some of the Tirolese valleys a kind of wrestling flourishes under the name of *Schwingen* (swinging). The wrestlers wear *schwinghosen* or wrestling-breeches, with stout belts, on which the holds are taken. The first man down loses the bout. In Styria, wrestlers stand firmly on both feet with right hands clasped. When the word is given each tries to push or pull the other from his stance, the slightest movement of a foot sufficing to lose.

The popularity of wrestling has survived in many Asiatic countries, particularly in Japan, where the first match recorded took place in 23 B.C., the victor being Sukune, who has ever since been regarded as the tutelary deity of wrestlers. In the 8th century the emperor Shômu made wrestling one of the features of the annual harvest "Festival of the Five Grains," the victor being appointed official referee and presented with a fan bearing the legend, "Prince of Lions." In 858 the throne of Japan was wrestled for by the two sons of the emperor Buntoku, and the victor, Koreshito, succeeded his father under the name of Seiwa. Imperial patronage of wrestling ceased in 1175, after the war which resulted in the establishment of the Shogunate, but continued to be a part of the training of the *samurai* or military caste. About 1600, professional wrestling again rose to importance, the best men being in the employ of the great *daimios* or feudal nobles. It was, nevertheless, still kept up by the *samurai*, and eventually developed into the peculiar combination of wrestling and system of doing bodily injury called *ju-jutsu* (*q.v.*), which survives with wrestling as a separate though allied art. The national championships were re-established in 1624, when the celebrated Shiganosuke won the honour, and have continued to the present day. The Japanese wrestlers, like those of India, lay much stress upon weight and are generally men of great bulk, although surprisingly light on their feet. They form a gild which is divided into several ranks, the highest being composed of the *joshiyori*, or elders, in whose hands the superintendence of the wrestling schools and tournaments lies, and who in feudal times used to rank next to the *samurai*. The badges of the three highest ranks are damask aprons richly embroidered. Every public wrestler must have passed through a thorough course of instruction under one of the *joshiyori* and have undergone numerous practical tests. The wrestling takes place in a ring 12 ft. in diameter, the wrestlers being naked but for a loin-cloth. At the command of the referee the two adversaries crouch with their hands on the ground and watch for an opening. The method is very similar to that of the ancient Greeks and the modern catch-as-catch-can style, except that a wrestler who touches the ground with any part of his person except the feet, after the first hold has been taken, loses the bout.

Indian wrestling resembles that of Japan in the great size of its exponents or *Pulwans*, and the number and subtlety of its attacks, called *penches*. It is of the "loose" order, the men facing each other nude, except for a loin-cloth, and manœuvring warily for a hold. Both shoulders placed on the ground simultaneously constitute a fall.

In Great Britain wrestling was cultivated at a very early age, both Saxons and Celts having always been addicted to it, and English literature is full of references to the sport. On St James's and St Bartholomew's days special matches took place throughout England, those in London being held in St Giles's Field, whence they were afterwards transferred to Clerkenwell. The lord mayor and his sheriffs were often present on these occasions, but the frequent brawls among the spectators eventually brought public matches into disrepute. English monarchs have not disdained to patronize the sport, and Henry VIII. is known to have been a powerful wrestler.

It was inevitable, in a country where the sport was so ancient and so universal, that different methods of wrestling should grow up. It is likely that the "loose" style, in which the contestants took any hold they could obtain, generally prevailed throughout Great Britain until the close of the 18th century, when the several local fashions became gradually coherent; but it was not until well into the 19th that their several rules were codified. Of these the "Cumberland and Westmorland" style, which prevails principally in the N. of England (except Lancashire) and the S. of Scotland, is the most important. In this the wrestlers stand chest to chest, each grasping the other with locked hands round the body with his chin on the other's right shoulder. The right arm is below and the left above the adversary's. When this hold has been firmly taken the umpire gives the word and the bout proceeds until one man touches the ground with any part of his person except his feet, or he fails to retain his hold, in either of which cases he loses. When both fall together the one who is underneath, or first touches the ground, loses. If both fall simultaneously side by side, it is a "dog-fall," and the bout begins anew. The different manœuvres used in British wrestling to throw the adversary are called "chips," those most important in the "Cumberland and Westmorland" or "North Country" style being the "back-heel," in which a wrestler gets a leg behind his opponent's heel on the outside; the "outside stroke," in which after a sudden twist of his body to the left the opponent is struck with the left foot on the outside of his ankle; the "hank," or lifting the opponent off the ground after a sudden turn, so that both fall together, but with the opponent underneath; the "inside click," a hank applied after jerking the opponent forward, the pressure then being straight back; the "outside click," a back-heel applied by a wrestler as he is on the point of being lifted from the ground—it prevents this and often results in oversetting the opponent; the "cross-buttock," executed by getting one's hip underneath the opponent's, throwing one's leg across both his, lifting and throwing him; the "buttock," in which one's hip is worked still further under that of the opponent, who is then thrown right over one's back; the "hipe" or "hype," executed by lifting the opponent, and, while swinging him to the right, placing the left knee under his right leg and carrying it as high as possible before the throw; the "swinging hipe," in which the opponent is swung nearly or quite round before the hipe is applied; and the "breast-stroke," which is a sudden double twist, first to one side and then to the other, followed by a throw.

In the "Cornwall and Devon" or "West Country" style the men wrestle in stout, loosely cut linen jackets, the hold being anywhere above the waist or on any part of the jacket. A bout is won by throwing the opponent on his back so that two shoulders and a hip, or two hips and a shoulder (three points), shall touch the ground simultaneously. This is a difficult matter, since ground wrestling is forbidden, and a man, when he feels himself falling, will usually turn and land on his side or face. Many of the "chips" common to other styles are used here, the most celebrated being the "flying mare," in which the opponent's left wrist is seized with one's right, one's back turned on him, his left elbow grasped with the left hand and he is then thrown over one's back, as in the buttock. Until comparatively recently there was a difference between the styles of Cornwall and Devon, the wrestlers of the latter county having worn heavily-soled shoes, with which it was legitimate to belabour the adversary's shins. In 1826 a memorable match took place between Polkinhorne, the Cornish champion, and the best wrestler of Devon, Abraham Cann, who wore "kicking-boots of an appalling pattern." Polkinhorne, however, encased his shins in leather, and the match was eventually drawn.

The "Lancashire" style, more generally known as "catch-as-catch-can," is practised not only in Lancashire and the adjacent districts, but throughout America, Australia, Turkey and other countries. It is the legitimate descendant and representative of the ancient Greek sport and of the wrestling of the middle ages. A bout is won when both shoulders of one wrestler touch the floor together. No kicking, striking or other foul practices are allowed, but theoretically every hold is legitimate. Exceptions are, however, made of the so-called strangle-holds, which are sufficiently described by their designation, and any hold resulting in a dislocation or a fracture. This style contains practically all the manœuvres known to other methods, and in its freedom and opportunity for a display of strategy, strength and skill, is the most preferable. A fall, though invariably begun standing, is nearly always completed on the ground (mat). The holds and "chips" are so numerous and complicated as to make anything but an elaborate description inadequate. The best book on the subject is the *Handbook of Wrestling* by Hugh F. Leonard (1897).

In Scotland a combination of the Cumberland and catch-as-catch-can styles has attained some popularity, in which the wrestlers begin with the North Country hold, but continue the bout on the ground should the fall not be a clean one with two shoulders down.

In Ireland the national style is called "collar and elbow" (in America, "back-wrestling"), from the holds taken by the two hands. The man loses, any part of whose person, except the feet, touches the ground.

The style mostly affected by the professional wrestlers of Europe at the present day is the Graeco-Roman (falsely so called, since it bears almost no resemblance to classic wrestling), which arose about 1860 and is a product of the French wrestling schools. It is a very restricted style, as no tripping is allowed, nor any hold below the hips, the result being that the bouts, which are contested almost entirely prone on the mat, are usually tediously long. British and American wrestlers, being accustomed to their own styles, are naturally at a disadvantage when wrestling under Graeco-Roman rules.

WREXHAM (Welsh *Gwrecsam*, in the Anglo-Saxon Chronicle *Wrightesham*), a market town and parliamentary and municipal borough of Denbighshire, N. Wales, 11 m. S.S.W. of Chester, with stations on the Great Western railway, and on the Great Central railway, 202 m. from London. Pop. (1901) 14,966. "One of the seven wonders of Wales" is St Giles's church, of the 14th, 15th and 16th centuries, with a panelled tower of several stages erected between 1506 and 1520, and containing ten famous bells cast (1726) by Rudhall; the interior is Decorated, and has two monuments by Roubilliac to the Myddletons. Wrexham is the seat of the Roman Catholic bishop of Menevia, whose diocese includes all Wales except Glamorganshire. The endowed free school was established in 1603. The markets and fairs are good, and the ales, mills (corn and paper) and tanneries locally famous. Brymbo Hall, in the neighbourhood, is said to have been built from a design by Inigo Jones, as were probably Gwydyr chapel (1633) and the Conwy bridge (1636), both at Llanrwst. Erddig Hall was noted for its Welsh MSS. Near Wrexham, but in a detached portion of Flintshire, to the S.E., is Bangor-is-coed (Bangor yn Maelor), the site of the most ancient monastery in the kingdom, founded before 180; some 1200 monks were slain here by Æthelfrith of Northumbria, who also spoiled the monastery. Bangor-is-coed was probably Antoninus's *Bovium*, and the *Banchorium* of Richard of Cirencester. Wrightesham was of Saxon origin, and lying E. of Offa's Dyke, was yet reckoned in Mercia. It was given (with Bromfield and Yale, or *Iâl*) by Edward I. to Earl Warenne.

WRIGHT, CARROLL DAVIDSON (1840–1909), American statistician, was born at Dunbarton, New Hampshire, on the 25th of July 1840. He began to study law in 1860, but in 1862 enlisted as a private in a New Hampshire volunteer regiment. He became colonel in 1864, and served as assistant-adjutant-general of a brigade in the Shenandoah Valley campaign. He was admitted to the New Hampshire bar after the war, and in 1867 became a member of the Massachusetts and United States bars. From 1872 to 1873 he served in the Senate of Massachusetts, and from 1873 to 1878 he was chief of the Massachusetts Bureau of Statistics of Labor. He was U.S. commissioner of labour from 1885 to 1905, and in 1893 was placed in charge of the Eleventh Census. In 1894 he was chairman of the commission which investigated the great railway strike of Chicago, and in 1902 was a member of the Anthracite Strike Commission. He was honorary professor of social economics in the Catholic university of America from 1895 to 1904; in 1900 became professor of statistics and social economics in Columbian (now George Washington) University, from 1900 to 1901 was university lecturer on wage statistics at Harvard, and in 1903 was a member of the special committee appointed to revise the labour laws of Massachusetts. In 1902 he was chosen president of Clark College, Worcester, Mass., where he was also professor of statistics and social economics from 1904 until his death. Dr Wright was president of the American Association for the Advancement of Science in 1903, and in 1907 received the Cross of the Legion of Honour for his work in improving industrial conditions, a similar honour having been conferred upon him in 1906 by the Italian government. He died on the 20th of February 1909.

His publications include *The Factory System of the United States* (1880); *Relation of Political Economy to the Labor Question* (1882); *History of Wages and Prices in Massachusetts, 1752–1883* (1885); *The Industrial Evolution of the United States* (1887); *Outline of Practical Sociology* (1899); *Battles of Labor* (1906); and numerous pamphlets and monographs on social and economic topics.

WRIGHT, CHAUNCEY (1830–1875), American philosopher and mathematician, was born at Northampton, Mass., on the 20th of September 1830, and died at Cambridge, Mass., on the 12th of September 1875. In 1852 he graduated at Harvard, and became computer to the *American Ephemeris* and *Nautical Almanac*. He made his name by contributions on mathematical and physical subjects in the *Mathematical Monthly*. He soon, however, turned his attention to metaphysics and psychology, and for the *North American Review* and later for the *National* he wrote philosophical essays on the lines of Mill, Darwin and Spencer. In 1870–71 he lectured on psychology at Harvard. Although, in general, he adhered to the evolution theory, he was a free lance in thought. Among his essays may be mentioned *The Evolution of Self-Consciousness* and two articles published in 1871 on the *Genesis of Species*. Of these, the former endeavours to explain the most elaborate psychical activities of men as developments of elementary forms of conscious processes in the animal kingdom as a whole; the latter is a defence of the theory of natural selection against the attacks of St George Mivart, and appeared in an English edition on the suggestion of Darwin. From 1863 to 1870 he was secretary and recorder to the American Academy of Arts and Sciences, and in the last year of his life he lectured on mathematical physics at Harvard.

His essays were collected and published by C. E. Norton in 1877, and his *Letters* were edited and privately printed at Cambridge, Mass., in 1878 by James Bradley Thayer.

WRIGHT, JOSEPH (1734–1797), styled Wright of Derby, English subject, landscape and portrait painter, was born at Derby on the 3rd of September 1734, the son of an attorney, who was afterwards town-clerk. Deciding to become a painter, he went to London in 1751 and for two years studied under Thomas Hudson, the master of Reynolds. After painting portraits for a while at Derby, he again placed himself for fifteen months under his former master. He then settled in Derby, and varied his work in portraiture by the production of the subjects seen under artificial light with which his name is chiefly associated, and by landscape painting. He married in 1773, and in the end of that year he visited Italy, where he remained till 1775. While at Naples he witnessed an eruption of Vesuvius, which formed the subject of many of his subsequent pictures. On his return from Italy he established himself at Bath as a portrait-painter; but meeting with little encouragement he returned to Derby, where he spent the rest of his life. He was a frequent contributor to the exhibitions of the Society of Artists, and to those of the Royal Academy, of which he was elected an associate in 1781 and a full member in 1784. He, however, declined the latter honour on account of a slight which he believed that he had received, and severed his official connexion with the Academy, though he continued to contribute to the exhibitions from 1783 till 1794. He died at Derby on the 29th of August 1797. Wright's portraits are frequently defective in drawing, and without quality or variety of handling, while their flesh tints are often hard. He is seen at his best in his subjects of artificial light, of which the "Orrery" (1766), the property of the corporation of Derby, and the "Air-pump" (1768), in the National Gallery, are excellent examples. His "Old Man and Death" (1774) is also a striking and individual production. An exhibition of Wright's works was brought together at Derby in 1883, and twelve of his pictures were shown in the winter exhibition of the Royal Academy in 1886.

His biography, by William Bemrose, was published in 1885.

WRIGHT, SILAS (1795–1847), American political leader, was born at Amherst, Mass., on the 24th of May 1795. He graduated at Middlebury College, Vermont, in 1815, was admitted to the bar in 1819, and began practice at Canton, in northern New York. He was appointed surrogate of St Lawrence county in 1820, and was successively a member of the state Senate in 1824–1826, a member of the national House of Representatives in 1827–1829, comptroller of the state in 1829–1833, U.S. senator in 1833–1844, and governor of New York in 1844–1846. During his public life he had become a leader of the Democratic party in New York, Martin Van Buren being his closest associate. He was an influential member of the so-called "Albany Regency," a group of Democrats in New York, including such men as J. A. Dix and W. L. Marcy, who for many years virtually controlled their party within the state. Wright's integrity in office was illustrated in 1845, when the "anti-rent troubles" (see NEW YORK) broke out and it seemed probable that the votes of the disaffected would decide the coming election. The governor asked and obtained from the legislature the power to suppress the disturbance by armed force, and put an end to what was really an insurrection. When the national Democratic party in 1844 nominated and elected James K. Polk to the presidency, instead of Martin Van Buren, Wright and the state organization took an attitude of armed neutrality towards the new administration. Renominated for governor in 1846, Wright was defeated, and the result was by many ascribed in part to the alleged hostility of the Polk administration. He died at Canton on the 27th of August 1847.

The best biography is that by J. D. Hammond, *Life and Times of Silas Wright* (Syracuse, N.Y., 1848), which was republished as vol. iii. of that author's *Political History of New York*.

WRIGHT, THOMAS (1809–1884), British palaeontologist, was born at Paisley in Renfrewshire on the 9th of November 1809. He studied at the Royal College of Surgeons in Dublin, and qualified as a doctor in 1832. Soon afterwards he settled at Cheltenham, and graduated M.D. at St Andrews in 1846. He devoted his leisure to geological pursuits, became an active member of the Cotteswold Naturalists' Club (founded in 1846), and gathered a fine collection of Jurassic ammonites and echinoderms. He contributed to the Palaeontographical Society monographs on the British fossil Echinodermata from the Oolitic and Cretaceous formations (1855–1882); he also began (1878) a monograph on the Lias ammonites of the British Islands, of which the last part was issued in 1885, after his death. He wrote many papers in the *Ann. and Mag. Nat. Hist.* and *Proc. Cotteswold Club*. The Wollaston medal was awarded to him by the Geological Society of London in 1878, and he was elected F.R.S. in 1879. He died at Cheltenham on the 17th of November 1884.

WRIGHT, THOMAS (1810–1877), English antiquary, was born near Ludlow, in Shropshire, on the 21st of April 1810. He was descended from a Quaker family formerly living at Bradford, Yorkshire. He was educated at the old grammar school, Ludlow, and at Trinity College, Cambridge, where he graduated in 1834. While at Cambridge he contributed to the *Gentleman's Magazine* and other periodicals, and in 1835 he came to London to devote himself to a literary career. His first separate work was *Early English Poetry in Black Letter, with Prefaces and Notes* (1836, 4 vols. 12mo), which was followed during the next forty years by a very extensive series of publications, many of lasting value. He helped to found the British Archaeological Association and the Percy, Camden and Shakespeare societies. In 1842 he was elected corresponding member of the Académie des Inscriptions et Belles Lettres of Paris, and was a fellow of the Society of Antiquaries as well as member of many other learned British and foreign bodies. In 1859 he superintended the excavations of the Roman city of Uriconium, near Shrewsbury, of which he issued a description. He died at Chelsea on the 23rd of December 1877, in his sixty-seventh year. A portrait of him is in the *Drawing Room Portrait Gallery* for October 1st, 1859. He was a great scholar, but will be chiefly remembered as an industrious antiquary and the editor of many relics of the middle ages.

His chief publications are—*Queen Elizabeth and her Times, a Series of Original Letters* (1838, 2 vols.); *Reliquiae antiquae* (1839–1843, again 1845, 2 vols.), edited with Mr J. O. Halliwell-Phillipps; W. Mapes's *Latin Poems* (1841, 4to, Camden Society); *Political Ballads* and *Carols*, published by the Percy Society (1841); *Popular Treatises on Science* (1841); *History of Ludlow* (1841, &c.; again 1852); *Collection of Latin Stories* (1842, Percy Society); *The Vision and Creed of Piers Ploughman* (1842, 2 vols.; 2nd ed., 1855); *Biographia literaria*, vol. i. Anglo-Saxon Period (1842), vol. ii. Anglo-Norman Period (1846); *The Chester Plays* (1843–1847, 2 vols., Shakespeare Society); *St Patrick's Purgatory* (1844); *Anecdota literaria* (1844); *Archaeological Album* (1845, 4to); *Essays connected with England in the Middle Ages* (1846, 2 vols.); Chaucer's *Canterbury Tales* (1847–1851, Percy Society), a new text with notes, reprinted in 1 vol. (1853 and 1867); *Early Travels in Palestine* (1848, Bohn's Antiq. Lib.); *England under the House of Hanover* (1848, 2 vols., several editions, reproduced in 1868 as *Caricature History of the Georges*); Mapes, *De nugis curialium* (1850, 4to, Camden Society); Geoffrey Gaimar's *Metrical Chronicle* (1850, Caxton Society); *Narratives of Sorcery and Magic* (1851, 2 vols.); *The Celt, the Roman and the Saxon* (1852; 4th ed., 1885); *History of Fulke Fitz Warine* (1855); Jo. de Garlandia, *De triumphis ecclesiae* (1856, 4to, Roxburghe Club); *Dictionary of Obsolete and Provincial English* (1857); *A Volume of Vocabularies* (1857; 2nd ed., by R. P. Wülcker, 1884, 2 vols.); *Les Cent Nouvelles nouvelles* (Paris, 1858, 2 vols.); Malory's *History of King Arthur* (1858, 2 vols., revised 1865); *Political Poems and Songs from Edward III. to Richard III.* (1859–1861, 2 vols., "Rolls" series); *Songs and Ballads of the Reign of Philip and Mary* (1860, 4to, Roxburghe Club); *Essays on Archaeological Subjects* (1861, 2 vols.); *Domestic Manners and Sentiments in England in the Middle Ages* (1862, 4to, reproduced in 1871 as *The Homes of other Days*); *Roll of Arms of Edward I.* (1864, 4to); *Autobiography of Thomas Wright* (1736–1797), his grandfather (1864); *History of Caricature* (1865, 4to); *Womankind in Western Europe* (1869, 4to); *Anglo-Latin Satirical Poets of 12th Century* (1872, 2 vols., "Rolls" series).

WRIGHT, WILLIAM ALDIS (1836–   ), English man of letters, was educated at Trinity College, Cambridge, and in 1888 became vice-master of the college. He was one of the editors of the *Journal of Philology* from its foundation in 1868, and was secretary to the Old Testament revision company from 1870 to 1885. He edited the plays of Shakespeare published in the "Clarendon Press" series (1868–1897), also with W. G. Clark the "Cambridge" Shakespeare (1863–1866; 2nd ed. 1891–1893) and the "Globe" edition (1864). He published (1899) a facsimile of the Milton MS. in the Trinity College library, and edited Milton's poems with critical notes (1903). He was the intimate friend and literary executor of Edward FitzGerald, whose *Letters and Literary Remains* he edited in 1889. This was followed by the *Letters of Edward FitzGerald to Fanny Kemble* (1895), his *Miscellanies* (1900), *More Letters of Edward FitzGerald* (1901), *The Works of Edward FitzGerald* (7 vols., 1903). He edited the metrical chronicle of Robert of Gloucester (1887), *Generydes* (1878) for the Early English Text Society, and other texts.

WRIST, in anatomy, the carpus or carpal articulation in man, the joint by which the hand is articulated with the fore-arm (see ANATOMY: *Superficial and Artistic*; and SKELETON: *Appendicular*). The word means by origin "that which turns," and is formed from the O. Eng. *wriðan*, to twist.

WRIT (O. Eng. *gewrit*, *writ*, from *writan*, to write), in law, a formal order from the crown or a delegated executive officer to an inferior executive officer or to a private person, enjoining some act or omission.[1] The word represents the Latin *brevis* or *breve* (sometimes Englished into "brief" in the older authorities), so called, according to Bracton and *Fleta*, from its "shortly" expressing the intention of the framer (*quia breviter et paucis verbis intentionem proferentis exponit*).[2]

The *breve* can be traced back as far as Paulus (about A.D. 220), who wrote a work *Ad edictum de brevibus*, cited in the Vatican Fragment, § 310. In the *Corpus juris* the word generally means a summary or report. In *Cod.* vii. 44, *breviculum* means a summary of the grounds of a judgment. The *interdictum* of Roman law sometimes represents the writ of English law; *e.g.* there is considerable likeness between the Roman *interdictum de libero homine exhibendo* and the English writs of *habeas corpus* and *de homine replegiando*. From Roman law the *breve* passed into the *Liber feudorum* and the canon law, in both in a sense differing from that at present borne by the writ of English law. The *breve testatum* of the *Libet feudorum* was an instrument in writing made on the land at the time of giving seisin by the lord to the tenant, and attested by the seals of the lord and the *pares curiae* or other witnesses. In England such witnesses were part of the inquest, and joined in the verdict in case of disputed right until 12 Edw. II. st. 1, c. 2. The *breve testatum* in England developed into the feoffment, later into the deed of grant; in Scotland into the charter, and later into the disposition. In canon law *breve* or *brevilegium* denoted a letter from the pope, sealed with the seal of the fisherman and less formal than a bull. In old English ecclesiastical law a brief—still named in one of the rubrics of the Book of Common Prayer—meant letters patent to churchwardens or other officers for the collection of money for church or charitable purposes.[1] (For counsel's brief see under Brief.)

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[1] There seems to be no authentic definition of writ. That of Reeves is "a settled form of precept applicable to the purpose of compelling defendants to answer the charge alleged by plaintiffs" (1 *Hist. of the Eng. Law*, 415).

[2] It is perhaps doubtful whether *intentio* is here used in its ordinary sense or in the technical signification which it bore as a part of the Roman *formula*.

The writ in English law still occupies a very important position, which can scarcely be understood without a sketch of its history.

History.

The whole theory of pleading depends in the last resort upon the writ, the plaintiff's claim simply expanding its terms.

Writ or *breve* was at first used in a less technical sense than that which it afterwards assumed: thus in the *Leges Henrici Primi* it simply means a letter from the king, and in the Assize of Clarendon (1166) *imbreviari* means to be registered. It became formalized by the reign of Henry II., and precedents are given by Glanvill. The writ process was at that date the foundation of all civil justice in the king's court, and of much in the lower courts, and was a profitable source of revenue to the exchequer. Writs were not framed on any scientific scheme, but as occasion arose, and were frequently the result of compromise in the struggle between the king's and the lords' courts. Every writ had to be purchased (*breve perquirere* was the technical term). This purchase developed in later times into the payment of a fine to the king where the damages were laid above £40. The usual scale was 6s. 8d. for every 100 marks claimed. In suing out a writ of covenant, the basis of the proceedings in levying a fine, the king was entitled to his *primer fine*, *i.e.* one-tenth of the annual value of the land concerned. The sale of writs was forbidden by Magna Carta and other statutes in certain cases, especially that of the writ *de odio et atia* in favour of the liberty of the subject. A solicitor was so called because his original duty was to solicit or sue out a writ and take the due proceedings by paying the proper fine. The costs of a writ purchased were first allowed to a successful demandant by the Statute of Gloucester, 1278. The counterpart of the writ (*contrabreve*) was usually filed in court with the *custos brevium*. Through the Norman period the prerogative of issuing writs seems to have been undisputed. Glanvill's precedents did not exhaust all possible forms, for in the time of Bracton, in the 13th century, it was still possible to frame new writs at the pleasure of the crown. The Provisions of Oxford in 1258 put an end to this by enacting that the chancellor should not seal anything out of course (*i.e.* any writ for which there was no precedent) by the will of the king, but that he should do it by the council. In 1285 the Statute of Westminster the Second re-established the power of the crown within certain limits, that is, in causes of action in a similar case falling under the same law (*in consimili casu cadente sub eodem jure*) as those for which precedents of writs already existed in the chancery. These precedents were recorded about 1227 in the *Registrum brevium*, called by Sir Edward Coke the oldest book in the common law.[2] Apart from the powers given by the statute, new writs could only be issued by the authority of parliament, and writs are sometimes found set out in statutes, especially in the *Statutum Walliae*, 1284, where precedents of the most usual writs will be found. The Statute of Westminster the Second itself contained precedents of the writ of formedon and of many others. The original flexibility of the writ was thus limited within comparatively narrow bounds. The right to the issue of the writ determined the right of action. If the writ was not sufficient to found an action, the writ was said to fail (*cadere*). So essential was the writ that it was a legal axiom in Bracton that no one could sue at law without a writ, and it was called by Coke, in his introduction to Littleton, "the heartstrings of the common law." As such it occupied an important place in some of the leading statutes dealing with constitutional rights. The Statute of Marlbridge, 1267, forbade a lord to distrain his freeholders to answer for their freeholds, or for anything touching their freeholds, without the king's writ. By 25 Edw. III. st. 5, c. 4 (1342), it was accorded, asserted and stablished that none should be taken by petition or suggestion made to the king or his council unless by indictment or presentment in due manner or by process made by writ original at the common law. 42 Edw. III. c. 3 (1359) provided that no man should be put to answer without presentment before justices, or matter of record, or by due process and writ original according to the old law of the land. Both these statutes were recited and the general principle confirmed by 16 Car. I. c. 10 (1641). Uniformity of procedure was secured by 27 Hen. VIII. c. 24 (1536), by which all writs were to be in the king's name in a county palatine or liberty, but tested by those who had the county palatine or liberty. It was not until 1731 that, by virtue of 4 Geo. II. c. 26, writs were framed in the English language. They had previously been in Latin; this accounts for the Latin names by which a large number are still known.

The writ was issued from the common law side of the chancery, and was in the special charge of the hanaper and petty bag offices.[3] Though issuing from the king's chancery, it did not necessarily direct the trial of the question in the king's court. In whatever court it was returnable, it called in the aid of the sheriff as executive officer. It was either addressed to him or, if addressed to the party alleged to be in default, it concluded with a threat of constraint by the sheriff in the event of disobedience, generally in those terms, *et, nisi feceris, vicecomes de N. faciat ne amplius clamorem audiam pro defectu justitiae*. If the writ was returnable in the county court or the lord's court, the sheriff or the lord sat as the deputy of the king, not by virtue of his inherent jurisdiction. The writ was not necessary for the initiation of proceedings in these courts or before the justices in eyre, but a custom seems to have grown up of suing out a writ from the king where the claim was above 40s. Cases were transferred from the lord's court to the county court by writ of *tolt* (so called because it removed, *tollit*, the case), from the latter to the king's court by writ of *pone* (so called from its first word). By Magna Carta the power of bringing a suit in the king's court in the first instance by writ of *praecipe* was taken away, and the writ was thenceforth only returnable in the king's court where the tenant held of the king *in capite*, or where the lord had no court or abandoned his right. Hence it became a common form in the writ of right to allege that the lord had renounced his court (*dominus remisit curiam*) so as to secure trial in the king's court.

Besides being used for the trial of disputes, writs addressed to sheriffs, mayors, commissioners or others were in constant use for financial and political purposes, *e.g.* for the collection of fifteenths, scutage, tallage, &c., for summons to the council and later to parliament, and for dissolving a parliament, the last by means of the rarely occurring writ *de revocatione parliamenti*.

There were several divisions of writs (excluding those purely financial and political), the most important being that into original and judicial, the former (tested in the name of the king) issued to bring a suit before the proper court, the latter (tested in the name of a judge) issued during the progress of a suit or to enforce judgment. Original were either optional, *i.e.* giving an option of doing a certain act or of showing cause why it was not done, beginning with the words *praecipe quod reddat*, the principal example being the writ on which proceedings in a common recovery (see Fine) were based, or peremptory, *i.e.* calling on a person to do a certain act, beginning with the words *si A. fecerit te securum*. Original were also either *de cursu* (also called by Bracton *formata*) or *magistralia*, the former those fixed in form and depending on precedent, the latter those framed by the masters in chancery under the powers of the Statute of Westminster the Second. They were also either general or special, the latter setting forth the grounds of the demand with greater particularity than the former. In regard to real estate they might be possessory or ancestral. By 5 Geo. II. c. 27 (1732) special writs were confined to causes of action amounting to £10 or upwards. There was also a division of writs into writs of right (*ex debito justitiae*), such as *habeas corpus*, and prerogative writs (*ex gratia*), such as mandamus and prohibition. Coke and other authorities mention numerous other divisions, but those which have been named appear to be the principal.

The most interesting form of writ from the historical point of view was the writ of right (*breve de recto*), called by Blackstone "the highest writ in the law," used at first for debt and other personal claims, afterwards confined to the recovery of real estate as the writ of right *par excellence*. It was so called from the words *plenum rectum* contained in it, and was the remedy for obtaining justice for ouster from or privation of the freehold. By it property as well as possession could be recovered. It generally lay in the king's court, as has been said, by virtue of a fictitious allegation. In that case it was addressed to the sheriff and was called a writ of right close. When addressed to the lord and tried in his court, it was generally a writ of right patent. After the appearance of the tenant the demandant in a writ of right counted, that is, claimed against the tenant according to the writ, but in more precise terms, the writ being as it were the embryo of the future count. The trial was originally by battle (see Trial), but in the reign of Henry II. an alternative and optional procedure was introduced, interesting as the earliest example of the substitution of something like the jury (*q.v.*) for the judicial combat. A writ *de magna assisa eligenda* was directed to the sheriff commanding him to return four knights of the county and vicinage to the court, there to return twelve other knights of the vicinage to try upon oath the question contained in the writ of right (technically called the *mise*). This mode of trial was known as trial by the grand assize. Generally the whole of the sixteen knights were sworn, though twelve was a sufficient number. The last occasion of trial by the grand assize was in 1835. But long before that date possessory had from their greater convenience tended to supersede proprietary remedies, and in most cases the title was sufficiently determined by the assizes of other kinds, especially that of novel disseisin and later by proceedings in ejectment. The oath of the champion on proceedings in a writ of right where the alternative of the judicial combat was accepted was regulated by statute, 3 Edw. I. c. 41 (1275). The writ of right is also interesting as being the basis of the law of limitation. By the Statute of Merton (1226) no seisin could be alleged by the demandant but from the time of Henry II. By 3 Edw. I. c. 39 the time was fixed at the reign of Richard I., by 32 Hen. VIII. c. 2 (1541) at sixty years at the most. There were other writs of right with special names, *e.g.* the writ of right by the custom of London for land in London, the writ of right by advowson, brought by the patron to recover his right of presentation to a benefice, and the writs of right of dower, *ne injuste vexes* and *de rationabili parte*, the latter brought by coparceners or brothers in gavelkind. Coheirs and coparceners also had the *nuper obiit* for disseisin by one of themselves. There were also writs in the nature of a writ of right, *e.g.* formedon, brought by a reversioner on discontinuance by a tenant in tail and given by the statute *De Donis Conditionalibus*; escheat, brought by the lord where the tenant died without an heir; *ne injuste vexes*, to prohibit the lord from exacting services or rents beyond his due; *de nativo habendo*, to recover the inheritance in a villein; and the little writ of right close according to the custom of the manor, to try in the lord's court the right of the king's tenants in antient demesne. They had also the writ of *monstraverunt*.

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[1] See W. A. Bewes, *Church Briefs* (1896). The lines in Cowper's "Charity" allude to such a brief:—

"The h [illegible] isits every pew,
But [illegible] mpliment but due."

[2] See article b [illegible] *rvard Law Rev.* 177.

[3] The place where writs were deposited was called *breviarium* or *breviorium*. This use of the word must be distinguished from legal compendia, such as the *Breviarium Alarici* or *Breviarium extravagantium*.

Up to 1832 an action was (except as against certain privileged persons, such as attorneys) begun at law by original writ, and writ practically became the equivalent of action, and is so used in old books of practice. The law was gradually altered by legislation and still more by the introduction of fictitious proceedings in the common law courts, by which the issue of the original writ was suspended, except in real actions, which were of comparatively rare occurrence. The original writ is no longer in use in civil procedure, an action being now in all cases commenced by the writ of summons, a judicial writ, a procedure first introduced in 1832 by 2 Will. IV. c. 39. In the following year an immense number of the old writs was abolished by the Real Property Limitation Act 1833. An exception was made in favour of the writ of right of dower, writ of dower *unde nihil habet*, *quare impedit* and ejectment, and of the plaints for freebench and dower in the nature of writs of right. Ejectment was remodelled by the Common Law Procedure Act 1852; the other writs and plaints remained up to the Common Law Procedure Act 1860, by which they were abolished. Other writs which have been superseded by simpler proceedings, generally by ordinary actions, are those of the four assizes of novel disseisin, *juris utrum*, *mort d'auncester* and *darrein presentment*, conspiracy, estrepement and waste, false judgment, *monstrans de droit*, nuisance, partition, *praemunire*, *quo warranto*, *scire facias*, *subpoena* and *warrantia chartae*.

Obsolete writs.

The number of writs, especially those connected with ecclesiastical procedure, was so large that any exhaustive list of them is almost impossible, but a few of those of more special interest which have become obsolete may be shortly mentioned. *Admensuratio* lay against persons usurping more than their share of property. It was either *dotis* or *pasturae*, the latter, like the Scottish "souming and rouming," being the remedy for surcharge of common, for which also *quod permittas* lay. *Alias* and *pluries* writs were issued when a previous writ had been disobeyed. *Apostata capiendo* was the mode of apprehension of a monk who had broken from his cloister. *Assistance* went to the sheriff to assist the party or an officer of chancery to gain possession of land. *Attaint* lay to inquire by a jury of twenty-four whether a jury of twelve had given a false verdict. *Decies tantum* also lay against a juror who had accepted a bribe, so called because he had to refund ten times the sum received. *Audita querela* was a means of relieving a defendant by a matter of discharge occurring after judgment. After having been long practically superseded by stay of execution it was finally abolished by the rules made under the Judicature Act 1875. *Beaupleader* lay to prohibit the taking of a fine *de pulcre placitando*, forbidden by the Statute of Marlbridge (1268).[1] *Capias*, *latitat* and *quominus* are interesting as showing the extraordinary mass of fictitious allegation in the old procedure of the common law courts before 1832. By *capias ad respondendum* followed by *alias* and *pluries* the court of common pleas was enabled to take cognizance of an action without the actual issue of an original writ. The *capias* was a judicial writ issued to follow an original writ of trespass *quia clausum fregit*. The issue of the original writ and after a time the issue of the *capias* became mere fictions, and proceedings commenced with the issue of another writ called *capias testatum*. On return of the writ the plaintiff elected to proceed with a cause of action other than trespass, and the real merits of the case were eventually reached in this tortuous manner. After being served with the *capias* the defendant was bound to put in common or special bail, the former being sufficient in all but exceptional cases. Here again there was a fiction, for his common bail were John Doe and Richard Roe. The same fictitious pair also appeared on the side of the plaintiff as his pledges for the due prosecution of his action. By *latitat* and *quominus* the courts of king's bench and exchequer respectively assumed jurisdiction by a further series of fictions over ordinary civil actions. The writ of *latitat*, following the bill of Middlesex, itself in later times generally a fiction, alledged that the defendant was in hiding out of Middlesex, after committing a trespass *quia clausum fregit*, for which he was in the custody of the king's marshal in the Marshalsea prison. The real cause of action was then stated in what was called the *ac etiam* clause. The writ of *quominus* alleged that the plaintiff was the king's debtor, and that through the defendant's default he was unable to discharge the debt. *De cautione admittenda* was a curiosity. It enjoined a bishop to admit an excommunicated person to absolution on condition of his giving security to obey the commands of the church. *Deceit* or *disceit* lay for the redress of anything done deceitfully in the name of another, but was especially used to reverse a judgment in a real action obtained by collusion. *Distraint of knighthood* was a mode of obtaining money for the crown by the exercise of the prerogative of forcing every one who held a knight's fee under the crown to be knighted or to pay a fine. The earliest extant writ was issued in 1278. It was abolished in 1641 by 16 Car. I. c. 20. *Entry* was a possessory remedy against one alleged to hold land unlawfully. It was divided into a large number of kinds, and was the subject of much of the old real property learning. The ones most commonly occurring were the writs of entry in the *per* and in the *post*, the former alleging, the latter not, the title of the heir from the original disseisor. When writ had come to be equivalent in meaning to action, one of the divisions of possessory actions was into writs of entry and writs of assize. A special writ of entry for dower was given by 6 Edw. I. c. 7. *Excommunicato capiendo* was the authority for arresting an excommunicated person and detaining him until he was reconciled to the church, when he was liberated by the writ *de excommunicato liberando*. These proceedings were abolished and the writ *de contumace capiendo* substituted in 1817. *Faux judgment* was for revising the decision of an inferior court. *Haeretico comburendo* was issued on certificate of conviction for heresy by the ecclesiastical court. A case of burning two Arians under this writ occurred as lately as the reign of James I. It was abolished by 29 Car. II. c. 9. *Homine replegiando*, *mainprise* and *odio et atia* (or *bono et malo*) were all ancient means of securing the liberty of the subject, long superseded by the more effective procedure of *habeas corpus*. The last of the three enjoined the sheriff to inquire whether a committal on suspicion of murder was on just cause or from malice and ill-will. It was regulated by Magna Carta and the Statute of Westminster the Second, but, having been abused to the advantage of sheriffs, it was abolished in 1355 by 28 Edw. III. c. 9. It was possibly among the means—like the writ of right—by which the trial by battle and the appeal of felony tended to become obsolete. *Leproso amovendo* explains itself. *Moderata misericordia* was the means of reviewing an excessive amercement of an inferior court, especially after an amercement had tended to become a fixed sum of twelve pence. *Nisi prius* was given by the Statute of Westminster the Second, 13 Edw. I. c. 30. Its place is now taken by the commission of *nisi prius*. *Orando pro rege et regno*, before the present Book of Common Prayer, enjoined public prayers for the high court of parliament. *Protection* was given for enabling a man to be quit of suits brought against him while absent beyond seas. It was dealt with by a large number of old statutes, but none has been issued since 1692. *Quare ejecit infra terminum* was the old remedy of the lessee for eviction by the lessor. *Rebellion* was a means of enforcing obedience to the process of the court of chancery. In modern procedure attachment takes its place. *Rege inconsulto* commanded judges of a court not to proceed in a case which might prejudice the king until his pleasure should be known. *Replevin* was a survival of the most archaic law. The procedure consisted of writ on writ to an almost unlimited extent. It originally began by the issue of a writ of replevin or *replegiari facias*. The case might be removed from the county court to a superior court by writ of *recordari facias loquelam*. If the distrainor claimed a property in the goods distrained, the question of property or no property was determined by a writ *de proprietate probanda*, and, if decided in favour of the distrainor, the distress was to be returned to him by writ *de retorno habendo*. If the goods were removed or concealed, a writ of *rescous* or *capias in withernam* enabled the sheriff, after due issue of *alias* and *pluries* writs, to take a second distress in place of the one removed. It is said that the question whether goods taken in *withernam* could be replevied was the only one which the Admirable Crichton found himself unable to answer. *Restitutione extracti ab ecclesia* lay for restoring a man to a sanctuary from which he had been wrongfully taken. *Secta* lay for enforcing the duties of tenants to their lord's court, *e.g.* *secta ad molendinum*, where the tenants were bound to have their corn ground at the lord's mill. *Seisina habenda* allowed delivery of lands of a felon to the lord after the king had had his year, day and waste. *Vi laica removenda* is curiously illustrative of ancient manners. It lay where two parsons contended for a church, and one of them entered with a great number of laymen and kept out the other by force. As lately as 1867 an application for the issue of the writ was made to the chancery court of the Bermuda Islands, but refused on the ground that the writ was obsolete, and that the same relief could be obtained by injunction. On appeal this refusal was sustained by the privy council.

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[1] Relief from "miskenning" or "mescheninga," or fine for beaupleader, was often granted in charters to towns, as by that of Henry I. to London.

Writs now in use.

Of writs now in use, other than those for elections, all are judicial, or part of the process[1] of the court, except perhaps the writ of error in criminal cases. They are to be hereafter issued out of the central office of the supreme court, or the office of the clerk of the crown in chancery. By the Crown Office Act 1877 the wafer great seal or the wafer privy seal may be attached to writs instead of the impression of the great or privy seal. The judicial writs issue chiefly, if not entirely, from the central office, with which the old crown office was incorporated by the Judicature (Officers) Act 1879. The crown office had charge of writs occurring in crown practice, such as *quo warranto* and *certiorari*.

In local civil courts, other than county courts, writs are usually issued out of the office of the registrar, or an officer of similar jurisdiction. By the Borough and Local Courts of Record Act 1872, writs of execution from such courts for sums under £20 may be stamped or sealed as of course by the registrar of a county court, and executed as if they had issued from the county court. In county court practice the warrant corresponds generally to the writ of the supreme court. Most of the present law on the subject of writs is contained in the Rules of the Supreme Court, 1883, Ord. xlii.-xliv., and in the Crown Office Rules 1906. Both sets of rules contain numerous precedents in their schedules. By Ord. ii. r. 8 of the rules of 1883 all writs (with certain exceptions) are to be tested in the name of the lord chancellor, or, if that office be vacant, in the name of the lord chief justice. The main exceptions are those which occur in crown practice, which are tested by the lord chief justice. The writ of error bears the *teste* of the king "witness ourselves." Before the issue of most writs a *praecipe*, or authority to the proper officer to issue the writ, is necessary. This is of course not to be confounded with the old original writ of *praecipe*. Writs affecting land must generally be registered in order to bind the land (see LAND REGISTRATION). A writ cannot as a rule be served on Sunday. Some of the more important modern writs (other than those of an extrajudicial nature) may be shortly noticed. *Habeas corpus, mandamus, prohibition, scire facias* and others are treated separately. Writs are generally, unless where the contrary is stated, addressed to the sheriff. *Abatement* or *nocumento amovendo* enjoins the removal of a nuisance in pursuance of a judgment to that effect. *Ad quod damnum* is for the purpose of inquiring whether a proposed crown grant will be to the damage of the crown or others. If the inquiry be determined in favour of the subject, a reasonable fine is payable to the exchequer by 27 Edw. I. st. 2 (1299). Attachment is issued as a means of supporting the dignity of the court by punishment for contempt of its orders (see CONTEMPT OF COURT). Since the Judicature Acts a uniform practice has been followed in all the branches of the high court, and a writ of attachment can now only be issued by leave of the court or a judge after notice to the party against whom it is to be issued. *Capias:* the old writs of *capias ad satisfaciendum* and *capias utlegatum* may still be used, but their importance has been much diminished since the alterations made in the law by the Debtors Act 1869 and the abolition of civil outlawry (see OUTLAWRY). *Certiorari* is a writ in very frequent use, by which the proceedings of an inferior court are brought up for review by the high court. In general it lies for excess of jurisdiction as *mandamus* does for defect. The Summary Jurisdiction Act 1879 makes the writ no longer necessary where a special case has been stated by a court of quarter sessions. Delivery enforces a judgment for the delivery of property without giving the defendant (unless at the option of the plaintiff) power to retain it on payment of the assessed value. *Distringas* lay to distrain a person for a crown debt or for his appearance on a certain day. Its operation has been much curtailed by the substitution of other proceedings by the Crown Suits Act 1865 and the rules of the supreme court. It now seems to lie only against inhabitants for non-repair of a highway. *Distringas nuper vicecomitem* is a writ calling on an ex-sheriff to account for the proceeds of goods taken in execution. *Elegit* is founded on the Statute of Westminster the Second, 1285, and is so named from the words of the writ, that the plaintiff has chosen (*elegit*) this particular mode of satisfaction. It originally ordered the sheriff to seize a moiety of the debtor's land and all his goods, save his oxen and beasts of the plough. By the Judgments Act 1838, the *elegit* was extended to include the whole of the lands, and copyholds as well as freeholds. By the Bankruptcy Act 1883, an *elegit* no longer applies to goods. *Error*, the last remaining example of an original writ was at one time largely used in both civil and criminal proceedings. It was abolished in civil procedure by the rules made under the Judicature Act 1875, and in criminal cases by the Criminal Appeal Act 1907. *Exigent* (with *proclamation*) forms part of the process of outlawry now existing only against a criminal. It depends on several statutes, commencing in 1344, and is specially mentioned in the Statute of Provisors of Edward III., 25 Edw. III. st. 6. *Extent* is the writ of execution issued by the crown for a crown debt of record. The sale of chattels seized under an extent takes place under a writ of *venditioni exponas*. A crown debtor is entitled to an *extent in aid* against a person indebted to him. Where a crown debtor has died a writ reciting his death, and so called *diem clausit extremum*, issues against his property. *Fieri facias* is the ordinary writ of execution on a judgment commanding the sheriff to levy the sum, interest and costs on the personal property of the party. Where the sheriff has not sold the goods, *venditioni exponas* issues to compel him to do so. Where the party is a beneficed clergyman, the writ is one of *fieri facias de bonis ecclesiasticis* or of *sequestrari facias* (addressed to the bishop). The latter writ also issues in other cases of an exceptional nature, as against a corporation and to seize a pension. It is addressed to commissioners, not to the sheriff. *Habere facias possessionem* is given to the owner of a tithe or rent charge, enabling him to have possession of the lands chargeable therewith until arrears due to him are paid. *Indicavit* is still nominally grantable under the statute *De Conjunctim Feoffatis* of 1306, and is a particular kind of prohibition granted to the patron of an advowson. *Inquiry* issues for the assessment of damages by the sheriff or his deputy. It represents to some extent the old writ of *justicies*, and the later writ of trial allowed by 3 & 4 Will. IV. c. 42, but is narrower in its operation, for under the last-named writs the whole case or issues under it could be tried. Before an inquiry the liability has been already established. *Levari facias* is the means of levying execution for forfeited recognizances. The Bankruptcy Act 1883 abolished it in civil proceedings. *Ne exeat regno* was at one time issued by virtue of the prerogative to prevent any person from leaving the realm, a form of restraint of liberty recognized by parliament in 5 Ric. II. c. 2. It has now become a means of preventing one who owes an equitable debt of £50 or more from quitting the kingdom, and so withdrawing himself from the jurisdiction of the court without giving security for the debt. It is usually issued on an *ex parte* motion in the chancery division, but is rare in practice, having been superseded by proceedings under the Debtors Act 1869. *Non omittas* is for executing process by the sheriff in a liberty or franchise, where the proper officer has neglected to do so. It rested originally chiefly upon the Statute of Westminster the Second, c. 39, and is now regulated by the Sheriffs Act 1887, which repeals the previous enactment. *Possession* enjoins the sheriff to give possession of land to the party entitled thereto under a judgment for such possession. It fills the place of the old writ of assistance. In admiralty, where the judgment is for possession of a ship, the writ is addressed to the marshal. *Procedendo* is the converse of prohibition. It directs the lower court to proceed with the case. It also lies to restore the authority of commissioners suspended by *supersedeas*. *Restitution* restores property, either real or personal, after the right to it has been judicially declared. Thus it lies on behalf of the owner of real property under the statutes of forcible entry and of the owner of personal property under the Larceny Act 1861. *Significavit*, once a writ, appears since 57 Geo. III. c. 127 to be merely a notice. It is a part of the process against a person disobeying the order of an ecclesiastical court, and consists in a notification to the crown in chancery of the disobedience. Thereupon a writ *de contumace capiendo* issues for his arrest. On his subsequent obedience or satisfaction, a writ of *deliverance* is granted. Precedents of these writs are given in the act named. *Subpoena* is the ordinary means of securing the presence of a witness in court, and is addressed to the person whose attendance is required. It is so called from its containing the words "and this you are not to omit under the penalty of £100," &c. The *subpoena* may be either *ad testificandum*, to give evidence, or *duces tecum*, to produce documents, &c., or both combined. By special order of a judge a *subpoena* may be issued from any court in England, Scotland or Ireland to compel the attendance of a witness out of the jurisdiction. *Summons* is the universal means of commencing an action in the high court. It is addressed to the defendant, and may be either generally or specially indorsed with a statement of the nature of the claim made. The latter form of indorsement is allowed in certain cases of debt or liquidated demand, and gives the plaintiff the great advantage of entitling him to final judgment in default of appearance by the defendant, and even in spite of appearance unless the defendant can satisfy a judge that he ought to be allowed to defend. No statement of claim is necessary in case of a specially indorsed writ, the indorsement being deemed to be the statement. The writ may be issued out of the central office or out of a district registry, and the plaintiff may name on his writ the division of the high court in which he proposes to have the case tried. There are special rules governing the issue of writs in probate and admiralty actions. The writ remains in force for twelve months, but may be renewed for good cause after the expiration of that time. Service must be personal, unless where substituted service is allowed, and in special cases, such as actions to recover land and admiralty actions. Service out of the jurisdiction of a writ or notice of a writ is allowed only by leave of the court or a judge. Notice of the issue of a writ, and not the writ itself, is served on a defendant who is neither a British subject nor in British dominions. The law is contained in the Rules of the Supreme Court, especially orders ii.-xi. and xiv. *Supersedeas* commands the stay of proceedings on another writ. It is often combined with *procedendo*, where on a *certiorari* or prohibition the high court has decided in favour of the jurisdiction of the inferior court. It is also used for removing from the commission of the peace, and for putting an end to the authority of any persons acting under commission from the crown. *Venire facias* is the first proceeding in outlawry, calling upon the party to appear. Under the old practice a *venire facias de novo* was the means of obtaining a new trial. *Ventre inspiciendo* appears still to be competent, and is a curious relic of antiquity. It issues on the application of an heir presumptive in order to determine by a jury of matrons whether the widow of a deceased owner of lands be with child or not. Almost exactly the same proceeding was known in Roman law.

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[1] It may be noticed [illegible] rpretation clause of the Sheriffs Act 1887 the expre [illegible] es any process.

The principal writs of a non-judicial nature relate to parliament or some of its constituent elements. Parliament is summoned by the king's writ issued out of chancery by advice of the privy council. The period of forty days once necessary between the writ and the assembling is now by an act of 1852 reduced to thirty-five days. Writs of summons are issued to the lords spiritual and temporal before every new parliament. Those to Irish representative peers are regulated by the Act of Union, those to archbishops and bishops by the Ecclesiastical Commissioners Act 1847. New peerages are no longer created by writ, but the eldest son of a peer is occasionally summoned to the House of Lords in the name of a barony of his father's. With respect to election of members of the House of Commons, the procedure differs as the election takes place after a dissolution or on a casual vacancy. After a dissolution the writ is issued, as already stated, by order of the crown in council. For a single election the warrant for a new writ is issued during the session by the speaker after an order of the house made upon motion; during the recess by the speaker's authority alone. The warrant is addressed to the clerk of the crown in chancery for Great Britain, to the clerk of the crown and hanaper of Ireland. A *supersedeas* to a writ has sometimes been ordered where the writ was improvidently issued. The time allowed to elapse between the receipt of the writ and the election is fixed by the Ballot Act 1872, sched. 1, at nine days for a county or a district borough, four days for any other borough. The writ is to be returned by the returning officer to the clerk of the crown with the name of the member elected endorsed on the writ. Sched. 2 gives a form of the writ, which is tested, like the writ of error, by the king himself. The returning officer is the sheriff in counties and counties of cities, generally the mayor in cities and boroughs, and the vice-chancellor in universities. Other writs for election are those for convocation, which is by 25 Hen. VIII. c. 19 summoned by the archbishop of the province on receipt of the king's writ, and for election of coroners, verderers of royal forests, and some other officers whose office is of great antiquity. The writ *de coronatore eligendo*, addressed to the sheriff, is specially preserved by the Coroners Act 1887.

Offences relating to writs are dealt with by the Criminal Law Consolidation Acts of 1861 and other statutes. The maximum penalty is seven years' penal servitude.

Scotland.—"Writ" is a more extensive term than in England. Writs are either judicial or extrajudicial, the latter including deeds and other instruments—as, for instance, in the Lord Clerk Register Act 1879, and in the common use of the phrase "oath or writ" as a means of proof. In the narrower English sense both "writ" and "brieve" are used. The brieve was as indispensable a part of the old procedure as it was in England, and many forms are given in *Regiam Majestatem* and *Quoniam Attachiamenta*. It was a command issued in the king's name, addressed to a judge, and ordering trial of a question stated therein. It was drawn by the writers to the signet, originally clerks in the office of the secretary of state. Its conclusion was the will of the summons. In some cases proceedings which were by writ in England took another form in Scotland. For instance, the writ of attaint was not known in Scotland, but a similar end was reached by trial of the jury for wilful error.[1] The English writ of *ne exeat regno* is represented by the *meditatio fugae* warrant. Most proceedings by brieve, being addressed to the sheriff, became obsolete after the institution of the court of session, when the sheriffs lost much of that judicial power which they had enjoyed to a greater extent than the English sheriff (see SHERIFF).[2] An English writ of execution is represented in Scotland by diligence, chiefly by means of warrants to messengers-at-arms under the authority of signet letters in the name of the king. See the Writs Execution Act 1868. The brieve, however, has not wholly disappeared. Brieves of tutory, terce and division among heir-portioners are still competent but not in use. Other kinds of brieve have been superseded by simpler procedure, *e.g.* the brieve of service of heirs, representing the older *breve de morte antecessoris*, by a petition to the sheriff under the Titles to Land Consolidation Act 1868 and the brieve of perambulation by a declaratory action. The brieve of cognition of insane persons is now one of the few of practical importance. The old brieves of furiosity and idiotcy were abolished, and this new form was introduced by the act last named. Writs *eo nomine* have been the subject of much modern legislation. The writs of *capias*, *habeas*, *certiorari* and extent were replaced by other proceedings by the Exchequer Court Act 1856. The writs of *clare constat*, resignation and confirmation (whether granted by the crown or a subject superior) were regulated by the act of 1868. By the same act crown writs are to be in the English language and registered in the register of crown writs. Writs need not be sealed unless at the instance of the party against whom they are issued. Writs of progress (except crown writs, writs of *clare constat* and writs of acknowledgment) were abolished by the Conveyancing Act 1874. The *clare constat* writ is one granted by the crown or a subject superior for the purpose of completing title of a vassal's heirs to lands held by the deceased vassal. Where the lands are leasehold the writ of acknowledgment under the Registration of Leases Act 1857 is used for the same purpose. By the Writs Execution Act 1877 the form of warrant of execution on certain extracts of registered writs is amended. Extracts of registered writs are to be equivalent to the registered writs themselves. Writs registered in the register of sasines for preservation only may afterwards be registered for preservation and execution. By 22 Geo. II. c. 48, passed for the purpose of assimilating the practice of outlawry for treason in Scotland to that in use in England, the court before which an indictment for treason or misprision of treason is found, is entitled on proper cause to issue writs of *capias*, proclamation and *exigent*. In some respects the proceedings in parliamentary elections differ from those in use in England. Thus the writ in university elections is directed to the vice-chancellors of Edinburgh and Glasgow respectively, but not to those of St Andrews and Aberdeen, and there is an extension of the time for the return in elections for Orkney and Shetland, and for the Wick burghs. Representative peers of Scotland were by the Act of Union to be elected after writ issued to the privy council of Scotland. On the abolition of the privy council a proclamation under the great seal was substituted by 6 Anne, c. 23.

United States.—Writs in United States courts are by Act of Congress to be tested in the name of the chief justice of the United States. By state laws writs are generally bound to be in the name of the people of the state, in the English language, and tested in the name of a judge. Writs of error have been the subject of much legislation by the United States and by the states. In New York writs of error and of *ne exeat* have been abolished. Writs as parts of real actions have been generally superseded, but in Massachusetts a writ of entry on disseisin is still a mode of trying title. Writs of dower and of estrepement are still in use in some states. By the law of some states, *e.g.* New Jersey, writs of election are issued to supply casually occurring vacancies in the legislature. The writ of assistance, already named, has its interest in constitutional history. Before the War of Independence it was issued to revenue officers to search premises for smuggled goods. It was on this writ that it was first contended in 1761 that a colonial court had jurisdiction to examine the constitutionality of a legislative act authorizing the issue of the writ. See Quincy's *Massachusetts Rep.* App., I. 520.

AUTHORITIES.—The importance of the writ in procedure led to the compilation of a great body of law and precedent at an early date. In addition to the *Registrum brevium* there were, among other old works, the *Natura brevium*, first published in 1525; Theloall, *Le Digest des briefes originales* (1579); Fitzherbert, *Le Nouvel Natura brevium* (1588); Hughes, *Original Writs* (1655); *Thesaurus brevium* (1661); Brownlow, *Brevia judicialia* (1662); *Officina brevium* (1679). See too Coke upon Littleton, 158, 159, 2 Coke's *Inst.* 39; and Du Cange.[3] Many precedents will be found in the collection of parliamentary writs and in Stubbs's *Select Charters*. The Crown Office Rules, 1906, contain many precedents of the modern writs used in crown practice. Old books of practice, such as Tidd's *Practice*, Corner's *Crown Practice* and Booth's *Real Actions*, contain much law on the subject. For the history, Spence's *Equitable Jurisdiction*, vol. i. bk. ii. ch. viii.; Forsyth's *Hist. of Trial by Jury*, Stephen; *On Pleading*, Bigelow's *Hist. of Procedure*, ch. iv.; Pollock and Maitland, *Hist. of Eng. Law*; and W. S. M'Kechnie, *Magna Carta* may be consulted. There appears to be no book dealing with the writ in modern practice, but sufficient information is contained in the ordinary treatises on procedure. (J. W.)

WRITERS TO THE SIGNET, in Scotland, a society of law agents corresponding to solicitors in England. They were originally clerks in the secretary of state's office and prepared the different writings passing the signet; every summons is still signed on its last page by a writer to the signet. By the Titles to Land Consolidation (Scotland) Act 1868, they have the exclusive privilege of preparing all crown writs, charters, precepts, &c., from the sovereign or the prince of Scotland. They have no charter but are usually considered a corporation by long custom; they have office-bearers and are members of the College of Justice. On the Act of Union there was much debate as to whether writers to the signet should be eligible to the Scottish bench. It was finally decided that they should be eligible aften ten years' practice. But, with the exception of Hamilton of Pencaitland in 1712, no writer to the signet has ever had a seat on the bench.

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[1] An example occurring in the reign of James VI. will be found in Pitcairn, *Criminal Trials*, i. 216.

[2] Explanations of many of the older writs will be found in Lord Clerk Register Skene's *De verborum significatione* (1641), and styles in Spotiswood, *Stile of Writs* (1715)

[3] A reference to Du Cange will show the great variety of the non-legal uses of *brevis* or *breve*. It may mean, *inter alia*, an annual rent, an amulet, a notice of the death of a monk. *Brevetum* signified what are now known as ship's papers.

WRITING (the verbal noun of "to write," O. Eng. *writan*, to inscribe), the use of letters, symbols or other conventional characters, for the recording by visible means of significant sounds; more specifically, the art of tracing by hand these symbols on paper or other material, by pen and ink, pencil, stylus or other such means, as opposed to mechanical methods such as printing. The principal features in the development of writing in its primary sense are dealt with in separate articles (see ALPHABET, PALAEOGRAPHY, INSCRIPTIONS, BOOK, MANUSCRIPT, SHORTHAND, &c.). Here it is only necessary briefly to refer to the origins of a system which has eventually followed the history of the various languages and has been stereotyped by the progress of typography (*q.v.*). Very early in the history of mankind three needs become pressing. These are (*a*) to recall at a particular time something that has to be done; (*b*) to communicate with some other person who is not present, nor for the moment easily accessible; (*c*) to assert rights over tools, cattle, &c., by a distinctive mark, or by a similar mark to distinguish one's own production (*e.g.* a special make of pottery) from that of others. The last-named use, out of which in time develops every kind of trade-mark, is itself a development of the earlier property mark. The right to property must be established before traffic, whether by way of barter or of sale, is possible.

Knot signs.

Every one is familiar with devices to achieve the first of these aims; one of the commonest is to tie a knot in a handkerchief. It is obvious that by multiplying the number of knots a number of points equal to the number of knots might in this way be referred to, though it is probable that the untrained memory would fail to recall the meaning attached to more than a very limited number of knots. The simplest application of these knots is in keeping a record of a number of days, as in the story related by Herodotus (iv. 98), to the effect that Darius, on crossing the Ister in his Scythian expedition, left with the Greeks appointed to guard the bridge a thong with a number of knots equal to the number of days that their watch over the bridge was to be continued. One knot was to be undone each day, and if the king had not returned by the time that all the knots were undone, the Greeks were to break down the bridge and go away. A development of this is found in the Peruvian *quipus*, which consists of a number of thongs or cords hanging from a top-band or cross-bar. In its simplified form, knots are merely tied upon the individual cords. In its more elaborate forms the cords are of different colours, and are knotted together so as to form open loops of various shapes. In the *Antiguedades Peruanas*,[1] we are told that the knots of the *quipus* in all probability indicated only numbers originally, but that as time went on the skill of the makers became so great that historical events, laws and edicts could thus be communicated. In every place of any importance there was an official whose business it was to interpret *quipus* received from a distance, and to make *quipus* himself. If, however, the *quipus* which was received came from a distant province, it was not intelligible without an oral explanation. Unfortunately, the art of interpretation of *quipus* is lost, so that it is impossible to ascertain how far the knots were merely a mnemonic for the messenger, and how far they were intelligible without explanation to a stranger. Similar mnemonics are said to have been used in the remotest antiquity amongst the Chinese, the Tibetans, and other peoples of the Old World.[2]

Message-sticks.

Similar in character to the *quipus* is the message-stick, which is still in use amongst the natives of Australia. A branch of a tree is taken and notches made upon it. These are now cut with a knife; in earlier times they were made with the edge of a mussel shell. The notches are made in the presence of the messenger, who receives his instructions while they are being made. The notches are thus merely aids to memory, and not self-explanatory, though if messages frequently passed between two persons, practice would in time help the person to whom the message was sent to guess at the meaning, even without a verbal explanation. The following was the method of the Wotjoballuk of the Wimmera river in Victoria.[3] "The messenger carried the message-stick in a net bag, and on arriving at the camp to which he was sent, he handed it to the headman at some place apart from the others, saying to him, 'So-and-so sent you this,' and he then gives his message, referring as he does so to the notches on the message-stick; and if his message requires it, also enumerates the days or stages, as the case may be," by a method of counting on different parts of the body.

Marked pebbles.

For the purposes of communication with absent persons, however, another method commended itself, which in time was adopted also for mnemonic purposes. This method was the beginning whence some forms at least of later writing have been derived. From the very earliest times to which the energy of man can be traced, date two kinds of writing: (*a*) engraving of a visible object on some hard substance, such as the flat surface of a bone; (*b*) drawing, painting or engraving marks which could again be identified. Of the first kind are the engravings of reindeer, buffaloes and other animals by the cave men of prehistoric times; of the second are a large number of pebbles discovered by M. Ed. Piette at Mas d'Azil, on the left bank of the Arize, an account of which was published by the discoverer in *L'Anthropologie* (1896), vii. 384 sqq. This layer of coloured pebbles is intercalated between the last layer of the Reindeer Age and the first of the Neolithic period. The layer is over 2 ft. thick, of a reddish-black colour, and along with the pebbles are found cinders, peroxide of iron, teeth of deer perforated, probably in order to be strung like beads, harpoons of various kinds, and the bones of a large number of animals, some wheat, and, in the upper part of the layer, nuts, cherry-stones and plums. The stones were coloured with peroxide of iron. The characters are of two kinds: (*a*) a series of strokes which possibly indicate numbers, (*b*) graphic symbols. The stones were scattered about without connexion or relation one with another. Whatever the meaning may be, it is clear that the markings are not accidental. It is noticeable, however, that none of them definitely represent any animal, though some of them bear a certain resemblance to caterpillars or serpents. Others look like rough attempts to represent trees and river plants. A great number closely resemble symbols of the alphabet. Piette himself was inclined to see in the symbols the forerunners of the later syllabaries and alphabets of the East, nine of them agreeing with forms in the Cypriot syllabary (see below) and eleven with those of the Phoenician alphabet. A certain amount of likeness, however, could not well be avoided, for as soon as the artist advances beyond the single perpendicular or horizontal line he must, by crossing two lines, get forms which resemble alphabetical symbols. It might be therefore a safer conclusion to suppose that if they passed beyond magic symbols, to be buried like the Australian *churinga*, they were conventional marks understood by the members of the clan or tribe which frequented the caves of Mas d'Azil. It has been suggested that, like similar things among the American Indians, they may have been used in playing games or gambling.

American picture-writing, &c.

A very large number of conventional marks, however, are demonstrably reductions from still older forms, conventional marks often developing out of pictographs. Pictography has, in fact, left its traces in all parts of the world. It has, however, been most widely developed in the New World as a system lasting down to modern times. The American Indians, besides picture-writing, used also (1) the simple mnemonic of a notched stick to record various incidents, such as the number of days spent on an expedition, the number of enemies slain and the like; (2) wampum belts, consisting of strung beads, which could be utilized as a mnemonic, exactly like a rosary. Wampum belts, however, were employed in more intricate forms; white beads indicated peace, purple or violet meant war. Sometimes a pattern was made in the belt with beads of a different colour, as in the belt presented to

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[1] Quoted by Middendorf, *Das Runa Simi oder die Keshua Sprache* (Leipzig, 1890), p. 8.

[2] Cf. Andree, *Ethnologische Parallelen und Vergleiche*, i. p. 184 sqq.

[3] A. W. Howitt in *Journal of the Anthropological Institute*, xviii. (1889), p. 318 sqq.

William Penn on the making of a treaty with the *Leni-Lenape* chiefs in 1682. Here, in the centre of the belt, two figures, intended to represent Penn and an Indian, join hands, thus clearly indicating a treaty. Very simple pictures are drawn upon birch bark, indicating by their order the subjects in a series of song-chants with sufficient precision to enable the singer to recall the theme of each in his recitation. An account can be kept of sales or purchases by representing in perpendicular strokes the number of items, and adding at the end of each series a picture of the animal or object to which the particular series refers. Thus three strokes followed by the picture of a deer indicate that the hunter has brought three deer for sale. A conventional symbol (a circle with a line across it) is used to indicate a dollar, a cross represents ten cents, and an upright stroke one cent, so that the price can be quite clearly set forth. This practice is followed in many other parts of the world. In clay tablets discovered by Dr Arthur Evans during his exploration of the great palace at Knossos, in Crete, a somewhat similar method of enumeration is followed; while at Athens conventional symbols were used to distinguish drachmae and obols upon the revenue records, of which considerable fragments are still preserved.

In comparatively recent times, according to Colonel Mallery (*10th Annual Report of American Bureau of Ethnology*), the Dakota Indians invented a chronological table, or winter count, wherein each year is recorded by a picture of some important event which befell during that year. In these pictures a considerable amount of symbolism was necessary. A black upright stroke indicates that a Dakota Indian was killed, a rough outline of the head and body spotted with blotches indicates that in the year thus indicated the tribe suffered from smallpox. Sometimes, in referring to persons, the symbol is of the nature of a rebus. Thus, Red Coat, an Indian chief, was killed in the winter of 1807–1808; this fact is recorded by a picture of a red coat with two arrows piercing it and blood dripping. There is, however, nothing of the nature of a play upon words intended, and even when General Manyadier is represented as a figure in European dress, with the heads of two deer behind his head and connected with his mouth, no rebus was intended (many a deer), but the Indians supposed that his name really meant this, like their own names Big Crow, Little Beaver, and so forth. Here the Mexicans proceeded a stage further, as in the often quoted case of the name of Itz-coatl, literally knife-snake, which is ordinarily represented by a reptile (*coatl*) with a number of knives (*its*) projecting from its back. It is, however, also found divided into three words, itz-co-atl—knife-pot-water—and represented by a different picture accordingly. The Mexicans, moreover, to indicate that the picture was a proper name, drew the upper part of the human figure below the symbol, and joined them by a line, a practice adopted also amongst their northern neighbours when, as in names like Little-Ring, the representation would hardly be sufficiently definite. Simple abstract notions could also be expressed in this picture-writing. Starvation or famine was graphically represented by a human figure with the ribs showing prominently. A noose amongst the Mexicans was the symbol for robbery, though more logically belonging to its punishment. In a Californian rock-painting reproduced by Mallery (p. 638), sorrow is represented by a figure from whose eyes drop tears. This could be abbreviated to an eye with tears falling from it, a form recorded by Schoolcraft as existing amongst the Ojibwa Indians. The symbol is so obvious that it is found with the same value among Egyptian hieroglyphics.

The civilization of the American Indians was nowhere very high, and for their simple needs this system, without further development, sufficed. It was different in the more elaborate civilizations which prevailed among the ancient peoples of the Old World, to whom with certainty the development of writing from pictography can be ascribed—the Assyrians (see Cuneiform), Egyptians (see Egypt) and Chinese (see China). Here more complex notions had to be expressed. The development of the system can be traced through many centuries, and, as might be expected, this development shows a tendency to conventionalize the pictorial symbols employed. Out of conventionalized forms develop (*a*) syllabaries, (*b*) alphabets. As regards the latter the historical evolution is traced in the article Alphabet. The account given under China (*language*) gives a good idea of the development of a syllabary from pictographic writing.

Egyptian.

The Egyptian system of writing is perhaps the oldest of known scripts, and was carried on till the Ptolemaic period, when the more convenient Greek alphabet led to its gradual disuse. But, as in Chinese, the fact that it was so long in use led to the conventionalizing of the pictures, and in many cases to a complete divorcement between the symbol and the sound represented, the original word having often become obsolete. In this case it is no longer possible to trace it. Attempts have been made to connect the three great pictographic systems of the Old World, some authorities holding that the Chinese migrated eastwards from Babylonia, while others contend that the civilization of Egypt sprang originally from the valley of the Euphrates, and that the ancient Egyptians were of the same stock as the Somali and were overlaid and permeated by a Semitic conquest and civilization. But there is no clear evidence that the Egyptian system of writing was not a development in the Nile Valley itself, or that it was either the descendant or the parent of the pictographic system which developed into the cuneiform of Assyria and neighbouring lands.

Egyptian started from the same point as every other pictographic system—the representation of the object or the concrete expression of the idea. But, like the Chinese, it took the further step, short of which the American Indian pictographs stopped; it converted its pictures into a syllabary from which there was an imperfect development towards an alphabet. Egyptian, however, never became alphabetic in the sense in which the western languages of modern Europe are alphabetic. This is attributed to the natural conservatism of the people, and the influence of the artist scribes, who, as Mr F. Ll. Griffith has pointed out, "fully appreciated the effect of decorative writing; to have limited their choice of signs by alphabetic signs would have constituted a serious loss to that highly important body." The effect of this love for decoration, combined with a desire for precision, is shown by the repetition several times over in the symbols of the sounds contained in a word. The development of Egyptian was exactly parallel to Chinese. A combination of sounds, which was originally the name of an object, was represented by the picture of that object. This picture again, like Chinese, and like the Indian name "Little-Ring," required at the end a determinative—a picture of the kind of object intended—in order to avoid ambiguity. As the alphabet represented only consonants and semi-consonants, and the Egyptian roots consisted mostly of only three letters, the parallelism with Chinese is remarkably close.

Hittite.

The cuneiform script spread to other people who spoke tongues in no way akin to those of either its inventors, the Sumerians, or their conquerors, the Semitic Babylonians. A widespread series of inscriptions, found in many parts of Asia and even in the Aegean, which are generally described as Hittite (*q.v.*) are written in a script of pictographic origin, though probably independent of Babylonian in its development.

Cyprian.

It is noteworthy that at a very early period a colony of Greeks from the Peloponnese, speaking a dialect closely akin to the Arcadian dialect (which is known to us only from a much later period), had settled in the island of Cyprus. Alone among the Greeks this colony did not write in an alphabet, but under some Asiatic influence adopted a syllabary. Even when the island came again closely in touch with their Greek kinsfolk, after the Persian wars, the Greek inhabitants continued to write in their syllabary. In the recent excavations made by the authorities of the British Museum an inscription of the 4th century B.C. was discovered, whereon a dedication to Demeter and Persephone was given first in Greek letters and repeated below in the syllabary, the Greek (as universally at so late a period) reading from left to right, the syllabary from right to left. This syllabary has five vowel symbols, but it could not distinguish between long and short vowels. In its consonant system it is unable to distinguish between breathed, voiced and aspirated stops, thus having but one symbol to represent *πε*, *βε* and *φε*. It is, of course, unable to represent a final consonant, but this is achieved by using the symbol for a syllable ending in *e* conventionally for the final consonant. Thus *ka-se* stands for *κάς*, the Cyprian equivalent of *καί*, "and." There are symbols for *ta*, for *te*, for *ti*, for *to*, for *tu*, though none for *t*, and similarly for most of the other consonants. There is, however, no symbol for *wu* (*Fυ*); *ya*, *ye*, *yi* occur, but no *yo* or *yu*. *Δαμάτρι* is expressed by *ta-ma-ti-ri*, where *ti* stands for *t* alone; *sa-ta-sa-to-ro* stands for *Στασάνδρω* (genitive). Here it is to be observed (1) that *ν* preceding another consonant is omitted altogether, the vowel being probably nasalized as in French; (2) that, as in the previous word, there is a sort of vowel euphony whereby the unnecessary vowel accompanying *t* takes the colour of the succeeding vowel. In other cases, however, it follows the preceding vowel, as in *a-ri-si-to-pa-to-o-a-ri-si-ta-go-ra-u* = *Ἀριστόφαντο(ς) ὁ Ἀρισταγόραυ*.

For literature on the history of writing, see the bibliographies to the articles Alphabet, &c., and under the headings of the various languages and peoples.

WROTHAM, an urban district in the Medway parliamentary division of Kent, England, 10 m. W. by N. of Maidstone, on the South-Eastern & Chatham railway. Pop. (1901) 3571. The church of St George, Early English and later, contains numerous brasses; and near it is the site of a palace of the archbishops of Canterbury, maintained until the time of Archbishop Simon Islip (*c.* 1350). S.W. of Wrotham is the village of Ightham, in which is a fine quadrangular moated manor-house, the Mote, in part of the 14th century, but with portions of Tudor dates.

WRYNECK (Ger. *Wendehals*, Dutch *draaihalzen*, Fr. *torcol*), a bird so called from its way of writhing its head and neck, especially when captured on its nest in a hollow tree. The *Iynx*[1] *torquilla* is a regular summer visitant to most parts of Europe, generally arriving a few days before the cuckoo, and is known in England as "cuckoo's leader" and "cuckoo's mate," but occasionally is called "snake-bird," not only from the undulatory motions just mentioned, but from the violent hissing with which it seeks to repel an intruder from its hole.[2]

The unmistakable note of the wryneck is merely a repetition of what may be syllabled *que, que, que*, many times in succession, rapidly uttered at first, but gradually slowing and in a continually falling key. This is only heard during a few weeks, and for the rest of the bird's stay in Europe it seems to be mute. It feeds almost exclusively on insects, especially on ants. It is larger than a sparrow, but its plumage is not easily described, being beautifully variegated with black, brown, buff and grey—the last produced by minute specks of blackish-brown on a light ground—the darker markings disposed in patches, vermiculated bars, freckles, streaks or arrow-heads—and the whole blended most harmoniously, so as to recall the coloration of a goatsucker (*q.v.*) or of a woodcock (*q.v.*). The wryneck commonly lays its translucent white eggs on the bare wood of a hole in a tree, and it is one of the few wild birds that can be induced to go on laying by abstracting its eggs day after day, and thus upwards of forty have been taken from a single hole—but the proper complement is from six to ten. As regards Britain, the bird is most common in the S.E., its numbers decreasing rapidly towards the W. and N., so that in Cornwall and Wales and beyond Cheshire and Yorkshire its occurrence is but rare; while it appears only by accident in Scotland and Ireland.

Some writers have been inclined to recognize five other species of the genus *Iynx*; but the so-called *I. japonica* is specifically indistinguishable from *I. torquilla*; while that designated, through a mistake in the locality assigned to it, *I. indica*, has been found to be identical with the *I. pectoralis* of S. Africa. Near to this is *I. pulchricollis*, discovered by Emin Pasha in the E. of the Bar-el-Djebel (*Ibis*, 1884, p. 28, pl. iii.). Another distinct African species is the *I. aequatorialis*, originally described from Abyssinia. The wrynecks (see WOODPECKER) form a subfamily *Iynginae* of the *Picidae*, from the more normal groups of which they differ but little in internal structure, but much in coloration and in having the tail-quills flexible, or at least not stiffened to serve as props as in the climbing *Picinae*. (A. N.)

WRY-NECK (Lat. *Torticollis*), a congenital or acquired deformity, characterized by the affected side of the head being drawn downwards towards the shoulder together with deviation of the face towards the sound side. There are various forms. (1) The congenital, due to a lesion of the sterno-mastoid muscle, either the result of a malposition in utero or due to the rupture of the muscle in the delivery of the aftercoming head in the birth of the breech presentation. (2) The rheumatic, due to exposure to a draught or cold. This is commonly known as "stiff-neck." (3) The nervous or spasmodic, the result of (*a*) direct irritation of the spinal accessory nerve or its roots, or (*b*) the result of cerebral irritation. In this form there is generally a family history of nervous diseases, notably epilepsy. This spasm is one of a group of nervous spasms known as "tics," a variety of habit spasm. The character of the movements varies with the muscles involved, the most usual muscle being the sterno-mastoid. The spasm ceases during sleep. Many cases are also due to hysteria and some to spinal caries. When wry-neck is congenital, massage and manipulation may be tried and some form of apparatus. Failing this, division of the muscle surgically may be practised. In the spasmodic forms, anti-neurotic treatment is recommended, the use of the bromides, valerianates and belladonna, and hydrobromide of hyoscine injected into the muscles has been found of value. T. Grainger Stewart recommends in persistent tic the trial of continuous and regular movements in the affected group of muscles with a view to replacing the abnormal movements by normal ones. In severe cases it may be necessary to cut down on and stretch or excise the spinal accessory nerve. In rheumatic torticollis the spasm is usually overcome by the application of hot compresses and appropriate anti-rheumatic treatment.

WUCHANG, the capital of the combined provinces of Hup-eh and Hu-nan, China. It is one of the three cities, Wuchang, Hanyang and Hankow, which stand together at the mouth of the Han river, and is situated on the right bank of the river Yangtsze, almost directly opposite the foreign settlement of Hankow. It is the seat of the provincial government of the two Hu or Hu-kwang, as these provinces are collectively termed, at the head of which is a viceroy. Next to Nanking and Canton, it is one of the most important vice-royalties in the empire. It possesses an arsenal and a mint. The provincial government has established ironworks for the manufacture of rails and other railway material. As the works did not pay under official management, they were transferred to the director-general of railways. Wuchang is not open to foreign trade and residence, but a considerable number of missionaries, both Roman Catholic and Protestant, live within the walls. The native population is estimated at 800,000, including cities on both banks. Wuchang is an important junction on the trunk railway from Peking to Canton; and is on the route of the Sze-ch'uen railway.

WUCHOW, a treaty port in the province of Kwang-si, China, opened to foreign trade in 1897, and situated on the left bank of the Si-kiang (West river) at its junction with the Fu or Kwei-Kiang (Cassia) river. It is 220 m. above Canton, with which it is in navigable connexion for vessels drawing up to 8 ft of water. In 1908 the value of the trade passing through the maritime customs amounted to £1,566,000, representing, however, only a portion of the trade. Of this total, two-thirds were for imports, consisting principally of cotton and cotton goods, kerosene oil, woollens, &c. Sugar, various oils, hides and aniseed were the chief exports. The native population is estimated at 65,000. At Shuihing the river flows for 5 m. through a deep gorge bordered by limestone cliffs 2000 ft. in height. Farther up the river threads its way through a series of rocky defiles, forming at intervals what seems an inland lake with no apparent outlet. During summer floods the water thus pent up by the gorges rises at Wuchow 50 or 60 ft. In consequence of the variation of river level, the principal offices and shops are built upon pontoons which are moored alongside the river-bank. The situation of Wuchow makes it the natural distributing centre between Kwei-chow, Kwang-si and Canton. Great things were therefore expected of it as a treaty port, but disorders in Kwang-si delayed the fulfilment of the hopes. Trade, however, has improved, and a large native passenger traffic has sprung up between it and Canton. It is connected with Hong Kong and Shanghai by telegraph.

WUHU, a district city in the province of Ngan-hui, China, about 1 m. from the S. bank of the Yangtsze-kiang, with which it is connected by a straggling suburb. It is about 50 m. above Nanking, and in 1858 it was marked out as a treaty port, but was not opened to trade until 1877. It is connected by canals with the important cities of Ning-Kwo Fu, T'ai-p'ing Hien, Nan-ling Hien and Ching Hien, the silk districts in the neighbourhood of the two last cities being within 50 m. of Wuhu. Coal to a considerable extent exists in the country round. At first its commercial progress was very slow, the older ports of Kiu-kiang and Chin-kiang militating against its success; but of late there has been a distinct improvement in the trade of the port, the net value of which was about £3,000,000 in 1906. The principal exports are rice, cotton, wheat, tea, furs and feathers. For the production of feathers large quantities of ducks are reared in the surrounding districts. Of imports, opium formed the most considerable item; other imports being matches, needles, sandalwood and window glass. The city, which is one of the largest of its rank in China, was laid desolate during the T'ai-p'ing rebellion, but has been repeopled, the population being estimated (1906) at 137,000. The streets are comparatively broad and are well paved. The land set apart for the British settlement, advantageously situated, was little built upon. A new general foreign settlement was opened in 1905.

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[1] Frequently misspelt, as by Linnaeus in his later years, *Yunx*.

[2] The peculiarity was known to Aristotle, and possibly led to the cruel use of the bird as a love-charm, to which several classical writers refer, as Pindar (*Pyth.* iv. 214; *Nem.* iv. 35), Theocritus (iv. 17. 30) and Xenophon (*Memorabilia*, iii. 11. 17, 18). In one part at least of China a name, *Shay-king*, signifying "Snake's neck," is given to it (*Ibis*, 1875, p. 125).

WULFENITE, a mineral consisting of lead molybdate, $PbMoO_4$, crystallizing in the hemimorphic-tetartohedral class of the tetragonal system. Crystals usually have the form of thin square plates bevelled at the edges by pyramidal planes. They have a brilliant resinous to adamantine lustre, and vary in colour from greyish to bright yellow or red: the hardness is 3, and the specific gravity 6·7. Small amounts of calcium are sometimes present isomorphously replacing lead. The mineral occurs in veins of lead ore, and was first found in the 18th century in the lead mines at Bleiberg in Carinthia. Bright yellow crystals are found in New Mexico and Utah, and brilliant red crystals in Arizona.

WULFHERE (d. 675), king of the Mercians, was a younger son of King Penda, and was kept in concealment for some time after his father's defeat and death in 655. In 658 or 659, however, the Mercians threw off the supremacy of Oswio, king of Northumbria, and Wulfhere became their king. He took energetic measures to spread Christianity, and was greatly helped by his bishop, Jaruman, and afterwards by St Chad. Outside Mercia he did something to induce the East and the South Saxons to accept Christianity, and is said to have founded one or two monasteries. He gained Lindsey from Northumbria in 657, and was successful against Wessex. He extended his borders in all directions, and was the founder of the passing greatness of Mercia, although he lost Lindsey just before his death. Wulfhere's wife was Eormenhild, a daughter of Erconberht, king of Kent, and he was succeeded by his brother Aethelred. His only son Coenred became king in 704 in succession to Aethelred. His only daughter was St Werburga or Werburh, abbess of Ely.

See Bede, *Historia ecclesiastica*, ed. C. Plummer (Oxford, 1896); and J. R. Green, *The Making of England* (1897–1899).

WULFSTAN, archbishop of York from 1003 until his death in May 1023, and also bishop of Worcester from 1003 to 1016, is generally held to be the author of a remarkable homily in alliterative English prose. Its title, taken from a manuscript, is *Lupi sermo ad Anglos, quando Dani maxime prosecuti sunt eos, quod fuit anno 1014*. It is an appeal to all classes to repent in the prospect of the imminent day of judgment, and gives a vivid picture of the desperate condition of England in the year of King Aethelred II.'s flight (1014). Of the many other homilies ascribed to Wulfstan very few are authentic. Subsequent legislation, especially that of Canute, bears clear traces of his influence.

See the edition of his homilies by A. Napier (Berlin, 1883); also the same writer's *Über die Werke des altenglischen Erzbischofs Wulfstan* (Göttingen dissertation, 1882), and his paper in *An English Miscellany* (Oxford, 1901, pp. 355 f.); also A. Brandl in H. Paul's *Grundriss der germanischen Philologie* (2nd ed., 1901–1909), ii. pp. 1110-1112.

WULFSTAN, ST (*c.* 1012–1095), bishop of Worcester, was born at Little Itchington near Warwick and was educated in the monastic schools of Evesham and Peterborough. He became a monk at Worcester, and schoolmaster and prior in the cathedral monastery there. In 1062 he was chosen bishop of Worcester, and the choice was approved by the witan; with some reluctance Wulfstan accepted, and was consecrated at York in September. The see of Worcester and the archbishopric of York had been held together before 1062 by Archbishop Aldred, who, when he was compelled to resign Worcester, retained twelve manors belonging to the see, which Wulfstan did not recover for some years. About 1070, however, it was decided that Worcester was in the province of Canterbury. Although he had been on friendly terms with Harold, the bishop submitted to William at Berkhampstead, and he was very useful in checking the rebellious barons during the revolt of 1075. He was equally loyal to William II. in his struggle with the Welsh. Wulfstan's relations with his ecclesiastical superiors were not so harmonious, and at one time both Lanfranc of Canterbury and Thomas of York unsuccessfully demanded his removal. He was the only survivor of the Anglo-Saxon bishops when he died on the 18th of January 1095. In 1203 he was canonized by Pope Innocent III. By his preaching at Bristol Wulfstan is said to have put an end to the kidnapping of English men and women and selling them as slaves. He rebuilt the cathedral church of Worcester, and some parts of his building still remain.

Lives of St Wulfstan by Hemming and Florence of Worcester are in H. Wharton's *Anglia sacra* (1691). See also E. A. Freeman, *Norman Conquest* (1867–1879).

WULLENWEBER, JÜRGEN (*c.* 1492–1537), burgomaster of Lübeck, was born probably at Hamburg. Settling in Lübeck as a merchant he took some part in the risings of the inhabitants in 1530 and 1531, being strongly in sympathy with the democratic ideas in religion and politics which inspired them. Having joined the governing council of the city and become leader of the democratic party, he was appointed burgomaster early in 1533 and threw himself into the movement for restoring Lübeck to her former position of influence. Preparations were made to attack the Dutch towns, the principal trading rivals of Lübeck, when the death of Frederick I., king of Denmark, in April 1533 changed the position of affairs. The Lübeckers objected to the bestowal of the Danish crown upon any prince favourable to the Empire or the Roman religion, and Wullenweber went to Copenhagen to discuss the matter. At length an alliance was concluded with Henry VIII. of England; considerable support was obtained in N. Germany; and in 1534 an attack was made on Christian, duke of Holstein, afterwards King Christian III., who claimed the throne. At first the Lübeckers gained several successes, but Christian of Holstein appeared before Lübeck; the efforts of Wullenweber to secure allies failed; and the citizens were compelled to make peace. The imperial court of justice at Spires restored the old constitution, and in August 1535 the aristocratic party returned to power. Soon afterwards Wullenweber was seized by Christopher, archbishop of Bremen, and handed over to his brother Henry II., duke of Brunswick-Wolfenbüttel. Having been tortured and sentenced to death as a traitor and an Anabaptist, he was beheaded at Wolfenbüttel on the 29th of September 1537. Wullenweber, who was long regarded as a popular hero in Lübeck, inspired tragedies by Heinrich Kruse and Karl Ferdinand Gutzkow, and a novel by Ludwig Köhler.

See G. Waitz, *Lübeck unter Jürgen Wullenweber und die europäische Politik* (Berlin, 1855–1856).

WUNDT, WILHELM MAX (1832–   ), German physiologist and philosopher, was born on the 16th of August 1832 at Neckarau, in Baden. He studied medicine at Tübingen, Heidelberg and Berlin, and in 1857 began to lecture at Heidelberg. In 1864 he became assistant professor there, and in 1866 was chosen to represent Heidelberg in the Baden Chamber, but soon resigned. In 1874 he was elected regular professor of philosophy at Zürich, and in the following year was called to the corresponding chair at Leipzig, where he founded an Institute for Experimental Psychology, the precursor of many similar institutes. The list of Wundt's works is long and comprehensive, including physiology, psychology, logic and ethics. His earlier works deal chiefly with physiology, though often in close connexion with psychology, as in the *Vorlesungen über die Menschen- und Tierseele* (1863; 4th ed., 1906; trans. Creighton and Titchener, 1896), *Lehrbuch der Physiologie des Menschen* (1865; 4th ed., 1878), and *Grundzüge der physiologischen Psychologie* (1874; 6th ed., 3 vols., 1908). He published an important work on *Logik* (1880–1883; 3rd ed., 1906–1907), and this was followed in 1886 by his *Ethik* (3rd ed., 1903). According to Wundt, the straight road to ethics lies through ethnic psychology, whose especial business it is to consider the history of custom and of ethical ideas from the psychological standpoint. We must look for ethics to supply the corner-stone of metaphysics, and psychology is a necessary propaedeutic. The *System der Philosophie* (1899; 3rd ed., 1907) contained the results of Wundt's work up to that date, both in the domain of science and in the more strictly philosophic field. The metaphysical or ontological part of psychology is in Wundt's view the actual part, and with this the science of nature and the science of mind are to be brought into relation, and thus constituted as far as possible philosophical sciences. In 1892 Wundt published *Hypnotismus und Suggestion*. Subsequent important works are the *Grundriss der Psychologie* (1896; 8th ed., 1907; trans. Judd, 3rd ed., 1907); *Völkerpsychologie* (1900–1906); *Einleitung in die Philos.* (1901; 4th ed., 1906). Two other works, containing accounts of the work of himself and his pupils, are *Philosophische Studien* (1883–1902) and *Psychologische Studien* (1905 foll.).

WUNTHO, a native state of Upper Burma annexed by the British and incorporated in the district of Katha in 1892. Wuntho was classed by the Burmese as a Shan state, but was never on the same footing as the true Shan states, and only escaped becoming an integral part of the Burmese empire through Burmese want of system. The Shan name is Wying Hsö, "the city of the high." It had an area of about 2400 sq. m. with 150,000 inhabitants, and lay midway between the Irrawaddy and Chindwin rivers. When the British annexed Upper Burma in 1885 the state became a refuge for rebels and dacoit leaders. Finally in 1891 the state broke out into open rebellion, the sawbwa was deposed, and a force of 1800 troops under General Sir George Wolseley occupied the town of Wuntho and reduced the state to order.

WUPPER, a river of Germany, a right-bank tributary of the Rhine, rising in the Sauerland near Meinerzhagen. The most remarkable part of its course is that in the so-called Wuppertal. In this section, 30 m. in length, it passes through the populous towns of Barmen and Elberfeld and supplies water-power to about five hundred mills and factories. Leaving the hills above Opladen, it debouches on to the plain and enters the Rhine at Rheindorf between Cologne and Düsseldorf, after a course of 63 m.

See A. Schmidt, *Die Wupper* (Lennep, 1902).

WÜRTTEMBERG, a kingdom of Germany, forming a tolerably compact mass in the S.W. angle of the empire. In the south it is cleft by the long narrow territory of Hohenzollern, belonging to Prussia; and it encloses six small enclaves of Baden and Hohenzollern, while it owns nine small exclaves within the limits of these two states. It lies between 47° 34′ 48″ and 49° 35′ 17″ N., and between 8° 15′ and 10° 30′ E. Its greatest length from N. to S. is 140 m.; its greatest breadth is 100 m.; its boundaries, almost entirely arbitrary, have a circuit of 1116 m.; and its total area is 7534 sq. m., or about 1/18th of the entire empire. It is bounded on the E. by Bavaria, and on the other three sides by Baden, with the exception of a short distance on the S., where it touches Hohenzollern and the lake of Constance.

Physical Features.—Württemberg forms part of the South-German tableland, and is hilly rather than mountainous. In fact the undulating fertile terraces of Upper and Lower Swabia may be taken as the characteristic parts of this agricultural country. The usual estimates return one-fourth of the entire surface as "plain," less than one-third as "mountainous," and nearly one-half as "hilly." The average elevation above the sea-level is 1640 ft.; the lowest point is at Böttingen (410 ft.), where the Neckar quits the country; the highest is the Katzenkopf (3775 ft.), on the Hornisgrinde, on the western border.

The chief mountains are the Black Forest (*q.v.*) on the west, the Swabian Jura or Rauhe Alb stretching across the middle of the country from south-west to north-east, and the Adelegg Mountains in the extreme south-east, adjoining the Algau Alps in Bavaria. The Rauhe Alb or Alp slopes gradually down into the plateau on its south side, but on the north it is sometimes rugged and steep, and has its line broken by isolated projecting hills. The highest summits are in the south-west, viz. the Lemberg (3326 ft.), Ober-Hohenberg (3312 ft.) and Plettenberg (3293 ft.). To the south of the Rauhe Alb the plateau of Upper Swabia stretches to the lake of Constance and eastwards across the Iller into Bavaria. Between the Alb and the Black Forest in the north-west are the fertile terraces of Lower Swabia, continued on the north-east by those of Franconia

About 70% of Württemberg belongs to the basin of the Rhine, and about 30% to that of the Danube. The principal river is the Neckar, which flows northward for 186 m. through the country to join the Rhine, and with its tributaries the Rems, Kocher, Jagst, Ens, &c. [illegible] he kingdom. The Danube flows from east to west across the south half of Württemberg, a distance of 65 m., a small section of which is in Hohenzollern. Just above Ulm it is joined by the Iller, which forms the boundary between Bavaria and Württemberg for about 35 m. The Tauber in the north-east joins the Main; the Argen and Schussen in the south enter the lake of Constance. The lakes of Württemberg, with the exception of those in the Black Forest, all lie south of the Danube. The largest is the Federsee (1 sq. m.), near Buchau. About one-fifth of the lake of Constance is reckoned to belong to Württemberg. Mineral springs are abundant; the most famous spa is Wildbad, in the Black Forest.

The climate is temperate, and colder among the mountains in the south than in the north. The mean temperature varies at different points from 43° to 50° F. The abundant forests induce much rain, most of which falls in the summer. The soil is on the whole fertile and well cultivated, and agriculture is the main occupation of the inhabitants.

Population.—The population of the four departments (*Kreise*) into which the kingdom is divided is shown below:—

District (*Kreis*).	Area in sq. m.	Pop. 1900.	Pop. 1905.	Density 1905.
Neckar. . . .	1286	745,669	811,478	631
Black Forest (Schwarzwald)	1844	509,258	541,662	293
Jagst	1985	400,126	407,059	205
Danube (Donau) . .	2419	514,427	541,980	223
Total	7534	2,169,480	2,302,179	306

The population is particularly dense in the Neckar valley from Esslingen northward. The mean annual increase from 1900 to 1905 amounted to 1·22%. 8·5% of the births are illegitimate. Classified according to religion, about 69% are Protestants, 30% Roman Catholics, and Jews amount to about ½%. Protestants largely preponderate in the Neckar district, Roman Catholics in that of the Danube. The people of the north-west belong to the Alamannic stock, those of the north-east to the Franconian, and those of the centre and south to the Swabian. According to the latest occupation census, nearly half of the entire population is supported by agriculture, and a third by industrial pursuits, mining and commerce. In 1910, 506,061 persons were engaged in agriculture and kindred occupations, 432,114 in industrial occupations, and 100,109 in trade and commerce.

The largest towns in the kingdom are Stuttgart (with Cannstadt), Ulm, Heilbronn, Esslingen, Reutlingen, Ludwigsburg, Göppingen, Gmünd, Tübingen, Tuttlingen and Ravensburg.

Agriculture.—Württemberg is essentially an agricultural state, and of its 4,821,760 acres, 44·9 % are agricultural land and gardens, 1·1 % vineyards, 17·9 % meadows and pastures, and 30·8 % forest. It possesses rich meadowlands, cornfields, orchards, gardens, and hills covered with vines. The chief agricultural products are oats, spelt, rye, wheat, barley, hops. To these must be added wine (mostly of excellent quality) of an annual value of about one million sterling, peas and beans, maize, fruit, chiefly cherries and apples, beets and tobacco, and garden and dairy produce. Of live stock, cattle, sheep and pigs are reared in considerable numbers, and great attention is paid to the breeding of horses.

Mining.—Salt and iron are the only minerals of great industrial importance found in Württemberg. The salt industry only began to be of importance at the beginning of the 19th century. The iron industry, on the other hand, is of great antiquity, but it is hampered by the entire absence of coal mines in the country. Other minerals produced are granite, limestone, ironstone and fireclay.

Manufactures.—The old-established manufactures embrace linen, woollen and cotton fabrics, particularly at Esslingen and Göppingen, and paper-making, especially at Ravensburg, Heilbronn and other places in Lower Swabia. The manufacturing industries assisted by the government developed rapidly during the later years of the 19th century, notably metal-working, especially such branches of it as require exact and delicate workmanship. Of particular importance are iron and steel goods, locomotives (for which Esslingen enjoys a great reputation), machinery, motor-cars, bicycles, small arms (in the Mauser factory at Oberndorf), all kinds of scientific and artistic appliances, pianos (at Stuttgart), organs and other musical instruments, photographic apparatus, clocks (in the Black Forest), electrical apparatus, and gold and silver goods. There are also extensive chemical works, potteries, cabinet-making workshops, sugar factories, breweries and distilleries. Water-power and petrol largely compensate for the lack of coal. Among other interesting developments is the manufacture of liquid carbonic acid gas procured from natural gas springs beside the Eyach, a tributary of the Neckar.

Commerce.—The principal exports are cattle, cereals, wood, pianos, salt, oil, leather, cotton and linen fabrics, beer, wine and spirits. The chief commercial cities are Stuttgart, Ulm, Heilbronn and Friedrichshafen. The book trade of Stuttgart, called the Leipzig of South Germany, is very extensive.

Communications.—In 1907 there were 1219 m. of railways, of which all except 159 m. belonged to the state. The Neckar, the Schussen and the lake of Constance are all navigable for boats; the Danube begins to be navigable at Ulm. The roads of Württemberg are fairly good; the oldest of them are Roman. Württemberg, like Bavaria, retained the control of its own postal and telegraph service on the foundation of the new German empire.

Constitution.—Württemberg is a constitutional monarchy and a member of the German empire, with four votes in the federal council (Bundesrat), and seventeen in the imperial diet. The constitution rests on a law of 1819, amended in 1868, in 1874, and again in 1906 The crown is hereditary, and conveys the simple title of king of Württemberg. The king receives a civil list of £103,227 The legislature is bi-cameral. The upper chamber (*Standesherren*) is composed of adult princes of the blood, heads of noble families from the rank of count (*Graf*) upwards, representatives of territories (*Standesherrschaften*), which possessed votes in the old German imperial dict or in the local diet; it has also members (not more than 6) nominated by the king, 8 members of knightly rank, 6 ecclesiastical dignitaries, a representative of the university of Tübingen, and 1 of the technical high school of Stuttgart, 2 representatives of commerce and industry, 2 of agriculture, and 1 of handicrafts. The lower house (*Abgeordnetenhaus*) has 92 members, viz. a representative from each of the administrative divisions (*Oberamtsbezirke*), 63 in all without Stuttgart, which has 6 representatives; also 1 from each of the six chief provincial towns, and 17 members elected by the two electoral divisions (*Landeswahlkreise*) into which the kingdom is divided. The latter class of members as well as those for Stuttgart are elected on the principle of proportional representation. The king appoints the president of the upper chamber; since 1874 the lower chamber has elected its own chairman. Members of both houses must be over twenty-five years of age, and parliaments are elected for six years; the suffrage is enjoyed by all male citizens over twenty-five years of age, and voting is by ballot.

The highest executive is in the hands of a ministry of state (*Staatsministerium*), consisting of six ministers respectively of justice, foreign affairs (with the royal household, railways, posts and telegraphs), the interior, public worship and education, war and finance. There is also a privy council, consisting of the ministers and some nominated councillors (*wirkliche Staatsräte*), who advise the sovereign at his command. The judges of a special supreme court of justice, called the *Staatsgerichtshof* (which is the guardian of the constitution), are partly elected by the chambers and partly appointed by the king. Each of the chambers has the right to impeach the ministers. The country is divided into four governmental departments (*Kreise*) and subdivided into sixty-four divisions (*Oberamtsbezirke*), each of which is under a headman (*Oberamtmann*) assisted by a local council (*Amtsversammlung*). At the head of each of the four departments is a government (*Regierung*).

Religion.—The right of direction over the churches resides in the king, who has also, so long as he belongs to the Protestant Church, the guardianship of the spiritual rights of that Church. The Protestant Church is controlled (under the minister of religion and education) by a consistory and a synod—the former consisting of a president, 9 councillors and 6 general superintendents or "prelates" from six principal towns, and the latter of a representative council, including both lay and clerical members. The Roman Catholic Church is subject to the bishop of Rottenburg, in the archdiocese of Freiburg. Politically it is under a Roman Catholic council, appointed by government. The Jews also, since 1828, have been subject to a state-appointed council (*Oberkirchenbehörde*).

Education.—According to official returns there is not an individual in the kingdom above the age of ten years who cannot both read and write. The higher branches of learning are provided in the university of Tübingen, in the technical high school (with academic rank) of Stuttgart, the veterinary high school at Stuttgart, the commercial college at Stuttgart, and the agricultural college of Hohenheim. There are gymnasia and other schools in all the larger towns, while every commune has a school. There are numerous schools and colleges for women. There is also a school of viticulture at Weinsberg.

Army.—By terms of the convention of 1871 the troops of Württemberg form the XIII. army corps of the imperial German army.

Finances.—The state revenue for 1909–1910 was estimated at £4,840,520, which is nearly balanced by the expenditure. About one-third of the revenue is derived from railways, forests and mines; about £1,400,000 from direct taxation; and the remainder from indirect taxes, the post-office and sundry items. In 1909 the public debt amounted to £29,285,335, of which more than £27,000,000 was incurred for railway construction. Of the expenditure over £900,000 is spent upon public worship and education, and over £1,200,000 goes in interest and repayment of the national debt. To the treasury of the German empire the kingdom contributed £660,000.

Authorities.—See *Württembergische Jahrbücher für Statistik und Landeskunde*, *Das Königreich Württemberg, eine Beschreibung nach Kreisen, Oberämtern und Gemeinden* (Stuttgart, 1904); *Statistisches Handbuch für das Königreich Württemberg* (Stuttgart, 1885 fol.); *Das Königreich Württemberg, eine Beschreibung von Land, Volk und Staat* (1893); the *Jahresberichte der Handels- und Gewerbekammern in Württemberg*; Lang, *Die Entwickelung der Bevölkerung Württembergs im Laufe des 19ten Jahrhunderts* (Tübingen, 1903); Engel and Schulze, *Geognostischer Wegweiser durch Württemberg* (Stuttgart, 1908); Göz, *Staatsrecht des Königreichs Württemberg* (Tübingen, 1908); and F Bitzer, *Regierung und Stände in Württemberg* (Stuttgart, 1882).

History.—The origin of the name Württemberg is uncertain, but the once popular derivation from Wirth am Berg is now universally rejected. Some authorities derive it from a proper name, Wiruto or Wirtino; others from a Celtic place-name, Virolunum or Verdunum. At all events from being the name of a castle near the village of Rothenberg, not far from Stuttgart, it was extended over the surrounding country, and as the lords of this district increased their possessions so the name covered an ever-widening area, until it reached its present denotation. Early forms of it are Wirtenberg, Wirtembenc and Wirtenberc. Wirtemberg was long current, and in the latter part of the 16th century Würtemberg and Württemberg appeared. In 1806 Württemberg was adopted as the official spelling, though Würtemberg is also common and occurs sometimes in official documents and even on coins issued after that date.

As far as we know, the first inhabitants of the country were the Celts, and then the Suebi. In the 1st century A.D. the Romans conquered the land and defended their position there by a rampart (*limes*). Early in the 3rd century the Alamanni drove the Romans beyond the Rhine and the Danube, but in their turn they were conquered by the Franks under Clovis, the decisive battle being fought in 496. For about four hundred years the district was part of the Frankish empire, being administered by counts, but in the 9th century it was incorporated with the German duchy of Swabia. The duchy of Swabia was ruled by the Hohenstaufen family until the death of Conradin in 1268, when a considerable part of it fell to the count of Württemberg, the representative of a family first mentioned about 1080, a certain Conrad von Beutelsbach, having called himself after his ancestral castle of Württemberg. The earliest count about whom anything is known is one Ulrich, who ruled from 1241 to 1265. He was marshal of Swabia and advocate of the town of Ulm, and had large possessions in the valleys of the Neckar and the Rems. Under his sons, Ulrich II. and Eberhard I., and their successors the power of the family grew steadily. Eberhard (d. 1325) was the opponent, and not always the unsuccessful one, of three German kings; he doubled the area of his county and transferred his residence from Württemberg to Stuttgart. His successors were not perhaps equally important, but all added something to the area of Württemberg. The lands of the family were several times divided, but in 1482 they were declared indivisible and were united under Count Eberhard V., called im Bart. This arrangement was confirmed by the German king, Maximilian I., and the imperial diet in 1495.

Eberhard was one of the most energetic rulers that Württemberg ever had, and in 1495 his county was raised to the rank of duchy. Dying in 1496, he was succeeded by his cousin, Duke Eberhard II., who, however, was deposed after a short reign of two years. The long reign (1498–1550) of Ulrich I., who succeeded to the duchy while still a child, was a most eventful period for the country, and many traditions cluster round the name of this gifted, unscrupulous and ambitious man. The extortions by which he sought to raise money for his extravagant pleasures excited a rising known as that of the *arme Konrad* (poor Conrad), not unlike the rebellion in England led by Wat Tyler; order was soon restored, and in 1514 by the treaty of Tübingen the people undertook to pay the duke's debts in return for various political privileges, which in effect laid the foundation of the constitutional liberties of the country. A few years later Ulrich quarrelled with the Swabian League, and its forces, helped by William IV., duke of Bavaria, who was angered by the treatment meted out by Ulrich to his wife Sabina, a Bavarian princess, invaded Württemberg, expelled the duke and sold his duchy to the emperor Charles V. for 220,000 gulden. Charles handed over Württemberg to his brother, the German king, Ferdinand I., who was its nominal ruler for a few years. Soon, however, the discontent caused by the oppressive Austrian rule, the disturbances in Germany leading to the Peasants' War and the commotions aroused by the Reformation gave Ulrich an opportunity to recover it. Aided by Philip, landgrave of Hesse, and other Protestant princes, he fought a victorious battle against Ferdinand's troops at Lauffen in May 1534, and then by the treaty of Cadan he was again recognized as duke, but was forced to accept his duchy as an Austrian fief. He now introduced the reformed doctrines and proceeded to endow Protestant churches and schools throughout his land. Ulrich's connexion with the league of Schmalkalden led to another expulsion, but in 1547 he was reinstated by Charles V., although on somewhat onerous terms.

Ulrich's son and successor, Christopher (1515–1568), completed the work of converting his subjects to the reformed faith. He introduced a system of church government, the *Grosse Kirchenordnung*, which has endured in part to the present day. In this reign a standing commission was established to superintend the finances, and the members of this body, all of whom belonged to the upper classes, gained considerable power in the state, mainly at the expense of the towns. Christopher's son Louis, the founder of the *Collegium illustre*, died childless in 1593 and was succeeded by a kinsman, Frederick I. (1557–1608). This energetic prince, who disregarded the limits placed to his authority by the rudimentary constitution, by paying a large sum of money, induced the emperor Rudolph II. in 1599 to free the duchy from the suzerainty of Austria. Thus once again Württemberg became a direct fief of the Empire. Unlike his predecessor, the next duke, John Frederick (1582–1628), was not allowed to become an absolute ruler, but was forced to recognize the checks on his power. During this reign, which ended in July 1628, Württemberg suffered severely from the Thirty Years' War, although the duke himself took no part in it. His son and successor Eberhard III. (1614–1674), however, plunged into it as an ally of France and Sweden as soon as he came of age in 1633, but after the battle of Nördlingen in 1634 the duchy was occupied by the imperialists and he himself was for some years an exile. He was restored by the peace of Westphalia, but it was to a depopulated and impoverished country, and he spent his remaining years in efforts to repair the disasters of the great war. During the reign of Eberhard IV (1676–1733), who was only one year old when his father Duke William Louis died in 1677, Württemberg made the acquaintance of another destructive enemy. In 1688, 1703 and 1707 the French entered the duchy and inflicted brutalities and sufferings upon the inhabitants. The sparsely populated country afforded a welcome to the fugitive Waldenses, who did something to restore it to prosperity, but this benefit was partly neutralized by the extravagance of the duke, anxious to provide for the expensive tastes of his mistress, Christiana Wilhelmina von Grävenitz. Charles Alexander, who became duke in 1733, had embraced the Roman Catholic faith while an officer in the Austrian service. His favourite adviser was the Jew Suss Oppenheimer, and it was thought that master and servant were aiming at the suppression of the diet and the introduction of the Roman Catholic religion. However, the sudden death of Charles Alexander in March 1737 put an abrupt end to these plans, and the regent, Charles Rudolph of Württemberg-Neuenstadt, had Oppenheimer hanged.

Charles Eugene (1728–1793), who came of age in 1744, was gifted, but vicious and extravagant, and he soon fell into the hands of unworthy favourites. He spent a great deal of money in building palaces at Stuttgart and elsewhere, and took the course, unpopular to his Protestant subjects, of fighting against Prussia during the Seven Years' War. His whole reign was disturbed by dissensions between the ruler and the ruled, the duke's irregular and arbitrary methods of raising money arousing great discontent. The intervention of the emperor and even of foreign powers was invoked, and in 1770 a formal arrangement removed some of the grievances of the people. But Charles Eugene did not keep his promises, although in his old age he made a few further concessions. He died childless, and was succeeded by one brother, Louis Eugene (d. 1795), and then by another, Frederick Eugene (d. 1797) This latter prince, who had served in the army of Frederick the Great, to whom he was related by marriage, educated his children in the Protestant faith. Thus, when his son Frederick II became duke in 1797, the ruler of Württemberg was again a Protestant, and the royal house has adhered to this faith since that date. During Frederick Eugene's short reign the French invaded Württemberg, compelled the duke to withdraw his troops from the imperial army and to pay a sum of money.

Frederick II. (1754–1816), a prince whose model was Frederick the Great, took part in the war against France in defiance of the wishes of his people, and when the French again invaded and devastated the country he retired to Erlangen, where he remained until after the conclusion of the peace of Lunéville in 1801 By a private treaty with France, signed in March 1802, he ceded his possessions on the left bank of the Rhine, receiving in return nine imperial towns, among them Reutlingen and Heilbronn, and some other territories, amounting altogether to about 850 sq. m. and containing about 124,000 inhabitants. He also accepted from Napoleon the title of elector. These new districts were not incorporated with the duchy, but remained separate; they were known as New Württemberg and were ruled without a diet. In 1805 Württemberg took up arms on the side of France, and by the peace of Pressburg in December 1805 the elector was rewarded with various Austrian possessions in Swabia and with other lands in the neighbourhood. On the 1st of January 1806 Frederick assumed the title of king, abrogated the constitution and united old and new Württemberg. Subsequently he placed the property of the church under the control of the state. In 1806 he joined the Confederation of the Rhine and received further additions of territory containing 160,000 inhabitants; a little later, by the peace of Vienna in October 1809, about 110,000 more persons were placed under his rule. In return for these favours Frederick joined Napoleon in his campaigns against Prussia, Austria and Russia, and of 16,000 of his subjects who marched to Moscow only a few hundreds returned. Then after the battle of Leipzig he deserted the waning fortunes of the French emperor, and by a treaty made with Metternich at Fulda in November 1813 he secured the confirmation of his royal title and of his recent acquisitions of territory, while his troops marched with those of the allies into France. In 1815 the king joined the Germanic Confederation, but the congress of Vienna made no change in the extent of his lands. In the same year he laid before the representatives of his people the sketch of a new constitution, but this was rejected, and in the midst of the commotion Frederick died on the 30th of October 1816.

At once the new king, William I., took up the consideration of this question and after much discussion a new constitution was granted in September 1819. This is the constitution which, with subsequent modifications, is still in force, and it is described in an earlier section of this article. A period of quietness now set in, and the condition of the kingdom, its education, its agriculture and its trade and manufactures, began to receive earnest attention, while by frugality, both in public and in private matters, King William helped to repair the shattered finances of the country. But the desire for greater political freedom had not been entirely satisfied by the constitution of 1819, and after 1830 there was a certain amount of unrest. This, however, soon passed away, while trade was fostered by the inclusion of Württemberg in the German Zollverein and by the construction of railways. The revolutionary movement of 1848 did not leave Württemberg untouched, although no actual violence took place within the kingdom. The king was compelled to dismiss Johannes Schlayer (1792–1860) and his other ministers, and to call to power men with more liberal ideas, the exponents of the idea of a united Germany. A democratic constitution was proclaimed, but as soon as the movement had spent its force the liberal ministers were dismissed, and in October 1849 Schlayer and his associates were again in power. By interfering with popular electoral rights the king and his ministers succeeded in assembling a servile diet in 1851, and this surrendered all the privileges gained since 1848. In this way the constitution of 1819 was restored, and power passed into the hands of a bureaucracy. Almost the last act of William's long reign was to conclude a concordat with the Papacy, but this was repudiated by the diet, which preferred to regulate the relations between church and state in its own way.

In July 1864 Charles I. (1823–1891) succeeded his father William as king and had almost at once to face considerable difficulties. In the duel between Austria and Prussia for supremacy in Germany, William I. had consistently taken the part of the former power, and this policy was equally acceptable to the new king and his advisers. In 1866 Württemberg took up arms on behalf of Austria, but three weeks after the battle of Königgrätz her troops were decisively beaten at Tauberbischofsheim, and the country was at the mercy of Prussia. The Prussians occupied the northern part of Württemberg and peace was made in August 1866; by this Württemberg paid an indemnity of 8,000,000 gulden, but at once concluded a secret offensive and defensive treaty with her conqueror.

The end of the struggle was followed by a renewal of the democratic agitation in Württemberg, but this had achieved no tangible results when the great war between France and Prussia broke out in 1870. Although the policy of Württemberg had continued antagonistic to Prussia, the country shared in the national enthusiasm which swept over Germany, and its troops took a creditable part in the battle of Wörth and in other operations of the war. In 1871 Württemberg became a member of the new German empire, but retained control of her own post office, telegraphs and railways. She had also certain special privileges with regard to taxation and the army, and for the next ten years the policy of Württemberg was one of enthusiastic loyalty to the new order. Many important reforms, especially in the realm of finance, were introduced, but a proposal for a union of the railway system with that of the rest of Germany was rejected. Certain reductions in taxation having been made in 1889, the reform of the constitution became the question of the hour The king and his ministers wished to strengthen the conservative element in the chambers, but only slight reforms were effected by the laws of 1874, 1876 and 1879, a more thorough settlement being postponed. On the 6th of October 1891 King Charles died suddenly, and was succeeded by his cousin William II. (b 1848), who continued the policy of his predecessor. The reform of the constitution continued to be discussed, and the election of 1895 was memorable because of the return of a powerful party of democrats. King William had no sons, nor had his only Protestant kinsman, Duke Nicholas (1833–1903), consequently the succession would ultimately pass to a Roman Catholic branch of the family, and this prospect raised up certain difficulties about the relations between church and state. The heir to the throne in 1910 was the Roman Catholic Duke Albert (b 1865).

Between 1900 and 1910 the political history of Württemberg centred round the settlement of the constitutional and the educational questions. The constitution was revised in 1906 on the lines already indicated, and a settlement of the education difficulty was brought about in 1909. In 1904 the railway system was united with that of the rest of Germany.

For the history of Württemberg see the *Wirtembergisches Urkundenbuch* (Stuttgart, 1849–1907), and the *Darstellungen aus der württembergischen Geschichte* (Stuttgart, 1904 fol.). Histories are those of P. F. Stälin, *Geschichte Württembergs* (Gotha, 1882–1887); E. Schneider, *Württembergische Geschichte* (Stuttgart, 1896); Belschner, *Geschichte von Württemberg in Wort und Bild* (Stuttgart, 1902); Weller, *Württemberg in der deutschen Geschichte* (Stuttgart, 1900); K. V. Fricker and Th. von Gessler, *Geschichte der Verfassung Württembergs* (Stuttgart, 1869); Hieber, *Die württembergische Verfassungsreform von 1906* (Stuttgart, 1906); and R. Schmid, *Reformationsgeschichte Württembergs* (Heilbronn, 1904). See also Golther, *Der Staat und die katholische Kirche im Königreich Württemberg* (Stuttgart, 1874); B. Kaisser, *Geschichte des Volksschulwesens in Württemberg* (Stuttgart, 1895–1897); Bartens, *Die wirtschaftliche Entwickelung des Königreichs Württemberg* (Frankfort, 1901); W. von Heyd, *Bibliographie der württembergischen Geschichte* (1895–1896), Band iii. by Th. Schön (1907); D. Schäfer, *Württembergische Geschichtsquellen* (Stuttgart, 1894 fol.); and A. Pfister, *König Friedrich von Württemberg und seine Zeit* (Stuttgart, 1888).

WURTZ, CHARLES ADOLPHE (1817–1884), French chemist, was born on the 26th of November 1817 at Wolfisheim, near Strassburg, where his father was Lutheran pastor. When he left the Protestant gymnasium at Strassburg in 1834, his father allowed him to study medicine as next best to theology. He devoted himself specially to the chemical side of his profession with such success that in 1839 he was appointed "Chef des travaux chimiques" at the Strassburg faculty of medicine. After graduating there as M.D. in 1843, with a thesis on albumin and fibrin, he studied for a year under J. von Liebig at Giessen, and then went to Paris, where he worked in J. B. A. Dumas's private laboratory. In 1845 he became assistant to Dumas at the École de Médecine, and four years later began to give lectures on organic chemistry in his place. His laboratory at the École de Médecine was very poor, and to supplement it he opened a private one in 1850 in the Rue Garencière; but soon afterwards the house was sold, and the laboratory had to be abandoned. In 1850 he received the professorship of chemistry at the new Institut Agronomique at Versailles, but the Institut was abolished in 1852. In the following year the chair of organic chemistry at the faculty of medicine became vacant by the resignation of Dumas and the chair of mineral chemistry and toxicology by the death of M. J. B. Orfila. The two were united, and Wurtz appointed to the new post. In 1866 he undertook the duties of dean of the faculty of medicine. In this position he exerted himself to secure the rearrangement and reconstruction of the buildings devoted to scientific instruction, urging that in the provision of properly equipped teaching laboratories France was much behind Germany (see his report *Les Hautes Études pratiques dans les universités allemandes*, 1870). In 1875, resigning the office of dean but retaining the title of honorary dean, he became the first occupant of the chair of organic chemistry, which he induced the government to establish at the Sorbonne, but he had great difficulty in obtaining an adequate laboratory, and the building ultimately provided was not opened until after his death, which happened at Paris on the 10th of May 1884. Wurtz was an honorary member of almost every scientific society in Europe. He was one of the founders of the Paris Chemical Society (1858), was its first secretary and thrice served as its president. In 1880 he was vice-president and in 1881 president of the Academy, which he entered in 1867 in succession to T. J. Pelouze. He was made a senator in 1881.

Wurtz's first published paper was on hypophosphorous acid (1842), and the continuation of his work on the acids of phosphorus (1845) resulted in the discovery of sulphophosphoric acid and phosphorus oxychloride, as well as of copper hydride. But his original work was mainly in the domain of organic chemistry. Investigation of the cyanic ethers (1848) yielded a class of substances which opened out a new field in organic chemistry, for, by treating those ethers with caustic potash, he obtained methylamine, the simplest organic derivative of ammonia (1849), and later (1851) the compound ureas. In 1855, reviewing the various substances that had been obtained from glycerin, he reached the conclusion that glycerin is a body of alcoholic nature formed on the type of three molecules of water, as common alcohol is on that of one, and was thus led (1856) to the discovery of the glycols or diatomic alcohols, bodies similarly related to the double water type. This discovery he worked out very thoroughly in investigations of ethylene oxide and the polyethylene alcohols. The oxidation of the glycols led him to homologues of lactic acid, and a controversy about the constitution of the latter with H. Kolbe resulted in the discovery of many new facts and in a better understanding of the relations between the oxy- and the amido-acids. In 1867 Wurtz prepared neurine synthetically by the action of trimethylamine on glycol-chlorhydrin, and in 1872 he discovered aldol, pointing out its double character as at once an alcohol and an aldehyde. In addition to this list of some of the new substances he prepared, reference may be made to his work on abnormal vapour densities. While working on the olefines he noticed that a change takes place in the density of the vapour of amylene hydrochloride, hydrobromide, &c., as the temperature is increased, and in the gradual passage from a gas of approximately normal density to one of half-normal density he saw a powerful argument in favour of the view that abnormal vapour densities, such as are exhibited by sal-ammoniac or phosphorus pentachloride, are to be explained by dissociation. From 1865 onwards he treated this question in several papers, and in particular maintained the dissociation of vapour of chloral hydrate, in opposition to H. Sainte-Claire Deville and M. Berthelot.

For twenty-one years (1852–1872) Wurtz published in the *Annales de chimie et de physique* abstracts of chemical work done out of France. The publication of his great *Dictionnaire de chimie pure et appliquée*, in which he was assisted by many other French chemists, was begun in 1869 and finished in 1878; two supplementary volumes were issued 1880–1886, and in 1892 the publication of a second supplement was begun. Among his books are *Chimie médicale* (1864), *Leçons élémentaires de chimie moderne* (1867), *Théorie des atomes dans la conception du monde* (1874), *La Théorie atomique* (1878), *Progrès de l'industrie des matières colorantes artificielles* (1876) and *Traité de chimie biologique* (1880–1885). His *Histoire des doctrines chimiques*, the introductory discourse to his *Dictionnaire*, but published separately in 1868, opens with the well-known dictum, "La chimie est une science française."

For his life and work, with a list of his publications, see Charles Friedel's memoir in the *Bulletin de la Société Chimique* (1885); also A. W. von Hofmann in the *Ber. deut. chem. Gesellsch.* (1887), reprinted in vol. iii. of his *Zur Erinnerung an vorangegangene Freunde* (1888).

WÜRZBURG, a university town and episcopal see of Bavaria, Germany, capital of the province of Lower Franconia, situated on the Main, 60 m. by rail S.E. from Frankfort and at the junction of main lines to Bamberg and Nuremberg. Pop. (1905) 80,220. An ancient stone bridge (1474–1607), 650 ft. long and adorned with statues of saints, and two modern bridges, the Luitpold (1887) and the Ludwig (1894), connect the two parts of the town on each side of the river. On the lofty Leistenberg stands the fortress of Marienberg, which from 1261 to 1720 was the residence of the bishops. The main part of the town, on the right bank, is surrounded by shady promenades, the Ringstrasse and the quay.

Würzburg is quaintly and irregularly built; many of the houses are interesting specimens of medieval architecture; and the numerous old churches recall the fact that it was long the capital of an ecclesiastical principality. The principal church is the imposing Romanesque cathedral, a basilica with transepts, begun in 1042 and consecrated in 1189. The four towers, however, date from 1240, the (rococo) façade from 1711–1719, and the dome from 1731. The spacious transepts terminate in apses. The exterior was restored in 1882–1883. The beautiful Marienkapelle, a Gothic edifice of 1377–1441, was restored in 1856, it is embellished with twenty statues by Tilman Riemenschneider (d. 1531). The Haugerstifts church, with two towers and a lofty dome, was built in the Italian Renaissance style in 1670–1691. The bones of St Kilian, the patron saint of Würzburg, are preserved in the Neumünster church, which dates from the 11th century; Walther von der Vogelweide is buried in the adjoining cloisters. The church of St Burkhard is externally one of the best-preserved architectural monuments in the city. It was built in 1033–1042, in the Romanesque style, and was restored in 1168. The Late Gothic choir dates from 1494–1497. The Neubaukirche, or university church, curiously unites a Gothic exterior with a Classical interior. The Protestant church of St Stephen (1782–1789) originally belonged to a Benedictine abbey. Of the secular buildings in Würzburg the most conspicuous is the palace, a huge and magnificent edifice built in 1720–1744 in imitation of Versailles, and formerly the residence of the bishops and grand-dukes of Würzburg. The Julius hospital, a large and richly endowed institution affording food and lodging to 600 persons daily, was founded in 1576 by Bishop Julius F 'brunn (1545–1619). In 1906 it was arranged to convert this into a residential college for students, the hospital being removed to a site outside the town. The quaint town hall dates in part from 1456. Among the other chief buildings are the government offices, the law courts, the theatre, the Maxschule, the observatory and the various university buildings.

A university was founded at Würzburg in 1403, but it only existed for a few years. The present university was founded by Bishop Julius in 1582. The medical faculty speedily became famous, and has remained the most important faculty in Würzburg ever since. Here W. K. Röntgen discovered the "Röntgen rays" in 1896. Würzburg was long the stronghold of Jesuitism in Germany, and the Roman Catholic theological faculty still attracts a large number of students. The university has a library containing 300,000 volumes, and is attended by about 1400 students. In no other university city of Germany has so much of the medieval academic life been preserved.

Würzburg is surrounded by vineyards, which yield some of the best wine in Germany. Its principal industries are the manufacture of tobacco, furniture, machinery, scientific instruments and railway carriages. It has also breweries, and produces bricks, vinegar, malt and chocolate.

The site of the Leistenberg was occupied by a Roman fort, and was probably fortified early in the 13th century. *Wircebirgum* is the old Latin form of the name of the town; *Herbipolis* (herb town) first appears in the 12th century. The bishopric was probably founded in 741, but the town appears to have existed in the previous century. The first bishop was St Burkhard, and his successors soon acquired much temporal power; about the 12th century they had ducal authority in Eastern Franconia. It is not surprising that quarrels broke out between the bishops and the citizens, and the latter espoused the cause of the emperor Henry IV., while the former joined the emperor's foes. The struggle continued intermittently until 1400, when the citizens were decisively defeated and submitted. Several imperial diets were held in Würzburg, chief among these being the one of 1180 when Henry the Lion, duke of Saxony, was placed under the ban.

By the peace of Lunéville the bishopric was secularized, and in 1803 Würzburg passed to Bavaria. The peace of Pressburg in 1805 transferred it, under the name of an electorate, to Ferdinand, formerly grand-duke of Tuscany, who joined the confederation of the Rhine and took the title of grand-duke of Würzburg. In 1815 the congress of Vienna restored Würzburg to Bavaria. The Würzburg Conference is the name given to the meeting of representatives of the smaller German states in 1859 to devise some means of mutual support. The conference, however, had no result. Würzburg was bombarded and taken by the Prussians in 1866, in which year it ceased to be a fortress. The bishopric of Würzburg at one time embraced an area of about 1900 sq. m. and had about 250,000 inhabitants. A new bishopric of Würzburg was created in 1817.

For the town see S. Göbl, *Würzburg, Ein kulturhistorisches Städtebild* (Würzburg, 1896), J. Gramich, *Verfassung und Verwaltung der Stadt Würzburg* (Würzburg, 1882); M. Cronthal, *Die Stadt Würzburg im Bauernkriege* (Würzburg, 1887), Heffner, *Würzburg und seine Umgebungen* (Würzburg, 1871); Beckmann, *Führer durch Würzburg* (1906); and Holländer and Hessler, *Malerisches aus Alt-Würzburg* (Würzburg, 1898). For the university see F. X. von Wegele, *Geschichte der Universität Würzburg* (Würzburg, 1882). For the bishopric see J. Hofmann, *Die Heiligen und Seligen des Bistums Würzburg* (Würzburg, 1889), F. J. B. Stamminger and A. Amrhein, *Franconia sacra. Geschichte des Bistums Würzburg* (Würzburg, 1889–1901); and T. Henner, *Die herzogliche Gewalt der Bischöfe von Würzburg* (Würzburg, 1874).

WURZEN, a town of Germany in the kingdom of Saxony, on the Mulde, here crossed by two bridges, 15½ m. by rail N.E. of Leipzig on the main line (via Riesa) to Dresden. Pop. (1905) 17,212. It has a cathedral dating from the 12th century, a castle, at one time a residence of the bishops of Meissen and now utilized as law courts, several schools and an agricultural college. The industries comprise iron-founding, weaving and brewing, and the making of machinery, carpets, cigars, furniture, leather and paper.

Wurzen was founded by the Sorbs, and was a town early in the 12th century, when Herwig, bishop of Meissen, founded a monastery here. In 1581 it passed to the elector of Saxony, and in the Thirty Years' War was sacked by the Swedes.

WUTTKE, KARL FRIEDRICH ADOLF (1819–1870), German Protestant theologian, was born at Breslau on the 10th of November 1819. He studied theology at Breslau, Berlin and Halle, where he eventually became professor ordinarius; and is known as the author of a treatise on Christian ethics (*Handbuch der christlichen Sittenlehre*, 1860–1863, 3rd ed. 1874–1875; Eng. trans., New York, 1873) and works on heathen religion (*Die Geschichte des Heidentums*, 1851–1853) and superstition (*Der deutsche Volksaberglaube der Gegenwart*, 1865, 2nd ed. 1869). He died on the 12th of April 1870.

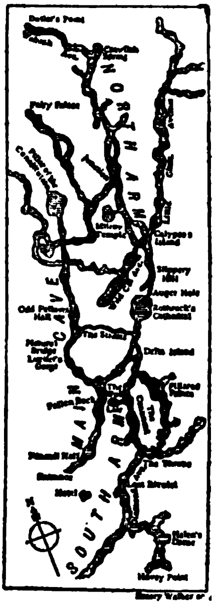
WYANDOT, or HURON (*q.v.*), a tribe of N. American Indians of Iroquoian stock. When first met by the French early in the 17th century, the Wyandots lived between Georgian Bay and Lake Simcoe, Ontario. They were then estimated at about 10,000, scattered over twenty villages. They were continually the victims of raids on the part of their neighbours the Iroquoian league of six nations and the Sioux, being driven from place to place, and a dispersal in 1650 resulted in one section settling in Quebec, while others found their way to Ohio, where they fought for the English in the Wars of Independence and 1812. By a treaty made in 1817 the latter section was granted territory in Ohio and Michigan, but the larger part of this was sold in 1819. In 1842 they migrated to Kansas. In 1855 many became citizens, the remainder being in 1867 removed to a reservation (now N.E. Oklahoma), numbering about 400 in 1905. The Hurons at Lorette, in Quebec, also number about 400.

See *Handbook of American Indians*, ed. F. W. Hodge (Washington, 1907), s.v. "Huron."

WYANDOTTE, a city of Wayne county, Michigan, U.S.A., on the Detroit river, about 6 m. S. by W. of Detroit. Pop. (1900) 5183, of whom 1267 were foreign-born; (1904) 5425; (1910) 8287. It is served by the Michigan Central, the Lake Shore & Michigan Southern, the Detroit, Toledo & Ironton, and (for freight only) the Detroit & Toledo Shore Line railways, and by two interurban electric lines. Salt and limestone are found here and the city has various manufactures. Wyandotte was first settled about 1820, was laid out as a town in 1854, and chartered as a city in 1867.

WYANDOTTE CAVE, a cave in Jennings township, Crawford county, Indiana, U.S.A., 5 m. N.E. of Leavenworth, on the Ohio river, and 12 m. from Corydon, the early territorial capital. The nearest railway station is Milltown, 9 m. distant. The cave is in a rugged region of high limestone hills, in one of which its main entrance is found, 220 ft. above the level of the Blue river, whose original name, the Wyandotte, was transferred to the cave by Governor David Wallace; it having previously been styled the Mammoth Cave of Indiana, the Epsom Salts Cave, and the Indiana Saltpetre Cave. The exact date of discovery is not known; but early records show it to have been preempted by a Dr Adams in 1812 for the manufacture of saltpetre, and his vats and hoppers are still to be seen. After the War of 1812 he relinquished his claim; and in 1819 the ground was bought from the United States government by Henry P. Rothrock, whose heirs are its owners. The earliest account is in Flint's *Geography* (1831); the first official report of it was by Dr R. T. Brown (1831); and it was first mapped by the writer (1855), whose map was revised by John Collett, state geologist (1878). No instrumental survey has been made, nor have all its intricate windings been explored. Its known passages aggregate more than 23 m. in length, and 144 places are named as noteworthy. The "Old Cave" contains the saltpetre works, and ends in a remarkable chamber exactly 144 ft. long and 56 ft. wide, in which stands the Pillar of the Constitution, a stalagmitic column perfectly cylindrical and 71 ft. in circumference, entirely composed of crystalline carbonate of lime (satin-spar), fluted and snow-white. A cavity in the column was first claimed by H. C. Hovey as a prehistoric quarry, proved to be such by the stag horns and boulder pounders found in its vicinity. His careful estimate of the rate of stalagmitic growth showed that 1000 years would have been needed to form the lip now covering the incision.

In the N. arm of the newer part of the cave, opened in 1850, is an immense room, styled Rothrock's Cathedral, 1000 ft. in circumference and 200 ft. high, with a rugged central hill 135 ft. high, surmounted by statuesque stalagmites, near which is another quarry of satin-spar with similar fragments, pounders and aboriginal relics. When Mr Hovey visited this cave in 1855 he found many extinct torches, charcoal embers, poles and pounders, as well as numerous footprints, in the soft nitreous earth of certain avenues, which were left by exploring parties previous to the coming of the white man.



Emery Walker sc.

In the Pillared Palace a number of large alabaster shafts had been thrown down and fragments carried away. Near by were so-called "bear-wallows," which proved to be the remains of an aboriginal workshop, where masses of flint were broken into rectangular blocks; and spalls and flint-chips encumber the floor and choke the passage-way. Milroy's Temple is a magnificent room, 100 by 150 ft. in its dimensions. It contains many remarkable formations; and its display of helictites, or twisted stalactites, is unsurpassed.

As Wyandotte Cave has no large streams and few pools or springs, its fauna and flora are not extensive. Formerly bears, wolves and other wild animals took refuge in its fastnesses; and bats, rats, mice and salamanders are frequent visitors. Blind crawfish (*Cambarus pellucidus*) inhabit the Crawfish Spring. Cave crickets (*Hadenoecus subterraneus*) abound. A dozen kinds of insects, with a few varieties of spiders, flies and worms, complete the meagre list. The flora include mainly forms brought in from the outside.

For more full descriptions of Wyandotte Cave and its contents, see Hovey's *Celebrated American Caverns*, pp. 123-153; Indiana State Geological Reports, by R. T. Brown, E. T. Cox, John Collett and W. S. Blatchley; and concerning cave fauna reports and papers by C. H. Eigenmann, professor of zoology, Indiana State University. (H. C. H.)

WYANT, ALEXANDER H. (1836–1892), American artist, was born at Port Washington, Ohio, on the 11th of January 1836. He was a pupil of Hans Gude in Carlsruhe, Germany. A trip with a government exploring expedition in the west of America undermined his health, and he painted mainly in the high altitudes of the Adirondack Mountains. He was elected a full member of the National Academy of Design, New York, in 1869, and died in New York City on the 29th of November 1892. He was only moderately appreciated during his lifetime, though after his death his works were eagerly sought for.

WYAT, SIR THOMAS (1503–1542), English poet and statesman, elder son of Henry Wyat, or Wiat, afterwards knighted, and his wife Anne, daughter of John Skinner of Reigate, Surrey, was born at Allington Castle, near Maidstone, Kent, in 1503. His father (1460–1537) belonged to a Yorkshire family, but bought Allington about 1493. He was an adherent of the Lancastrian party, and was imprisoned and put to the torture by Richard III. The family records (in the possession of the earl of Romney) relate that during his imprisonment he was saved from starvation by a cat that brought him pigeons. At the accession of Henry VII. he became knight of the Bath (1509), knight banneret (1513) and held various offices at court. His son, Thomas Wyat, was admitted at St John's College, Cambridge, when about twelve years of age, took his B.A. degree in 1518, and proceeded M.A. in 1522. The vague statement of Anthony à Wood (*Athen. Oxon.* i. 124), that he was transferred to Oxford to attend Wolsey's new college there, has no foundation in fact. He married very early Elizabeth Brooke, daughter of the 3rd

Lord Cobham. The marriage was an unhappy one, for a letter (29th March 1537) from the lady's brother to Thomas Cromwell complains that Wyat had gone abroad and made no provision for his wife, and a letter from the Spanish ambassador Chapuys to Charles V. (9th Feb. 1542) speaks of her having been repudiated by her husband. As early as 1516 Wyat was server extraordinary to the king, and in 1524 he was at court as keeper of the king's jewels. He was one of the champions in the Christmas tournament of 1525. His father had been associated with Sir Thomas Boleyn as constable of Norwich Castle, and he had thus been early acquainted with Anne Boleyn. He appears to have been generally regarded as her lover, but it is possible that the relations between them were merely of the fashionable poetic sort. In 1526 he was sent with Sir Thomas Cheney to congratulate Francis I. on his safe return from Spain; in 1527 he accompanied Sir John Russell, afterwards 1st earl of Bedford, on an embassy to the papal court. He was sent by Russell, who was incapacitated by a broken leg, to negotiate with the Venetian republic. On his return journey to Rome he was taken prisoner by the Spanish troops, who demanded 3000 ducats for his ransom, but he contrived to escape. In 1528 he was acting as high marshal at Calais with a salary of two shillings per day, and was only superseded in November 1530. During the following years he was constantly employed in Henry's service, and was apparently high in his favour. He was, however, sent to the Tower in 1536, perhaps because it was desired that he should incriminate the queen. His father's correspondence with Cromwell does not suggest that his arrest had anything to do with the proceedings against Anne Boleyn, but the connexion is assumed (*Letters and Papers of Henry VIII.* vol. x. No. 919) in the letters of John Hussey to Lord Lisle, deputy of Calais. The Roman Catholic writer, Nicholas Harpsfield, makes a circumstantial statement (*Pretended Divorce* . . . Camden Soc. p. 253) that Wyat had confessed his intimacy with Anne to Henry VIII. and warned him against marrying her; but this, in view of his continued favour, seems highly improbable. He was released after a month's imprisonment, and in the autumn of that year took part in the suppression of the Lincolnshire rising. In March 1537 he was knighted, and a month later was sent abroad as ambassador to Charles V., whose ill-will had been revived by the declaration of the illegitimacy of the princess Mary. In 1538 he was joined by Edmund Bonner, then a simple priest, and one Simon Haynes, and seems to have been ashamed of their bad manners, and to have offended them in various ways. Bonner had evidently been desired by Thomas Cromwell to send his own account of the negotiations. He wrote to Cromwell (2nd Sept. 1538) a long letter (Petyt MS. 47, Middle Temple; first printed in the *Gentleman's Magazine*, June 1850) in which he accused Wyat of disloyalty to the king's interests, and of many personal slights to himself. Wyat was unsuccessful in the difficult affairs entrusted to him, but so long as Cromwell ruled he had a firm friend at court, and no notice was taken of Bonner's allegations. Cromwell even seems to have taken some care of his private affairs, which were left in considerable disorder. He was recalled in April 1539, but later in the same year he was employed on another embassy to the emperor, who was on his way to the Low Countries. After Cromwell's death Wyat's enemies renewed their attacks, and he was imprisoned (17th Jan. 1541) in the Tower on the old charges, with the additional accusation of treasonable correspondence with Cardinal Reginald Pole. Being privately informed of the nature of the charges, he prepared an eloquent and manly defence of his conduct in two documents addressed to the Privy Council and to his judges, in which he cleared himself effectually and exposed his accusers' motives. He was released at the intercession of the queen, Catherine Howard, on condition that he confessed his guilt and took back his wife, from whom he had been separated for fifteen years, on pain of death if he were thenceforth untrue to her (see Chapuys to Charles V., March 1541). He received a formal pardon on the 21st of March, and received during the year substantial marks of the king's favour. In the summer of the next year he was sent to Falmouth to meet the ambassadors of the emperor. The heat brought on a fever to which he succumbed at Sherborne, Dorset, on the 11th of October. A Latin elegy on his death was written by his friend John Leland, "Naenia in mortem Thomae Viati equitis incomparabilis"; and Henry Howard, earl of Surrey, celebrated his memory in some well-known lines beginning "Wyat resteth here, that quick could never rest," and in two sonnets.

Wyat's work falls readily into two divisions: the sonnets, rondeaus, and lyric poems dealing with love; and the satires and the version of the penitential psalms. The love poems probably date from before his first imprisonment. A large number were published in 1557 in *Songes and Sonettes* (*Tottel's Miscellany*). Wyat's contributions number 96 out of a total of 310. These have been supplemented from MSS. He was the pioneer of the sonnet in England, and the acknowledged leader of the "company of courtly makers who . . . having travailed in Italie and there tasted the sweet and stately measures and stile of the Italian Poesie, as novices newly crept out of the schooles of Dante, Arioste and Petrarche, greatly pollished our rude and homely maner of vulgar Poesie, from that it had been before" (Puttenham's *Art of English Poesie*, 1589).[1] Wyat wrote in all thirty-one sonnets, ten of which are direct translations of Petrarch. The sentiment is strained and artificial. Wyat shows to greater advantage in his lyrical metres, in his epigrams and songs, especially in those written for music,[2] where he is less hampered by the conventions of the Petrarcan tradition, to which his singularly robust and frank nature was ill-fitted. His thought is generally far in advance of his technical skill, and his disciple Surrey has been far more widely recognized, chiefly because of the superior smoothness of his versification. His works are preserved in a MS. in possession of the Harrington family, which originally belonged to Wyat himself, and in another belonging to the duke of Devonshire in which are inscribed the names of Wyat's sister, Margaret Lee, and of the duchess of Richmond, Surrey's sister. The text differs considerably from Tottel's, which has been generally adopted. Wyat wrote three excellent satires—"On the mean and sure estate," dedicated to John Poins, "Of the Courtier's Life," to the same, and "How to use the court and himself." They are written in *terza rima* and in form and matter owe much to Luigi Alamanni. In the "Penitential Psalms" each is preceded by a prologue describing the circumstances under which the psalmist wrote, and the psalms themselves are very freely paraphrased, with much original matter from the author. They were published in 1549 by Thomas Raynald and John Harrington as *Certayne Psalmes . . . drawen into English meter by Sir Thomas Wyat Knyght.*

None of Wyat's other poems were printed until fifteen years after his death, in *Songes and Sonettes.* The standard edition of his works is that by Dr G. F. Nott, forming the second volume (1816) of *The Works of Henry Howard, Earl of Surrey, and of Sir Thomas Wyat the Elder*, with an exhaustive memoir. Some family papers, now in the possession of the earl of Romney, were collected by Richard Wyat in 1727. Some use of these is made in *The History of Boxley Parish* (1892), by J. Cave Browne. See also Brewer and Gairdner, *Letters and Papers of Henry VIII.* (especially from 1536 to 1542): *The Poetical Works of Sir Thomas Wyatt* (1866), with a memoir in the *Aldine Edition of the British Poets*; Professor E. Arber's introductory matter to the edition of *Songes and Sonnettes* (1870) in his *English Reprints*; R. Alscher, "Sir Thomas Wyatt . . ." (1886), in *Wiener Beiträge zur deutschen u. engl. Philologie*, giving a full account of Wyat's metrical practice; W. E. Simonds, *Sir Thomas Wyatt* (Boston, 1889); W. J. Courthope, *Hist. of Eng. Poetry*, vol. ii. (1897), the second chapter of which is devoted to a critical study of Wyat; E. Flügel, "Die handschriftliche Überlieferung der Gedichte von Sir Thomas Wyat," in *Anglia*, vol. xviii.; F. M. Padelford, *Early Sixteenth Century Lyrics* (1907).

WYAT, SIR THOMAS (d. 1554), English conspirator, son of the preceding, was over twenty-one in 1543, but the date of his birth is uncertain. He is said to have accompanied his father on his mission to Spain, and to have been turned into an enemy of the

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[1] Ed. J. Haslewood, *Ancient Critical Essays*, i. 48 (1811).

[2] One of the most musical of the pieces printed in his works, however, "The Lover complayneth the unkindnes of his Love," beginning "My lute, awake," is sometimes attributed to George Boleyn, Lord Rochford (see E. Bapst, *Deux Gentilshommes poètes de la cour de Henri VIII*, p. 142).

Spaniards by the menaces of the Inquisition. In 1537 he married Jane, daughter of Sir William Hawte of Bishopsbourne in Kent, by whom he had ten children. Wyat was noted in his youth as dissipated, and even as disorderly. He is known to have had a natural son, whose mother Elizabeth was a daughter of Sir Edward Darrell of Littlecote. In 1542 he inherited the family property of Allington Castle and Boxley Abbey on the death of his father. From 1543 to 1550 he saw service abroad as a soldier. In 1554 he joined with the conspirators who combined to prevent the marriage of Queen Mary with Philip the prince of Spain, afterwards King Philip II. A general movement was planned; but his fellow-conspirators were timid and inept, the rising was serious only in Kent, and Wyat became a formidable rebel mostly by accident. On the 22nd of January 1554 he summoned a meeting of his friends at his castle of Allington, and the 25th was fixed for the rising. On the 26th Wyat occupied Rochester, and issued a proclamation to the county. The country people and local gentry collected, but at first the queen's supporters, led by Lord Abergavenny and Sir Robert Southwell, the sheriff, appeared to be able to suppress the rising with ease, gaining some successes against isolated bands of the insurgents. But the Spanish marriage was unpopular, and Kent was more affected by the preaching of the reformers than most of the country districts of England. Abergavenny and Southwell were deserted by their men, who either disbanded or went over to Wyat. A detachment of the London train-bands sent against him by Queen Mary, under the command of the duke of Norfolk, followed their example. The rising now seemed so formidable that a deputation was sent to Wyat by the queen and council to ask for his terms. He insisted that the Tower should be surrendered to him, and the queen put under his charge. The insolence of these demands caused a reaction in London, where the reformers were strong and were at first in sympathy with him. When he reached Southwark on the 3rd of February he found London Bridge occupied in force, and was unable to penetrate into the city. He was driven from Southwark by the threats of Sir John Brydges (or Bruges), afterwards Lord Chandos, who was prepared to fire on the suburb with the guns of the Tower. Wyat now marched up the river to Kingston, where he crossed the Thames, and made his way to Ludgate with a part of his following. Some of his men were cut off. Others lost heart and deserted. His only hope was that a rising would take place, but the loyal forces kept order, and after a futile attempt to force the gate Wyat surrendered. He was brought to trial on the 15th of March, and could make no defence. Execution was for a time delayed, no doubt in the hope that in order to save his life he would say enough to compromise the queen's sister Elizabeth, afterwards Queen Elizabeth, in whose interests the rising was supposed to have been made. But he would not confess enough to render her liable to a trial for treason. He was executed on the 11th of April, and on the scaffold expressly cleared the princess of all complicity in the rising. His estates were afterwards partly restored to his son George, the father of the Sir Francis Wyat (d. 1644) who was governor of Virginia in 1621–26 and 1639–1642. A fragment of the castle of Allington is still inhabited as a farm-house, near Maidstone, on the bank of the Medway.

See G. F. Nott, *Works of Surrey and of Sir Thomas Wyat* (1815); and Froude, *History of England*.

WYATT, JAMES (1746–1813), English architect, was born at Burton Constable in Staffordshire on the 3rd of August 1746. He was the sixth son of Benjamin Wyatt, a farmer, timber merchant and builder. At the age of fourteen his taste for drawing attracted the attention of Lord Bagot, newly appointed ambassador to the pope, who took him with him to Rome, where he spent five or six years in studying architecture. He returned to England in 1766, and gained his first great success by the adaptation for dramatic purposes of the Pantheon in Oxford Street, London (1772), a work which was destroyed by fire twenty years later. In 1776 he was made surveyor of Westminster Abbey, and in 1778 and the following years executed many important commissions at Oxford.

During this earlier period Wyatt shared the prevailing contempt for Gothic architecture; thus the New Buildings at Magdalen College, Oxford, designed by him, formed part of a scheme, the plans for which are extant, which involved the demolition of the famous medieval quadrangle and cloisters. He built many country houses in the classic style, of which he proved himself a master. Gradually, however, he turned his attention to Gothic, the spirit of which, in spite of his diligent study of medieval models, he never understood. The result is still visible in such "Gothic" freaks as that at Ashridge Park, Hertfordshire, built for Lord Bridgewater to replace the ancient priory, and in the lamentable "restorations," *e.g.* in Salisbury and Lichfield cathedrals, which earned for him even among contemporary archaeologists the title of "the Destroyer." Of these Gothic experiments the most celebrated was Fonthill Abbey, built for Beckford (the eccentric author of *Vathek*), the great tower of which speedily collapsed, while much of the rest has been pulled down. None the less, Wyatt must be regarded as the pioneer of the "Gothic revival," while his general influence may be gauged by the fact that nearly every county and large town in England possesses or possessed buildings by him.

On the death of Sir William Chambers in 1796, he was appointed surveyor-general to the Board of Works. In 1785 he became a member of the Royal Academy, and during a misunderstanding between Benjamin West and the Academy, in 1805, he filled the presidential office at the wish of King George III. He was killed by a fall from his carriage on the 4th of September 1813, and was buried in Westminster Abbey. His son, Benjamin Dean Wyatt (1775–1850?), who succeeded him as surveyor of Westminster Abbey, was also an architect of some distinction.

WYCHERLEY, WILLIAM (*c.* 1640–1716), English dramatist, was born about 1640 at Clive, near Shrewsbury, where for several generations his family had been settled on a moderate estate of about £600 a year. Like Vanbrugh, Wycherley spent his early years in France, whither, at the age of fifteen, he was sent to be educated in the very heart of the "precious" circle on the banks of the Charente. Wycherley's friend, Major Pack, tells us that his hero "improved, with the greatest refinements," the "extraordinary talents" for which he was "obliged to nature." Although the harmless affectations of the circle of Madame de Montausier, formerly Madame de Rambouillet, are certainly not chargeable with the "refinements" of Wycherley's comedies—comedies which caused even his great admirer Voltaire to say afterwards of them, "Il semble que les Anglais prennent trop de liberté et que les Françaises n'en prennent pas assez"—these same affectations seem to have been much more potent in regard to the "refinements" of Wycherley's religion.

Wycherley, though a man of far more intellectual power than is generally supposed, was a fine gentleman first, a responsible being afterwards. Hence under the manipulations of the heroine of the "Garland" he turned from the Protestantism of his fathers to Romanism—turned at once, and with the same easy alacrity as afterwards, at Oxford, he turned back to Protestantism under the manipulations of such an accomplished master in the art of turning as Bishop Barlow. And if, as Macaulay hints, Wycherley's turning back to Romanism once more had something to do with the patronage and unwonted liberality of James II., this merely proves that the deity he worshipped was the deity of the "polite world" of his time—gentility. Moreover, as a professional fine gentleman, at a period when, as the genial Major Pack says, "the amours of Britain would furnish as diverting memoirs, if well related, as those of France published by Rabutin, or those of Nero's court writ by Petronius," Wycherley was obliged to be a loose liver. But, for all that, Wycherley's sobriquet of "Manly Wycherley" seems to have been fairly earned by him, earned by that frank and straightforward way of confronting life which, according to Pope and Swift, characterized also his brilliant successor Vanbrugh.

That effort of Wycherley's to bring to Buckingham's notice the case of Samuel Butler (so shamefully neglected by the court Butler had served) shows that the writer of even such heartless plays as *The Country Wife* may be familiar with generous impulses, while his uncompromising lines in defence of Buckingham, when the duke in his turn fell into trouble, show that the inventor of so shameless a fraud as that which forms the pivot of *The Plain Dealer* may in actual life possess that passion for fairplay which is believed to be a specially English quality. But among the "ninety-nine" religions with which Voltaire accredited England there is one whose permanency has never been shaken—the worship of gentility. To this Wycherley remained as faithful to the day of his death as Congreve himself. And, if his relations to that "other world beyond this," which the Puritans had adopted, were liable to change with his environments, it was because that "other world" was really out of fashion altogether.

Wycherley's university career seems also to have been influenced by the same causes. Although Puritanism had certainly not contaminated the universities, yet English "quality and politeness" (to use Major Pack's words) have always, since the great rebellion, been rather ashamed of possessing too much learning. As a fellow-commoner of Queen's College, Oxford, Wycherley only lived (according to Wood) in the provost's lodgings, being entered in the public library under the title of "Philosophiae Studiosus" in July 1660. And he does not seem to have matriculated or to have taken a degree.

Nor when, on quitting Oxford, he took up his residence in the Inner Temple, where he had been entered in 1659, did he give any more attention to the dry study of the law than was proper to one so warmly caressed "by the persons most eminent for their quality or politeness." Pleasure and the stage were alone open to him, and probably early in 1671 was produced, at the Theatre Royal, *Love in a Wood*. It was published the next year. With regard to this comedy Wycherley told Pope—told him "over and over" till Pope believed him—believed him, at least, until they quarrelled about Wycherley's verses—that he wrote it the year before he went to Oxford. But we need not believe him: the worst witness against a man is mostly himself. To pose as the wicked boy of genius has been the foolish ambition of many writers, but on inquiry it will generally be found that these inkhorn Lotharios are not nearly so wicked as they would have us believe. When Wycherley charges himself with having written, as a boy of nineteen, scenes so callous and so depraved that even Barbara Palmer's appetite for profligacy was, if not satisfied, appeased, there is, we repeat, no need to believe him. Indeed, there is every reason to disbelieve him,—not for the reasons advanced by Macaulay, however, who in challenging Wycherley's date does not go nearly deep enough. Macaulay points to the allusions in the play to gentlemen's periwigs, to guineas, to the vests which Charles ordered to be worn at court, to the great fire, &c., as showing that the comedy could not have been written the year before the author went to Oxford. We must remember, however, that even if the play had been written in that year, and delayed in its production till 1672, it is exactly this kind of allusion to recent events which any dramatist with an eye to freshness of colour would be certain to weave into his dialogue. It is not that "the whole air and spirit of the piece belong to a period subsequent to that mentioned by Wycherley," but that "the whole air and spirit of the piece" belong to a man—an experienced and hardened young man of the world—and not to a boy who would fain pose as an experienced and hardened young man of the world. The real defence of Wycherley against his foolish impeachment of himself is this, that *Love in a Wood*, howsoever inferior in structure and in all the artistic economies to *The Country Wife* and *The Plain Dealer*, contains scenes which no inexperienced boy could have written—scenes which, not for moral hardness merely, but often for real dramatic ripeness, are almost the strongest to be found amongst his four plays. With regard to dramatic ripeness, indeed, if we were asked to indicate [illegible]ll Wycherley, we should very likely select [illegible]cene of the third act of this very play, where the vain, foolish and boastful rake Dapperwit, having taken his friend to see his mistress for the express purpose of advertising his lordship over her, is coolly denied by her and insolently repulsed. "I think," says Dapperwit, "women take inconstancy from me worse than from any man breathing."

Now, does the subsequent development of Wycherley's dramatic genius lead us to believe that, at nineteen, he could have given this touch, worthy of the hand that drew Malvolio? Is there anything in his two masterpieces—*The Country Wife* or *The Plain Dealer*—that makes it credible that Wycherley, the boy, could have thus delineated by a single quiet touch vanity as a chain-armour which no shaft can pierce—vanity, that is to say, in its perfect development? However, Macaulay (forgetting that, among the myriad vanities of the writing fraternity, this of pretending to an early development of intellectual powers that ought not to be, even if they could be, developed early is at once the most comic and the most common) is rather too severe upon Wycherley's disingenuousness in regard to the dates of his plays. That the writer of a play far more daring than Etheredge's *She Would if She Could*—and far more brilliant too—should at once become the talk of Charles's court was inevitable; equally inevitable was it that the author of the song at the end of the first act, in praise of harlots and their offspring, should touch to its depths the soul of the duchess of Cleveland. Possibly Wycherley intended this famous song as a glorification of Her Grace and her profession, for he seems to have been more delighted than surprised when, as he passed in his coach through Pall Mall, he heard the duchess address him from her coach window as a "rascal," a "villain," and as a son of the very kind of lady his song had lauded. For his answer was perfect in its readiness: "Madam, you have been pleased to bestow a title on me which belongs only to the fortunate." Perceiving that Her Grace received the compliment in the spirit in which it was meant, he lost no time in calling upon her, and was from that moment the recipient of those "favours" to which he alludes with pride in the dedication of the play to her. Voltaire's story (in his *Letters on the English Nation*) that Her Grace used to go to Wycherley's chambers in the Temple disguised as a country wench, in a straw hat, with pattens on and a basket in her hand, may be apocryphal—very likely it is—for disguise was quite superfluous in the case of the mistress of Charles II. and Jacob Hall, but it at least shows how general was the opinion that, under such patronage as this, Wycherley's fortune as poet and dramatist, "eminent for his quality and politeness," was now made.

Charles, who had determined to bring up his son, the duke of Richmond, like a prince, was desirous of securing for tutor a man so entirely qualified as was Wycherley to impart what was then recognized as the princely education, and it seems pretty clear that, but for the accident, to which we shall have to recur, of his meeting the countess of Drogheda at Bath and secretly marrying her, the education of the young man would actually have been entrusted by his father to Wycherley as a reward for the dramatist's having written *Love in a Wood*.

Whether Wycherley's experiences as a naval officer, which he alludes to in his lines "On a Sea Fight which the Author was in betwixt the English and the Dutch," occurred before or after the production of *Love in a Wood* is a point upon which opinions differ, but on the whole we are inclined to agree with Macaulay, against Leigh Hunt, that these experiences took place not only after the production of *Love in a Wood* but after the production of *The Gentleman Dancing Master*, in 1673. We also think, with Macaulay, that he went to sea simply because it was the "polite" thing to do so—simply because, as he himself in the epilogue to *The Gentleman Dancing Master* says, "all gentlemen must pack to sea."

This second comedy was published in 1673, but was probably acted late in 1671. It is inferior to *Love in a Wood*. In *The Relapse* the artistic mistake of blending comedy and farce damages a splendid play, but leaves it a splendid play still. In *The Gentleman Dancing Master* this mingling of discordant elements destroys a play that would never in any circumstances have been strong—a play nevertheless which abounds in animal spirits, and is luminous here and there with true dramatic points.

It is, however, on his two last comedies—*The Country Wife* and *The Plain Dealer*—that must rest Wycherley's fame as a master of that comedy of repartee which, inaugurated by Etheredge, and afterwards brought to perfection by Congreve and Vanbrugh, supplanted the humoristic comedy of the Elizabethans. *The Country Wife*, produced in 1672 or 1673 and published in 1675, is so full of wit, ingenuity, animal spirits and conventional humour that, had it not been for its motive—a motive which in any healthy state of society must always be as repulsive to the most lax as to the most moral reader—it would probably have survived as long as the acted drama remained a literary form in England. So strong, indeed, is the hand that could draw such a character as Majory Pinchwife (the undoubted original not only of Congreve's Miss Prue but of Vanbrugh's Hoyden), such a character as Sparkish (the undoubted original of Congreve's Tattle), such a character as Horner (the undoubted original of all those cool impudent rakes with whom our stage has since been familiar), that Wycherley is certainly entitled to a place alongside Congreve and Vanbrugh. And, indeed, if priority of date is to have its fair and full weight, it seems difficult to challenge Professor Spalding's dictum that Wycherley is "the most vigorous of the set."

In order to do justice to the life and brilliance of *The Country Wife* we have only to compare it with *The Country Girl*, afterwards made famous by the acting of Mrs Jordan, that Bowdlerized form of *The Country Wife* in which Garrick, with an object more praiseworthy than his success, endeavoured to free it of its load of unparalleled licentiousness by disturbing and sweetening the motive—even as Voltaire afterwards (with an object also more praiseworthy than his success) endeavoured to disturb and sweeten the motive of *The Plain Dealer* in *La Prude*. While the two Bowdlerized forms of Garrick and Voltaire are as dull as the *Æsop* of Boursault, the texture of Wycherley's scandalous dialogue would seem to scintillate with the changing hues of shot silk or of the neck of a pigeon or of a shaken prism, were it not that the many-coloured lights rather suggest the miasmatic radiance of a foul ditch shimmering in the sun. It is easy to share Macaulay's indignation at Wycherley's satyr-like defilement of art, and yet, at the same time, to protest against that disparagement of their literary riches which nullifies the value of Macaulay's criticism. And scarcely inferior to *The Country Wife* is *The Plain Dealer*, produced probably early in 1674 and published three years later,— a play of which Voltaire said, "Je ne connais point de comédie chez les anciens ni chez les moderns ou il y ait autant d'esprit." This comedy had an immense influence, as regards manipulation of dialogue, upon all subsequent English comedies of repartee, and he who wants to trace the ancestry of Tony Lumpkin and Mrs Hardcastle has only to turn to Jerry Blackacre and his mother, while Manly (for whom Wycherley's early patron, the duke of Montausier, sat), though he is perhaps overdone, has dominated this kind of stage character ever since. If but few readers know how constantly the blunt sententious utterances of this character are reappearing, not on the stage alone, but in the novel and even in poetry, it is because a play whose motive is monstrous and intolerable can only live in a monstrous and intolerable state of society; it is because Wycherley's genius was followed by Nemesis, who always dogs the footsteps of the defiler of literary art. When Burns said—

"The rank is but the guinea stamp,
The man's the gowd for a' that";

when Sterne, in *Tristram Shandy*, said, "Honours, like impressions upon coin, may give an ideal and local value to a bit of base metal, but gold and silver will pass all the world over without any other recommendation than their own weight," what did these writers do but adopt—adopt without improving—Manly's fine saying to Freeman, in the first act:—"I weigh the man, not his title; 'tis not the king's stamp can make the metal better or heavier"? And yet it is in the fourth and fifth acts that the coruscations of Wycherley's comic genius are the most dazzling; also, it is there that the licentiousness is the most astonishing. Not that the worst scenes in this play are really more wicked than the worst scenes in Vanbrugh's *Relapse*, but they are more seriously imagined. Being less humorous than Vanbrugh's scenes, they are more terribly and earnestly realistic; therefore they seem more wicked. They form indeed a striking instance of the folly of the artist who selects a story which cannot be actualized without hurting the finer instincts of human nature. When Menander declared that, having selected his plot, he looked upon his comedy as three parts finished, he touched upon a subject which all workers in drama—all workers in imaginative literature of every kind—would do well to consider. In all literatures— ancient and modern—an infinite wealth of material has been wasted upon subjects that are unworthy, or else incapable, of artistic realization; and yet Wycherley's case is, in our literature at least, without a parallel. No doubt it may be right to say, with Aristotle, that comedy is an imitation of bad characters, but this does not mean that in comedy art may imitate bad characters as earnestly as she may imitate good ones,—a fact which Thackeray forgot when he made Becky Sharp a murderess, thereby destroying at once what would otherwise have been the finest specimen of the comedy of convention in the world. And perhaps it was because Vanbrugh was conscious of this law of art that he blended comedy with farce. Perhaps he felt that the colossal depravity of intrigue in which the English comedians indulged needs to be not only warmed by a superabundance of humour but softened by the playful mockery of farce before a dramatic circle such as that of the Restoration drama can be really brought within human sympathy. Plutarch's impeachment of Aristophanes, which affirms that the master of the old comedy wrote less for honest men than for men sunk in baseness and debauchery, was no doubt unjust to the Greek poet, one side of whose humour, and one alone, could thus be impeached. But does it not touch all sides of a comedy like Wycherley's—a comedy which strikes at the very root of the social compact upon which civilization is built? As to comparing such a comedy as that of the Restoration with the comedy of the Elizabethans, Jeremy Collier did but a poor service to the cause he undertook to advocate when he set the occasional coarseness of Shakespeare alongside the wickedness of Congreve and Vanbrugh. And yet, ever since Macaulay's essay, it has been the fashion to speak of Collier's attack as being levelled against the immorality of the "Restoration dramatists." It is nothing of the kind. It is (as was pointed out so long ago as 1699 by Dr Drake in his little-known vigorous reply to Collier) an attack upon the English drama generally, with a special reference to the case of Shakespeare. While dwelling upon that noxious and highly immoral play *Hamlet*, Collier actually leaves unscathed the author of *The Country Wife*, but fastens on Congreve and Vanbrugh, whose plays—profligate enough in all conscience—seem almost decent beside a comedy whose incredible *vis motrix* is "the modish distemper."

That a stage, indeed, upon which was given with applause *A Woman Killed with Kindness* (where a wife dies of a broken heart for doing what any one of Wycherley's married women would have gloried in doing) should, in seventy years, have given with applause *The Country Wife* shows that in historic and social evolution as in the evolution of organisms, "change" and "progress" are very far from being convertible terms. For the barbarism of the society depicted in these plays was, in the true sense of the word, far deeper and more brutal than any barbarism that has ever existed in these islands within the historic period. If civilization has any meaning at all for the soul of man, the Englishmen of Chaucer's time, the Anglo-Saxons of the Heptarchy, nay, those half-naked heroes, who in the dawn of English history clustered along the southern coast to defend it from the invasion of Caesar, were far more civilized than that "race gangrenée"—the treacherous rakes, mercenary slaves and brazen strumpets of the court of Charles II., who did their best to substitute for the human passion of love (a passion which was known perhaps even to palaeolithic man) the promiscuous intercourse of the beasts of the field. Yet Collier leaves Wycherley unassailed, and classes Vanbrugh and Congreve with Shakespeare!

It was after the success of *The Plain Dealer* that the turning-point came in Wycherley's career. The great dream of all the men about town in Charles's time, as Wycherley's plays all show, was to marry a widow, young and handsome, a peer's daughter if possible—but in any event rich, and spend her money upon wine and women. While talking to a friend in a bookseller's shop at Tunbridge, Wycherley heard *The Plain Dealer* asked for by a lady who, in the person of the countess of Drogheda, answered all the requirements. An introduction ensued, then love-making, then marriage—a secret marriage, probably in 1680, for, fearing to lose the king's patronage and the income therefrom, Wycherley still thought it politic to pass as a bachelor. He had not seen enough of life to learn that in the long run nothing is politic but "straightforwardness." Whether because his countenance wore a pensive and subdued expression, suggestive of a poet who had married a dowager countess and awakened to the situation, or whether because treacherous confidants divulged his secret, does not appear, but the news of his marriage oozed out—it reached the royal ears, and deeply wounded the father anxious about the education of his son. Wycherley lost the appointment that was so nearly within his grasp—lost indeed the royal favour for ever. He never had an opportunity of regaining it, for the countess seems to have really loved him, and *Love in a Wood* had proclaimed the writer to be the kind of husband whose virtue prospers best when closely guarded at the domestic hearth. Wherever he went the countess followed him, and when she did allow him to meet his boon companions it was in a tavern in Bow Street opposite to his own house, and even there under certain protective conditions. In summer or in winter he was obliged to sit with the window open and the blinds up, so that his wife might see that the party included no member of a sex for which her husband's plays had advertised his partiality. She died, however, in the year after her marriage and left him the whole of her fortune. But the title to the property was disputed; the costs of the litigation were heavy—so heavy that his father was unable (or else he was unwilling) to come to his aid; and the result of his marrying the rich, beautiful and titled widow was that the poet was thrown into the Fleet prison. There he remained for seven years, being finally released by the liberality of James II.—a liberality which, incredible as it seems, is too well authenticated to be challenged. James had been so much gratified by seeing *The Plain Dealer* acted that, finding a parallel between Manly's "manliness" and his own, such as no spectator had before discovered, he paid off Wycherley's execution creditor and settled on him a pension of £200 a year. Other debts still troubled Wycherley, however, and he never was released from his embarrassments, not even after succeeding to a life estate in the family property. In coming to Wycherley's death, we come to the worst allegation that has ever been made against him as a man and as a gentleman. At the age of seventy-five he married a young girl, and is said to have done so in order to spite his nephew, the next in succession, knowing that he himself must shortly die and that the jointure would impoverish the estate.

Wycherley wrote verses, and, when quite an old man, prepared them for the press by the aid of Alexander Pope, then not much more than a boy. But, notwithstanding all Pope's tinkering, they remain contemptible. Pope's published correspondence with the dramatist was probably edited by him with a view to giving an impression of his own precocity. The friendship between the two cooled, according to Pope's account, because Wycherley took offence at the numerous corrections on his verses. It seems more likely that Wycherley discovered that Pope, while still professing friendship and admiration, satirized his friend in the *Essay on Criticism*. Wycherley died on the 1st of January 1716, ar [illegible] e vault of the church in Covent Garder (T. W.-D.)

WYCLIFFE[1] (or WYCLIF), **JOHN** (*c.* 1320–1384), English reformer, was born, according to John Leland,[2] our single authority on the point, at Ipreswel (evidently Hipswell), 1 m. from Richmond in Yorkshire. The date may have been somewhere about 1320. Leland elsewhere mentions that he "drew his origin" from Wycliffe-on-Tees (*Collectanea*, ii. 329), so that his lineage was of the ancient family which is celebrated by Scott in *Marmion*. The Wycliffes had a natural connexion with the college at Oxford which had been founded in the latter part of the previous century by their neighbours, the Balliols of Barnard Castle; and to Balliol College, then distinctively an "arts" college,[3] John Wycliffe in due time proceeded. It has been generally believed, and was in fact believed not many years after his death, that he was a fellow of Merton College in 1356; but this identification probably rests on a confusion with a contemporary. That the future reformer was a fellow of Balliol is implied in the fact that some time after 1356, but before the summer of 1360, he was elected master. This office he held but a short time. So soon as 1361 he accepted a college living, that of Fillingham in Lincolnshire, and probably left Oxford for some time. In the same year the name of a certain "John de Wyclif of the diocese of York, M.A." appears as a suppliant to the Roman Curia for a provision to a prebend, canonry and dignity at York (*Cal. of Entries in the Papal Registries*, ed. Bliss, Petitions, i. 390). This was not granted, but Wycliffe received instead the prebend of Aust in the collegiate church of Westbury-on-Trym. In 1365 one "John de Wyclif" was appointed by Simon Islip, archbishop of Canterbury, to the wardenship of Canterbury Hall, a house which the archbishop founded for a mixed body of monks and secular clergy, and then—as a result of the inevitable quarrels—filled exclusively with the latter. Two years later, however, Islip's successor, the monk Simon Langham, reversed the process, replacing the intruded seculars by monks. The dispossessed warden and fellows appealed to Rome, and in 1371 judgment was given against them. The question of the identity of the warden of Canterbury Hall with the reformer is still a matter of dispute. It has been understood as referred to by Wycliffe himself (*De ecclesia*, cap. xvi. pp. 370 sq.), and was assumed by the contemporary monk of St Albans (*Chron. Angl.* "Rolls" ser. p. 115) and by Wycliffe's opponent William Woodford (*Fasc. Zizan.* p. 517), who found in Wycliffe's resentment at this treatment the motive for his attacks on the religious orders, it has likewise been assumed by a series of modern scholars, including Loserth (*Realencyklopädie*, 1908 ed., vol. xxi. p. 228, § 35), who only denies the deductions that Woodford drew from it. Dr Rashdall, on the other hand, following Shirley, brings evidence to show that the Wycliffe of Canterbury Hall could not have been the reformer, but was the same person as the fellow of Merton, this being the strongest argument against the identification of the latter with the reformer. The confusion is increased by the appearance of yet another "John Wyclif" or "Wiclif" on the books of Queen's College; as paying rent for rooms as a "pensioner" or "commoner" for the years 1371–1372, 1374–1375 and 1380–1381. It has thus been commonly assumed (*e.g.* by Loserth) that the reformer was at one time in residence at Queen's, the date being given as 1363. It is probable, however, that the John Wiclif of the Queen's College accounts is the same as the John Wyclif who appears in the College *computus* for 1371–1372 as one of the "almonry boys" of the College, and, therefore, certainly not the reformer.[1]

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[1] A note is necessary as to the spelling of Wycliffe's name. Out of thirteen contemporary entries in *documents*, twelve give "y" in the first syllable. In not one of these is there a "ck" (though once a "kc") (see F. D. Matthew in the *Academy*, June 7, 1884). The chroniclers, &c., offer every imaginable variety of spelling, and it is possible that one favourite form in more recent times, "Wickliffe," derived its popularity from the old play on the name, "nequam vita," which we find in Gascoigne. The spelling adopted in the present article is that of the village from which Wycliffe derived his name; it is also preferred by the editors of the Wycliffe Bible, by Milman and by Stubbs. "Wyclif" has the support of Shirley, of T. Arnold and of the Wyclif Society; while "Wiclif" is the popular form in Germany.

[2] *Itinerary*, Stow's transcript, Bodleian Library, Tanner MS. 464, f. 45 (Leland's original being mutilated at this place). Hearne misprinted the name "Spreswel" and thus set all Wycliffe's biographers on a search after a *vox nihili*. The identification of Spreswell with the site of a vanished hamlet near Wycliffe on the Tees, about 1 m. from that of a supposed "Old Richmond," accepted by Loserth on the authority of Lechler, is unsupported by any trustworthy evidence.

[3] See a document of 1325 printed in the appendix to the *Fourth Report* of the Historical Manuscripts Commission, pp. 442 sq. Provision for theological study was made by the benefaction of Sir Philip Somerville in 1340 (Lyte, *Hist. of the Univ. of Oxford*, p. 154, 1886).

These questions, even that of the wardenship of Canterbury, are, however, essentially unimportant, unless we are prepared with Woodford to impute mean motives to a great man. What is certain is that long before Wycliffe had become a power outside Oxford his fame was established in the university. He was acknowledged supreme in the philosophical disputations of the schools, and his lectures were crowded. His influence was, however, purely academic, nor does it seem to have been inspired at the outset by any conscious opposition to the established order in the church; and, as Loserth points out, it was not until he was drawn into the arena of the politico-ecclesiastical conflicts of the day that Wycliffe became of world-importance. It has been generally assumed that this happened first in 1366, and that Wycliffe published his *Determinatio quaedam de dominio* in support of the action of parliament in refusing the tribute demanded by Pope Urban V.; but Loserth has shown that this work, which contains the first trace of that doctrine of *dominium* or lordship which Wycliffe afterwards developed in a sense hostile to the whole papal system, must be assigned to a date some eight years later. Wycliffe, in fact, for some years to come had the reputation of a good "curialist." Had it been otherwise, the pope would scarcely have granted him (January 1373) a licence to keep his Westbury prebend even after he should have obtained one at Lincoln (*Cal. Papal Letters*, ed. Bliss and Twemlow, iv. 193). Moreover, it is uniformly asserted that Wycliffe fell into heresy after his admission to the degree of doctor (*Fasc. Ziz.* p. 2), and the papal document above quoted shows that he had only just become a doctor of theology, that is in 1372.

This, of course, does not mean that Wycliffe's tendencies may not already have been sufficiently pronounced to call attention to him in high places as a possibly useful instrument for the anti-papal policy of John of Gaunt and his party. Evidence of royal favour was soon not wanting. On the 7th of April 1374, he was presented by the crown to the rectory of Lutterworth in Leicestershire, which he held until his death; and on the 26th of July he was nominated one of the royal envoys to proceed to Bruges to confer with the papal representatives on the long vexed question of "provisions" (*q.v.*). It is probable that he was attached to this mission as theologian, and that this was so is sufficient proof that he was not yet considered a *persona ingrata* at the Curia. The rank he took is shown by the fact that his name stands second, next after that of the bishop of Bangor, on the commission, and that he received pay at the princely rate of twenty shillings a day. The commission itself was appointed in consequence of urgent and repeated complaints on the part of the Commons; but the king was himself interested in keeping up the papal system of provisions and reservations, and the negotiations were practically fruitless.

After his return to England Wycliffe lived chiefly at Lutterworth and Oxford, making frequent and prolonged visits to London, where his fame as a popular preacher was rapidly established. It is from this period, indeed, that dates the development of the trenchant criticisms of the folly and corruption of the clergy, which had gained him a ready hearing, into a systematic attack on the whole established order in the church. It was not at the outset the dogmatic, but the political elements in the papal system that provoked his censure. The negotiations at Bruges had doubtless strengthened the sympathy which he already felt for the anti-curial tendencies in English politics from Edward I.'s time onwards, and a final impulse was given by the attitude of the "Good Parliament" in 1376; in the autumn of that year he was reading his treatise on civil lordship (*De civili dominio*) to his students at Oxford. Of its propositions some, according to Loserth, were taken bodily from the 140 titles of the bill dealing with ecclesiastical abuses introduced in the parliament; but it may perhaps be questioned whether Wycliffe did not rather inspire the bill than the bill Wycliffe. However this may be, the reformer now for the first time publicly proclaimed the revolutionary doctrine that righteousness is the sole indefeasible title to dominion and to property, that an unrighteous clergy has no such title, and that the decision as to whether or no the property of ecclesiastics should be taken away rests with the civil power—"politicorum qui intendunt praxi et statui regnorum" (*De civ. dom.* i. 37, p. 269). It was unlikely that a doctrine so convenient to the secular authorities should long have remained a mere subject of obscure debate in the schools; as it was, it was advertised abroad by the indiscreet zeal of its orthodox opponents, and Wycliffe could declare that it was not his fault if it had been brought down into the streets and "every sparrow twittered about it."

If the position at which Wycliffe had now arrived was originally inspired, as Loserth asserts, by his intimate knowledge of and sympathy with the legislation of Edward I., *i.e.* by political rather than theological considerations, the necessity for giving to it a philosophical and religious basis led inevitably to its development into a criticism not only of the political claims but of the doctrinal standpoint of the church. As a philosopher, indeed, Wycliffe was no more than the last of the conspicuous Oxford scholastics, and his philosophy is of importance mainly in so far as it determined his doctrine of *dominium*, and so set the direction in which his political and religious views were to develop. In the great controversy between Realism and Nominalism he stood on the side of the former, though his doctrine of universals showed the influence of the criticisms of Ockham and the nominalists. He is Platonic in his conception of God as the *forma rerum* in whom the *rationes exemplares* exist eternally, being in fact his Word, who is *omnia in omnibus* (1 Cor. xv. 28); every creature in respect of its *esse intelligibile* is God, since every creature is in essence the same as the idea, and all *rationes ideales* are essentially the same as the Word of God (*De dominio divino*, pp. 42, 43). There is one *ens*, the *ens analogum*, which includes in itself and comprehends all other *entia*—all universals and all the individual parts of the universe (*De dom. div.* pp. 58 sq.). The process by which the primary *ens* is specificated, or by which a higher and more general class passes into sensible existence, is that it receives the addition of substantial form whereby it is rendered capable of acquiring qualities and other accidents (*ibid*, pp. 48 sq.). To Wycliffe the doctrine of arbitrary divine decrees was anathema. The will of God is his essential and eternal nature, by which all his acts are determined; it was thus with the creation, since God created all things in their primordial causes, as genera and species, or else in their material essences, *secundum rationes absconditas seminales* (*ibid.* p. 66). God's creation is conditioned by his own eternal nature; the world is therefore not merely one among an infinity of alternatives, an arbitrary selection, so to speak, but is the only possible world; it is, moreover, not in the nature of an eternal emanation from God, but was created at a given moment of time—to think otherwise would be to admit its absolute necessity, which would destroy free-will and merit. Since, however, all things came into being in this way, it follows that the creature can produce nothing save what God has already created.[2] So then all human lordship is derived from the supreme overlordship of God and is inseparable from it, since whatever God gives to his servants is part of himself, from the first gift, which is the *esse intelligibile*, *i.e.* really the divine essence, down to those special gifts which flow from the communication of his Holy Spirit; so that in him we live and move and have our being. But, in giving, God does not part with the lordship of the thing given; his gifts are of the nature of fiefs, and whatever lordship the creature may possess is held subject to due service to the supreme overlord. Thus, as in feudalism, lordship is distinguished from possession. Lordship is not properly proprietary, and property is the result of sin; Christ and his apostles had none.[1] The service, however, by which lordship is held of God is righteousness and its works; it follows that the unrighteous forfeit their right to exercise it, and may be deprived of their possessions by competent authority.

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[1] See H. T. Riley's remarks in the *Second Report* of the Historical Manuscripts Commission, appendix, pp. 141 sq. The appearance of a John Wyclif on the books of Queen's led to the common mistake, repeated in Milman's *Hist. of Latin Christianity* (bk. xiii. ch. vi)., that Wycliffe began his university career at Queen's College. The whole question is argued at length by Dr Rashdall in the *Dict. Nat. Biog.*

[2] This leads to the question of predestination and free-will, in which Wycliffe takes a middle position with the aid of the Aristotelian distinction between that which is necessary absolutely and that which is necessary on a given supposition. God does not will sin, for he only wills that which has being, and sin is the negation of being; he necessitates men to perform actions which are in themselves neither right nor wrong; they become right or wrong through man's free agency.

The question, of course, follows as to what this authority is, and this Wycliffe sets out to answer in the *Determinatio quaedam de dominio* and, more elaborately, in the *De civili dominio*. Briefly, his argument is that the church has no concern with temporal matters at all, that for the clergy to hold property is sinful, and that it is lawful for statesmen (*politici*)—who are God's stewards in temporals—to take away the goods of such of the clergy as, by reason of their unrighteousness, no longer render the service by which they hold them. That the church was actually in a condition to deserve spoliation he refused, indeed—though only under pressure—to affirm; but his theories fitted in too well with the notorious aims of the duke of Lancaster not to rouse the bitter hostility of the endowed clergy. With the mendicant orders he continued for a while to be on good terms.

Hitherto Wycliffe had made no open attack on the doctrinal system of the church, and for some time he had been allowed to spread his doctrines without hindrance. Early in 1377, however, Archbishop Sudbury summoned him to appear before the bishop of London, and answer certain charges laid against him. The nature of these accusations is not stated, but their purport can hardly be doubtful. On the 19th of February 1377, Wycliffe made his appearance at St Paul's. He was accompanied by the duke of Lancaster, by Lord Percy, marshal of England, and by four doctors of the four mendicant orders. The trial, however, came to nothing; before Wycliffe could open his mouth, the court was broken up by a rude brawl between his protectors and Bishop Courtenay, ending in a general riot of the citizens of London, who were so much enraged by the insult to their bishop in his own cathedral church—coming as this did at the same time as a serious attempt at an invasion by the duke in parliament of their civic liberties (*Chron. Angl.* p. 120)—that they would have sacked his palace of the Savoy had not Courtenay himself intervened.

Wycliffe had escaped for the time, but his enemies did not rely solely on their own weapons. Probably before this they had set their case before the pope; and on the 22nd of May five bulls were issued by Gregory XI., who had just returned to Rome from Avignon, condemning eighteen (or in other copies nineteen) "conclusions" drawn from Wycliffe's writings. All the articles but one are taken from his *De civili dominio.* The bulls truly stated Wycliffe's intellectual lineage; he was following in the error of Marsilius of Padua; and the articles laid against him are concerned entirely with questions agitated between church and state—how far ecclesiastical censures could lawfully affect a man's civil position, and whether the church had a right to receive and hold temporal endowments. The bulls were addressed to the archbishop of Canterbury and the bishop of London, the university of Oxford, and the king. The university was to take Wycliffe and send him to the prelates; the latter were then to examine the truth of the charges and to report to the pope, Wycliffe being meanwhile kept in confinement. The execution of the papal bulls was impeded by three separate causes—the king's death on the 21st of June; the tardy action of the bishops, who enjoined the university to make a report, instead of simply sending Wycliffe to them; and the unwillingness of the university to admit external authority, and, above all, the pope's right to order the imprisonment of any man in England. The convocation of the university, indeed, as the St Albans chronicler[2] states with lamentation, made serious objections to receiving the bull at all; and in the end it merely directed Wycliffe to keep within his lodgings at Black Hall for a time.

If the university was disposed to favour the reformer, the government was not less so. John of Gaunt was for the moment in retirement; but the mother of the young king appears to have adopted his policy in church affairs, and she naturally occupied a chief position in the new council. As soon as parliament met in the autumn of 1377, Wycliffe was consulted by it as to the lawfulness of prohibiting that treasure should pass out of the country in obedience to the pope's demand. Wycliffe's affirmative judgment is contained in a state paper still extant; and its tone is plain proof enough of his confidence that his views on the main question of church and state had the support of the nation.[3] Indeed he had laid before this same parliament his answer to the pope's bulls, with a defence of the soundness of his opinions. His university, moreover, confirmed his argument; his tenets, it said, were true (*i.e.* orthodox), though their expression was such as to admit of an incorrect interpretation. But Wycliffe was still bound to clear himself before the prelates who had summoned him, and early in 1378 he appeared for this purpose in the chapel of Lambeth Palace. His written defence, expressed in some respects in more cautious language than he had previously used, was laid before the council; but its session was rudely interrupted, not only by an inroad of the London citizens with a crowd of the rabble, but also by a messenger from the princess of Wales enjoining them not to pass judgment against Wycliffe; and thus a second time he escaped, either without sentence, or at most with a gentle *request* that he would avoid discussing the matters in question. Meanwhile his "protestatio" was sent on to Rome. Before, however, any further step could be taken at Rome, Gregory XI. died.

In the autumn of this year Wycliffe was once more called upon to prove his loyalty to John of Gaunt. The duke had violated the sanctuary of Westminster by sending a band of armed men to seize two squires who had taken refuge there. One of them was taken by a stratagem, the other murdered, together with the servant of the church who attempted to resist his arrest. After a while the bishop of London excommunicated all concerned in the crime (except only the king, his mother and his uncle), and preached against the culprits at Paul's Cross. At the parliament held at Gloucester in October, in the presence of the legates of Pope Urban VI., Wycliffe read an apology for the duke's action at Westminster, pleading that the men were killed in resisting legal arrest. The paper, which forms part of the *De ecclesia*, lays down the permissible limits of the right of asylum, and maintains the right of the civil power to invade the sanctuary in order to bring escaped prisoners to justice.

The schism in the papacy, owing to the election of Clement VII. in opposition to Urban VI., accentuated Wycliffe's hostility to the Holy See and its claims. His attitude was not, indeed, as yet fully developed. He did not object to a visible head of the church so long as this head possessed the essential qualification of righteousness, as a member of the elect. It was only later, with the development of the scandals of the schism, that Wycliffe definitely branded the pope, *qua* pope, as Antichrist;[4] the sin of Silvester I. in accepting the donation of Constantine had made all his successors apostates (*Sermones*, ii. 37). The year 1378, indeed, saw the beginning of an agressive propaganda which was bound sooner or later to issue in a position wholly revolutionary. Wycliffe's criticism of the established order and of the accepted doctrines had hitherto been mainly confined to the schools; he now determined to carry it down into the streets. For this purpose he chose two means, both based on the thesis which he had long maintained as to the supreme authority of Holy Scripture, as the great charter of the Christian religion. The first means was his institution of the "poor" or "simple" priests to preach his doctrines throughout the country; the second was the translation of the Vulgate into English, which he accomplished with the aid of his friends Nicholas Hereford and John Purvey (see BIBLE, ENGLISH). This version of the Bible, and still more his numerous sermons and tracts, established Wycliffe's now undisputed position as the founder of English prose writing.

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[1] See R. L. Poole's preface to his edition of the *De dominio divino*, where Wycliffe's indebtedness to Richard Fitz Ralph, archbishop of Armagh, for his views on lordship and property is shown at some length (pp. xxxiv sq.). Fitz Ralph had been a fellow of Balliol, and was vice-chancellor of the university in or about 1333 (A. à Wood, *Fasti Oxon.* p. 21, ed. Gutch, 1790). The first four books of his *De pauperis Salvatoris* were edited by R. L. Poole for the Wycliffe Society, and published in 1890 in an appendix to the edition of the *De dominio divino.* Fitz Ralph also taught that lordship was conditioned by grace, and that property had come into the world with sin. Fitz Ralph's work was, however, directed to the settlement of the controversy raised by the mendicant orders as to "possession" and "u[illegible]ded the scope of the doctrine so as to include [illegible]ical society.

[2] When he says that the bull was only received at Oxford shortly before Christmas, he is apparently confounding it with the prelates' mandate, which is dated December 18 (Lewis, appendix xvii.).—*Chron. Angl.* p. 173.

[3] In one text of this document a note is appended, to the effect that the council enjoined silence on the writer as touching the matter therein contained (*Fasciculi Zizaniorum*, p. 271). This, if true, was apparently a measure of precaution.

[4] So he describes the popes in the first sermon in vol. ii. of the *Sermones*. This may very probably refer to the two rival popes (cf. Buddensieg, *Polemical Works*, intr. p. xxi). Book iii. of his *Opus evangelicum* is also significantly entitled *De Antichristo.*

The choice of secular priests to be his itinerant preachers was significant of another change of attitude on Wycliffe's part. Hitherto he had been on good terms with the friars, whose ideal of poverty appealed to him; as already mentioned, four doctors of the mendicant orders had appeared with him at his trial in 1377. But he had come to recognize that all organized societies within the church, "sects" as he called them, were liable to the same corruption, while he objected fundamentally to the principle which had established a special standard of morality for the "religious." On the other hand, Wycliffe's itinerant preachers were not necessarily intended to work as rivals to the beneficed clergy. The idea that underlay their mission was rather analogous to that which animated Wesley four centuries later. Wycliffe aimed at supplementing the services of the church by regular religious instruction in the vernacular; and his organization included a good number of men who held or had held respectable positions in their colleges at Oxford. The influence of their teaching was soon felt throughout the country. The common people were rejoiced by the plain and homely doctrine which dwelt chiefly on the simple "law" of the gospel, while they no doubt relished the denunciation of existing evils in the church which formed, as it were, the burthen of such discourses. The feeling of disaffection against the rich and careless clergy, monks and friars was widespread but undefined. Wycliffe turned it into a definite channel.

Meanwhile, in addition to his popular propaganda and his interventions in politics, Wycliffe was appealing to the world of learning in a series of Latin treatises, which followed each other in rapid succession, and collectively form his *summa theologiae*.[1] During the years 1378 and 1379 he produced his works on the truth of Holy Scripture, on the church, on the office of king, on the papal power.

Of all these, except the third, the general character has already been indicated. The *De officio regis* is practically a declaration of war against the papal monarchy, an anticipation of the theocratic conception of national kingship as established later by the Reformation. The king is God's vicar, to be regarded with a spiritual fear second only to that due to God, and resistance to him for personal wrong suffered is wicked. His jurisdiction extends over all causes. The bishops—who are to the king as Christ's Humanity is to his Divinity—derive their jurisdiction from him, and whatever they do is done by his authority.[2] Thus in his palpable dignity, towards the world, the king is superior to the priest; it is only in his impalpable dignity, towards God, that the priest is superior to the king. Wycliffe thus passed from an assailant of the papal to an assailant of the sacerdotal power; and in this way he was ultimately led to examine and to reject the distinctive symbol of that power, the doctrine of transubstantiation.[3]

Wycliffe himself had for some time, both in speech and writing, indicated the main characteristics of his teaching on the Eucharist. It was not, however, till 1379 or 1380[4] that began a formal public attack on what he calls the "new" doctrine in a set of theses propounded at Oxford. These were followed by sermons, tracts, and, in 1381, by his great treatise *De eucharistia*. Finally, at the close of his life, he summed up his doctrine in this as in other matters in the *Trialogus*.

The language in which he denounced transubstantiation anticipated that of the Protestant reformers: it is a "blasphemous folly," a "deceit," which "despoils the people and leads them to commit idolatry";[5] philosophically it is nonsense, since it presupposes the possibility of an accident existing without its substance; it overthrows the very nature of a sacrament. Yet the consecrated bread and wine are the body and blood of Christ, for Christ himself says so (*Fasc. Zizan.* p. 115); we do not, however, corporeally touch and break the Lord's body, which is present only *sacramentaliter, spiritualiter et virtualiter*—as the soul is present in the body. The real presence is not denied; what Wycliffe "dares not affirm" is that the bread is after consecration "essentially, substantially, corporeally and identically" the body of Christ (*ib.*). His doctrine, which was by no means always consistent or clear, would thus seem to approximate closely to the Lutheran doctrine of consubstantiation, as distinguished from the Zwinglian teaching accepted in the xxviii. Article of Religion of the Church of England, that "the means whereby the body of Christ is received and eaten in the Supper is Faith."[6]

A public attack by a theologian of Wycliffe's influence on the doctrine on which the whole system of the medieval church was based could not be passed over as of mere academic interest. The theologians of the university were at once aroused. The chancellor, William Barton, sat with twelve doctors (six of whom were friars), and solemnly condemned the theses. Wycliffe appealed, in accordance with his principles, not to the pope, but to the king. But the lay magnates, who were perfectly ready to help the church to attain to the ideal of apostolic poverty, shrank from the responsibility of lending their support to obscure propositions of the schools, which, for no practical end, involved undoubted heresy and therefore the pains of hell. John of Gaunt, accordingly, hastily sent down a messenger enjoining the reformer to keep silence on the subject. The rift thus created between Wycliffe and his patrons in high places was, moreover, almost immediately widened by the outbreak of the great Peasants' Revolt of 1381, the result of which was to draw the conservative elements in church and state together, in defence of their common interests.

With the Peasants' Revolt it has been supposed that Wycliffe had something to do. The only positive fact implicating him is the confession of one of its leaders, John Ball, that he learned his subversive doctrines from Wycliffe. But the confession of a condemned man can seldom be accepted without reserve; and we have not only the precise and repeated testimony of Knyghton that he was a "precursor" of Wycliffe, but also documentary evidence that he was excommunicated as early as 1366, long before Wycliffe exposed himself to ecclesiastical censure. Wycliffe in truth was always careful to state his communistic views in a theoretical way; they are confined to his Latin scholastic writings, and thus could not reach the people from him directly. At the same time it is very possible that his less scrupulous followers translated them in their popular discourses, and thus fed the flame that burst forth in the rebellion. Perhaps it was a consciousness of a share of responsibility for it that led them to cast the blame on the friars. In any case Wycliffe's advocates must regret that in all his known works there is only one trace of any reprobation of the excesses that accompanied the outbreak.

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[1] J. Loserth, in his paper "Die Genesis von Wiclifs Summa Theologiae" (*Sitzungsber. der k. Akad. der Wissensch.*, Vienna, 1908, vol. 156) gives proofs that the *Summa* was not produced on a previously thought out plan, but that even the larger works forming part of it "were the outcome of those conflicts which were fought out inside and outside the Good Parliament," *i.e.* they were primarily intended as weapons in the ecclesiastico-political controversies of the time.

[2] *Episcopi, sui officiales et curati sui, tenentur in qualicunque tali causa spiritualiter cognoscere auctoritate regis; ergo rex per illos. Sunt enim tales legii homines regis.* See *De officio regis* (ed. A. W Pollard and Charles Sayle, from Vienna MSS. 4514, 3933, Wyclif Soc. 1887), cap. vi. p. 119.

[3] Sporadic attacks had been made on this before, though it had not been formally challenged in the schools See the interesting case of the heretic priest Ralph of Tremur in the *Register of John de Grandison, Bishop of Exeter*, edited by F. C. Hingeston-Randolph (London and Exeter, 1894), pp. 1147 and 1179.

[4] 1381 (corrected by the editor from 1380) is the date given in Shirley's edition of the *Fasciculi Zizaniorum*. F. D. Matthew, in the *Eng. Hist. Rev.* for April 1890 (v. 328), proves that the date must have been 1379 or 1380.

[5] *Trialogus*, lib. iv., cap. 22; *De Euch.* p. 249.

[6] The difference is summed up by Melanchthon, in his rejection of Bucer's eirenicon, thus:—*Fucum faciunt hominibus per hoc quod dicunt vere adesse corpus, et tamen postea addunt contemplatione fidei, i.e. imaginatione. Sic iterum negant praesentiam realem. Nos docemus, quod corpus Christi vere et realiter adest cum pane vel in pane* (*Corpus Reformatorum*, ii. 222 sq.).

In the spring following the Revolt his old enemy, William Courtenay, who had succeeded the murdered archbishop Sudbury as archbishop of Canterbury, resolved to take measures for stamping out Wycliffe's crowning heresy. He called a court of bishops, theologians and canonists at the Blackfriars' convent in London, which assembled on the 17th to 21st of May and sat with intervals until July. This proceeding was met by a hardly expected manifestation of university feeling on Wycliffe's side. The chancellor, Robert Rygge, though he had joined in the condemnation of the theses, stood by him, as did also both the proctors. On Ascension Day (the 15th of May) his most prominent disciple, Nicholas Hereford, was allowed to preach a violent sermon against the regulars in the churchyard of St Frideswyde. The archbishop protested through his commissary, the Carmelite Dr Peter Stokes, who was charged with the execution of the archbishop's mandate (on the 28th of May) for the publication in the university of the decision of the Blackfriars' council, by which 24 articles extracted from Wycliffe's works were condemned, ten as heretical and fourteen as erroneous. The reply of the chancellor was to deny the archbishop's jurisdiction within the university, and to allow Philip Repington, another of Wycliffe's disciples, to preach on Corpus Christi day before the university. Chancellor and preacher were guarded by armed men, and Stokes wrote that his life was not safe at Oxford. The chancellor and proctors were now summoned to Lambeth, and directed to appear before the Blackfriars' court on the 12th of June. The result was that the university officers were soon brought to submission. Though they were, with the majority of regent masters at Oxford, on the side of Wycliffe, the main question at issue was for them one of philosophy rather than faith, and they were quite prepared to make formal submission to the authority of the Church. For the rest, a few of the reformer's more prominent adherents were arrested, and imprisoned until they recanted.

Wycliffe himself remained at large and unmolested. It is said indeed by Knyghton that at a council held by Courtenay at Oxford in the following November Wycliffe was brought forward and made a recantation; but our authority fortunately gives the text of the recantation, which proves to be nothing more nor less than a plain English statement of the condemned doctrine. It is therefore lawful to doubt whether Wycliffe appeared before the council at all, and even whether he was ever summoned before it. Probably after the overthrow of his party at Oxford by the action of the Blackfriars' council Wycliffe found it advisable to withdraw permanently to Lutterworth. That his strength among the laity was undiminished is shown by the fact that an ordinance passed by the House of Lords alone, in May 1382, against the itinerant preachers was annulled on the petition of the Commons in the following autumn. In London, Leicester and elsewhere there is abundant evidence of his popularity. The reformer, however, was growing old. There was work, he probably felt, for him to do, more lasting than personal controversy. So in his retirement he occupied himself, with restless activity, in writing numerous tracts, Latin and English. To this period, too, belong two of his most important works:—the *Trialogus* and the unfinished *Opus evangelicum*.

The *Trialogus* is as it were his *summa summarum theologiae*, a summing up of his arguments and conclusions on philosophy and doctrine, cast in the form of a discussion between three persons, Alithia, representing "solid theology," Phronesis, representing "subtle and mature theology," and Pseustis, representing "captious infidelity" whose function is to bring out the truth by arguing and demonstrating against it. The *Trialogus* was the best known and most influential of all Wycliffe's works, and was the first to be printed (1525), a fact which gave it a still greater vogue. It is also significant that all the only four known complete MSS. of the work, preserved in the Imperial Library at Vienna, are of Hussite origin. The note of both the *Trialogus* and of the *Opus evangelicum*, Wycliffe's last work, is their insistence on the "sufficiency of Holy Scripture."

In 1382 or early in 1383, Wycliffe was seized with a paralytic str[illegible] h he continued his labours. In 1384 it is st[illegible] by Pope Urban VI. to appear before him at Rome, but to Rome he never went. On the 28th of December of this year, while he was hearing mass in his own church, he received a final stroke, from the effects of which he died on the New Year's eve. He was buried at Lutterworth; but by a decree of the council of Constance, May 4, 1415, his remains were ordered to be dug up and burned, an order which was carried out, at the command of Pope Martin V., by Bishop Fleming in 1428.

A sober study of Wycliffe's life and works justifies a conviction of his complete sincerity and earnest striving after what he believed to be right. If he cannot be credited (as he has been by most of his biographers) with all the Protestant virtues, he may at least claim to have discovered the secret of the immediate dependence of the individual Christian upon God, a relation which needs no mediation of any priest, and to which the very sacraments of the Church, however desirable, are not essentially necessary. When he divorces the idea of the Church from any connexion with its official or formal constitution, and conceives it as consisting exclusively of the righteous, he may seem to have gone the whole length of the most radical reformers of the 16th century. And yet, powerful as was his influence in England, his doctrines in his own country were doomed to perish, or at best to become for a century and a half the creed of obscure and persecuted sectaries (see LOLLARDS). It was otherwise in Bohemia, whither his works had been carried by the scholars who came to England in the train of Richard II.'s queen, Anne of Bohemia. Here his writings were eagerly read and multiplied, and here his disciple, John Huss (*q.v.*), with less originality but greater simplicity of character and greater moral force, raised Wycliffe's doctrine to the dignity of a national religion. Extracts from the *De ecclesia* and the *De potestate Papae* of the English reformer made up the greater part of the *De ecclesia* of Huss, a work for centuries ascribed solely to the Bohemian divine, and for which he was condemned and burnt. It was Wycliffe's *De sufficientia legis Christi* that Huss carried with him to convert the council of Constance; cf the fiery discourses now included in the published edition of Wycliffe's *Sermones* many were likewise long attributed to Huss. Finally, it was from the *De eucharistia* that the Taborites derived their doctrine of the Lord's Supper, with the exception of the granting of the chalice to the laity. To Huss, again, Luther and other continental reformers owed much, and thus the spirit of the English reformer had its influence on the reformed churches of Europe.

BIBLIOGRAPHY.—The documentary materials for Wycliffe's biography are to be found in John Lewis's *Life and Sufferings of J. Wiclif* (new ed., Oxford, 1820), which contains a valuable appendix of illustrative papers and records; Foxe's *Acts and Monuments*, vol. iii., ed. 1855, with app.; Forshall and Madden's preface to the Wycliffe Bible, p. vii. note, Oxford, 1851, W W. Shirley's edition of the *Fasciculi Zizaniorum*, a collection of contemporary documents bearing on the history of Wycliffe and the Lollards, with interspersed narrative and comments (probably the work of Thomas Netter of Walden) (1858); and H. T. Riley's notices in the appendices to the *Second* and *Fourth Reports* of the Historical Manuscripts Commission. Among contemporary records the narrative of a monk of St Albans—a bitter opponent of John of Gaunt—is of conspicuous value, it was published under the title of *Chronicon Angliae*, by Sir E. Maunde Thompson (1874). Of this the account in Walsingham's *Historia Anglicana* (ed. H. T. Riley, 1863, 1864) is mainly a modified version. Knyghton, who wrote *De eventibus Angliae* at Leicester in the heart of what may be called the Wycliffe country, is very well informed as to certain passages in the reformer's history, though his chronology is extremely faulty (ed. J. R. Lumby, 1889–1895) There are valuable notices also in the continuation of the *Eulogium historiarum* (vol iii., ed F. S. Haydon, 1863), in the *Chronicle* of Adam of Usk (ed. E. M Thompson, 1876), and in more than one of the continuations of Higden. For the study of Wycliffe's theology the controversial works of Wodeford and Walden are important, but must necessarily be used with caution.

Of modern biographies that by G. V. Lechler (*Johann von Wiclif und die Vorgeschichte der Reformation*, 2 vols., Leipzig, 1873; partial Eng. trans., by P. Lorimer, 1878, 1881 and 1884) is by far the most comprehensive; it includes a detailed exposition of the reformer's system, based to a considerable extent on works which were then unpublished. Shirley's masterly introduction to the *Fasciculi Zizaniorum*, and F. D. Matthew's to his edition of *English Works of Wyclif hitherto unprinted* (1880), as well as Creighton's *History of the Papacy*, vol. i., 1882, and Sir H. C. Maxwell Lyte's account in his *History of the University of Oxford* (1886), add to or correct our stock of biographical materials, and contain much valuable criticism.

Wycliffe's political doctrine is discussed by Mr R. L. Poole (*Illustrations of the History of Mediaeval Thought*, 1884); and his relation to Huss is elaborately demonstrated by Dr J. Loserth (*Hus und Wiclif*, Prague, 1884; also Eng. trans.).

See also G. M. Trevelyan, *England in the Age of Wycliffe* (London, 1899); Oman, *History of England 1377–1485* (London, 1906), pp. 511 ff. for authorities; W. W. Capes, "History of the English Church in the 14th and 15th Centuries," in *Hist. of the Eng. Church*, ed Stephen and Hunt (London, 1900). Many references to more recent monographs on particular points will be found in J. Loserth's article "Wiclif," in Herzog-Hauck, *Realencyklopädie* (3rd ed., 1908), xxi. pp. 225-227.

Wycliffe's works are enumerated in a *Catalogue* by Shirley (Oxford, 1865). Of his Latin works only two had been published previously to 1880, the *De officio pastorali*, ed. G. V. Lechler (Leipzig, 1863) and the *Trialogus*, ed. Lechler (Oxford, 1869). The pious hope expressed by the learned editor of the *Trialogus* in his preface, that English scholars might be moved to publish all Wycliffe's Latin works, began to be realized in 1882 with the foundation at Oxford of the Wyclif Society, under the auspices of which the following have been published:—*Polemical Tracts*, ed. R. Buddensieg, (2 vols., 1883); *De civili dominio*, vol. i. ed. R. L. Poole, vols. ii.-iv., ed. J. Loserth (1885–1905); *De composicione hominis*, ed. R. Beer (1884); *De Ecclesia*, ed. Loserth (1886); *Dialogus sive speculum ecclesiae militantis*, ed. A. W. Pollard (1886); *Sermones*, ed. Loserth, vols. i.-iv. (1887–1890); *De officio regis*, ed. A. W Pollard and C. Sayle (1887); *De apostasia*, ed. M. Dziewicki (1889); *De dominio divino*, ed. R. L. Poole (1890); *Quaestiones. De ente praedicamentali*, ed. R. Beer (1891); *De eucharistia tractatus major*, ed. Loserth (1893); *De blasphemia*, ed. Dziewicki (1894); *Logica* (3 vols., ed. Dziewicki, 1895–1899); *Opus evangelicum*, ed. Loserth (4 vols., 1898), parts iii. and iv. also bear the title *De Antichristo*; *De Simonia*, ed. Herzberg-Fränkel and Dziewicki (1898); *De veritate sacrae scripturae*, ed. R. Buddensieg (3 vols., 1905); *Miscellanea philosophica*, ed. Dziewicki (2 vols., 1905) (vol. i. has an introduction on Wycliffe's philosophy); *De potestate papae*, ed. Loserth (1907).

For Wycliffe's English works see *Select English Works*, ed T. Arnold (3 vols., 1869–1871), and *English Works hitherto unprinted*, ed. F. D. Matthew (1880), chiefly sermons and short tracts, of many of which the authenticity is uncertain. *The Wicket* (Nuremberg, 1546; reprinted at Oxford, 1828) is not included in either of these collections. (R. L. P., W. A. P.)

WYCOMBE (officially Chepping Wycombe, also Chipping or High Wycombe), a market town and municipal borough in the Wycombe parliamentary division of Buckinghamshire, England, 34 m. W by N. of London by the Great Western railway. Pop. (1901) 15,542. The church of All Saints, originally of Norman foundation, was rebuilt in 1273 by the abbess and nuns of Godstow near Oxford, and was largely reconstructed early in the 15th century. For the grammar school, founded *c.* 1550 by the mayor and burgesses, a new building was erected in 1883. There are remains of a Norman hospital of St John the Baptist, consisting of arches of the chapel. The market-house and guildhall was erected in 1757. The family of Petty, with whom the town has long been connected, occupied the mansion called Wycombe Abbey. Lord Beaconsfield's mansion of Hughenden is 1½ m. N. of the town. Among a number of almshouses are some bearing the name of Queen Elizabeth, endowed in 1562 out of the revenues of a dissolved fraternity of St Mary. The principal industry is chair-making, and there are also flour and paper mills. The borough is under a mayor, 8 aldermen and 24 councillors. Area, 1734 acres. The burgesses of Wycombe have ancient rights of common pasturage on the neighbouring Rye Mead.

There are various British remains in the neighbourhood of Chipping Wycombe (*Wicumbe, Wycumbee, Cheping Wycombe, Cheping Wickham*), but the traces of a Roman settlement are more important. In Domesday Book the manor only is mentioned, but in 1199 the men of Wycombe paid tallage to the king. In 1225–1226 Alan Basset granted to the burgesses the whole town as a free borough. This grant was confirmed by Henry III, Edward I., Henry IV. and Mary. In 1558, however, a new charter of incorporation was granted in reward for the loyalty shown to Queen Mary. It was confirmed by Elizabeth in 1598 and by James I. in 1609 with certain additions. Cromwell granted another charter, but it was burnt after the Restoration, and the last charter was granted by Charles II. in 1663. The corporation was remodelled under the Municipal Corporations Act of 1835, and now consists of a mayor, 6 aldermen and 18 councillors. Wycombe returned two burgesses to parliament in 1300 and continued to send members until 1885. The franchise was enlarged after 1832, and in 1867 the borough was deprived of one of its members. A market was granted by Basset to the burgesses in 1226, and at the present day it is held every Friday, the day fixed by the charter of Queen Mary. Two statutory fairs were held under the charter of 1558, but in 1792 only one fair was held on the Monday before Michaelmas for hiring, but there is now a pleasure fair on the same day.

See John Parker, *History and Antiquities of Wycombe* (1878).

WYE, a river of England, famous for its beautiful scenery. It rises in Montgomeryshire on the E. slope of Plinlimmon, close to the source of the Severn, the estuary of which it joins after a widely divergent course. Its length is 130 m.; its drainage area (which is included in the basin of the Severn), 1609 sq. m. Running at first S.E. it crosses the W. of Radnorshire, passing Rhayader, and receiving the Elan, in the basin of which are the Birmingham reservoirs. It then divides Radnorshire from Brecknockshire, receives the Ithon on the left, passes Builth, and presently turns N.E. to Hay, separating Radnorshire from Herefordshire, and thus forming a short stretch of the Welsh boundary The river, which rose at an elevation exceeding 2000 ft, has now reached a level of 250 ft., 55 m. from its source. As it enters Herefordshire it bends E. by S. to reach the city of Hereford. It soon receives the Lugg, which, augmented by the Arrow and the Frome, joins from the N. The course of the Wye now becomes extremely sinuous; and the valley narrows nearly to Chepstow. For a short distance the Wye divides Herefordshire from Gloucestershire, and for the rest of its course Gloucestershire and Monmouthshire. It passes Monmouth, where it receives the Monnow on the right, and finally Chepstow, 2 m. above its junction with the Severn estuary. The river is navigable for small vessels for 15 m. up from the mouth on high tides, but there is not much traffic above Chepstow. The average spring rise of the tide is 38 ft. at Chepstow, while 50 ft. is sometimes exceeded; the average neap rise is 28½ ft. The scenery is finest between Rhayader and Hay in the upper part, and from Goodrich, below Ross, to Chepstow in the lower, the second being the portion which gives the Wye its fame.

The name of Wye belongs also to two smaller English rivers—(1) a right-bank tributary of the Derbyshire Derwent, rising in the uplands near Buxton, and having part of its early course through one of the caverns characteristic of the district; (2) a left-bank tributary of the Thames, watering the valley of the Chilterns in which lies Wycombe and joining the main river near Bourne End.

WYKES, THOMAS, English chronicler, was a canon regular of Oseney Abbey, near Oxford. He was the author of a chronicle extending from 1066 to 1289, which is printed among the monastic annals edited by H. R. Luard for the "Rolls" Series. He gives an account of the barons' war from a royalist standpoint, and is a severe critic of Montfort's policy. He is of some value for the reign of Edward I. His work is closely connected with the Oseney Annals, which are printed parallel with his work by Luard, but from 1258 to 1278 Wykes is an independent authority.

See H. R. Luard's *Annales monastici*, vol. iv. (1869); and earlier edition in Gale's *Scriptores quinque*, pp. 21-128.

WYLIE, ALEXANDER (1815–1887), British missionary, was born in London on the 6th of April 1815, and went to school at Drumlithie, Kincardineshire, and at Chelsea. While apprenticed to a cabinet-maker he picked up a Chinese grammar written in Latin, and after mastering the latter tongue made such good progress with the former, that in 1846 James Legge engaged him to superintend the London Missionary Society's press at Shanghai. In this position he acquired a wide knowledge of Chinese religion and civilization, and especially of their mathematics, so that he was able to show that Sir George Horner's method (1819) of solving equations of all orders had been known to the Chinese mathematicians of the 14th century. He made several journeys into the interior, notably in 1858 with Lord Elgin up the Yang-tsze and in 1868 with Griffith John to the capital of Sze-ch'uen and the source of the Han. From 1863 he was an agent of the British and Foreign Bible Society. He settled in London in 1877, and died on the 10th of February 1887.

In Chinese he published books on arithmetic, geometry, algebra (De Morgan's), mechanics, astronomy (Herschel's), and *The Marine Steam Engine* (T. J. Main and T. Brown), as well as translations of the first two gospels. In English his chief works were *Notes on Chinese Literature* (Shanghai, 1867), and scattered articles collected under the title *Chinese Researches by Alexander Wylie* (Shanghai, 1897).

See H. Cordier, *Life and Labours of A. Wylie* (1887).

WYLIE, ROBERT (1839–1877), American artist, was born in the Isle of Man in 1839. He was taken to the United States when a child, and studied in the schools of the Pennsylvania Academy of the Fine Arts, Philadelphia, the directors of which sent him to France in 1863 to study. He won a medal of the second class at the Paris Salon of 1872. He went to Pont Aven, Brittany, in the early sixties, where he remained until his death on the 4th of February 1877. He painted Breton peasants and scenes in the history of Brittany; among his important works was a large canvas, "The Death of a Vendean Chief," now at the Metropolitan Museum of Art, New York.

WYMONDHAM (pronounced *Windham*), a market town in the mid-parliamentary division of Norfolk, England, 10 m. S.W. of Norwich by the Great Eastern railway. Pop. (1901) 4764. The church of St Mary the Virgin rises on an eminence on the outskirts of the town. It was attached to a Benedictine priory, founded about the beginning of the 12th century as a cell of St Albans abbey by William de Albini. In 1448 this foundation became an abbey. The nave is of ornate Norman work, with a massive triforium, surmounted by a Perpendicular clerestory and a beautiful wooden roof. The broad N. aisle is Perpendicular, and has also a very fine rood screen. At the W. end there is a lofty and graceful Perpendicular tower. The choir, which was used as the conventual church, has left only slight traces, and one arch is standing of a large chapel which adjoined it on the S. In the centre of the town is a picturesque half-timbered market cross (1616), with an octagonal upper chamber raised on massive pillars of wood. A chapel, dedicated to St Thomas of Canterbury, is used as a grammar school. At Wymondham on the 7th of July a festival was formerly held in honour of the saint. It was at this festival in 1549 that the rebellion of Robert Ket or Kett came to a head.

WYNAAD, or Wainad, a highland tract in S. India, forming part of Malabar district, Madras. It consists of a table-land amid the W. Ghats, 60 m. long by 30 m. broad, with an average elevation of 3000 ft.; pop. (1901) 75,149. It is best known as the district where a large amount of British capital was sunk during the decade 1876–1886 in gold mines. It had yet earlier been a coffee-planting district, but this industry has recently declined. Tea, pepper and cardamoms are produced in increasing quantities. There are also valuable forest reserves.

WYNDHAM, SIR CHARLES (1837–   ), English actor, was born in Liverpool on the 23rd of March 1837, the son of a doctor. He was educated abroad, at King's College, London and at the College of Surgeons and the Peter Street Anatomical School, Dublin, but his taste for the stage was too strong for him to take up either the clerical or the medical career, suggested for him, and early in 1862 he made a first appearance in London as an actor. Later in the year, being in America, he volunteered during the Civil War, and became brigade surgeon in the Federal army, resigning in 1864 to appear on the stage in New York with John Wilkes Booth. Returning to England, he played at Manchester and Dublin in *Her Ladyship's Guardian*, his own adaptation of Edward B. Hamley's novel *Lady Lee's Widowhood*. He reappeared in London in 1866 as Sir Arthur Lascelles in Morton's *All that Glitters is not Gold*, but his great success at that time was in F. C. Burnand's burlesque of *Black-eyed Susan*, as Hatchett, "with dance." This brought him to the St James's theatre, where he played with Henry Irving in *Idalia*; then with Ellen Terry in Charles Reade's *Double Marriage*, and Tom Taylor's *Still Waters Run Deep*. As Charles Surface, his best part for many years, and in a breezy three-act farce, *Pink Dominoes*, by James Albery, and in *Brighton*, an anglicized version of *Saratoga* by Bronson Howard (1842–1908), who married his sister, he added greatly to his popularity both at home and abroad. In 1876 he took control of the Criterion theatre. Here he produced a long succession of plays, in which he took the leading part, notably a number of old English comedies, and in such modern plays as *The Liars*, *The Case of Rebellious Susan* and others by Henry Arthur Jones; and he became famous for his acting in *David Garrick*. In 1899 he opened [illegible] called Wyndham's. In 1902 he was knighted. From 1885 onwards his leading actress was Miss Mary Moore (Mrs Albery), who became his partner in the proprietorship of the Criterion and Wyndham's theatres, and of his New Theatre, opened in 1903; and her delightful acting in comedy made their long association memorable on the London stage.

WYNDHAM, SIR WILLIAM, Bart. (1687–1740), English politician, was the only son of Sir Edward Wyndham, Bart., and a grandson of William Wyndham (d. 1683) of Orchard Wyndham, Somerset, who was created a baronet in 1661. Educated at Eton and at Christ Church, Oxford, he entered parliament in 1710 and became secretary-at-war in the Tory ministry in 1712 and chancellor of the exchequer in 1713. He was closely associated with Lord Bolingbroke, and he was privy to the attempts made to bring about a Jacobite restoration on the death of Queen Anne; when these failed he was dismissed from office. In 1715 the failure of a Jacobite movement led to his imprisonment, but he was soon set at liberty. Under George I. Wyndham was the leader of the opposition in the House of Commons, fighting for his High Church and Tory principles against Sir Robert Walpole. He was in constant communication with the exiled Bolingbroke, and after 1723 the two were actively associated in abortive plans for the overthrow of Walpole. He died at Wells on the 17th of June 1740. Wyndham's first wife was Catherine, daughter of Charles Seymour, 6th duke of Somerset. By her he had two sons, Charles, who became 2nd earl of Egremont in 1750, and Percy, who took the name of O'Brien and was created earl of Thomond in 1756.

The Wyndham Family. Sir John Wyndham, a Norfolk man, was knighted after the battle of Stoke in 1487 and beheaded for high treason on the 2nd of May 1502. He married Margaret, daughter of John Howard, duke of Norfolk, and his son Sir Thomas Wyndham (d. 1521), of Felbrigg, Norfolk, was vice-admiral of England under Henry VIII. By his first wife Sir Thomas was the father of Sir John Wyndham, who married Elizabeth, daughter of John Sydenham of Orchard, Somerset, and founded the Somerset branch of the family, and also of Sir Edmund Wyndham of Felbrigg, who was sheriff of Norfolk at the time of Robert Ket's rebellion. By his second wife Sir Thomas was the father of the seaman Thomas Wyndham (*c.* 1510–1553), an account of whose voyage to Morocco in 1552 is printed in Hakluyt's *Voyages*.

From Sir John Wyndham of Orchard Wyndham was descended Thomas Wyndham (1681–1745), lord chancellor of Ireland from 1726 to 1739, who in 1731 was created Baron Wyndham of Finglass, a title which became extinct on his death. His nephew, Henry Penruddocke Wyndham (1736–1819), the topographer, wrote *A Gentleman's Tour through Monmouthshire and Wales in June and July 1774* (1775); and *Wiltshire from Domesday Book, with a Translation of the Original Latin into English* (Salisbury, 1788).

Sir John Wyndham of Orchard Wyndham was also the ancestor of the Windhams of Felbrigg, who adopted this form of spelling the family name, the most noteworthy members of which were the statesman William Windham (*q.v.*), and Sir Charles Ash Windham (1810–1870), a soldier who commanded in the Crimea and in the Indian Mutiny.

The Wyndhams are also connected through a female line with the family of Wyndham-Quin, which holds the earldom of Dunraven. Valentine Richard Quin (1752–1824), of Adare, county Limerick, was created Baron Adare on the union with England in 1800, and earl of Dunraven and Mount-Earl in 1822. His son, the 2nd earl (1782–1850), married Caroline (d. 1870), daughter and heiress of Thomas Wyndham of Dunraven Castle, Glamorganshire, and took the name of Wyndham-Quin. Their son, the 3rd earl (1812–1871), who was created a peer of the United Kingdom as Baron Kenry in 1866, was a well-known man of science, especially interested in archaeology. His son, Windham Thomas Wyndham-Quin (b. 1841), the 4th earl, was under-secretary for the colonies in 1885–1887, and became later a prominent figure in Irish politics, as chairman of the Irish Land Conference and president of the Irish Reform Association;

he was also prominent as a yachtsman, competing for the America cup (see Yachting) in 1893 and 1895.

WYNN, SIR JOHN (1553–1627), Welsh antiquary, was the son of Morris Wynn and descended from the princes of Wales. He was educated at Oxford, succeeded to his father's estate of Gwydir in Carnarvonshire in 1580, and was member of parliament for this county in 1586. In 1606 he was made a knight and in 1611 a baronet. He was interested in several mining ventures and also found time for antiquarian studies. He died on the 1st of March 1627. At Llanrwst Wynn founded an hospital and endowed a school. His *History of the Gwydir Family*, which had a great reputation in North Wales, was first published by Daines Barrington in 1770, and in 1878 an edition was published at Oswestry. It is valuable as the only work which describes the state of society in North Wales in the 15th and the earlier part of the 16th century. His son Richard (d. 1649) was in attendance on Prince Charles, afterwards Charles I., when he visited Spain in 1623, and was afterwards treasurer to Queen Henrietta Maria; he wrote an account of the journey to Spain, published by T. Hearne in 1729 with the *Historia vitae et regni Ricardi II*. He built the bridge over the Conway at Llanrwst. The baronetcy became extinct in 1719, when Wynnstay, near Ruabon, passed to Sir Watkin Williams, who took the name of Williams-Wynn and founded the family of that name.

Sir John Wynn's estate of Gwydir came to the 1st duke of Ancaster in the 17th century by his marriage with the heiress of the Wynns. On the death of the last duke in 1779, Gwydir was inherited by his sister Priscilla, Lady Willoughby de Eresby in her own right, whose husband was created Baron Gwydir. On the death of Alberic, Lord Willoughby de Eresby (1870), this title (now merged in that of earl of Ancaster) fell into abeyance between his two daughters, while that of Baron Gwydir passed to his cousin and heir male Gwydir itself was sold by the earl of Ancaster in 1895, the house and part of the estate being bought by Earl Carrington, who also claimed descent from Sir John Wynn.

WYNTOUN, ANDREW OF (?1350–?1420), author of a long metrical history of Scotland, called the *Orygynale Cronykil of Scotland*, was a canon regular of St Andrews, and prior of St Serf's in Lochleven. He wrote the *Chronicle* at the request of his patron, Sir John of Wemyss, whose representative, Mr Erskine Wemyss of Wemyss Castle, Fifeshire, possesses the oldest extant MS. of the work. The subject is the history of Scotland from the mythical period (hence the epithet "original") down to the accession of James I. in 1406. The earlier books are of no historical value, but the later have in all outstanding matters stood the test of comparison with contemporary records. The philological interest is great, for few works of this date, and no other of like magnitude, are extant in the vernacular.

The text is preserved in eight MSS., of which three are in the British Museum, the Royal (17 D xx.), the Cottonian (Nero D. xi.) and the Lansdowne (197); two in the Advocates' library, Edinburgh (19, 2, 3 and 19, 2, 4), one at Wemyss Castle (*u.s.*); one in the university library at St Andrews, and one, formerly in the possession of the Boswells of Auchinleck, now the property of Mr John Ferguson, Duns, Berwickshire. The first edition of the *Chronicle* (based on the Royal MS.) was published by David Macpherson in 1795; the second by David Laing, in the series of "Scottish Historians" (Edin., 1872). Both are superseded by the elaborate edition by Mr Amours for the Scottish Text Society (1906).

WYOMING, one of the Central Western states of the United States of America, situated between the parallels of latitude 41° and 45° N., and the meridians of longitude 27° and 34° W. of Washington. It is bounded on the N. by Montana on the E. by S. Dakota and Nebraska, on the S. by Colorado and Utah, and on the W. by Utah, Idaho, and a small southward projection of Montana. The state has a length of about 375 m. E. and W. along its southern border and a breadth of 276 m. N. and S. It has an area of 97,914 sq. m., of which 320 sq. m. are water surface

Physical Features.—The greater portion of the state belongs to the Great Plains Province, which extends from N. to S. across the United States between the 100th meridian and the Rocky Mountains. Within this province are found the Black Hills of S. Dakota, and their W. slopes extend across the boundary into N.E. Wyoming. The N.W. portion of the state is occupied by the S. end of the Northern Rocky Mountain Province; and the N. end of the Southern Rockies extends across the Colorado line into southern Wyoming. The Great Plains in Wyoming have an elevation of from 5000 to 7000 ft. over much of the state, and consist of flat or gently rolling country, barren of tree growth, but often covered with nutritious grasses, and affording pasturage for vast numbers of live stock. Erosion buttes and mesas occasionally rise as picturesque monuments above the general level of the plains, and in the vicinity of the mountains the plains strata, elsewhere nearly horizontal, are bent sharply upward and carved by erosion into "hogback" ridges. These features are well developed about the Bighorn Mountains, an outlying member of the Rockies which boldly interrupts the continuity of the plains in north-central Wyoming. The plains sediments contain important coal beds, which are worked in nearly every county in the state. In the region between the Northern and Southern Rockies, the plains are interrupted by minor Mountain groups, volcanic buttes and lava flows, among which the Leucite Hills and Pilot Butte are prominent examples.

Notwithstanding these elevations, this portion of the state makes a distinct break in the continuity of the Northern and Southern Rockies, giving a broad, relatively low pass utilized by the Oregon Trail in early days, and by the Union Pacific railway at a later period. The Black Hills District in the N.E. contains the Little Missouri Buttes and the Mato Tepee (or Devil's Tower), prominent erosion remnants of volcanic intrusions. Local glaciation has modified the higher levels of the Bighorn Mountains, giving glacial cirques, alpine peaks and many mountain lakes and waterfalls. Several small glaciers still remain about the base of Cloud Peak, the highest summit in the range (13,165 ft.). The Southern Rockies end in broken ranges with elevations of 9000 ft. and over. That portion of the Northern Rockies extending into the N.W. of the state affords the most magnificent scenery. Here is the Yellowstone National Park (*q.v.*). Just S. of the Park the Teton Mountains, rising abruptly from the low basin of Jackson's Hole to elevations of 10,000 and 11,000 ft., form a striking feature. In the Wind River Range, farther S.E., are Gannett Peak (13,775 ft.), the highest point in the state, and Fremont Peak (13,720 ft.). In addition to the hot springs of the Yellowstone region, mention should be made of large hot springs at Thermopolis and Saratoga, where the water has a temperature of about 135° F.

Much of the state is drained by branches of the Missouri river, the most important being the Yellowstone, Bighorn and Powder rivers flowing N., and the Cheyenne and North Platte flowing E. The Green river, a branch of the Colorado, flows S. from the S.W. of the state, while the Snake river rises farther N. and flows W. to the Pacific drainage. S.W. of the centre of the state is an area with no outward drainage, the streams emptying into desert lakes.

Fauna.—Great herds of bison formerly ranged the plains and a few are still preserved in the National Park. The white-tailed Virginia deer inhabits the bottom lands and the mule deer the more open country. Lewis's prairie dog, the cottontail rabbit, the coyote, the grey wolf and the kit fox are all animals of the plains. In the mountains are elk, puma, lynx, the varying hare and snowshoe rabbit, the yellow-haired porcupine, Fremont's and Bailey's squirrels, the mountain sheep, the four-striped chipmunk, Townsend's spermophile, the prong-horned antelope, the cinnamon pack-rat, grizzly, brown, silvertip and black bears and the wolverine. Other animals, more or less common, are the black-tailed deer, the jackrabbit, the badger, the skunk, the beaver, the moose and the weasel. The prairie rattlesnake is common in the dry plains country.

The streams are well stocked with rainbow and brook trout. The former fish were introduced from California in 1885. They thrive in the Wyoming streams and rivers and are superior game fish. Specimens of eight and ten pounds weight have been taken by rod and fly fishermen from the Big Laramie river. Other fish native to the waters of the state are the sturgeon, catfish, perch (locally called pike), buffalo fish, flathead and sucker.

There is a great variety of birds. Eared grebes and ring-billed gulls breed on the sloughs of the plains, and rarely the white pelican nests about the lake shores. Here, too, breed many species of ducks, the mallard, gadwall, baldpate, three species of teal, shoveler, pintail, hooded mergansers, and Canada geese; other ducks and geese are migrants only. Formerly the trumpeter swan nested here. On the plains a few waders breed, as the avocet, western willet and long-billed curlew; but most are birds of passage. At high altitudes the mountain plover is found; the dusky grouse haunts the forests above 8000 ft.; the white-tailed ptarmigan is resident in the alpine regions; and on the plains are found the prairie sharp-tailed grouse and the sage-hen. The turkey-buzzard is found mainly in the plains country. Various hawks and owls are common; the golden eagle nests on the mountain crags and the burrowing owl on the plains. The red-naped sapsucker and Lewis's woodpecker are conspicuous in wooded lands; Nuttall's poor-will, Say's phoebe, the desert horned lark, Bullock's oriole, the yellow-headed blackbird and McCown's longspur are characteristic of the open lowlands.

Flora.—Forest growth in Wyoming is limited to the highest mountain ranges, the most important forests being in the Black Hills region in the N.E., on the lower slopes of the Bighorn Mountains, and in the Rocky Mountain ranges of the N.W. of the state, including Yellowstone National Park. The yellow pine is the most important tree in the Bighorns, and small lodge-pole pine makes up the greater part of the N.W. forests. White fir is found above the foothill zone, and heavy growths of cottonwood along the streams in the Bighorn region. The Douglas spruce and Rocky Mountain white pine are common in the forests of the Medicine Bow Mountains, from which much of the native lumber used in the S. of the state is secured. Other trees are the juniper, willow, green ash, box elder scrub oak, wild plum and wild cherry. Occasional cottonwoods along streams are the only trees on the plains. The common sage brush artemisia, is the characteristic shrub of the plains where the soil is comparatively free from alkali, and is abundant in the valleys of the arid foothills. Where alkali is present, the plains may be nearly barren, or covered with grease wood and species of atriplex, including the so-called white sage. Grease wood is likewise abundant in the foothills wherever the soil contains alkali. Various species of nutritious grasses cover much of the plains and foothills, and even clothe the apparently barren mountain peaks.

Climate.—In the lower Bighorn Valley, summer temperatures rise to 95° or 100°, but at heights of 6000 to 7000 ft on neighbouring ranges, summer temperatures seldom rise above 90°, and frosts may occur at any time Elevations under 6000 ft. have a mean annual temperature of from 40° to 47°, but high mountain areas and cold valleys may have mean temperatures as low as 34° The air is clear and dry, and although temperatures of 100° are recorded, sunstrokes are practically unknown. Winter temperatures as low as −51° have been recorded, but these very low temperatures occur in the valleys rather than on the higher elevations. The cold is sharp and bracing rather than disagreeable, on account of the dryness of the air; and the periods of cold weather are generally of short duration. The winter climate is remarkably pleasant as a rule, and outdoor work may usually be carried on without discomfort.

The following figures give some idea of the climatic variations. At Basin, in the Bighorn Valley, the mean winter temperature is 16°, the summer mean 72°. Thayne, on the mountainous W. border of the state, has a winter mean of 19°, and a summer mean of but 59°; Cheyenne in the S.E., has a winter mean of 27°, and a summer mean of 65°. The percentage of sunshine in the state is high. Precipitation varies in different areas from 8 to 20 in., the average for the state being 12·5 in. Wyoming thus belongs with the arid states, and irrigation is necessary for agriculture. A greater precipitation doubtless prevails on the higher mountains, but trustworthy records are not available. Spring is the wettest season. The prevailing winds are W. and reach a high velocity on the level plains.

Soil.—While some of the more arid districts have soils so strongly alkaline as to be practically unreclaimable, there are extensive areas of fertile lands which only require irrigation to make them highly productive. Alluvial deposits brought down by mountain streams, and strips of floodplain along larger streams on the plains are very fertile and well repay irrigation. Lack of water rather than poverty of soil renders most of the plains region fit for grazing only. In the mountains, ruggedness combines with thin and scattered soil to make these districts of small agricultural value.

Agriculture.—The total area in farms in 1880 was 124,433 acres, of which 83,122 acres (66·8 %) were improved; in 1900 it was 8,124,536 acres, of which 792,332 acres (9·8 %) were improved. The large increase in unimproved acreage in farms was principally due to the increased importance in sheep-raising. In 1909 Wyoming ranked first among the states in the number of sheep and the production of wool. The number of sheep in 1909 was 7 316,000, valued at $32,190,000, being more than one-eighth in numbers and nearly one-seventh in value of all sheep in the United States. The production of wool in 1909 was 38,400,000 ℔ of washed and unwashed wool and 12,288,000 ℔ of scoured wool. The average weight per fleece was 8 ℔. The Bureau of Animal Industry of the U.S. Department of Agriculture has made experiments in breeding range sheep in Wyoming. The total number of neat cattle on farms and ranges in 1910 was 986,000 (including 27,000 milch cows) valued at $26,277,000; horses, 148,000, valued at $12,284,000;[1] mules, 2000, valued at $212,000; and swine, 21,000, valued at $178,000.

In 1909 the hay crop (alfalfa, native hay, timothy hay, &c.) was 665,000 tons, valued at $5,918,000 and raised on 277,000 acres. The cereal crops increased enormously in the decade 1899–1909. The principal cereal crop in 1909 was oats, the product of which was 3,500,000 bushels, grown on 100,000 acres and valued at $1,750,000. The wheat crop increased from 4674 bushels in 1879 to 2,297,000 bushels in 1909, grown on 80,000 acres and valued at $2,274,000. The product of Indian corn in 1909 was 140,000 bushels, grown on 5000 acres and valued at $109,000.

Mining.—The development of Wyoming's naturally rich mineral resources has been retarded by inadequate transport and by insufficient capital. The value of the state's mineral product was $5,684,286 in 1902 and $9,453,341 in 1908. In 1908 Wyoming ranked twelfth among the states of the Union in the value of its output of bituminous coal. Other mineral products of the state are copper, gold, iron, petroleum, asbestos, soda, silver and lead, gypsum, stone and clay products. The original coal supply of the present state has been estimated (by the United States Geological Survey) at 424,085,000,000 short tons of the bituminous or sub-bituminous variety, this amount being second only to that for North Dakota, 500,000,000 000 short tons, which, however, is entirely lignite. Coal was first mined in what is now Wyoming in 1865, probably in connexion with the building of the Union Pacific railway, and the product in that year was 800 short tons. Thereafter the industry developed steadily and the product in 1908 was 5,489,902 tons, valued at $8,868,157. In 1908 (and for several years before) the largest product of coal (2,180,933 tons) came from Sweetwater county, in the S.W. of the state, and Uinta county (adjoining Sweetwater county on the W.) had the next largest product, 1,380,488 tons. Sheridan county, in the north-central part of the state, Carbon county in the south-central part and Weston county in the N.E. were the next largest producers. The product of coal to the end of 1908 was 125,000,000 short tons, or 0·029 % of the estimated supply.

The mining product next in value to coal in 1908 was copper, taken chiefly in Carbon county in a zone of brecciated quartzite underlying schist, the original ore being chalcopyrite, with possibly some pyrite, a secondary enrichment, which has produced important bodies of chalcocite in the upper workings, but these are replaced by chalcopyrite at greater depth. The production in 1908 was 2,416,197 ℔, valued at $318,938. The gypsum product (from the Laramie plains) in 1908 was 31,188 tons, valued at $94,935.

There are extensive deposits of petroleum and natural gas, which have become of commercial importance. Oil has been found in eighteen different districts, the fields being known as follows:—The Carter, Hilliard, Spring Valley and Twin Creek in Uinta county; the Popo Agie, Lander, Shoshone, Beaver and a part of Dutton in Fremont county; the Rattlesnake, Arrago, Oil Mountain and a part of Dutton, Powder river and Salt Creek in Natrona county; part of Powder river and Salt Creek in Johnson county; Newcastle in Weston county; Belle Fourche in Crook county; Douglas in Converse county and Bonanza in Bighorn county. The Popo Agie and Lander fields produce the largest quantities of oil the wells being partly gushers from which a heavy fuel oil is obtained. This is now being used by the Chicago & North Western Railroad Company on its locomotives, and it is also used in Omaha (Nebraska) by manufacturing establishments. There is a great variety in the grades of oils produced in the state, ranging from the heavy asphaltic oils of the Popo Agie and Lander fields to the high-grade lubricants and superior light products obtained from the wells in the Douglas, Salt Creek and Uinta county fields. Natural gas in quantity has been found in the Douglas field and in Bighorn county.

The iron deposits are very extensive, and the ores consist of red haematites, magnetites, titanic, chrome and manganese irons. In nearly every county there are veins of iron ore of varying extent and quality, the most important being at Hartville, Laramie county, Iron Mountain, Albany county, the Seminole and Rawlins in Carbon county. The Hartville ores are remarkable for their high grade and purity, running from 60 to 70 % metallic iron, with 2½ to 5 % silica, and only traces of sulphur and phosphorus. The ore is a red haematite occurring in slate. The iron ore from this district obtained the grand prize at the World's Fair held in Chicago in 1893, in competition with iron ores from all parts of the world. The Hartville iron deposits are worked by the Colorado Fuel & Iron Company, which ships large quantities of ore to its furnaces at Pueblo, Colorado. The discovery of natural gas in the Douglas oil field has opened up the possibility of working a smelting plant at the mines by means of this cheap and convenient fuel. The distance to be covered by a pipe line is not prohibitive, and the matter has been under consideration by the owners and lessees of the iron mines.

There are sandstone deposits in Carbon county, which supplied the stone for the Capitol at Cheyenne and the state penitentiary; and from the Iron mountain quarries in Laramie county was taken the white variety used in building the Carnegie library and the Federal building in Cheyenne. Sandstones and quartzites were also quarried in 1902 in Albany, Crook and Uinta counties. Limestone occurs in thick formations near Lava Creek, and in the valley of the East Fork of the Yellowstone river; also near the summit of the Owl Creek range, and in the Wind River range. Gold was discovered on the Sweetwater river in 1867, and placer and quartz deposits have been found in almost every county in the state. Sulphur has been found near Cody and Thermopolis.

Irrigation.—The irrigable area of Wyoming is estimated at about 6,200,000 acres, lying chiefly in Bighorn, Sheridan and Johnson counties in the N.W. of the state, and in Laramie, Albany and Carbon counties in the S.E., though there are large tracts around the headwaters of the Bighorn river, in Fremont county in the west-central part, along the North Platte river and its tributaries in Converse county in the central part, and along the Green river and its tributaries in Sweetwater and Uinta counties in the S.W. Under the Carey Act and its amendments Congress had in 1909 given to the state about 2,000,000 acres of desert land on condition that it should be reclaimed, and in that year about 800,000 acres were in process of reclamation, mostly by private companies. Settlers intending to occupy such lands must satisfy the state that they have entered into contracts with the irrigating company for a sufficient water-right

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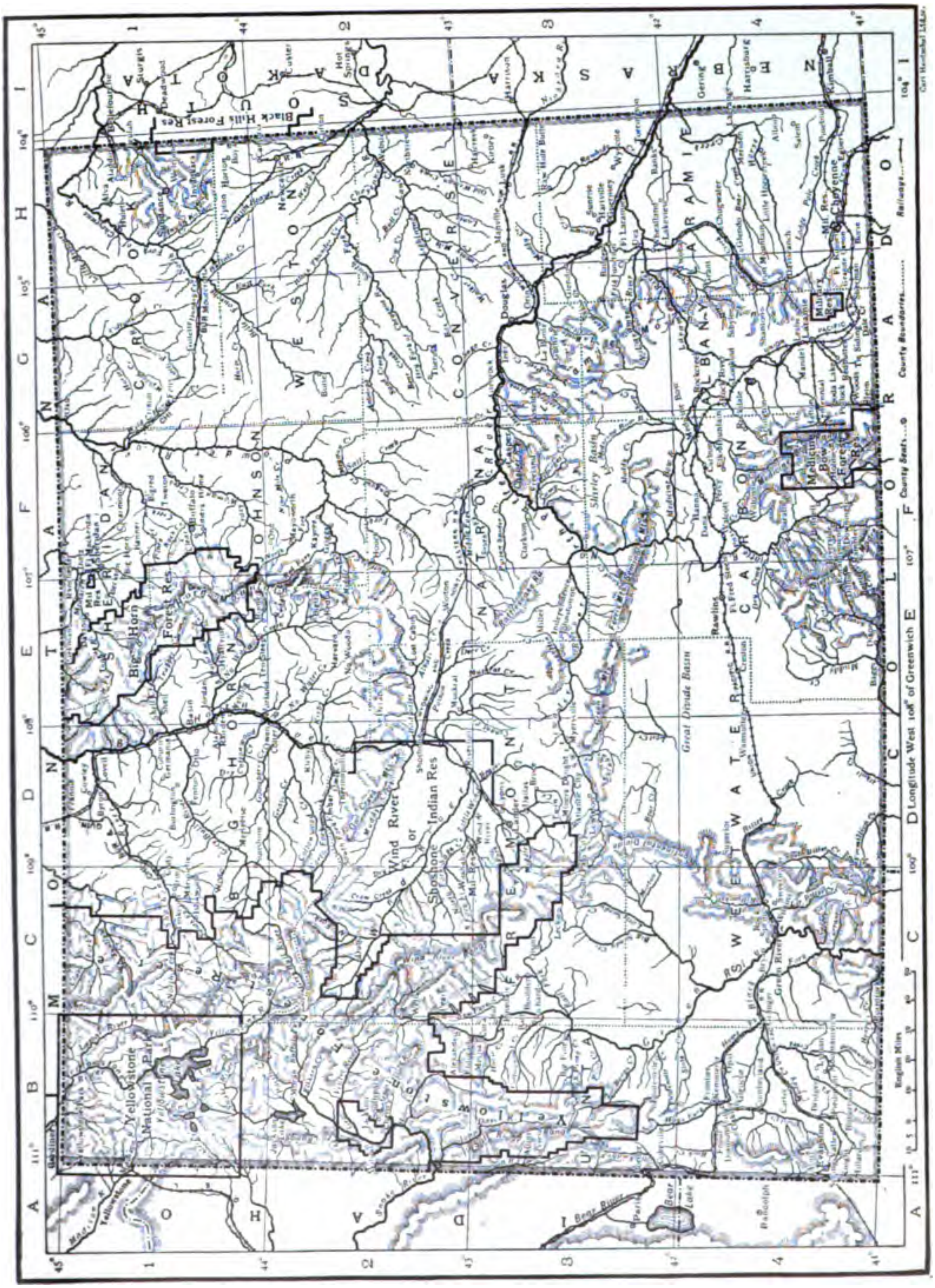
[1] The breed of horses in Wyoming has improved rapidly; in 1904, when the U.S. Department of Agriculture purchased eighteen mares and a stallion in hope of improving the American carriage horse, six of the mares were from Wyoming and were principally of Morgan stocks.

WYOMING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Yellowstone National Park
Wind River or Shoshone Indian Res
Big Horn Forest Res
Medicine Bow Forest Res
Black Hills Forest Res
Great Divide Basin
Shirley Basin
Bear Lake
Cheyenne
Rawlins
Douglas
Green River
Evanston
Lander
Sheridan
Buffalo
Casper
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County Seats
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and a perpetual interest in the irrigation works. The principal undertaking of the Federal government is the Shoshone project in Bighorn county. This provides for a storage reservoir, controlled by Shoshone dam on Shoshone river, about 8 m. above Cody; a canal diverting water from Shoshone reservoir round the N. of Shoshone dam and covering lands in the vicinity of Cody, Corbett, Eagle Nest and Ralston; a dam at Corbett about 16 m. below the reservoir diverting water to Ralston reservoir and thence to lands in the vicinity of Ralston, Powell, Garland, Mantua and Frannie, and a dam on the Shoshone river near Eagle Nest diverting water into a canal covering the lands of the Shoshone River Valley. This project was authorized in 1904; it will affect, when completed, 131,900 acres, of which in 1909 about 10,000 acres were actually under irrigation. Near Douglas, in Converse county, there is a reinforced concrete dam, impounding the waters of Laprele Creek, to furnish water for over 30,000 acres, and power for transmitting electricity. There are large irrigated areas in Johnson and Sheridan counties.

Forests.—The woodland area of Wyoming in 1900 was estimated at 12,500 sq. m. (13% of the area of the state), of which the United States had reserved about 3500 sq. m. in the Yellowstone National Park and 5207 sq. m., chiefly in the Bighorn Mountains in the N., and the Medicine Bow Mountains in the S.E. of the state. The saleable timber consists almost entirely of yellow pine, though there is a relatively small growth of other conifers and of hard-wood trees.

Manufactures.—Wyoming's manufacturing industries are relatively unimportant. In the period 1900–1905 the value of factory products increased from $3,268,555 to $3,523,260; the amount of capital invested, from $2,047,883 to $2,695,889, and the number of establishments from 139 to 169; the average number of employees decreased from 2060 to 1834. In the same period (1900–1905), the value of the products of urban[1] establishments decreased from $1,332,288 to $1,244,223, and the amount of capital invested increased from $871,531 to $988,615; but the value of the products of rural establishments increased from $1,936,267 to $2,279,037, and the capital invested from $1,176,352 to $1,707,274. The values of the products of the principal industries of the state in 1905 were: car and general shop construction and repairs by steam railway companies, $1,640,361; lumber and timber products, $426,433; flour and grist mill products, $283,653; butter, $114,354. Among other manufactures were gypsum wall-plaster, saddlery and harness, malt liquors and tobacco, cigars and cigarettes.

Transport.—There has been relatively little development of transport facilities in Wyoming. The railway mileage, which was only 459 m. in 1870, increased to 1002 m. in 1890, 1280 m. in 1905, and 1623 m. on the 1st of January 1909. The Union Pacific railway crosses the S. of the state, connects with the Oregon Short Line at Green river and extends both E. and S. from Cheyenne. The Colorado & Southern (controlled by the Chicago, Burlington & Quincy Railroad Company) extends N. from Cheyenne to Orin Junction, where it connects with the Chicago & North Western, which runs across the south-central part of the state as far as Lander (under the name of the Wyoming & North Western railroad). Four branches of the Chicago, Burlington & Quincy system enter or cross the state. One extends from Cheyenne S.E. to Holdredge, Nebraska; the main line crosses the N.E. of the state to Billings, Montana, whence it extends S. to Cody and Kirby in the Bighorn basin, Wyoming; while another branch from Alliance, Nebraska, extends to the iron mines at Guernsey. The Chicago, Burlington & Quincy was building in 1910 a new line from the N.W. to connect with the Colorado & Southern line at Orin Junction, passing through Douglas. When completed to Orin Junction this will be a main through route from the Mexican Gulf to the N.W. Pacific coast. There are also several shorter railways in the state, and various stage lines reach the more inaccessible regions.

Population.—The population in 1870 was 9118; in 1880, 20,789; in 1890, 60,705; in 1900, 92,531; in 1910, 145,965. The density of the population was 0·6 per sq. m. in 1890 and 1·5 per sq. m. in 1910, there being in this year only one state with a smaller average number of inhabitants to the sq. m., namely Nevada, with 0·7. Of the total population in 1900, 88,051, or 96·2%, were whites; 1686 were Indians; 940 were negroes; 461 were Chinese and 393 were Japanese. The Indians are all taxed. They belong to the Arapaho and Shoshoni tribes.[2] The Wind River Reservation, under the Shoshoni School, is in the central part of the state. There were 17,415 foreign-born in the state in 1900, of whom 2596 were English, 2146 Germans, 1727 Swedes, 1591 Irish, 1253 Scotch and 1220 Finns. Of the 41,993 persons of foreign parentage (*i.e.* having either or both parents of foreign birth) in that year 4973 were of English, 4571 of German, and 4482 of Irish parentage, *i.e.* on both the father's and the mother's side. Of the 75,116 born in the United States, 19,507 were natives of Wyoming, 6112 were born in Iowa, 5009 in Nebraska, 4923 in Illinois, 4412 in Missouri and 3750 in Utah. Among the numbers of religious denominations in 1906 the Roman Catholics, with 10,264 communicants, had the largest membership, followed by the Latter-day Saints, or Mormons, with 5211 communicants (21·8% of the total church membership for the state), the Protestant Episcopalians with 1741, the Methodists with 1612 and the Presbyterians with 984. The urban population (*i.e.* the population of places having 4000 inhabitants or more) increased from 18,078 in 1890 to 26,657 in 1900 or 47·5%, the urban being 28·8% of the total population in 1900. The semi-urban population (*i.e.* population of incorporated places, or the approximate equivalent, having fewer than 4000 inhabitants) decreased in the same period from 14,910 to 12,725, and the rural population (*i.e.* the population outside of incorporated places) increased from 29,567 to 53,149, which was 78·7% of the total increase. The principal cities of the state (with population) in 1900 were: Cheyenne, 14,087; Laramie, 8207; Rock Springs, 4363; Rawlins, 2317, and Evanston, 2110. After 1900 the population of the centre and N. of the state increased in proportion faster than the older settled portions in the S. In 1910 Sheridan (8408) in Sheridan county, Douglas in Converse county and Lander in Fremont county were as important as some of the older towns of the southern part of the state.

Government.—Wyoming is governed under its first constitution, which was adopted in November 1889. An amendment may be proposed by either branch of the legislature. If it is approved by two-thirds of the members of each branch, it must be submitted to the people at the next general election and, if approved by a majority of the electors, it then becomes a part of the constitution. Whenever two-thirds of the members elected to each branch of the legislature vote for a convention to revise or amend the constitution and a majority of the people voting at the next general election favour it, the legislature must provide for calling a convention. Suffrage is conferred upon both men and women, and the right to vote at a general election is given to all citizens of the United States who have attained the age of twenty-one years, are able to read the constitution, and have resided in the state one year and in the county sixty days immediately preceding, with the exception of idiots, insane persons, and persons convicted of an infamous crime; at a school election the voter must also own property on which taxes are paid. General elections are held biennially, in even-numbered years, the first Tuesday after the first Monday in November, and each new administration begins the first Monday in the following January.

Executive.—The governor is elected for a term of four years. He must be at least thirty years of age, and have resided in the state for five years next preceding his election. If the office becomes vacant the secretary of state becomes acting governor; there is no lieutenant-governor. The governor, with the concurrence of the Senate, appoints the attorney-general, the state engineer and the members of several boards and commissions. He has the power to veto bills, to pardon, to grant reprieves and commutations, and to remit fines and forfeitures, but the Board of Charities and Reform constitutes a Board of Pardons for investigating all applications for executive clemency and advising the governor with respect to them. The secretary of state, auditor, treasurer and superintendent of public instruction are elected for the same term as the governor.

Legislature.—The legislature consists of a Senate and a House of Representatives. The number of representatives must be not less than twice nor more than three times the number of senators. One-half the senators and all the representatives are elected every two years. Both senators and representatives are apportioned among the several counties according to their population; each county, however, is entitled to at least one senator and one representative. The legislature meets biennially, in odd-numbered years, on the second Tuesday in January, and the length of its sessions is limited to forty days. All bills for raising a revenue must originate in the House of Representatives, but the Senate may propose amendments. The governor has three days (Sundays excepted) in which to veto any bill or any item in an appropriation bill, and a two-thirds vote of the members elected to each house is required to override his veto.

Judiciary.—The administration of justice is vested principally in a supreme court, district courts, justices of the peace and municipal courts. The supreme court consists of three justices who are elected by the state at large for a term of eight years, and the one having the shortest term to serve is chief justice. The court has original jurisdiction in *quo warranto* and *mandamus* proceedings against state officers and in *habeas corpus* cases, general appellate jurisdiction, and a superintending control over the inferior courts. It holds two terms annually, at the capital, one beginning the first Monday in April and one beginning the first Monday in October. The state is divided into four judicial districts, and in each of these a district judge is elected for a term of eight years. The district courts have original jurisdiction in all actions and matters not expressly vested in some other court and appellate jurisdiction in cases arising in the lower courts. Justices of the peace, one of whom is elected biennially in each precinct, have jurisdiction in civil actions in which the amount in controversy does not exceed $200 and the title to or boundary of real estate is not involved, and in criminal actions less than a felony and in which the punishment prescribed by law does not exceed a fine of $100 and imprisonment for six months. Each incorporated city or town has a municipal court for the trial of offences arising under its ordinances.

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[1] That is, those in the two municipalities (Cheyenne and Laramie) having a population in 1900 of more than 8000.

[2] The *Report* of the Commissioner of Indian Affairs for 1909 gives 854 Arapaho and 816 Shoshoni under the Shoshoni School.

Local Government.—A board of three commissioners is elected in each county, one for four years and one for two years at each biennial election. It has the care of the county property, manages the county business, builds and repairs the county buildings, apportions and orders the levying of taxes, and establishes the election precincts. The other county officers are a treasurer, a clerk, an attorney, a surveyor, a sheriff, a coroner and a superintendent of schools, each elected for a term of two years. A justice of the peace and a constable are elected for and by each precinct. Cities and towns are incorporated under general laws.

Miscellaneous Laws.—A married woman may hold, acquire, manage and convey property and carry on business independently of her husband. When a husband or a wife dies intestate one-half of the property of the deceased goes to the survivor; if there are no children or descendants of any child three-fourths of it goes to the survivor; if there are no children or descendants of any child and the estate does not exceed $10,000 the whole of it goes to the survivor. The causes for a divorce are adultery, incompetency, conviction of a felony and sentence to imprisonment therefor after marriage, conviction of a felony or infamous crime before marriage provided it was unknown to the other party, habitual drunkenness, extreme cruelty, intolerable indignities, neglect of the husband to provide the common necessaries of life, vagrancy of the husband and pregnancy of the wife before marriage by another man than her husband and without his knowledge. The plaintiff must reside in the state for one year immediately preceding his or her application for a divorce unless the parties were married in the state and the applicant has resided there since the marriage. Neither party is permitted to marry a third party until one year after the divorce has been granted. The desertion of a wife or of children under fifteen years of age is a felony punishable with imprisonment for not more than three years nor less than one year. The homestead of a householder who is the head of a family or of any resident of the state who has attained the age of sixty years is exempt, to the value of $1500, or 160 acres of land, from execution and attachment arising from any debt, contract or civil obligation other than taxes, purchase money or improvements, so long as it is occupied by the owner or his or her family, and the exemption inures for the benefit of a widow, widower or minor children. If the owner is married the homestead can be alienated only with the consent of both husband and wife. The family Bible, school books, a lot in a burying-ground and $500 worth of personal property are likewise exempt to any person who is entitled to a homestead exemption. A day's labour in mines and in works for the reduction of ores is limited to eight hours except in cases of emergency where life or property is in imminent danger. The sale of intoxicating liquors is licensed only in incorporated cities and towns.

Charities and Corrections.—The state charitable and penal institutions consist of the Wyoming General Hospital at Rock Springs, with one branch at Sheridan and another branch at Casper; the Big Horn Hot Springs at Thermopolis, the Wyoming State Hospital for the Insane at Evanston, the Wyoming Home for the Feeble-Minded and Epileptic at Lander, the Wyoming Soldiers' and Sailors' Home near Buffalo, and the State Penitentiary at Rawlins. The general supervision and control of all these institutions is vested in the Board of Charities and Reform, consisting of the governor, the secretary of state, the treasurer, the auditor, and the superintendent of public instruction; the same officers also constitute the Board of Pardons. Convicts other than those for life are sentenced to the penitentiary for a maximum and a minimum term, and when one has served his minimum term the governor, under rules prescribed by the Board of Pardons, may release him on parole, but he may be returned to prison at any time upon the request of the Board of Pardons.

Education.—The administration of the common school system is vested in the state superintendent of public instruction, county superintendents and district boards. Whenever 100 freeholders request it, the county commissioners must submit to the voters of a proposed high school district the question of establishing a high school district, and each precinct giving a majority vote for it constitutes a part of such a district for establishing and maintaining a high
sch tween seven and fourteen years of age must
a or parochial school during the entire time
heir district is in session unless excused by the district board. The common schools are maintained with the proceeds of school taxes and an annual income from school funds which are derived principally from lands. At the head of the educational system is the University of Wyoming (1886), at Laramie (*q.v.*); it is governed by a board of trustees consisting of its president, the superintendent of public instruction, and nine other members appointed by the governor with the concurrence of the Senate for a term of six years. It is maintained with the proceeds from funds derived principally from lands and with a university tax amounting in 1909 to one-half mill on a dollar.

Finance.—The principal sources of revenue are a general property tax, a tax on the gross receipts of express companies, a tax on the gross products of mines, an inheritance tax, a poll tax and the sale of liquor licences. Railways, telegraph lines and mines are assessed by the state board of equalization, which consists of the secretary of state, the treasurer and the auditor. Other property is assessed by the county assessors. The county commissioners constitute the county board of equalization. A commissioner of taxation who is appointed by the governor with the concurrence of the Senate for a term of four years exercises a general supervision over all tax officers and the boards of equalization. By a law enacted in 1909 county commissioners are forbidden to levy a tax which will yield more than 10% in excess of that raised the preceding year. The constitution limits the state tax for other than the support of educational and charitable institutions and the payment of the state debt and the interest thereon to four mills on the dollar; the county tax for other than the payment of the county debt and the interest thereon to twelve mills on the dollar; the tax of an incorporated city or town for other than the payment of its debt and the interest thereon to eight mills on the dollar. The constitution also forbids the creation of a state debt in excess of 1% of the assessed value of the taxable property in the state; of a county debt in excess of 2% of the assessed value of the taxable property in the county; or of a municipal debt for any other purpose than obtaining a water supply in excess of 2%, unless for building sewerage, when a debt of 4% may be authorized. Wyoming entered the Union with a bonded indebtedness of $320,000. This has been reduced as rapidly as the bonds permit, and on the 30th of June 1910 the debt was only $140,000.

History.—Spanish historians have claimed that adventurers from the Spanish settlements in the S. penetrated almost to the Missouri river during the first half of the 17th century and even formed settlements within the present limits of Wyoming, but these stories are more than doubtful. The first white men certainly known to have traversed the region were Sieur de la Verendrye and his sons, who working down from Canada spent a part of the year 1743–1744 examining the possibilities of the fur trade. Apparently no further French explorations were made from that direction, and the transfer of Canada from France to Great Britain (1763) was followed by lessened interest in exploration. The expedition of Meriwether Lewis and William Clark in 1804–1806 did not touch the region, but a discharged member of the party, John Colter, in 1807 discovered the Yellowstone Park region and then crossed the Rocky Mountains to the head of Green river. Trappers began to cover the N. portion about the same time, and in 1811 the overland party of the Pacific Fur Company crossed the country on their way to Astoria. In 1824 William H. Ashley with a considerable party explored and trapped in the Sweetwater and Green river valleys, and in 1826 wagons were driven from St Louis to Wind river for the Rocky Mountain Fur Company. Captain B. L. E. Bonneville was the first to cross the Rockies with wagons (1832),[1] and two years later Fort Laramie, near the mouth of the Laramie river, was established to control the fur trade of the Arapahoes, Cheyennes and Sioux.

The United States exploring expedition, commanded by John Charles Frémont, explored the Wind River Mountains and the South Pass in 1842, under the guidance of Kit Carson. From this time the favourite route to the Pacific led through Wyoming;[2] but of all the thousands who passed few or none settled permanently within the present limits of the state, partly because of the aridity of the land and partly because of the pronounced hostility of the Indians. For the latter reason the National Congress on the 19th of May 1846 authorized the construction at intervals along the trail of military stations for the protection of the emigrant trains, and Fort Kearny was built (1848) and Fort Laramie was purchased (1849). The great

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[1] See Washington Irving, *Adventures of Captain Bonneville* (New York, 1860).

[2] See Francis Parkman, *The Oregon Trail* (Boston, 1849).

Mormon migration passed along the trail in 1847–1849, and in 1853 fifty-five Mormons settled on Green river at the trading post of James Bridger, which they purchased and named Fort Supply. This S.W. corner of the present state was at that time a part of Utah. With the approach of United States troops under Albert Sidney Johnston in 1857, Fort Supply was abandoned, and in the next year the Mormon settlers retired to Salt Lake City, again leaving the region almost without permanent inhabitants.

The Indians saw with alarm the movement of so many whites through their hunting grounds and became increasingly unfriendly. By a treaty negotiated at Fort Laramie in 1851, the Arapahoes, Sioux, Cheyennes and others agreed to confine themselves within the territory bounded by 100° and 107° W. longitude and 39° and 44° N. latitude, but, besides minor conflicts, a considerable portion of the garrison of Fort Laramie was killed in 1854 and there was trouble for more than twenty years. During the Civil War (1861–1865) the Indians were especially bold as they realized that the Federal troops were needed elsewhere. Meanwhile, there began a considerable migration to Montana, and the protection of the N. of the trail demanded the construction of posts, of which the most important were Fort Reno, on the Powder river, and Fort Phil Kearny in the Bighorn Mountains. In spite of the treaty allowing the opening of the road, during a period of six months fifty-one hostile demonstrations were made, and on the 21st of December 1866 Captain W. J. Fetterman and seventy-eight men from Fort Phil Kearny were ambushed and slain. Hostilities continued in 1867, but the troops were hampered on account of the scarcity of cavalry. Congress in 1867 appointed a commission to arrange a peace, but not until 1868 (29th April, at Fort Laramie) were any terms agreed upon. The posts on the Montana trail were abandoned, and the Indians agreed to remove farther E. and to cease attacking trains, not to oppose railway construction, &c. The territory N. of the Platte river and E. of the Bighorn Mountains was to be reserved as an Indian hunting ground and no white men were to settle on it without the consent of the Indians. Gold was discovered on the Sweetwater river in 1867, and a large inrush of population followed. This unorganized territory E. of the Rocky Mountains was a part of Dakota, and in January 1868 Carter (later Sweetwater) county was erected. Farther E. Cheyenne was laid out by the Union Pacific Railroad (July 1867), a city government was established in August, newspapers began publication, and Laramie county was organized before the arrival of the first railway train on the 13th of November 1867. About six thousand persons spent the winter in Cheyenne, and disorder was checked only by the organization of a vigilance committee. Almost the same scenes followed the laying off of Laramie in April 1868, when 400 lots were sold during the first week and 500 habitations were erected within a fortnight. Albany and Carbon counties were organized farther W. in the same year.

A bill to organize the Territory of Wyoming had been introduced into Congress in 1865, and in 1867 the voters of Laramie county had chosen a delegate to Congress. He was not permitted to take a seat, but his presence in Washington hastened action, and on the 25th of July 1868 the act of Congress establishing a Territory with the present boundaries was approved by President Andrew Johnson. The portion of the Territory E. of the Rocky Mountains was taken from Dakota and that W. from Utah and Idaho, and included parts of the three great additions to the original territory of the United States. That portion E. of the mountains was a part of the Louisiana Purchase (1803), the W. portion above 42° was a part of the Oregon country, and that S. of that parallel came by the Mexican cession of 1848. The first governor, John A. Campbell, was appointed in April 1869, and the organization of the Territory was completed in May of the same year. At the first election, on the 2nd of September 1869, 5266 votes were cast. The legislature established the seat of government at Cheyenne, and granted full suffrage and the right of holding office to women. The first great inrush of population, following the discovery of gold and the opening of the railway, brought many desperate characters, who were held in check only by the stern, swift measures of frontier justice. After the organization of the Territory, except for the appearance of organized bands of highwaymen in 1877–1879, there was little turbulence, in marked contrast with conditions in some of the neighbouring Territories. Agriculture began in the narrow but fertile river valleys, and stock-raising became an important industry, as the native grasses are especially nutritious. The history of the Territory was marked by few striking events other than Indian troubles. The N.E. of the Territory, as has been already said, had been set apart (1868) as a hunting ground for the Sioux Indians, but the rumour of the discovery of gold in the Black Hills and the Bighorn Mountains in 1874–1875 caused a rush to the region which the military seemed powerless to prevent. The resentful Indians resorted to war. After a long and arduous contest in Wyoming, Montana and Dakota, which lasted from 1874 to 1879, and during which General George A. Custer (*q.v.*) and his command were killed in 1876 on the Little Bighorn in Montana, the Indians were thoroughly subdued and confined to reservations. The settlers in Wyoming shared the general antipathy to the Chinese, common to the western country. On the 2nd of September 1885 the miners at Rock Springs attacked about 400 Chinamen who had been brought by the railway to work in the mines, killing about fifty of them and driving the remainder from the district. Governor Warren summoned Federal troops and prevented further destruction of life and property.

The Territory increased in population and more rapidly in wealth, owing chiefly to the large profits in cattle raising, though this prosperity suffered a check during the severe winter of 1886–1887, when nearly three-fourths of the range cattle died of exposure. Agitation for statehood increased, and on the 30th of September 1889 a constitution was formed which was adopted by the people in November of the same year. The Constitution, which continued the Territorial provision of full suffrage for women, met the approval of Congress, and on the 10th of July 1890 Wyoming was formally admitted as a state. Since admission the progress of the state has been steady. Extensive irrigation projects have made available many thousand acres of fertile land, and much more will be subjected to cultivation in the future as the large ranges are broken up into smaller tracts. In some sections a system of dry-farming, by which the scanty rainfall is protected from evaporation by deep ploughing and mulching the soil, has proved profitable.

The transition of the principal stock-raising industry from large herds of cattle to small, and the utilization of the ranges for sheep grazing almost exclusively covered a period of over twenty years preceding 1910, during which time many conflicts occurred between range cattle-owners and sheep flockmasters over the use of the grazing grounds. The settler also, who selected his homestead covering watering places to which the range cattle formerly had free access, came into conflict with the cattlemen. Some of these small settlers owned no cattle, and subsisted by stealing calves and unbranded cattle (mavericks) belonging to the range cattlemen. In parts of the state it became impossible to get a jury composed of these small squatters to convict anybody for stealing or killing cattle, and so bad did this become that, in 1892, certain cattlemen formed a small army of mounted men and invaded the central part of the state with the avowed intention of killing all the men generally considered to be stock thieves, an episode known as the Johnson County Raid. This armed body, consisting of over fifty men, surrounded a log cabin and shot down two of the supposed cattle "rustlers," the latter defending themselves bravely. The country round was roused and large numbers of settlers and others turned out and besieged the cattlemen, who had taken refuge in some ranch buildings. Their case was becoming desperate when a troop of Federal cavalry arrived, raised the siege, and took the cattlemen back to Cheyenne as prisoners. They were subsequently held for murder, but were finally released without trial. Since that time experience has proved that the grazing ranges of the state are better suited to sheep than cattle, the former being much more profitable and better able to stand the cold on the open range.

While many cattlemen have been driven out of business by the encroachments of sheep, the majority of the present flockmasters were range cattle owners in the past and have changed to the more profitable occupation. At the present time serious collisions between sheep and cattle owners are rare. There are still many cattle in the state, but they are divided up into small herds, no longer depending upon the open range for a precarious subsistence during the winter, but are sheltered and fed during winter storms on the hay ranches. The breeds of cattle are far superior now to the old range stock, so that it pays to take care of them, many thousands are fed during the winter on alfalfa hay

Governors of Wyoming

Territorial

John A Campbell	1869–1875
John M Thayer	1875–1878
John W. Hoyt	1878–1882
William Hale	1882–1885
Francis E. Warren	1885–1886
George W. Baxter (acting)	1886–1887
Thomas Moonlight	1887–1889
Francis E. Warren	1889–1890

State.

Francis E. Warren	Republican	1890
Amos W. Barber (acting)	„	1890–1892
J. E. Osborne	Dem.-Populist	1892–1895
W. A. Richards	Republican	1895–1899
De Forest Richards	„	1899–1903
Fenimore Chatterton[1] (acting)	„	1903–1905
Bryant B. Brooks	„	1905–1911
J. M. Carey	Democrat	1911–

Bibliography.—H. C. Beeler, *Report to the Governor of Wyoming by the State Geologist* (Cheyenne, 1904), and "Geology and Mineral Resources of Wyoming," pp. 113-118 of *Rept. of Proc Am. Mining Cong*, 7th Ann. Sess. (1905), a general account of the geology and mineral resources of Wyoming; C. A. White, "Geology and Physiography of a portion of North-western Colorado and adjacent parts of Utah and Wyoming," pp. 677-712 of 9th *Ann. Rept.* U.S. Geol. Survey, 1887–1888 (Washington, 1889); F. E. Mathes, "Glacial Sculpture of Bighorn Mountains, Wyoming," pp. 167-190 of Pt. ii. of 21st *Ann. Rept.* U.S. Geol. Survey, 1899–1900 (Washington, 1900); N. H. Darton, "Preliminary Description of the Geology and Water Resources of the Southern Half of the Black Hills and adjoining regions in South Dakota and Wyoming," pp. 489-599 of Pt. iv. of 21st *Ann. Rept.* U.S. Geol Survey, 1899–1900 (Washington, 1901); A. C. Spencer, "Mineral Resources of the Encampment Copper Region, Wyoming," pp. 163-169, U.S. Geol. Survey *Bull.* No. 213 (Washington, 1903); *Mineral Resources of the United States* published annually by the U.S. Geological Survey; and material indexed in the various bibliographies (*e.g. Bulls.* 301, 372 and 409) of the U.S. Geological Survey; Aven Nelson, *Report on the Flora of Wyoming*, Wyoming Experiment Station, *Bull.* 28 (1896); A. J. Henry, *Climatology of the United States*, U.S. Weather Bureau *Bull.* Q (Washington, 1906); for industries, population, &c., the Reports of the U.S. Census generally; Department of Immigration of the state, *Some Views of Wyoming* (1908); *The State of Wyoming*, published by authority of the state legislature (1908); F. Chatterton, secretary of state, *The State of Wyoming* (1904); and reports of the various state officers mentioned in the text; *Revised Statutes of Wyoming* (Laramie, 1899); *Wyoming Irrigation Laws* (1908); G. R. Hebard, *Government of Wyoming* (San Francisco, 1904); H. H. Bancroft, *Nevada, Colorado and Wyoming* (San Francisco, 1890), and *Utah* (San Francisco, 1889); E. R. Talbot, *My People of the Plains* (New York, 1906); W. M. Raine, *Wyoming, a Story of the Outdoor West* (New York, 1909). An interesting picture of former conditions in Wyoming is given in Owen Wister's novel, *The Virginian* (1902).

WYOMING VALLEY, a valley on the N. branch of the Susquehanna river, in Luzerne county, Pennsylvania, U.S.A. Its name is a corruption of a Delaware Indian word meaning "large plains." The valley, properly speaking, is about 3½ m. wide and about 25 m. long, but the term is sometimes used historically in a broader sense to include all of the territory in the N.E. of the state once in dispute between Pennsylvania and Connecticut. In Connecticut the Susquehanna Land Company was formed in 1753 to colonize the valley, and the Delaware Land Company was formed in 1754 for the region immediately W. of the Delaware river. The rights of the Six Nations to all this territory were purchased at Albany, New York, by the Susquehanna Company in 1754, but the work of colonization was delayed for a time by the Seven Years' War. A few colonists sent out by the Susquehanna Company settled at Mill Creek near the present site of Wilkes-Barré in 1763, but were (October 15th) attacked and driven away by the Indians. In December 1768 the company divided a part of the valley into five townships of 5 sq. m. each, granting to forty proprietors the choice of one of these on condition that they should take possession of it by the 1st of February 1769, and the other four townships to 200 settlers on condition that they should follow by the 1st of May The first group arrived on the 8th of February, the first division of the larger body on the 12th of May, and the five original towns of Wilkes-Barré (*q.v.*), Kingston (*q.v.*), Hanover,[2] Plymouth and Pittston were soon founded.

In the meantime the Six Nations (in 1768) had repudiated their sale of the region to the Susquehanna Company and had sold it to the Penns; the Penns had erected here the manors of Stoke and Sunbury, the government of Pennsylvania had commissioned Charles Stewart, Amos Ogden and others to lay out these manors, and they had arrived and taken possession of the block-house and huts at Mill Creek in January 1769. The conflict which followed between the Pennsylvania and the Connecticut settlers is known as the first Pennamite-Yankee War. Although defeated in the early stages of the conflict, the Yankees or Connecticut settlers finally rallied in August 1771 and compelled the Pennsylvanians to retreat, and the war terminated with the defeat of Colonel William Plunket (1720–1791) and about 700 Pennsylvanians by a force of 300 Yankees under Colonel Zebulon Butler (1731–1795) in the battle of "Rampart Rocks" on the 25th of December 1775. The General Assembly of Connecticut, in January 1774, erected the valley into the township of Westmoreland and attached it to Litchfield county, and in October 1776 the same body erected it into Westmoreland county. On the 3rd of July 1778, while a considerable number of the able-bodied men were absent in the Connecticut service, a motley force of about 400 men and boys under Colonel Zebulon Butler were attacked and defeated near Kingston in the "battle of Wyoming" by about 1100 British, Provincial (Tory) and Indian troops under Major John Butler, and nearly three-fourths were killed or taken prisoners and subsequently massacred. Thomas Campbell's poem, *Gertrude of Wyoming* (1809), is based on this episode, various liberties being taken with the facts. As the War of Independence came to a close the old trouble with Pennsylvania was revived. A court of arbitration appointed by the Continental Congress met at Trenton, New Jersey, in 1782, and on December 30th gave a unanimous decision in favour of Pennsylvania. The refusal of the Pennsylvania government to confirm the private land titles of the settlers, and the arbitrary conduct of a certain Alexander Patterson whom they sent up to take charge of affairs, resulted in 1784 in the outbreak of the second Pennamite-Yankee War. The Yankees were dispossessed, but they took up arms and the government of Pennsylvania despatched General John Armstrong with a force of 400 men to aid Patterson. Armstrong induced both parties to give up their arms with a promise of impartial justice and protection, and as soon as the Yankees were defenceless he made them prisoners. This treachery and the harsh treatment by Patterson created a strong public opinion in favour of the Yankees, and the government was compelled to adopt a milder policy. Patterson was withdrawn, the disputed territory was erected into the new county of Luzerne (1786), the land titles were confirmed (1787), and Colonel Timothy Pickering (*q.v.*) was commissioned to organize the new county and to effect a reconciliation. But a few of the settlers under the lead of Colonel John Franklin (1749–1831) attempted to form a separate state government. Franklin was seized and imprisoned, under a warrant from the State Supreme Court. As Pickering was held responsible for Franklin's imprisonment, some of Franklin's followers in retaliation kidnapped Pickering and carrying him into the woods, tried in vain for nearly three weeks to get from him a promise to intercede for Franklin's pardon. The trouble was again revived by the repeal in 1790 of the confirming act of 1787 and by a subsequent decision of the United States Circuit Court, unfavourable to the Yankees, in the case of *Van Horn* versus *Dorrance*. All of the claims were finally confirmed by a series of statutes passed in 1799, 1802 and 1807. Since 1808, mainly through the development of its coal mines (see PITTSTON, PA.), the valley has made remarkable progress both in wealth and in population.

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[1] In pl [illegible] ards, deceased.

[2] Several Scotch-Irish families from Lancaster county, Pennsylvania, accepted Connecticut titles and settled at Hanover under

For a thorough study of the early history of Wyoming Valley see O. J. Harvey, *A History of Wilkes-Barré* (3 vols., Wilkes-Barré, 1909–1910); see also H. M. Hoyt, *Brief of a Title in the Seventeen Townships in the County of Luzerne* (Harrisburg, 1879).

WYON, THOMAS (1792–1817), English medallist, was born at Birmingham. He was apprenticed to his father, the chief engraver of the king's seals, and studied in the schools of the Royal Academy, London, where he gained silver medals in both the antique and the life class; he also obtained a gold medal from the Society of Arts. He was appointed probationary engraver to the mint in 1811, and soon after engraved his medal commemorative of the peace, and his Manchester Pitt medal. In 1815 he was appointed chief engraver to the mint. His younger brother, Benjamin Wyon (1802–1858), his nephews, Joseph Shepherd Wyon (1836–1873) and Alfred Benjamin Wyon (1837–1884), and his cousin, William Wyon (1795–1851), were also distinguished medallists.

WYSE, SIR THOMAS (1791–1862), Irish politician, belonged to a family claiming descent from a Devon man, Andrew Wyse, who is said to have crossed over to Ireland during the reign of Henry II. and obtained lands near Waterford, of which city thirty-three members of the family are said to have been mayors or other municipal officers. From the Reformation the family had been consistently attached to the Roman Catholic Church. Thomas Wyse was educated at Stonyhurst College and at Trinity College, Dublin, where he distinguished himself as a scholar. After 1815 he passed some years in travel, visiting Italy, Greece, Egypt and Palestine. In 1821 he married Laetitia (d. 1872), daughter of Lucien Buonaparte, and after residing for a time at Viterbo he returned to Ireland in 1825, having by this time inherited the family estates. He now devoted his great oratorical and other talents to forwarding the cause of Roman Catholic emancipation, and his influence was specially marked in his own county of Waterford, while his standing among his associates was shown by his being chosen to write the address to the people of England. In 1830, after the passing of the Roman Catholic Relief Act, he was returned to parliament for county Tipperary, and he attached himself to the Liberal party and voted for the great measures of the reform era. But he was specially anxious to secure some improvement in the education of the Irish people, and some of his proposals were accepted by Mr E. G. Stanley, afterwards 14th earl of Derby, and the government. He was chairman of a committee which inquired into the condition of education in Ireland, and it was partly owing to his efforts that provincial colleges were established at Cork, Galway and Belfast. His work as an educational pioneer also bore fruit in England, where the principles of state control and inspection, for which he had fought, were adopted, and where a training college for teachers at Battersea was established on lines suggested by him. From 1835 to 1847 he was M.P. for the city of Waterford and from 1839 to 1841 he was a lord of the treasury; from 1846 to 1849 he was secretary to the board of control, and in 1849 he was sent as British minister to Greece. He was very successful in his diplomacy, and he showed a great interest in the educational and other internal affairs of Greece. In 1857 he was made a K.C.B., and he died at Athens on the 16th of April 1862. Wyse wrote *Historical Sketch of the late Catholic Association of Ireland* (1829); *An Excursion in the Peloponnesus* (1858, new ed. 1865); and *Impressions of Greece* (1871). His two sons shared his literary tastes. They were Napoleon Alfred Bonaparte Wyse (1822–1895); and William Charles Bonaparte Wyse (1826–1892), a student of the dialect of Provence.

WYTTENBACH, DANIEL ALBERT (1746–1820), German-Swiss classical scholar, was born at Bern, of a family whose nobility and distinction he loved to recall. In particular, he was [illegible] was [illegible] Bern, and [illegible] took place [illegible] had [illegible] bodied the [illegible] theological [illegible] fourteen the [illegible] years' course there [illegible] a Lutheran pastor. [illegible] education, principally [illegible] and history. The [illegible] acquired great influence over [illegible] have taught his subject with [illegible] seriousness and piety, often [illegible] mathematician, who had [illegible] measure and weight. "Philology" [illegible] of that age meant Hebrew and [illegible] were generally handled by the same [illegible] almost solely to theological students. W[illegible] course at Marburg was troubled about the [illegible] by mental unrest, due to the fascination exer[illegible] Bunyan's *Pilgrim's Progress*. The disorder was [illegible] enberg. The principal study of the third year was [illegible] which took Wyttenbach entirely captive. The fourth [illegible] year was to be devoted to theology and Christian [illegible] Wyttenbach had hitherto submitted passively to his fa[illegible] wishes concerning his career, in the hope that some unex[illegible] occurrence might set him free. But he now turned away from theological lectures, and privately devoted his time to the task of deepening and extending his knowledge of Greek literature. He possessed at the time, as he tells us, no more acquaintance with Greek than his own pupils at a later time could acquire from him during four months' study. He was almost entirely without equipment beyond the bare texts of the authors. But Wyttenbach was undaunted, and four years' persistent study gave him a knowledge of Greek such as few Germans of that time possessed. His love for philosophy carried him towards the Greek philosophers, especially Plato. During this period Ruhnken's notes on the Platonic lexicon of *Timaeus* fell into his hands. Ruhnken was for him almost a superhuman being, whom he worshipped day and night, and with whom he imagined himself as holding converse in the spirit. When Wyttenbach was twenty-two he determined to seek elsewhere the aids to study which Marburg could not afford. His father, fully realizing the strength of his son's pure passion for scholarship, permitted and even advised him to seek Heyne at Göttingen. From this teacher he received the utmost kindness and encouragement, and he was urged by him to dedicate to Ruhnken the first-fruits of his scholarships. Wyttenbach therefore set to work on some notes to Julian, Eunapius and Aristaenetus, and Heyne wrote to Ruhnken to bespeak his favourable consideration for the work. Before it reached him Ruhnken wrote a kind letter to Wyttenbach, which the recipient "read, re-read and kissed," and another on receipt of the tract, in which the great scholar declared that he had not looked to find in Germany such knowledge of Greek, such power of criticism, and such mature judgment, especially in one so young. By Heyne's advice, he worked hard at Latin, which he knew far less thoroughly than Greek, and we soon find Heyne praising his progress in Latin style to both Ruhnken and Valckenaer. He now wrote to ask their advice about his scheme of coming to the Netherlands to follow the profession of a scholar. Ruhnken strongly exhorted Wyttenbach to follow his own example, for he too had been designed by his parents for the Christian ministry in Germany, but had settled at Leiden on the invitation of Hemsterhuis. Valckenaer's answer was to the same effect, but he added that Wyttenbach's letter would have been pleasanter to him had it been free from excessive compliments. These letters were forwarded to the elder Wyttenbach, with a strong recommendation from Heyne. The old man had been himself in Leiden in his youth, and entertained an admiration for the scholarship of the Netherlands; so his consent was easily won. Young Wyttenbach reached Leiden in 1770. A year was spent with great contentment, in learning the language of the people, in attending the lectures of the great "duumviri" of Leiden, and in collating MSS. of Plutarch. At the end of 1771 a professor was wanted at Amsterdam for the College of the Remonstrants. By the recommendation of Ruhnken, Wyttenbach obtained the chair, which he filled with great success for eight years. His lectures took a wide range. Those on Greek were repeated also to the students of the university of Amsterdam (the "Athenaeum"). In 1775 a visit was made to Paris, which was fruitful both of new friendships and of progress in study. About this time, on the advice of Ruhnken, Wyttenbach began the issue of his *Bibliotheca critica*, which appeared at intervals for the next thirty years. The methods of criticism employed were in the main those established by Hemsterhuis, and carried on by Valckenaer and Ruhnken, and the publication met with acceptance from the learned all over Europe. In 1777 the younger Burmann ("Burmannus Secundus") retired from his professorship at the Athenaeum, and Wyttenbach hoped to succeed him. When another received the appointment, he was sorely discouraged. Only his regard for Ruhnken and for Dutch freedom (in his own words "Ruhnkeni et Batavae libertatis cogitatio") kept him in Holland. For fear of losing him, the authorities at Amsterdam nominated him in 1779 professor of philosophy. In 1785 Toll, Burmann's successor, resigned, and Wyttenbach was at once appointed to succeed him. His full title was "professor of history and eloquence and Greek and Latin literature." He had hardly got to work in his new office when Valckenaer died, and he received a call to Leiden. Greatly to Ruhnken's disappointment, he declined to abandon the duties he had so recently undertaken. In 1787 began the internal commotions in Holland, afterwards to be aggravated by foreign interference. Scarcely during the remaining thirty-three years of Wyttenbach's life was there a moment of peace in the land. About this time two requests were made to him for an edition of the *Moralia* of Plutarch, for which a recension of the tract *De sera numinis vindicta* had marked him out in the eyes of scholars. One request came from the famous "Societas Bipontina," the other from the delegates of the Clarendon Press at Oxford. Wyttenbach, influenced at once by the reputation of the university, and by the liberality of the Oxonians in tendering him assistance of different kinds, declined the offer of the Bipontine Society,—very fortunately, since their press was soon destroyed by the French. The fortunes of Wyttenbach's edition curiously illustrate the text "habent sua fata libelli." The first portion was safely conveyed to Oxford in 1794. Then war broke out between Holland and Great Britain. Randolph, Wyttenbach's Oxford correspondent, advised that the next portion should be sent through the British ambassador at Hamburg, and the MS. was duly consigned to him "in a little chest well protected by pitch." After sending Randolph a number of letters without getting any answer, Wyttenbach in disgust put all thought of the edition from him, but at last the missing box was discovered in a forgotten corner at Hamburg, where it had lain for two years and a half. The work was finally completed in 1805. Meanwhile Wyttenbach received invitations from his native city Bern, and from Leiden, where vacancies had been created by the refusal of professors to swear allegiance to the new Dutch republic set up in 1795, to which Wyttenbach had made submission. But he only left Amsterdam in 1799, when on Ruhnken's death he succeeded him at Leiden. Even then his chief object in removing was to facilitate an arrangement by which the necessities of his old master's family might be relieved. His removal came too late in life, and he was never so happy at Leiden as he had been at Amsterdam. Before long appeared the ever-delightful *Life of David Ruhnken*. Though written in Latin, this biography deserves to rank high in the modern literature of its class. Of Wyttenbach's life at Leiden there is little to tell. The continual changes in state affairs greatly disorganized the universities of Holland, and Wyttenbach had to work in face of much detraction; still, his success as a teacher was very great. In 1805 he narrowly escaped with his life from the great gunpowder explosion, which killed 150 people, among them the Greek scholar Luzac, Wyttenbach's colleague in the university. One of Wyttenbach's letters gives a vivid account of the disaster. During the last years of his life he suffered severely from illness and became nearly blind. After the conclusion of his edition of Plutarch's *Moralia* in 1805, the only important work he was able to publish was his well-known edition of Plato's *Phaedo*. Many honours were conferred upon him both at home and abroad, and in particular he was made a member of the French Institute. Shortly before his death, he obtained the licence of the king of Holland to marry his sister's daughter, Johanna Gallien, who had for twenty years devoted herself to him as housekeeper, secretary and aider in his studies. The sole object of the marriage was to secure for her a better provision after her husband's death, because as the widow of a professor she would be entitled to a pension. Johanna Gallien was a woman of remarkable culture and ability, and wrote works held in great repute at that time. On the festival of the tercentenary of the foundation of the university of Marburg, celebrated in 1827, the degree of doctor was conferred upon her. Wyttenbach died of apoplexy in 1820, and he was buried in the garden of his country house near Amsterdam, which stood, as he noted, within sight of the dwellings of Descartes and Boerhaave.

Although his work can hardly be set on the same level as that of Hemsterhuis, Valckenaer and Ruhnken, yet he was a very eminent exponent of the sound methods of criticism which they established. These four men, more than any others after Bentley, laid the foundations of modern Greek scholarship. The precise study of grammar, syntax and style, and the careful criticism of texts by the light of the best manuscript evidence, were upheld by these scholars in the Netherlands when they were almost entirely neglected elsewhere on the Continent, and were only pursued with partial success in England. Wyttenbach may fairly be regarded as closing a great period in the history of scholarship. He lived indeed to see the new birth of German classical learning, but his work was done, and he was unaffected by it. Wyttenbach's criticism was less rigorous, precise and masterly, but perhaps more sensitive and sympathetic, than that of his great predecessors in the Netherlands. In actual acquaintance with the philosophical writings of the ancients, he has probably never been surpassed. In character he was upright and simple-minded, but shy and retiring, and often failed to make himself appreciated. His life was not passed without strife, but his few friends were warmly attached to him, and his many pupils were for the most part his enthusiastic admirers. Wyttenbach's biography was written in a somewhat dry and lifeless manner by Mahne, one of his pupils, who also published some of his letters. His *Opuscula*, other than those published in the *Bibliotheca critica*, were collected in two volumes (Leiden, 1823). (J. S. R.)

WYVERN, or Wivern, the name of an heraldic monster, with the forepart of a winged dragon and the hind part of a serpent or lizard (see Heraldry). The earlier spelling of the word was *wiver* or *wivere*; O. Eng. *wyvre*; O. Fr. *wivre*, mod. *givre*. It is a doublet of "viper," with an excrescent *n*, as in "bittern," M. Eng. *bitore*.

X the twenty-fourth letter of the English alphabet. Its position and form are derived from the Latin alphabet, which received them from the Western Greek alphabet. The alphabet of the Western Greeks differed from the Ionic, which is the Greek alphabet now in general use, by the shape and position of X and of some other consonants. The Ionic alphabet placed *x* (ξ) immediately after N and, in the oldest records, in the form ≢, from which the ordinary Greek capital Ξ was developed. The position and shape of this symbol show clearly that it was taken from the Semitic Samekh, which on the Moabite stone appears as ≢. Why the Greeks attached this value to the symbol is not clear; in Semitic the symbol indicates the ordinary *s*. Still less clear is the origin of the form X, which in the Ionic alphabet stands for χ (*k* followed by a breath). In a very ancient alphabet on a small vase found in 1882 at Formello near the ancient Veii in Etruria, a symbol appears after N consisting of three horizontal and three vertical lines, ⊞. From this it has been suggested that both forms of the Greek *x* are derived, Ξ by removing the vertical lines, X in its earliest form + by removing the four marginal lines. The Ionic symbol, however, corresponds closely to the earliest Phoenician, so that this theory is not very plausible for Ξ, and there are various other possibilities for the development of X (see Alphabet). This symbol appears in the very early Latin inscriptions found in the Roman Forum in 1899 as ✗. In its usual value as *ks* it is superfluous. In the Ionic alphabet it was useful, because there it represented a single sound, which before the invention of the symbol had to be represented by *kh*. In the alphabet in use officially at Athens before 403 B.C. *x* was written by χσ (*khs*). In English there is an interesting variation of pronunciation in many words according to the position of the accent: if the accent precedes, *x* is pronounced *ks*; if it follows, *x* is pronounced *gz*: compare *éxit* (*eksit*) with *exáct* (*egzact*).

The symbol X was used both by the Romans and the Etruscans for the numeral 10. Which borrowed from the other is uncertain, but the Etruscans did not use X as part of their alphabet. X with a horizontal line over it was used for 10,000, and when a line on each side was added, ☒, for a million. (P. Gi.)

XANTHI (Turkish *Eskije*), a town of European Turkey in the vilayet of Adrianople; situated on the right bank of the river Eskije and at the S. foot of the Rhodope Mountains, 29 m. W. of Gumuljina by the Constantinople-Salonica railway. Pop. (1905) about 14,000, of whom the bulk are Turks and Greeks in about equal proportions, and the remainder (about 4000) Armenians, Roman Catholics or Jews. There are remains of a medieval citadel, and on the plain to the S. the ruins of an ancient Greek town. Xanthi is built in the form of an amphitheatre and possesses several mosques, churches and monasteries, a theatre with a public garden, and a municipal garden. A preparatory school for boys and girls was founded and endowed by Mazzini. The town is chiefly notable for the famous Yénidjé tobacco.

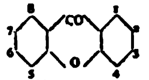
XANTHIC ACID (xanthogenic acid), $C_2H_5O{\cdot}CS{\cdot}SH$, an organic acid named from the Greek ξανθός, yellow, in allusion to the bright yellow colour of its copper salt. The salts of this acid are formed by the action of carbon bisulphide on the alcoholates, or on alcoholic solutions of the caustic alkalis. They react with the alkyl iodides to form dialkyl esters of the dithio-carbonic acid, which readily decompose into mercaptans and thiocarbamic esters on treatment with ammonia: $C_2H_5O{\cdot}CS{\cdot}SR_1 + NH_3 = C_2H_5O{\cdot}CS{\cdot}NH_2 + R_1{\cdot}SH$; with the alkali alcoholates they give salts of the alkyl thiocarbonic acids: $C_2H_5O{\cdot}CS{\cdot}SR + CH_3OK + H_2O = CH_3O{\cdot}CO{\cdot}SK + C_2H_5OH + R{\cdot}SH$. Ethyl xanthic acid, $C_2H_5O{\cdot}CS{\cdot}SH$, is obtained by the action of dilute sulphuric acid on the potassium salt at 0° C. (Zeise, *Berz. Jahresb.*, 3, p. 83). It is a colourless oil which is very unstable, decomposing at 25° C. into carbon bisulphide and alcohol. The potassium salt crystallizes in colourless needles and is formed by shaking carbon bisulphide with a solution of caustic potash in absolute alcohol. On the addition of cupric sulphate to its aqueous solution it yields a yellow precipitate of cupric xanthate. Potassium xanthate is used in indigo printing and also as an antidote for phylloxera. Tschugaeff (*Ber.*, 1899, 32, p. 3332) has used the xanthic ester formation for the preparation of various terpenes, the methyl ester when distilled under slightly diminished pressure decomposing, in the sense of the equation, $C_nH_{2n-1}{\cdot}O.CS{\cdot}SCH_3 = C_nH_{2n-2} + COS + CH_3SH$. According to the author molecular change in the hydrocarbon is prevented, since no acid agent is used.

XANTHIPPE, the wife of Socrates (*q.v.*). Her name has become proverbial in the sense of a nagging, quarrelsome woman. Attempts have been made to show that she has been maligned, notably by E. Zeller ("Zur Ehrenrettung der Xanthippe," in his *Vorträge und Abhandlungen*, i., 1875).

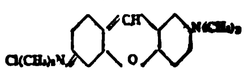
XANTHONE (dibenzo-γ-pyrone, or diphenylene ketone oxide), $C_{13}H_8O_2$, in organic chemistry, a heterocyclic compound containing the ring system shown below. It is obtained by the oxidation of xanthene (methylene diphenylene oxide) with chromic acid; by the action of phosphorus oxychloride on disodium salicylate; by heating 2·2′-dioxybenzophenone with concentrated sulphuric acid; by distilling fluoran with lime; by the oxidation of xanthydrol (R. Meyer, *Ber.*, 1893, 26, p. 1277); by boiling diazotized 2·2′-diaminobenzophenone with water (Heyl., *Ber.*, 1898, 31, p. 3034); by heating salol with concentrated sulphuric acid (C. Graebe, *Ann.*, 1889, 254, p. 280), and by heating potassium-ortho-chlorobenzoate with sodium phenolate and a small quantity of copper powder to 180–190° C. (F. Ullmann, *Ber.*, 1905, 38, pp. 729, 2120, 2211). It crystallizes in needles which melt at 173–174° and boil at 349–350° C., and are volatile in steam. Its solution in concentrated sulphuric acid is of a yellow colour and shows a marked blue fluorescence. The carbonyl group is not ketonic in character since it yields neither an oxime nor hydrazone. When fused with caustic potash it yields phenol and salicylic acid. Mild reducing agents convert it into xanthydrol, the group >CO becoming >CH·OH, whilst a strong reducing agent like hydriodic acid converts it into xanthene, the group >CO becoming >CH_2. Phosphorus pentasulphide at 140–150° C. converts it into xanthion by transformation of >CO to >CS (R. Meyer, *Ber.*, 1900, 33, p. 2580), and this latter compound condenses with hydroxylamine to form xanthone oxime.

All four mono-hydroxyxanthones are known, and are prepared by heating salicylic acid with either resorcin, pyrocatechin or hydroquinone; they are yellow crystalline solids, which act as dyestuffs. The 1·7-dihydroxyxanthone, known as euxanthone, is prepared by heating euxanthic acid with hydrochloric acid or by heating hydroquinone carboxylic acid with β-resorcylic acid and acetic anhydride (S. Kostanecki, *Ber.*, 1891, 24, p. 3983; C. Graebe, *Ann.*, 1889, 254, p. 298). It is also obtained from Indian yellow (Graebe, ibid.), formed in the urine of cows fed on mango leaves. It crystallizes in yellow needles which sublime readily. On fusion with caustic potash it decomposes with formation of tetrahydroxy-benzophenone, which then breaks up into resorcin and hydroquinone. The isomeric 1·6-dihydroxyxanthone, isoeuxanthone, is formed when β-resorcylic acid is heated with acetic anhydride. Gentiein, or 1·3·7-trihydroxyxanthone, is found in the form of its methyl ether (gentisin) in gentian root; it is obtained synthetically by condensing phloroglucin with hydroquinone carboxylic acid.

Xanthene, $C_{13}H_{10}O$, may be synthesized by condensing phenol with ortho-cresol in the presence of aluminium chloride. Its tetramethyl-diamino derivative, which is formed by condensing formaldehyde with dimethyl-meta-aminophenol and subsequent elimination of water from the resulting diphenyl methane derivative, is the leuco base of pyronine, into which it passes by oxidation.



Xanthone.



Pyronine.

XANTHUS (mod. *Gunük*), an ancient city of Lycia, on the river Xanthus (*Eshen Chai*) about 8 m. above its mouth. It was besieged by the Persian general Harpagus (546 B.C.), when the acropolis was burned and all the inhabitants perished (Herod. i. 176). The city was afterwards rebuilt; and in 42 B.C. it was besieged by the Romans under M. Junius Brutus. It was taken by storm and set on fire, and the inhabitants perished in the flames. The ruins lie on a plateau, high above the left bank of the river. The nearest port is Kalamaki, whence a tedious ride of three to four hours round the edge of the great marsh of the Eshen Chai brings the traveller to Xanthus. The whole plan of the city with its walls and gates can be discerned. The well-preserved theatre is remarkable for a break in the curve of its *auditorium*, which has been constructed so as not to interfere with a sarcophagus on a pedestal and with the "Harpy Monument" which still stands to its full height, robbed of the reliefs of its parapet (now in the British Museum). In front of the theatre stands the famous *stele* of Xanthus inscribed on all four sides in Lycian and Greek. Behind the theatre is a terrace on which probably the temple of either the Xanthian Apollo or Sarpedon stood. The best of the tombs—the "Payava Tomb," the "Nereid Monument," the "Ionic Monument" and the "Lion Tomb"—are in the British Museum, as the result of Sir Chas. Fellows's expedition; only their bases can be seen on the site. A fine triple gateway, much polygonal masonry, and the walls of the acropolis are the other objects of most interest.

See O. Benndorf and G. Niemann, *Reisen in Lykien und Karien* (1884). (D. G. H.)

XAVIER, FRANCISCO DE (1506–1552), Jesuit missionary and saint, commonly known in English as St Francis Xavier and also called the "Apostle of the Indies." He was the youngest son of Juan de Jasso, privy councillor to Jean d'Albret, king of Navarre, and his wife, Maria de Azpilcueta y Xavier, sole heiress of two noble Navarrese families. He was born at his mother's castle of Xavier or Xavero, at the foot of the Pyrenees and close to the little town of Sanguesa, on the 7th of April 1506, according to a family register, though his earlier biographers fix his birth in 1497. Following a Spanish custom of the time, which left the surname of either parent optional with children, he was called after his mother; the best authorities write "Francisco de Xavier" (Lat. *Xaverius*) rather than "Francisco Xavier," as Xavier is originally a place-name. In 1524 he went to the university of Paris, where he entered the College of St Barbara, then the headquarters of the Spanish and Portuguese students, and in 1528 was appointed lecturer in Aristotelian philosophy at the Collége de Beauvais. In 1530 he took his degree as master of arts. He and the Savoyard Pierre Lefèvre, who shared his lodging, had already, in 1529, made the acquaintance of Ignatius of Loyola—like Xavier a native of the Spanish Basque country. Ignatius succeeded, though in Xavier's case after some opposition, in gaining their sympathy for his missionary schemes (see LOYOLA, IGNATIUS OF); and they were among the company of seven persons, including Loyola himself, who took the original Jesuit vows on the 15th of August 1534. They continued in Paris for two years longer; but on November 15th, 1536, they started for Italy, to concert with Ignatius plans for converting the Moslems of Palestine. In January 1537 they arrived in Venice. As some months must elapse before they could sail for Palestine, Ignatius determined that the time should be spent partly in hospital work at Venice and later in the journey to Rome. Accordingly, Xavier devoted himself for nine weeks to the hospital for incurables, and then set out with eight companions for Rome, where Pope Paul III. sanctioned their enterprise. Returning to Venice, Xavier was ordained priest on Midsummer Day 1537; but the outbreak of war between Venice and Turkey put an end to the Palestine expedition, and the companions dispersed for a twelvemonth's home mission work in the Italian cities. Nicolas Bobadilla and Xavier betook themselves first to Monselice and thence to Bologna, where they remained till summoned to Rome by Ignatius at the close of 1538.

Ignatius retained Xavier at Rome until 1541 as secretary to the Society of Jesus (see JESUITS for the events of the period 1538–41). Meanwhile John III., king of Portugal, had resolved on sending a mission to his Indian dominions, and had applied through his envoy Pedro Mascarenhas to the pope for six Jesuits. Ignatius could spare but two, and chose Bobadilla and a Portuguese named Simão Rodrigues for the purpose. Rodrigues set out at once for Lisbon to confer with the king, who ultimately decided to retain him in Portugal. Bobadilla, sent for to Rome, arrived there just before Mascarenhas was about to depart, but fell too ill to respond to the call made on him.

Hereupon Ignatius, on March 15th, 1540, told Xavier to leave Rome the next day with Mascarenhas, in order to join Rodrigues in the Indian mission. Xavier complied, merely waiting long enough to obtain the pope's benediction, and set out for Lisbon, where he was presented to the king, and soon won his entire confidence, attested notably by procuring for him from the pope four briefs, one of them appointing him papal nuncio in the Indies. On April 7th, 1541, he sailed from Lisbon with Martim Alfonso de Sousa, governor designate of India, and lived amongst the common sailors, ministering to their religious and temporal needs, especially during an outbreak of scurvy. After five months' voyage the ship reached Mozambique, where the captain resolved to winter, and Xavier was prostrated with a severe attack of fever. When the voyage was resumed, the ship touched at Malindi and Sokotra, and reached Goa on May 6th, 1542. Exhibiting his brief to D. João d'Albuquerque, bishop of Goa, he asked his permission to officiate in the diocese, and at once began walking through the streets ringing a small bell, and telling all to come, and send their children and servants, to the "Christian doctrine" or catechetical instruction in the principal church. He spent five months in Goa, and then turned his attention to the "Fishery Coast," where he had heard that the Paravas, a tribe engaged in the pearl fishery, had relapsed into heathenism after having professed Christianity. He laboured assiduously amongst them for fifteen months, and at the end of 1543 returned to Goa.

At Travancore he is said to have founded no fewer than forty-five Christian settlements. It is to be noted that his own letters contain, both at this time and later on, express disproof of that miraculous gift of tongues with which he was credited even in his lifetime, and which is attributed to him in the *Breviary* office for his festival. Not only was he obliged to employ interpreters, but he relates that in their absence he was compelled to use signs only.

He sent a missionary to the isle of Manaar, and himself visited Ceylon and Mailapur (Meliapur), the traditional tomb of St Thomas the apostle, which he reached in April 1544, remaining there four months. At Malacca, where he arrived on September 25th, 1545, he remained another four months, but had comparatively little success. While in Malacca he urged King John III. of Portugal to set up the Inquisition in Goa to repress Judaism, but the tribunal was not set up until 1560. After visiting Amboyna, the Moluccas and other isles of the Malay archipelago, he returned to Malacca in July 1547, and found three Jesuit recruits from Europe awaiting him. About this time an attack upon the city was made by the Achinese fleet, under the raja of Pedir in Sumatra; and Xavier's early biographers relate a dramatic story of how he roused the governor to action. This story is open to grave suspicion, as, apart from the miracles recorded, there are wide discrepancies between the secular Portuguese histories and the narratives written or inspired by Jesuit chroniclers of the 17th century.

While in Malacca Xavier met one Yajiro, a Japanese exile (known to the biographies as Anger, Angero or Anjiro), who fired him with zeal for the conversion of Japan. But he first revisited India and then, returning to Malacca, took ship for Japan, accompanied by Yajiro, now known as Paul of the Holy Faith. They reached Kagoshima on the 15th of August 1549, and remained in Japan until the 20th of November 1551. (See JAPAN, § viii.) On board the "Santa Cruz," the vessel in which he returned from Japan to Malacca, Xavier discussed with Diogo Pereira, the captain, a project for a missionary journey to China. He devised the plan of persuading the viceroy of Portuguese India to despatch an embassy to China, in whose train he might enter, despite the law which then excluded foreigners from that empire. He reached Goa in February 1552, and obtained from the viceroy consent to the plan of a Chinese embassy and to the nomination of Pereira as envoy. Xavier left India on the 25th of April 1552 for Malacca, intending there to meet Pereira and to re-embark on the "Santa Cruz."

The story of his detention by the governor (officially styled captain) of Malacca—a son of Vasco da Gama named Alvaro de Ataide or Athayde—is told with many picturesque details by F. M. Pinto and some of the Jesuit biographers, who have pilloried Ataide as actuated solely by malice and self-interest. Ataide appears to have objected not so much to the mission as to the rank assigned to Pereira, whom he regarded as unfit for the office of envoy. The right to send a ship to trade with China was one for which large sums were paid, and Pereira, as commander of the expedition, would enjoy commercial privileges which Ataide had, *ex officio*, the power to grant or withhold. It seems doubtful if the governor exceeded his legal right in refusing to allow Pereira to proceed;[1] in this attitude he remained firm even when Xavier, if the Jesuit biographers may be trusted, exhibited the brief by which he held the rank of papal nuncio, and threatened Ataide with excommunication. On Xavier's personal liberty no restraint was placed. He embarked without Pereira on July 16th, 1552. After a short stay at Singapore, whence he despatched several letters to India and Europe, the ship at the end of August 1552 reached Changchuen-shan (St John Island) off the coast of Kwang-tung, which served as port and rendezvous for Europeans, not then admitted to visit the Chinese mainland.

Xavier was seized with fever soon after his arrival, and was delayed by the failure of the interpreter he had engaged, as well as by the reluctance of the Portuguese to attempt the voyage to Canton for the purpose of landing him. He had arranged for his passage in a Chinese junk, when he was again attacked by fever, and died on December 2nd, or, according to some authorities, November 27th, 1552. He was buried close to the cabin in which he had died, but his body was later transferred to Malacca, and thence to Goa, where it still lies in a magnificent shrine (see J. N. da Fonseca, *An Historical and Archaeological Sketch of Goa*, Bombay, 1878). He was beatified by Paul V. in 1619 and canonized by Gregory XV. in 1621.

In appearance Xavier was neither Spanish nor Basque. He had blue or grey eyes, and fair hair and beard, which turned white through the hardships he endured in Japan. That he was of short stature is proved by the length of the coffin in which his body is still preserved, less than 5 ft. 1 in. (Fonseca, *op. cit.* p. 296). Many miracles have been ascribed to him; an official list of these, said to have been attested by eye-witnesses, was drawn up by the auditors of the Rota when the processes for his canonization were formed, and is preserved in manuscript in the Vatican library. The contention that Xavier should be regarded as the greatest of Christian missionaries since the first century A.D. rests upon more tangible evidence. His Jesuit biographers attribute to him the conversion of more than 700,000 persons in less than ten years; and though these figures are absurd, the work which Xavier accomplished was enormous. He inaugurated new missionary enterprises from Hormuz to Japan and the Malay Archipelago, leaving an organized Christian community wherever he preached; he directed by correspondence the ecclesiastical policy of John III. and his viceroy in India; he established and controlled the Society of Jesus in the East. Himself an ascetic and a mystic, to whom things spiritual were more real than the visible world, he had the strong common sense which distinguished the other Spanish mystics, St Theresa, Luis de Leon or Raimon Lull. This quality is nowhere better exemplified than in his letters to Gaspar Baertz (Barzaeus), the Flemish Jesuit whom he sent to Hormuz, or in his suggestions for the establishment of a Portuguese staple in Japan. Supreme as an organizer, he seems also to have had a singularly attractive personality, which won him the friendship even of the pirates and bravos with whom he was forced to consort on his voyages. Modern critics of his work note that he made no attempt to understand the oriental religions which he attacked, and censure him for invoking the aid of the Inquisition and sanctioning persecution of the Nestorians in Malabar. He strove, with a success disastrous to the Portuguese empire, to convert the government in Goa into a proselytizing agency. Throughout his life he remained in close touch with Ignatius of Loyola, who is said to have selected Xavier as his own successor at the head of the Society of Jesus. Within a few weeks of Xavier's death, indeed, Ignatius sent letters recalling him to Europe with that end in view.

BIBLIOGRAPHY.—Many of the authorities on which the biographies of Xavier have been based are untrustworthy, notably the *Peregrinaçam* of F. M. Pinto (*q.v.*), which minutely describes certain incidents of his life in the Far East (especially in Japan and Malacca). Xavier's extant letters, supplemented by a few other 16th-century documents, outweigh all other evidence. It is perhaps noteworthy that Xavier himself never mentions Pinto; but the omission may be explained by the numerous gaps in his correspondence. A critical text of the letters, with notes, bibliography and a life in Spanish, will be found in *Monumenta Xaveriana ex Autographis vel ex Antiquioribus Exemplis collecta*, vol. i. (Madrid, 1899–1900), included in *Monumenta historica Societatis Jesu*. For translations, *The Life and Letters of St Francis Xavier*, by H. Coleridge, S.J. (2 vols., London, 1872), is useful, though the historical commentary has little value. There are numerous older and uncritical biographies by members of the Society; best and earliest are *De vita Francisca Xaverii . . . libri sex*, by O. Torsellino (Tursellinus) (Antwerp, 1596; English by T. F., *The Admirable Life of St Francis Xavier*, Paris, 1632); and *Historia da Vida do Padre Francisco de Xavier*, &c., by João Lucena (Lisbon, 1600). Later works by the Jesuits Bartoli, Maffei, de Sousa, Poussines, Menchacha, Léon Pagès and others owe much to Torsellino and Lucena, but also incorporate many traditions which can no longer be verified. *St François de Xavier, sa vie et ses lettres*, by J. M. Cros, S.J. (2 vols., Toulouse, 1900), embodies the results of long research. *The Missionary Life of St Francis Xavier*, by the Rev. H. Venn, prebendary of St Paul's cathedral, London (London, 1862), is polemical, but contains an interesting map of Xavier's journeys. For a non-partisan account of Xavier's work in the East, see K. G. Jayne, *Vasco da Gama and his Successors*, chapters 25–32 (London, 1910); and Otis Cary, *A History of Christianity in Japan* (2 vols., London, 1909). (K. G. J.)

XENIA, a city and the county-seat of Greene county, Ohio, U.S.A., in the township of Xenia, about 3 m. E. of the Little Miami river, and about 55 m. S.W. of Columbus and about 65 m. N.E. of Cincinnati. Pop. (1900) 8696, of whom 410 were foreign-born; (1910 census) 8706. Xenia is served by the Cincinnati, Hamilton & Dayton, and the Pittsburg, Cincinnati, Chicago & St Louis (Pennsylvania System) railways, and by interurban electric lines to Springfield and Dayton. It is the seat of the Ohio Soldiers' and Sailors' Orphans' Home and of the Xenia Theological Seminary (United Presbyterian; founded in 1794 at Service, Pa., and united in 1874 with the Theological Seminary of the North-West, founded in 1839 at Oxford, Ohio). About 3 m. N.E., at Wilberforce, is Wilberforce University (co-educational; opened in 1856 and reorganized in 1863), conducted by the African Methodist Episcopal Church. The public buildings of Xenia include a public library, the county court-house and the municipal building. Xenia is situated in a fine farming and stock-raising region, and among its manufactures are cordage and twine, boots and shoes, carriages and machinery. The township was first settled about 1797. Xenia was laid out as a village in 1803, was incorporated as a town in 1808 and was chartered as a city in 1870.

XENOCRATES, of Chalcedon, Greek philosopher, scholarch or rector of the Academy from 339 to 314 B.C., was born in 396. Removing to Athens in early youth, he became the pupil of the Socratic Aeschines, but presently joined himself to Plato, whom he attended to Sicily in 361. Upon his master's death

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[1] See R. S. Whiteway, *Rise of the Portuguese Power in India* (London, 1898), appendix A. The question is complicated by the fact that the *Sixth Decade* of Diogo do Couto, the best contemporary historian of these events, was suppressed by the censor in its original form, and the extant version was revised by an ecclesiastical editor.

(347 B.C.), in company with Aristotle he paid a visit to Hermias at Atarneus. In 339, Aristotle being then in Macedonia, Xenocrates succeeded Speusippus in the presidency of the school, defeating his competitors Menedemus and Heracleides by a few votes. On three occasions he was member of an Athenian legation, once to Philip, twice to Antipater. Soon after the death of Demosthenes in 322, resenting the Macedonian influence then dominant at Athens, Xenocrates declined the citizenship offered to him at the instance of Phocion, and, being unable to pay the tax levied upon resident aliens, was, it is said, sold, or on the point of being sold, into slavery. He died in 314, and was succeeded as scholarch by Polemon, whom he had reclaimed from a life of profligacy. Besides Polemon, the statesman Phocion, Chaeron, tyrant of Pellene, the Academic Crantor, the Stoic Zeno and Epicurus are alleged to have frequented his lectures.

Xenocrates's earnestness and strength of character won for him universal respect, and stories were remembered in proof of his purity, integrity and benevolence. Wanting in quickness of apprehension and in native grace, he made up for these deficiencies by a conscientious love of truth and an untiring industry. Less original than Speusippus, he adhered more closely to the letter of Platonic doctrine, and is accounted the typical representative of the Old Academy. In his writings, which were numerous, he seems to have covered nearly the whole of the Academic programme; but metaphysics and ethics were the subjects which principally engaged his thoughts. He is said to have invented, or at least to have emphasized, the tripartition of philosophy under the heads of physic, dialectic and ethic.

In his ontology Xenocrates built upon Plato's foundations: that is to say, with Plato he postulated ideas or numbers to be the causes of nature's organic products, and derived these ideas or numbers from unity (which is active) and plurality (which is passive). But he put upon this fundamental dogma a new interpretation. According to Plato, existence is mind pluralized: mind as a unity, *i.e.* universal mind, apprehends its own plurality as eternal, immutable, intelligible ideas; and mind as a plurality, *i.e.* particular mind, perceives its own plurality as transitory, mutable, sensible things. The idea, inasmuch as it is a law of universal mind, which in particular minds produces aggregates of sensations called things, is a "determinant" (*πέρας ἔχον*), and as such is styled "quantity" (*ποσόν*) and perhaps "number" (*ἀριθμός*); but the ideal numbers are distinct from arithmetical numbers. Xenocrates, however, failing, as it would seem, to grasp the idealism which was the metaphysical foundation of Plato's theory of natural kinds, took for his principles arithmetical unity and plurality, and accordingly identified ideal numbers with arithmetical numbers. In thus reverting to the crudities of certain Pythagoreans, he laid himself open to the criticisms of Aristotle, who, in his *Metaphysics*, recognizing amongst contemporary Platonists three principal groups—(1) those who, like Plato, distinguished mathematical and ideal numbers; (2) those who, like Xenocrates, identified them; and (3) those who, like Speusippus, postulated mathematical numbers only—has much to say against the Xenocratean interpretation of the theory, and in particular points out that, if the ideas are numbers made up of arithmetical units, they not only cease to be principles, but also become subject to arithmetical operations. Xenocrates's theory of inorganic nature was substantially identical with the theory of the elements which is propounded in the *Timaeus*, 53 C seq. Nevertheless, holding that every dimension has a principle of its own, he rejected the derivation of the elemental solids—pyramid, octahedron, icosahedron and cube—from triangular surfaces, and in so far approximated to atomism. Moreover, to the tetrad of simple elements—viz. fire, air, water, earth—he added the *πέμπτη οὐσία*, ether.

His cosmology, which is drawn almost entirely from the *Timaeus*, and, as he intimated, is not to be regarded as a cosmogony, should be studied in connexion with his psychology. Soul is a self-moving number, derived from the two fundamental principles, unity (*ἕν*) and plurality (*δυὰς ἀόριστος*), whence it obtains its powers of rest and motion. It is incorporeal, and may exist apart from body. The irrational soul, as well as the rational soul, is immortal. The universe, the heavenly bodies, man, animals, and presumably plants, are each of them endowed with a soul, which is more or less perfect according to the position which it occupies in the descending scale of creation. With this Platonic philosopheme Xenocrates combines the current theology, identifying the universe and the heavenly bodies with the greater gods, and reserving a place between them and mortals for the lesser divinities.

If the extant authorities are to be trusted, Xenocrates recognised three grades of cognition, each appropriated to a region of its own—viz. knowledge, opinion and sensation, having for their respective objects supra-celestials or ideas, celestials or stars, and infra-celestials or things. Even here the mythological tendency displays itself—*νοητά*, *δοξαστά* and *αἰσθητά* being severally committed to Atropos, Lachesis and Clotho. Of Xenocrates's logic we know only that with Plato he distinguished *τὸ καθ᾽ αὑτό* and *τὸ πρός τι*, rejecting the Aristotelian list of ten categories as a superfluity.

Valuing philosophy chiefly for its influence upon conduct, Xenocrates bestowed especial attention upon ethics. The catalogue of his works shows that he had written largely upon this subject; but the indications of doctrine which have survived are scanty, and may be summed up in a few sentences. Things are goods, ills or neutrals. Goods are of three sorts—mental, bodily, external; but of all goods virtue is incomparably the greatest. Happiness consists in the possession of virtue, and consequently is independent of personal and extraneous advantages. The virtuous man is pure, not in act only, but also in heart. To the attainment of virtue the best help is philosophy; for the philosopher does of his own accord what others do under the compulsion of law. Speculative wisdom and practical wisdom are to be distinguished. Meagre as these statements are, they suffice to show that in ethics, as elsewhere, Xenocrates worked upon Platonic lines.

Xenocrates was not in any sense a great thinker. His metaphysic was a travesty rather than a reproduction of that of his master. His ethic had little which was distinctive. But his austere life and commanding personality made him an effective teacher, and his influence, kept alive by his pupils Polemon and Crates, ceased only when Arcesilaus, the founder of the so-called Second Academy, gave a new direction to the studies of the school.

See D. Van de Wynpersse, *De Xenocrate Chalcedonio* (Leiden, 1822); C. A. Brandis, *Gesch. d. griechisch-römischen Philosophie* (Berlin, 1853), ii. 2, 1; E. Zeller, *Philosophie d. Griechen* (Leipzig, 1875), ii. 1; F. W. A. Mullach, *Fragmenta Philosophorum Graecorum* (Paris, 1881), iii. (H. JA.)

XENOPHANES of Colophon, the reputed founder of the Eleatic school of philosophy, is supposed to have been born in the third or fourth decade of the 6th century B.C. An exile from his Ionian home, he resided for a time in Sicily, at Zancle and at Catana, and afterwards established himself in southern Italy, at Elea, a Phocaean colony founded in the sixty-first Olympiad (536–533). In one of the extant fragments he speaks of himself as having begun his wanderings sixty-seven years before, when he was twenty-five years of age, so that he was not less than ninety-two when he died. His teaching found expression in poems, which he recited rhapsodically in the course of his travels. In the more considerable of the elegiac fragments which have survived, he ridicules the doctrine of the migration of souls (xviii.), asserts the claims of wisdom against the prevalent athleticism, which seemed to him to conduce neither to the good government of states nor to their material prosperity (xix), reprobates the introduction of Lydian luxury into Colophon (xx.), and recommends the reasonable enjoyment of social pleasures (xxi.). Of the epic fragments, the more important are those in which he attacks the "anthropomorphic and anthropopathic polytheism" of his contemporaries. According to Aristotle, "the first of Eleatic unitarians was not careful to say whether the unity which he postulated was finite or infinite, but, contemplating the whole firmament, declared that the One is God." Whether Xenophanes was a monotheist, whose assertion of the unity of God *suggested* to Parmenides the doctrine of the unity of Being, or a pantheist, whose assertion of the unity of God was also a declaration of the unity of Being, so that he *anticipated* Parmenides—in other words, whether Xenophanes's teaching was purely theological or had also a philosophical significance—is a question about which authorities have differed and will probably continue to differ. The silence of the extant fragments, which have not one word about the unity of Being, favours the one view; the voice of antiquity, which proclaims Xenophanes the founder of Eleaticism, has been thought to favour the other.

Of Xenophanes's utterances about (1) God, (2) the world, (3) knowledge, the following survive: (1) "There is one God, greatest among gods and men, neither in shape nor in thought like unto mortals. . . . He is all sight, all mind, all ear (*i.e.* not a composite organism). . . . Without an effort ruleth he all things by thought. . . . He abideth ever in the same place motionless, and it befitteth him not to wander hither and thither. . . . Yet men imagine gods to be born, and to have raiment and voice and body, like themselves. . . . Even so the gods of the Ethiopians are swarthy and flat-nosed, the gods of the Thracians are fair-haired and blue-eyed. . . . Even so Homer and Hesiod attributed to the gods all that is a shame and a reproach among men—theft, adultery, deceit and other lawless acts. . . . Even so oxen, lions and horses, if they had hands wherewith to grave images, would fashion gods after their own shapes and make them bodies like to their own. (2) From earth all things are and to earth all things return. . . . From earth and water come all of us. . . . The sea is the well whence water springeth. . . . Here at our feet is the end of the earth where it reacheth unto air, but, below, its foundations are without end. . . . The rainbow, which men call Iris, is a cloud that is purple and red and yellow. (3) No man hath certainly known, nor shall certainly know, that which he saith about the gods and about all things; for, be that which he saith ever so perfect, yet doth he not know it; all things are matters of opinion. . . . That which I say is opinion like unto truth. . . . The gods did not reveal all things to mortals in the beginning; long is the search ere man findeth that which is better."

There is very little secondary evidence to record. "The Eleatic school," says the Stranger in Plato's *Sophist*, 242 D, "beginning with Xenophanes, and even earlier, starts from the principle of the unity of all things." Aristotle, in a passage already cited, *Metaphysics*, A5, speaks of Xenophanes as the first of the Eleatic unitarians, adding that his monotheism was reached through the contemplation of the *οὐρανός*. Theophrastus (in Simplicius's *Ad Physica*, 5) sums up Xenophanes's teaching in the propositions, "The All is One and the One is God." Timon (in Sext. Empir. *Pyrrh*. i. 224), ignoring Xenophanes's theology, makes him resolve all things into one and the same unity. The demonstrations of the unity and the attributes of God, with which the treatise *De Melisso, Xenophane et Gorgia* (now no longer ascribed to Aristotle or Theophrastus) accredits Xenophanes, are plainly framed on the model of Eleatic proofs of the unity and the attributes of the Ent, and must therefore be set aside. The epitomators of a later time add nothing to the testimonies already enumerated.

Thus, whereas in his writings, so far as they are known to us, Xenophanes appears as a theologian protesting against an anthropomorphic polytheism, the ancients seem to have regarded him as a philosopher asserting the unity of Being. How are we to understand these conflicting, though not irreconcilable, testimonies? According to Zeller, the discrepancy is only apparent. The Greek gods being the powers of nature personified, pantheism lay nearer to hand than monotheism. Xenophanes was, then, a pantheist. Accordingly his assertion of the unity of God was at the same time a declaration of the unity of Being, and in virtue of this declaration he is entitled to rank as the founder of Eleaticism, inasmuch as the philosophy of Parmenides was his forerunner's pantheism divested of its theistic element. This reconciliation of the internal and the external evidence, countenanced as it is by Theophrastus, one of the best informed of the ancient historians, and approved by Zeller, one of the most learned of the modern critics, is more than plausible; but there is something to be said on the contrary part. In the first place, it may be doubted whether to a Greek of the 6th century pantheism was nearer than monotheism. Secondly, the external evidence does not bear examination. The Platonic testimony, if it proved anything, would prove too much, namely, that the doctrine of the unity of Being originated, not with Xenophanes, but before him; and, in fact, the passage from the *Sophist* no more proves that Plato attributed to Xenophanes the philosophy of Parmenides than *Theaetetus*, 160 D, proves that Plato attributed to Homer the philosophy of Heraclitus. Again, Aristotle's description of Xenophanes as the first of the Eleatic unitarians does not necessarily imply that the unity asserted by Xenophanes was the unity asserted by Parmenides; the phrase, "contemplating the firmament, he declared that the One is God," leaves it doubtful whether Aristotle attributed to Xenophanes any philosophical theory whatever; and the epithet *ἀγροικότεροι* discourages the belief that Aristotle regarded Xenophanes as the author of a new and important departure. Thirdly, when Xenophanes himself says that theories about gods and about things are not knowledge, that his own utterances are not verities but verisimilitudes, and that, so far from learning things by revelation, man must laboriously seek a better opinion, he plainly renounces the "disinterested pursuit of truth." If then he was indifferent to the problem, he can hardly be credited with the Eleatic solution. In the judgment of the present writer, Xenophanes was neither a philosopher nor a sceptic. He was not a philosopher, for he despaired of knowledge. He was not a sceptic, if by "sceptic" is meant the misologist whose despair of knowledge is the consequence of disappointed endeavour, for he had never hoped. Rather he was a theologian who arrived at his theory of the unity of the Supreme Being by criticism of the contemporary mythology. But, while he thus stood aloof from philosophy, Xenophanes influenced its development in two ways: first, his theological henism led the way to the philosophical henism of Parmenides and Zeno; secondly, his assertion that so-called knowledge was in reality no more than opinion taught his successors to distinguish knowledge and opinion, and to assign to each a separate province.

Apart from the old controversy about Xenophanes's relations to philosophy, doubts have recently arisen about his theological position. In fragments i., xiv., xvi., xxi., &c., he recognises, thinks Freudenthal, a plurality of deities; whence it is inferred that, besides the One God, most high, perfect, eternal, who, as immanent intelligent cause, unifies the plurality of things, there were also lesser divinities, who govern portions of the universe, being themselves eternal parts of the one all-embracing Godhead. Whilst it can hardly be allowed that Xenophanes, so far from denying, actually affirms a plurality of gods, it must be conceded to Freudenthal that Xenophanes's polemic was directed against the anthropomorphic tendencies and the mythological details of the contemporary polytheism rather than against the polytheistic principle, and that, apart from the treatise *De Melisso Xenophane et Gorgia*, now generally discredited, there is no direct evidence to prove him a consistent monotheist. The wisdom of Xenophanes, like the wisdom of the Hebrew Preacher, showed itself, not in a theory of the universe, but in a sorrowful recognition of the nothingness of things and the futility of endeavour. His theism was a declaration not so much of the greatness of God as rather of the littleness of man. His cosmology was an assertion not so much of the immutability of the One as rather of the mutability of the Many. Like Socrates, he was not a philosopher, and did not pretend to be one; but, as the reasoned scepticism of Socrates cleared the way for the philosophy of Plato, so did Xenophanes's "abnormis sapientia" for the philosophy of Parmenides.

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(H. JA.)

XENOPHON, Greek historian and philosophical essayist, the son of Gryllus, was born at Athens about 430 B.C.[1] He belonged to an equestrian family of the deme of Erchia. It may be inferred from passages in the *Hellenica* that he fought at Arginusae (406), and that he was present at the return of Alcibiades (408), the trial of the Generals and the overthrow of the Thirty. Early in life he came under the influence of Socrates, but an active life had more attraction for him. In 401, being invited by his friend Proxenus to join the expedition of the younger Cyrus against his brother, Artaxerxes II. of Persia, he at once accepted the offer. It held out the prospect of riches and honour, while he was little likely to find favour in democratic Athens, where the knights were regarded with suspicion as having supported the Thirty. At the suggestion of Socrates, Xenophon went to Delphi to consult the oracle; but his mind was already made up, and he at once proceeded to Sardis, the place of rendezvous. Of the expedition itself he has given a full and detailed account in his *Anabasis*, or the "Up-Country March." After the battle of Cunaxa (401), in which Cyrus lost his life, the officers in command of the Greeks were treacherously murdered by the Persian satrap Tissaphernes, with whom they were negotiating an armistice with a view to a safe return. The army was now in the heart of an unknown country, more than a thousand miles from home and in the presence of a troublesome enemy. It was decided to march northwards up the Tigris valley and make for the shores of the Euxine, on which there were several Greek colonies. Xenophon became the leading spirit of the army; he was elected an officer, and he it was who mainly directed the retreat. Part of the way lay through the wilds of Kurdistan, where they had to encounter the harassing guerrilla attacks of savage mountain tribes, and part through the highlands of Armenia and Georgia. After a five months' march they reached Trapezus [Trebizond] on the Euxine (February 400), where a tendency to demoralization began to show itself, and even Xenophon almost lost his control over the soldiery. At Cotyora he aspired to found a new colony; but the idea, not being unanimously accepted, was abandoned, and ultimately Xenophon with his Greeks arrived at Chrysopolis [Scutari] on the Bosporus, opposite Byzantium. After a brief period of service under a Thracian chief, Seuthes, they were finally incorporated in a Lacedaemonian army which had crossed over into Asia to wage war against the Persian satraps Tissaphernes and Pharnabazus. Xenophon, who accompanied them, captured a wealthy Persian nobleman, with his family, near Pergamum, and the ransom paid for his recovery secured Xenophon a competency for life.

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[1] As the description of the Ionian campaign of Thrasyllus in 410 (*Hellenica*, i. 2) is clearly derived from Xenophon's own reminiscences, he must have taken part in this campaign, and cannot therefore have been less than twenty years of age at the time.

On his return to Greece Xenophon served under Agesilaus, king of Sparta, at that time the chief power in the Greek world. With his native Athens and its general policy and institutions he was not in sympathy. At Coroneia (394) he fought with the Spartans against the Athenians and Thebans, for which his fellow-citizens decreed his banishment. The Spartans provided a home for him at Scillus in Elis, about two miles from Olympia; there he settled down to indulge his tastes for sport and literature. After Sparta's crushing defeat at Leuctra (371), Xenophon was driven from his home by the people of Elis. Meantime Sparta and Athens had become allies, and the Athenians repealed the decree which had condemned him to exile. There is, however, no evidence that he ever returned to his native city. According to Diogenes Laërtius, he made his home at Corinth. The year of his death is not known; all that can be said is that it was later than 355, the date of his work on the *Revenues of Athens*.

The *Anabasis* (composed at Scillus between 379 and 371) is a work of singular interest, and is brightly and pleasantly written. Xenophon, like Caesar, tells the story in the third person, and there is a straightforward manliness about the style, with a distinct flavour of a cheerful lightheartedness, which at once enlists our sympathies. His description of places and of relative distances is very minute and painstaking. The researches of modern travellers attest his general accuracy. It is expressly stated by Plutarch and Diogenes Laërtius that the *Anabasis* was the work of Xenophon, and the evidence from style is conclusive. The allusion (*Hellenica*, iii. 1, 2) to Themistogenes of Syracuse as the author shows that Xenophon published it under an assumed name.

The *Cyropaedia*, a political and philosophical romance, which describes the boyhood and training of Cyrus, hardly answers to its name, being for the most part an account of the beginnings of the Persian empire and of the victorious career of Cyrus its founder. The *Cyropaedia* contains in fact the author's own ideas of training and education, as derived conjointly from the teachings of Socrates and his favourite Spartan institutions. It was said to have been written in opposition to the *Republic* of Plato. A distinct moral purpose, to which literal truth is sacrificed, runs through the work. For instance, Cyrus is represented as dying peacefully in his bed, whereas, according to Herodotus, he fell in a campaign against the Massagetae.

The *Hellenica* written at Corinth, after 362, is the only contemporary account of the period covered by it (411–362) that has come down to us. It consists of two distinct parts; books i. and ii., which are intended to form a continuation of the work of Thucydides, and bring the history down to the fall of the Thirty, and books iii.–vii., the *Hellenica* proper, which deal with the period from 401 to 362, and give the history of the Spartan and Theban hegemonies, down to the death of Epaminondas. There is, however, no ground for the view that these two parts were written and published as separate works. There is probably no justification for the charge of deliberate falsification. It must be admitted, however, that he had strong political prejudices, and that these prejudices have influenced his narrative. He was a partisan of the reactionary movement which triumphed after the fall of Athens; Sparta is his ideal, and Agesilaus his hero. At the same time, he was a believer in a divine overruling providence. He is compelled, therefore, to see in the fall of Sparta the punishment inflicted by heaven on the treacherous policy which had prompted the seizure of the Cadmea and the raid of Sphodrias. Hardly less serious defects than his political bias are his omissions, his want of the sense of proportion and his failure to grasp the meaning of historical criticism. The most that can be said in his favour is that as a witness he is at once honest and well-informed. For this period of Greek history he is, at any rate, an indispensable witness.

The *Memorabilia*, or "Recollections of Socrates," in four books, was written to defend Socrates against the charges of impiety and corrupting the youth, repeated after his death by the sophist Polycrates. The work is not a literary masterpiece; it lacks coherence and unity, and the picture it gives of Socrates fails to do him justice. Still, as far as it goes, it no doubt faithfully describes the philosopher's manner of life and style of conversation. It was the moral and practical side of Socrates's teaching which most interested Xenophon; into his abstruse metaphysical speculations he seems to have made no attempt to enter: for these indeed he had neither taste nor genius. Moving within a limited range of ideas, he doubtless gives us "considerably less than the real Socrates, while Plato gives us something more." It is probable that the work in its presen [illegible] ment.

Xenophon has left several minor works, some of which are very interesting and give an insight into the home life of the Greeks.

The *Oeconomics* (to some extent a continuation of the *Memorabilia*, and sometimes regarded as the fifth book of the same) deals with the management of the house and of the farm, and presents a pleasant and amusing picture of the Greek wife and of her home duties. There are some good practical remarks on matrimony and on the respective duties of husband and wife. The treatise, which is in the form of a dialogue between Socrates and a certain Ischomachus, was translated into Latin by Cicero.

In the essays on horsemanship (*Hippikē*) and hunting (*Cynegeticus*). Xenophon deals with matters of which he had a thorough practical knowledge. In the first he gives rules how to choose a horse, and then tells how it is to be groomed and ridden and generally managed. The *Cynegeticus* deals chiefly with the hare, though the author speaks also of boar-hunting and describes the hounds, tells how they are to be bred and trained, and gives specimens of suitable names for them. On all this he writes with the zest of an enthusiastic sportsman, and he observes that those nations whose upper classes have a taste for field-sports will be most likely to be successful in war. Both treatises may still be read with interest by the modern reader.

The *Hipparchicus* explains the duties of a cavalry officer; it is not, according to our ideas, a very scientific treatise, showing that the art of war was but very imperfectly developed and that the military operations of the Greeks were on a somewhat petty scale. He dwells at some length on the moral qualities which go to the making of a good cavalry officer, and hints very plainly that there must be strict attention to religious duties.

The *Agesilaus* is a eulogy of the Spartan king, who had two special merits in Xenophon's eyes: he was a rigid disciplinarian, and he was particularly attentive to all religious observances. We have a summary of his virtues rather than a good and striking picture of the man himself.

The *Hiero* works out the line of thought indicated in the story of the Sword of Damocles. It is a protest against the notion that the "tyrant" is a man to be envied, as having more abundant means of happiness than a private person. This is one of the most pleasing of his minor works; it is cast into the form of a dialogue between Hiero, tyrant of Syracuse, and the lyric poet Simonides.

The *Symposium*, or "Banquet," to some extent the complement of the *Memorabilia*, is a brilliant little dialogue in which Socrates is the prominent figure. He is represented as "improving the occasion," which is that of a lively Athenian supper-party, at which there is much drinking, with flute-playing, and a dancing-girl from Syracuse, who amuses the guests with the feats of a professional conjuror. Socrates's table-talk runs through a variety of topics, and winds up with a philosophical disquisition on the superiority of true heavenly love to its earthly or sensual counterfeit, and with an earnest exhortation to one of the party, who had just won a victory in the public games, to lead a noble life and do his duty to his country.

There are also two short essays, attributed to him, on the political constitution of Sparta and Athens, written with a decided bias in favour of the former, which he praises without attempting to criticize. Sparta seems to have presented to Xenophon the best conceivable mixture of monarchy and aristocracy. The second is certainly not by Xenophon, but was probably written by a member of the oligarchical party shortly after the beginning of the Peloponnesian War.

In the essay on the *Revenues of Athens* (written in 355) he offers suggestions for making Athens less dependent on tribute received from its allies. Above all, he would have Athens use its influence for the maintenance of peace in the Greek world and for the settlement of questions by diplomacy, the temple at Delphi being for this purpose an independent centre and supplying a divine sanction.

The *Apology*, Socrates's defence before his judges, is rather a feeble production, and in the general opinion of modern critics is not a genuine work of Xenophon, but belongs to a much later period.

Xenophon was a man of great personal beauty and considerable intellectual gifts; but he was of too practical a nature to take an interest in abstruse philosophical speculation. His dislike of the democracy of Athens induced such lack of patriotism that he even fought on the side of Sparta against his own country. In religious matters he was narrow minded, a believer in the efficacy of sacrifice and in the prophetic art. His plain and simple style, which at times becomes wearisome, was greatly admired and procured him many imitators.

The editions of Xenophon's works, both complete and of separate portions, are very numerous, especially of the *Anabasis*; only a selection can be given here. Editio princeps (1516, incomplete); J. G. Schneider (1790–1849); G. Sauppe (1865–66); L. Dindorf (1875); E. C. Marchant (1900– , in the Clarendon Press *Scriptorum Classicorum Bibliotheca*). ANABASIS: R. Kühner (1852); J. F. Macmichael (1883); F. Vollbrecht (1887); A. Pretor (1888); C. W. Krüger and W. Pökel (1888); W. W. Goodwin and J. W. White (i.–iv., 1894). CYROPAEDIA: G. M. Gorham (1870); L. Breitenbach (1875); A. Goodwin (vi.–viii., 1880); F. Hertlein and W. Nitsche (1886); H. A. Holden (1887–90). HELLENICA: L. Breitenbach (1874–84); R. Büchsenschütz (1880–91); J. I. Manatt (i.-iv., 1888); L. D. Dowdall (i., ii., 1890). MEMORABILIA: P. Frost (1867); A. R. Cluer (1880); R. Kühner (1882); L. Breitenbach (1889); J. Marshall (1890). OECONOMICUS: H. A. Holden (1895); C. Graux and A. Jacob (1886). HIERO: H. A. Holden (1888). AGESILAUS: R. W. Taylor (1880); O. Güthling (1888). RESP. LACEDAEM.: G. Pierleoni (1905). RESP. ATHENIENSIUM: A. Kirchhoff (1874); E. Belot (1880); H. Müller and Strübing (1880). CYNEGETICUS: G. Pierleoni (1902). HIPPIKE: Tommasini (1902). REDITUS ATHEN.: A. Zurborg (1876). SCRIPTA MINORA: L. Dindorf (1888). There is a good English translation of the complete works by H. G. Dakyns (1890–94), and of the *Art of Horsemanship* by M. H. Morgan (U.S.A., 1890). Of general works bearing on the subject may be mentioned: G. Sauppe, *Lexilogus Xenophonteus* (1869); A. Croiset, *X., son caractère et son talent* (1873); Roquette, *De Xenophontis Vita* (1884); I. Hartmann, *Analecta Xenophontea* (1887) and *Analecta Xenophontea Nova* (1889); C. Joël, *Der echte und der Xenophonteische Socrates* (1892); Lange, *X., sein Leben, seine Geistesart und seine Werke* (1900). See also GREECE: *Ancient History*, § "Authorities," and works quoted; J. B. Bury, *Ancient Greek Historians* (1909); Mure's *History of Greek Literature* and Grant's monograph in *Blackwood's Ancient Classics for English Readers* may be read with advantage. Bibliographies in Engelmann-Preuss, *Bibliotheca Scriptorum Classicorum* (i., 1880) and in C. Bursian's *Jahresbericht* (c., 1900) by E. Richter. (E. M. W.; J. H. F.)

XERXES (the Greek form of the Pers. *Khshayārshā*; Old Testament *Ahasverus*, *Akhashverosh*—*i.e.* Ahasuerus (*q.v.*)—with wrong vocalization and substitution of *y* for *v*, instead of *Akhshavarsh*; in Aramaic inscriptions and papyri from Egypt the name is written *Khshai'arsh*), the name of two Persian kings of the Achaemenid dynasty.

1. XERXES I., son of Darius I. and Atossa, the daughter of Cyrus the Great, and therefore appointed successor to his father in preference to his eldest half-brothers, who were born before Darius had become king (Herod. vii. 2 f.). After his accession in October 485 B.C. he suppressed the revolt in Egypt which had broken out in 486, appointed his brother Achaemenes as satrap and "brought Egypt under a much heavier yoke than it had been before" (Herod. vii. 7). His predecessors, especially Darius, had not been successful in their attempts to conciliate the ancient civilizations. This probably was the reason why Xerxes in 484 abolished the "kingdom of Babel" and took away the golden statue of Bel (Marduk, Merodach), the hands of which the legitimate king of Babel had to seize on the first day of each year, and killed the priest who tried to hinder him.[1] Therefore Xerxes does not bear the title of "King of Babel" in the Babylonian documents dated from his reign, but "King of Persia and Media," or simply "King of countries" (*i.e.* of the world). This proceeding led to two rebellions, probably in 484 and 479; in the Babylonian documents occur the names of two ephemeral kings, Shamash-irba and Tarziya, who belong to this time. One of these rebellions was suppressed by Megabyzus, son of Zopyrus, the satrap whom the Babylonians had slain.[2]

Darius had left to his son the task of punishing the Greeks for their interference in the Ionian rebellion and the victory of Marathon. From 483 Xerxes prepared his expedition with great care: a channel was dug through the isthmus of the peninsula of Mount Athos; provisions were stored in the stations on the road through Thrace; two bridges were thrown across the Hellespont. Xerxes concluded an alliance with Carthage, and thus deprived Greece of the support of the powerful monarchs of Syracuse and Agrigentum. Many smaller Greek states, moreover, took the side of the Persians ("Medized"), especially Thessaly, Thebes and Argos. A large fleet and a numerous army were gathered. In the spring of 480 Xerxes set out from Sardis. At first Xerxes was victorious everywhere. The Greek fleet was beaten at Artemisium, Thermopylae stormed, Athens conquered, the Greeks driven back to their last line of defence at the Isthmus of Corinth and in the Bay of Salamis. But Xerxes was induced by the astute message of Themistocles (against the advice of Artemisia of Halicarnassus) to attack the Greek fleet under unfavourable conditions, instead of sending a part of his ships to the Peloponnesus and awaiting the dissolution of the Greek armament.[3] The battle of Salamis (28th of September 480) decided the war (see SALAMIS). Having lost his communication by sea with Asia, Xerxes was forced to retire to Sardis; the army which he left in Greece under Mardonius was in 479 beaten at Plataea (*q.v.*). The defeat of the Persians at Mycale roused the Greek cities of Asia.

Of the later years of Xerxes little is known. He sent out Sataspes to attempt the circumnavigation of Africa (Herod. iv. 143), but the victory of the Greeks threw the empire into a state of languid torpor, from which it could not rise again. The king himself became involved in intrigues of the harem (cf. Herod. ix. 108 ff.—compare the late Jewish novel of *Esther*, in which a remembrance of the true character of the king is retained) and was much dependent upon courtiers and eunuchs. He left inscriptions at Persepolis, where he added a new palace to that of Darius, at Van in Armenia, and on Mount Elvend near Ecbatana; in these texts he merely copies the words of his father. In 465 he was murdered by his vizier Artabanus (*q.v.*), who raised Artaxerxes I. to the throne.

2. Xerxes II., son and successor of Artaxerxes I., was assassinated in 424 after a reign of forty-five days by his brother Secydianus or Sogdianus, who in his turn was murdered by Darius II. (*q.v.*).

See Ctesias, *Pers.* 44; Diod. xii., 64, 71, and the chronographers; neither of the two ephemeral kings is mentioned in the canon of Ptolemy nor in the dates of Babylonian contracts of this time.

The name XERXES was also borne by a king of Armenia, killed about 212 B.C. by Antiochus the Great (Polyb. viii. 25; Johannes Antiochenus, p. 53; his name occurs on copper coins); and by a son of Mithradates the Great of Pontus (Appian, *Mithr.* 108, 117). (ED. M.)

XIPHILINUS, JOANNES, epitomator of Dio Cassius, lived at Constantinople during the latter half of the 11th century A.D. He was a monk and the nephew of the patriarch of Constantinople of the same name, a well-known preacher (Migne, *Patrologia Graeca*, cxx.). The epitome (ἐκλογαί) of Dio was prepared by order of Michael Parapinaces (1071–1078), but is unfortunately incomplete. It comprises books 36–80, the period included being from the times of Pompey and Caesar down to Alexander Severus. In book 70 the reign of Antoninus Pius and the early years of Marcus Aurelius appear to have been missing in his copy, while in books 78 and 79 a mutilated original must have been used. Xiphilinus divided the work into sections, each containing the life of an emperor. He omitted the name of the consuls and sometimes altered or emended the original. The epitome is valuable as preserving the chief incidents of the period for which the authority of Dio is wanting.

See H. Reimar's edition of Dio Cassius, ii.; J. Melber's Dio in Teubner series; C. Wachsmuth, *Einleitung in das Studium der alten Geschichte* (1895); W. Christ, *Geschichte der griechischen Litteratur* (1898).

X-RAY TREATMENT. The X rays (see RÖNTGEN RAYS) are now used extensively in medical work for purposes of treatment. They have been found to be valuable in many forms of skin disease, more particularly in those of a chronic character. They have a favourable influence upon glandular tumours, as for example in enlargements of the lymphatic glands, of the spleen and of the thyroid gland. They give useful palliative effects in certain forms of malignant disease, although it is not yet certain that any permanent cures of cancerous conditions have been obtained by their use. In the disease known as rodent ulcer, which is a process of destructive ulceration, and to that extent presents features allied to cancer, there is no doubt of the efficacy of X-ray treatment for bringing about a complete cure in the majority of cases, provided that the disease has not advanced too deeply into the tissues.

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[1] Herod. i. 183, by Ctesias changed into a plundering of the tomb of Belitanas or Belus: cf. Aelian, *Var. Hist.* 13, 3; Aristobulus *ap.* Arrian vii. 17, 2, and Strabo xvi. p. 738.

[2] Ctesias, *Pers.* 22; his legendary history is transferred by Herodotus, iii. 150 ff., to the former rebellion against Darius.

[3] See G. B. Grundy, *Great Persian War* (1901), and in criticism W. W. Tarn, "The Fleet of Xerxes," in *Journal of Hellenic Studies* (1908), 202–34; also Macan's notes on Herod. iv.–vi. (1895), and authorities for PLATAEA, SALAMIS.

The idea of using X rays in the treatment of disease arose from the recognition of the injurious effects which followed the prolonged application of the rays for diagnostic purposes It fell to the lot of many early workers with X rays to notice the production of an inflammation of the skin, or a falling out of the hair over parts which had been subjected to X rays, and Leopold Freund, of Vienna, has stated that his first attempts to utilize X rays in treatment were made in 1896 to cure a hairy mole and were prompted by what he had read of such occurrences. A definite action of the rays upon the skin having been observed, their employment in the treatment of skin diseases followed as a natural corollary. Amongst the earliest investigators of the possible therapeutic effects of X rays the names of Schiff, Freund, Kienböck, Holtzknecht, Sjögren and Stenbeck may be mentioned. In Great Britain Sir Malcolm Morris, E. Dore and J. H. Sequeira were amongst the earliest investigators.

For operating successfully with an agent capable of producing decidedly harmful effects when given in large doses it is necessary to have some method of measurement, and the need for this quickly became apparent when X rays were used for treatment. The results of X-ray photography had already shown that the tubes employed were capable of emitting radiations of very varying powers of penetration, and that the tubes were by no means constant in this respect; and the question whether highly penetrating rays or rays of feeble penetration were to be preferred for therapeutic use became the subject of much discussion. It is now recognized that the rays which act upon the tissues are those which are absorbed by the tissues, and consequently the softer or less penetrating rays are now regarded as those to be used in treatment. So too the problem of measuring the quantity of rays emitted by a tube during a given time began to call for a solution, if that were in any way possible. In 1901 Benoist designed an apparatus by which the quality of the rays emitted by a tube at any moment could be accurately determined, and in 1902 Holtzknecht brought out the first quantitative device. It was called a chromoradiometer, and it enabled the dose administered to a patient to be observed, and recorded for future guidance. Holtzknecht also drew up a scale of units by means of which the indications of his apparatus could be interpreted. The units of Holtzknecht are still used to express the dosage of X rays, though his apparatus has been superseded. Holtzknecht's method of measurement consisted in observing the change of colour in certain pastilles when exposed to X rays, and his apparatus consisted of a scale of tints, and a number of pastilles of a yellow tint which acquired a green colour during exposure. The composition of these was kept a secret, but analysis revealed in them the presence of potassium sulphate combined with celluloid or gelatine. The pastilles were laid upon the surface under treatment, and their change of colour was compared at intervals with the scale of standard tints.

It was next thought that under suitable conditions the measurement of the current passing through the X-ray tube might serve as a guide to the quantity of X rays emitted by the tube, but, although this is the case to a certain extent, the method of quantity measurement which is now employed almost universally in X-ray treatment is that devised by Sabouraud and Noiré, and used with signal success by them in an enormous number of cases of ringworm, in which disease measurement of dose is of the most critical importance, for the following reason. The cure of ringworm by X rays requires that all the hair of the affected region shall be caused to fall out, but, nevertheless, it is necessary for obvious reasons that the hair should grow again after the disease has disappeared. Now if the dose of X rays be insufficient the hair does not come out and no cure results, while if the dose be too great the hair comes out but does not grow again; and the margin of safety is quite a narrow one. The method of Sabouraud and Noiré which has proved itself reliable for such critical measurements of dosa[illegible]r ringworm treatment, has to-day the ur[illegible]ll X-ray workers for other forms of X-ray treatment, although the use of their pastilles has certain disadvantages.

Sabouraud's pastilles consist of small disks of platinocyanide of barium. This chemical compound has a bright yellow-green colour when freshly prepared, and changes through gradations of yellow to a brown colour when exposed to X rays. The pastilles are supplied in a book with which a permanent tint of colour is supplied, to indicate the colour change in the pastille which corresponds with a quantity of X rays equal to the maximum dose which the healthy skin will stand without inflammatory consequences. This is often spoken of as a "pastille dose." As the amount of irradiation needed to produce the change of colour is considerable, the salt is fixed, during the treatment, at a point half-way between the source of the rays and the skin surface under treatment. During an exposure the chemical salt, in the form of a small disk of the material on cardboard, is adjusted in the required position by means of a pastille holder, and it is examined at intervals during the course of the exposure, until it has reached the required tint. When in the holder the pastille must be protected from light, and should have a piece of metal as a backing, if its indications are to be accurate.

In X-ray treatment some protection of the surrounding healthy parts is usually necessary. With this object various methods of shielding have been devised, either by coverings of the patient by impermeable materials, or by enclosing the tube in an impermeable box. Both methods are used, but tube-boxes are the most convenient, and most instrument makers now supply these boxes with suitable windows or openings of different sizes for the passage of the pencil of rays which is to fall upon the part under treatment.

The effect of the rays on healthy tissues is in the main a destructive one, but some of the cells of the tissues are more sensitive to the rays than are others; and this permits of a selective effect being obtained, with the destruction of some cells and not of the whole tissue. Young cells, and actively growing cells, are the most susceptible, and for this reason it is possible to influence the glands of the skin and the papillae of the hairs with a dose which will not destroy the skin itself. The art of successful working with X rays is based upon a careful adjustment of the dose so as to secure a selective destruction of the morbid elements, and to avoid wholesale damage to the part treated. The effects of excessive doses of X rays is to produce an inflammation which may result in painful sores which obstinately refuse to heal for many weeks or months. A quantity up to double that of the usual maximum or pastille dose may be employed in urgent cases without risk of any serious inflammation, but anything over this is to be avoided most carefully. In the treatment of ringworm the exact pastille dose must not be exceeded, for after a dose of about one and a half pastilles the fall of the hair is likely to be followed by permanent baldness.

In X-ray treatment it is customary to make use of moderate currents, and to bring the X-ray tube in its tube-holder and box into position so that the pencil of rays may fall upon the part to be treated. The distance of the skin surface from the centre of the tube must be known, and the pastille arranged in place accordingly. Fifteen centimetres is a usual distance, and at this distance a tube working with a current of a milliampere should give the full therapeutic dose or "pastille dose" in about 15 minutes. In general X-ray treatment it is quite usual at the present time to proceed by the method of full doses at rather long intervals. From the experience obtained by Sabouraud in numerous cases of ringworm it has been found that a full dose must not be repeated until a month has elapsed. So too in the treatment of rodent ulcer full doses at long intervals are now thought better than smaller doses repeated more often, and such doses are more easily measured by the Sabouraud pastille, which records large doses more simply than small ones, in which the slighter changes of tint are not easy to distinguish.

A great amount of work has been done with X rays for the treatment of cancer, but it is now recognized that the X rays do not cure a cancer, although they are of value for the relief of pain and for the healing of cancerous ulcers. Diminution of size in cancerous growths has frequently been observed, and in some instances sarcomatous tumours have completely disappeared under X-ray treatment. Sooner or later, however, the cancer or sarcoma returns either in the original site or elsewhere, and the patient dies of the disease. It is probable that X-ray treatment is able to prolong life in a fair number of cases, and by its agency in causing a healing of ulceration in cancer cases it is able to give valuable relief both to the body and mind of the patient, and this relief may last for a year or more.

In rodent ulcer X rays are usually sufficient to provide a lasting cure, but there are some exceptions, as for instance when the rodent ulcer has been long neglected, and has spread deeply so as to invade bony structures. An important factor in the successful treatment of rodent ulcer by X rays is to continue the applications at intervals for several months after apparent cure. If this precaution is omitted there is a very great likelihood of relapse taking place later on.

In the treatment of skin diseases by X rays the method finds a very suitable field. Almost all chronic skin affections yield to X-ray treatment fairly quickly, and maximal doses are not usually necessary.

In ringworm X rays have achieved wonderful results. The rays act upon the hair papillae, and not upon the ringworm fungus. They cause a shedding of the hair fifteen days after exposure and the fungus then dies out from the hair follicles, so that when in due course the hair begins to grow again after a period of two months it grows healthily and without disease. The X-ray treatment of ringworm has been a real advance, and Sabouraud has told us of the enormous pecuniary saving which has been effected in Paris by the shortening of the stay of the ringworm cases in the special schools maintained there for the affected children.

In lupus X rays are valuable, but not fully satisfactory. The treatment by the rays will often succeed in bringing about a healing of the ulceration of lupus, but relapses are frequent, because foci of infection are apt to remain in the healed scar tissue and after a period of quiescence these may gradually provoke fresh mischief.

X-ray treatment is of service for the treatment of enlarged "strumous" glands in the neck. When these glands are in the early stages, and there has not been any softening or breaking down of the gland tissue, the application of X rays, a few times repeated in moderate doses, will determine the subsidence of the enlargement and may effect a complete cure.

In the massive glandular enlargements of lymphadenoma a great reduction of the tumours can be brought about by heavy doses of X rays, but the results are to give a symptomatic rather than a real cure, for fresh glandular growths take place internally, and the usual course of the disease is not fundamentally modified.

So too in leukemia, the symptom of excessive abundance of white cells in the circulating blood can be surprisingly altered for the better by X rays, but generally without real cure of the underlying condition. The effect appears to be due to a direct destructive action upon the leucocytes or white corpuscles of the blood.

Quite recently the use of X rays in fibroid tumours of the uterus has been advocated, particularly by Courmelles in France and Albert-Schonberg in Germany. The action of the rays seems to be in part due to their influence upon the activity of the ovaries and in part to a direct effect upon the growing fibroids themselves, causing decrease of activity, relief of symptoms and reduction of the tumours. (H. L. J.)

XYLANDER, GUILIELMUS (Wilhelm Holtzman, according to his own spelling) (1532–1576), German classical scholar, was born at Augsburg on the 26th of December 1532. He studied at Tübingen, and in 1558, when in a state of abject poverty (caused, according to some, by his intemperate habits), he was appointed to succeed Micyllus (Molshem, Molseym or Molsheym) in the professorship of Greek at Heidelberg, which he exchanged for that of logic (publicus organi Aristotelii interpres) in 1562. He died at Heidelberg on the 10th of February 1576. Xylander was the author of a number of important works, among which his Latin translations of Dio Cassius (1558), Plutarch (1560–1570) and Strabo (1571) deserve special mention. He also edited (1568) the geographical lexicon of Stephanus of Byzantium; the travels of Pausanias (completed after his death by F. Sylburg, 1583); the *Meditations of Marcus Aurelius* (1558, the editio princeps based upon a Heidelberg MS. now lost; a second edition in 1568 with the addition of Antoninus Liberalis, Phlegon of Tralles, an unknown Apollonius, and Antigonus of Carystus—all paradoxographers); and the chronicle of George Cedrenus (1566). He translated the first six books of Euclid into German with notes, the *Arithmetica* of Diophantus, and the *De quattuor mathematicis scientiis* of Michael Psellus into Latin.

XYLENE, or Dimethyl Benzene, $C_6H_4(CH_3)_2$. Three isomeric hydrocarbons of this formula exist; they occur in the light oil fraction of the coal tar distillate, but they cannot be separated by fractional distillation owing to the closeness of their boiling points. The mixture can be separated by shaking with sulphuric acid, whereupon the ortho and meta forms are converted into soluble sulphonic acids, the para form being soluble only in concentrated acid; the ortho and meta acids may be separated by crystallization of their salts or sulphonamides. Ortho-xylene is obtained from ortho-bromtoluene, methyl iodide and sodium as a colourless mobile liquid boiling at 142°, melting at −28°, and having a specific gravity of 0·8932 at 0°. Oxidation by potassium permanganate gives phthalic acid; whilst chromic acid gives carbon dioxide and water. Meta- or iso-xylene, the most important isomer, may be prepared by nucleus-synthetic reactions, or by distilling mesitylenic acid, $C_6H_3(CH_3)_2CO_2H$, an oxidation product of mesitylene, $C_6H_3(CH_3)_3$, which is produced on the condensation of acetone, with lime; this reaction is very important, for it orientates meta-compounds. It boils at 139°, melts at −54°, and has a specific gravity of 0·8812. Para-xylene is obtained when camphor is distilled with zinc chloride, but it is best prepared from para-brom-toluene or dibrombenzene, methyl iodide and sodium. Dilute nitric acid oxidizes it first to para-toluic acid and then to terephthalic acid. It boils at 138°, melts at 15°, and has a specific gravity of 0·8801 at 0°.

XYLOPHONE (Fr. *xylophone*; Ger. *Xylophon*, *Strohfiedel* or *Holzharmonika*; Ital. *armonica de legno*), a small instrument of percussion, of definite sonorousness, used in the orchestra to mark the rhythm. The xylophone consists of a series of little wooden staves in the form of a half cylinder and graduated in size. The staves, each of which represents a semitone, rest on two, three or four wooden bars, covered with straw and converging to form an acute angle. They are so arranged that each stave is isolated. In some models the staves are grouped in two rows, comprising the naturals and the accidentals. The xylophone is played with two little wooden hammers, and has a compass of two or three octaves. The quality of tone is inferior to that of the steel harmonica or glockenspiel. (K. S.)

XYSTUS, the Greek architectural term for the covered portico of the gymnasium, in which the exercises took place during the winter or in rainy weather; this was known as the *ξυστὸς δρόμος*, from its polished floor (*ξύειν*, to polish). The Romans applied the term to the garden walk in front of the porticoes, which was divided into flower beds with borders of box, and to a promenade between rows of large trees.

Y the twenty-fifth letter of the English alphabet, one of four variants (*u*, *v*, *w*, *y*) which have been developed out of one Greek symbol. It was taken into the Roman alphabet as a form distinct from V in the 1st century B.C., when it was desired to represent the sound of the Greek *υ* more accurately than could be done by the ordinary Roman alphabet. Many Greek words had been borrowed from Greek long before this and pronounced like genuine Latin words. Thus the proper name Πύρρος was borrowed as *Burrus*, Φρύγες as *Bruges*. But with the growth of literary knowledge this was felt to be a very inexact representation of the Greek sounds, and the words were respelt as *Pyrrhus* and *Phryges*. The philosopher Pythagoras is said to have regarded this letter as a symbol of human life (Servius, on Virgil, *Aeneid* vi. 136). To this there are various references in the Roman poets. Two lines of Persius (iii. 56–57) seem to throw some light upon the particular form of Y intended·

> "Et tibi quae Samios diduxit littera ramos
> surgentem dextro monstravit limite callem."

These lines appear to imply that the letter took the form Y, which can only be one of the oldest forms (Y) written from right to left. The straight road is the difficult, the deviating line is the easier path of vice. Anglo-Saxon took over the Roman Y with its Roman value of the "modified *u*" (*ü*), and employed it accordingly for the sound which arose from a *u* sound under the influence of an *i* in the following syllable: *fyllan*, "fill," cp. Gothic *fulljan*; mūs, "mouse," plural *mȳs*, from an earlier lost *mūsis*. The *y* sounds were often confused with *i*, whence, in modern English, *mice*.

The vowel use was the only use of the old symbol. The consonant Y is of a different origin. The early English *g* (always hard as in *gig*) was palatalized before *e* and *i* sounds into a consonant *i* (*i̯*) or *y*, which was written in Middle English with the symbol ȝ. With this letter also was written the original consonant *i* (*i̯*), which appears in Latin as *i* (*j*) in *iugum*, *iuvencus*. This Latin sound seems, at least initially, to have represented two originally separate sounds, for Greek represents the first sound of *iugum* by ζ (ζυγόν), while in other words it represents a *ĝ* (*y*) of other languages by the "rough breathing" (*h* or ʽ): ἁγνός, "holy," is the same word as the Sanskrit *yajnas*. The English words that correspond etymologically to *iugum* and *iuvencus* are "yoke" and "young." In Northern English the symbol ȝ survived longer than in the southern part of the island, and in Scottish documents of the 16th century was confused with *z*. From this cause various Scottish names that were never pronounced with *z* are so spelt, as Menzies (Mengies), Dalziel, Cadzow. In others like Mackenzie, *z* is now universally pronounced, though as late as the middle of the 18th century Lord Kames declared that to hear Mackenzie pronounced with a *z* turned his stomach. (P. Gi.)

YABLONOI, or YABLÓNOVOI ("Apple Mountains," known to the Mongols as *Dynse-daban*), a range of E. Siberia, stretching N.E. from near the sources of the river Kerulen (N.E. of Urga in N. Mongolia) to the bend of the river Olekma in 56° N., and forming the S.E. border ridge of the upper terrace of the great plateau of Central and E. Asia. Its summits reach altitudes of 5000–6000 ft., culminating in Mount Sokhondo (8040 ft.) near the Transbaikal-Mongolia frontier. The range serves as the water-parting between the streams which flow to the Pacific and those which flow to the Arctic Ocean, and is a dividing line between the Siberian and the Daurian flora. The passes have altitudes of 2000–3500 ft. The range is a continuation of the Kentei Mountains of Mongolia, but is not orographically connected with the Stanovoi Mountains, farther to the N.E., though the names Yablonoi and Stanovoi are commonly used alternatively. The latter are the S.E. border-range of the lower terrace and are connected with the Great Khingan Mountains.

YACHOW-FU, a prefectural city in the province of Szech'uen, China, in 30° N., 103° E.; pop. about 40,000. It is situated in a valley on the banks of the river Ya, where tea is grown. The town owes its importance to the fact that it stands at the parting of the tea and tobacco trade route to Tibet via Tachien-lu and the cotton trade route to west Yun-nan via Ningyuen-Fu. The city wall measures 2 m. in circumference, and is pierced by four gates. Yachow-Fu is first mentioned during the Chow dynasty (1122–255 B.C.).

YACHTING, the sport of racing in yachts[1] and boats with sails, and also the pastime of cruising for pleasure in sailing steam or motor vessels. Yacht racing dates from the beginning of the 19th century; for, although there were sailing yachts long before, they were but few, and belonged exclusively to princes and other illustrious personages. For instance, in the Anglo-Saxon period Athelstan had presented to him by the king of Norway a magnificent royal vessel, the sails of which were purple and the head and deck wrought with gold, apparently a kind of state barge. Elizabeth had one, and so has every English sovereign since. During her reign a pleasure ship was built (1588) at Cowes (Isle of Wight), so that the association of that place with the sport goes back a very long time. In 1660 Charles II. was presented by the Dutch with a yacht named the "Mary," until which time the word "yacht" was unknown in England. The Merrie Monarch was fond of sailing, for he designed a yacht of 25 tons called the "Jamie," built at Lambeth in 1662, as well as several others later on. In that year the "Jamie" was matched for £100 against a small Dutch yacht, under the duke of York, from Greenwich to Gravesend and back, and beat her, the king steering part of the time—apparently the first record of a yacht match and of an amateur helmsman. Mr Arthur H. Clark, in his *History of Yachting* (1904), traces the history of pleasure craft from 1600 to 1815, and gives an interesting illustrated account of the yachts belonging to Charles II.

The first authentic record of a sailing club is in 1720, when the Cork Harbour Water Club, now known as the Royal Cork Yacht Club, was established in Ireland, but the yachts were small. Maitland, in his *History of London* (1739) mentions sailing and rowing on the Thames as among the amusements then indulged in; and Strutt, in his *Sports and Pastimes* (1801), says that the Cumberland Society, consisting of gentlemen partial to this pastime, gave yearly a silver cup to be sailed for in the vicinity of London. The boats usually started from Blackfriars Bridge, went up the Thames to Putney, and returned to Vauxhall, being, no doubt, mere sailing boats and not yachts or decked vessels. From the middle to the end of the 18th century yachting developed very slowly: although matches were sailed at Cowes as far back as 1780, very few yachts of any size, say 35 tons, existed in 1800 there or elsewhere. In 1812 the Royal Yacht Squadron was established by fifty yacht-owners at Cowes and was called the Yacht Club, altered to the Royal Yacht Club in 1820; but no regular regatta was held there until some years later. The yachts of the time were built of heavy materials, like the revenue cutters, full in the fore body and fine aft; but it was soon discovered that their timbers and scantlings were unnecessarily strong, and they were made much lighter. It was also found that the single-masted cutter was more weatherly than the brigs and schooners of the time, and the former rig was adopted for racing, and, as there was no time allowance for difference of size, they were all built of considerable dimensions.

Early English Yachts.—Among the earliest of which there is any record were the "Pearl," 95 tons, built by Sainty at Wyvenhoe near Colchester in 1820, for the marquess of Anglesey, and the "Arrow," 84 tons, originally 61 ft. 9½ in. long and 18 ft. 5½ in. beam, built by Joseph Weld in 1822, which for many years remained extant as a racing yacht, having been rebuilt and altered several times, and again entirely rebuilt in 1887–88. The Thames soon followed the example of the Solent and established the Royal Thames Yacht Club in 1823, the Clyde founding the Royal Northern Yacht Club in 1824, and Plymouth the Royal Western in 1827. In this year the Royal Yacht Squadron passed a resolution disqualifying any member who should apply steam to his yacht—the enactment being aimed at T. Assheton Smith, an enthusiastic yachtsman and fox-hunter, who was having a paddle-wheel steam yacht called the "Menai" built on the Clyde. In 1830 one of the largest cutters ever constructed was launched, viz. the "Alarm," built by Inman at Lymington for Joseph Weld of Lulworth Castle, from the lines of a famous smuggler captured off the Isle of Wight. She was 82 ft. on the load-line by 24 ft. beam, and was reckoned of 193 tons, old measurement, in which length, breadth and half-breadth (supposed to represent depth) were the factors for computation. Some yachtsmen at this time preferred still larger vessels and owned square-topsail schooners and brigs like the man-o'-war brigs of the day, such as the "Waterwitch," 381 tons, built by White of Cowes, in 1832, for Lord Belfast, and the "Brilliant," barque, 493 tons, belonging to J. Holland Ackers, who invented a scale of time allowance for competitive sailing. In 1834 the first royal cup was given by William IV. to the Royal Yacht Squadron. In 1836 the Royal Eastern Yacht Club was founded at Granton near Edinburgh; in 1838 the Royal St George's at Kingstown and the Royal London; in 1843 the Royal Southern at Southampton and the Royal Harwich; in 1844 the Royal Mersey at Liverpool and the Royal Victoria at Ryde. The number of vessels kept pace with the clubs—the fifty yachts of 1812 increasing nearly tenfold before the middle of the century.

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[1] The English word "yacht" is the Dutch *jacht*, *jagt*, from *jachten*, "to hurry," "to hunt." See also SHIP and SHIPBUILDING.

First Alteration in Type.—In 1848, after J. Scott Russell had repeatedly drawn attention to the unwisdom of constructing sailing vessels on the "cod's head and mackerel tail" plan, and had enunciated his wave-line theory, Mare built at Blackwall an entirely new type of vessel, with a long hollow bow and a short after-body of considerable fulness. This was the iron cutter "Mosquito," of 59 ft. 2 in. water-line, 15 ft. 3 in. beam, and measuring 50 tons. Prejudice against the new type of yacht being as strong as against the introduction of steam, there were no vessels built like the "Mosquito," with the exception of the "Volante," 59 tons, by Harvey of Wyvenhoe, until the eyes of English yachtsmen were opened by the Americans three years later. About this period yacht racing had been gradually coming into favour in the United States, the first yacht club being founded at New York in 1844 by nine yacht-owners; and in 1846 the first match between yachts in the States was sailed, 25 m. to windward and back from Sandy Hook lightship, between J. C. Stevens's new centre-board sloop "Maria," 170 tons, 100 ft. water-line and 26 ft. 8 in. beam, with a draught of 5 ft. 3 in. of water, and the "Coquette," schooner, 74 tons, belonging to J. H. Perkins, the latter winning; but the appearance of the "Maria," which had a clipper or schooner bow, something like that of the racing cutters of 1887–88, did much for yachting in America. Stevens then commissioned George Steers of New York, builder of the crack pilot schooners, to construct a racing schooner to visit England in the year of the great exhibition, and the result was the "America" of 170 tons. She crossed the Atlantic in the summer of 1851, but failed to compete for the Queen's cup at Cowes in August, although the club for that occasion threw the prize open to all the world, as her owner declined to concede the usual time allowance for difference of size. The members of the Yacht Squadron, not wishing to risk the reproach of denying the visitor a fair race, decided that their match for a cup given by the club, to be sailed round the Isle of Wight later in the same month, should be without any time allowance. The "America," thus exceptionally treated, entered and competed against fifteen other vessels. The three most dangerous competitors being put out through accidents, the "America" passed the winning-post 18 minutes ahead of the 47-ton cutter "Aurora," and won the cup; but, even if the time allowance had not been waived, the American schooner yacht would still have won by fully a couple of minutes. The prize was given to the New York Yacht Club and constituted a challenge cup, called "the America's cup," for the yachts of all nations, by the deed of gift of the owners of the winner. (See below for a complete account of these races.)

Not only was the "America" as great a departure from the conventional British type of yacht as the "Mosquito," but the set of her sails was a decided novelty. In England it had been the practice to make them baggy, whereas those of the "America" were flat, which told materially in working to windward. The revolution in yacht designing and canvasing was complete, and the bows of existing cutters were lengthened, that of the "Arrow" among others. The "Alarm" was also lengthened and turned into a schooner of 248 tons, and the "Wildfire," cutter, 59 tons, was likewise converted. Indeed there was a complete craze for schooners, the "Flying Cloud," "Gloriana," "Lalla Rookh," "Albertine," "Aline," "Egeria," "Pantomime" and others being built between 1852 and 1865, during which period the centre-board, or sliding keel, was applied to schooners as well as sloops in America. The national or cutter rig was nevertheless not neglected in England, for Hatcher of Southampton built the 35-ton cutter "Glance"—the pioneer of the subsequent 40-tonners—in 1855, and the "Vampire"—the pioneer of the 20-tonners—in 1857, in which year Weld also had the "Lulworth," an 82-ton cutter of comparatively shallow draught, constructed at Lymington. At this time too there came into existence a group of cutters, called "flying fifties" from their tonnage, taking after the "Mosquito" as their pioneer; such were the "Extravaganza," "Audax" and "Vanguard." In 1866 a large cutter was constructed on the Clyde called the "Condor," 135 tons, followed by the still larger "Oimara," 163 tons, in 1867. In 1868 the "Cambria" schooner was built by Ratsey at Cowes for Ashbury of Brighton, and, having proved a successful match-sailer, was taken to the United States in 1870 to compete for the America's cup, but was badly beaten, as also was the "Livonia" in 1871.

The First Great Era of Yacht Racing.—The decade between 1870 and 1880 may be termed the first Golden Age of yachting, inasmuch as the racing fleet had some very notable additions made to it, of which it will suffice to mention the schooners "Gwendolin," "Cetonia," "Corinne," "Miranda" and "Waterwitch"; the large cutters "Kriemhilda," "Vol au Vent," "Formosa," "Samoena" and "Vanduara," a cutter built of steel; the 40-tonners "Foxhound," "Bloodhound," "Myosotis" and "Norman"; the 20-tonners "Vanessa" (Hatcher's masterpiece), "Quickstep," "Enriqueta," "Louise" and "Freda"; and the yawls "Florinda," "Corisande," "Jullanar" and "Latona." The "Jullanar" may be noted as a specially clever design. Built in 1874 from the ideas of Bentall, an agricultural implement maker of Maldon, Essex, she had no dead wood forward or aft, and possessed many improvements in design which were embodied and developed by the more scientific naval architects, G. L. Watson, William Fife, jun., and others in later years. Lead, the use of which commenced in 1846, was entirely used for ballast after 1870 and placed on the keel outside.

Of races there was a plethora; indeed no fewer than 400 matches took place in 1876, as against 63 matches in 1856, with classes for schooners and yawls, for large cutters, for 40-tonners, 20-tonners and 10-tonners. The sport, too, was better regulated, and was conducted on a uniform system: the Yacht-Racing Association, established in 1875, drew up a simple code of laws for the regulation of yacht races, which was accepted by the yacht clubs generally, though a previous attempt to introduce uniformity, made by the Royal Victoria Yacht Club in 1868, had failed. The Association adopted the rule for ascertaining the size or tonnage of yachts which had been for many years in force, known as the Thames rule; but in 1879 they altered the plan of reckoning length from that taken on deck to that taken at the load water-line, and two years later they adopted an entirely new system of calculation.

The Plank-on-edge.—These changes led to a decline in yacht-racing, the new measurement exercising a prejudicial effect on the sport, as it enabled vessels of extreme length, depth and narrowness, kept upright by enormous masses of lead on the outside of the keel, to compete on equal terms with vessels of greater width and less depth, in other words, smaller yachts carrying an inferior area of sail. The new type was known as the "lead mine" or plank-on-edge type. Of this type were the yawls "Lorna" and "Wendur," the cutters "May," "Annasona," "Sleuth-hound," "Tara," "Marjorie" and "Margarite"—the most extreme of all being perhaps the 40-tonner "Tara," six times as long as she was broad, and unusually deep, with a displacement of 75 tons, 38 tons of lead on her keel, and the sail-spread of a 60-tonner like "Neva."

In 1884 two large 80-ton cutters of the above type were built for racing, the "Genesta" on the Clyde and the "Irex" at Southampton. Having been successful in her first season, the former went to the United States in 1885 in quest of the America's cup; but she was beaten by the "Puritan," which had a moderate draught of 8 ft. 3 in. of water, considerable beam and a deep centre-board. The defeat of the "Genesta" was not surprising; she drew 13 ft. of water, had a displacement or weight of 141 as against the "Puritan's" 106 tons, and a sail area of 7887 sq. ft. to the American's 7982—a greater mass with less driving power. Still, she did not leave the States empty-handed, as she won and brought back the Cape May and Brenton Reef challenge cups, though they were wrested from her by the "Irex" in the following year. The same thing happened to the "Galatea," which was beaten by the "Mayflower" in 1886. In all classes in British waters the narrow type was not carried to excess; indeed, as the narrowness of the new yachts increased annually, so did the popularity of racing decrease.

Plank-on-edge Type abandoned.—Prior to 1886 it had been the custom in Great Britain for several reasons to build the yachts deep, narrow, wall-sided, with very heavy lead keels and heavy displacement. The system of measurement had been a tonnage measurement, and under this system designers found, from the knowledge they had then attained from racing trials, that a narrow heavy vessel would beat a wider and lighter craft when both were measured by the tonnage rules. In America this was not the case. There a much lighter and wider form of yacht had been in vogue, having shallower draught and relying upon a centre-board for weatherliness instead of a deep lead keel. Hence in the International contests from 1884 to 1886 for the America's cup and other events the trials were between deep and narrow British yachts and shallow and broad American yachts. Even in 1887, when G. L. Watson built the "Thistle," much broader than "Genesta" and "Galatea," this vessel was met and defeated by a far wider and shallower American sloop, namely, the "Volunteer" above referred to. British yachtsmen claimed that their narrow deep-keeled vessels were more weatherly and better sea-boats than the light American sloops, but racing honours rested with the Americans.

In 1887 the plank-on-edge type was completely abandoned in the United Kingdom. Thenceforward, therefore, the old spirited contests between deep British yachts and shallow American sloops ceased. Whilst Britain abandoned her narrow deep type, America soon also began to modify the old shallow centre-board sloop type, and so between 1887 and 1893 the rival types began to converge very rapidly, until the old idea of a race for the America's cup being a test of a British type against an American type completely died out. Races sailed for that trophy, after 1887, were less and less trials of opposing national types, but merely contests between British and American designed yachts built upon the same general principle of similar type.

Dixon Kemp in 1887 induced British yachtsmen to abandon the system o[illegible] 's by tonnage and to adopt a new system [illegible] ater-line length and sail area. The new system contained no taxes or penalties upon beam or depth nor upon "over all" length. The only factors measured were the water-line and the area of the sails. All the old tonnage rules taxed the length and the breadth. The effect of this change of the system measurement was electrical. It crushed the plank-on-edge type completely. There was not another boat of the kind built.

Revival of Yacht-Racing under Length and Sail Area Rule.—Yachtsmen were greatly pleased with the broader and lighter types of yachts that designers began to turn out under the length and sail area rule. They were more comfortable and drier in a seaway than the old vessels. The first large cutters built with considerable beam were "Yarana" and "Petronilla" in 1888, and in 1889 the first of Lord Dunraven's Valkyries was a vessel that was much admired. Then in 1890 "Iverna," a handsome clipper-bowed cutter owned by Mr Jameson, came out and raced against "Thistle." Meanwhile, up to 1892 a host of splendid 40-raters had been built; "Mohawk," "Deerhound," "Castanet," "Reverie," "Creole," "Thalia," "Corsair," "White Slave," "Queen Mab" and "Varuna" formed a class the like of which had never been surpassed in British waters. Watson, Fife and Payne were the most successful designers.

While a revival of yachting in the larger classes was notable under the rule Dixon Kemp had originated, the sudden popularity attained in the small classes in the Solent was even more remarkable. Under the tonnage rules deep narrow 3-tonners, 5-tonners and 10-tonners had raced about the coast, but the Solent did not seem to attract a greater number of yachtsmen as small boat sailors than the Thames, Mersey or Irish ports. Moreover, the Clyde really remained the most advanced centre of small yacht sailing. At Southampton, prior to Dixon Kemp's rule being adopted by the Yacht-Racing Association in 1887, there were some sporting classes of so-called Itchen Ferry boats which raced on a rating consisting of length on the water-line only. As there was no tax upon their sail, they were built (according to the ideas of designers in 1885 or 1886, who had not by that time absorbed the knowledge of the value of bulb-keels) with great beam, immense displacement and very thick heavy lead keels and huge sail-spread. A sail area of 2200 sq. ft. was crowded on to a 30-foot yacht, and one 30-footer even carried a jointed spinnaker boom 56 ft. in length. It was not surprising that such a type never became popular; indeed the Southampton length classes in the 'eighties were no better than the extremely narrow 5-tonners and 3-tonners. The 5-tonner "Doris," built by Watson in 1885, was 33 ft. 8 in. L.W.L., 5 ft. 7 in. beam, 7 ft. draught; displacement of 12·55 tons; 1681 sq. ft. of sail. The "Yvonne," built by Fife in 1889, was 34·1 ft. L.W.L., 9 ft. beam, 8·1 ft. draught, with a displacement of 12·9 tons and a sail area of 1726 sq. ft. The difference in dimensions between "Doris" and "Yvonne" shows how the beam and sail-carrying power was increased in the new type, for "Yvonne" could beat the "Doris" with the greatest ease. With the advent of the length and sail area rule the Solent at once became the fashionable rendezvous for small racing yachts, and the craft known as the Solent classes, 5-raters, 2½-raters, 1-raters and ½-raters, flourished greatly.

The Second Great Era in Yachting.—As the years 1870 to 1880 will always be remembered for the great schooners and the glorious fleet of old-fashioned cutters and yawls, which showed such fine sport before they were outbuilt by the planks-on-edge, so will the seasons following 1892 be identified with the big cutter racing. In that year it was commonly said that yachtsmen would build no more very large cutters. The revival under the length and sail area rule had so far extended to "Iverna," "Tarana," "Petronilla," and "Valkyrie I." being built in the first class, but then there had been a pause of some years during which large numbers of 40-raters, 20-raters and the Solent classes had been built. Just when the critics were declaring that in the future no yachtsmen would build a class racer larger than a 40-rater (60 ft. L.W.L. with 4000 sq. ft. of sail), the prince of Wales (afterwards Edward VII.) gave an order for the cutter "Britannia," while Lord Dunraven built "Valkyrie II.," Mr A. D. Clarke "Satanita" and Mr Peter Donaldson "Calluna"; and in this same season (1893), an American yachtsman took the Herreshoff yacht "Navahoe" over the Atlantic. The new vessels averaged 87 ft. L.W.L. and carried about 10,300 sq. ft. of canvas, their beam being as much as 23 ft. They were an entirely different type from "Iverna" or

"Thistle," being developed from the form of the 40-raters "Varuna" and "Queen Mab." The main differences between the "Britannia" and other yachts of her year and the older vessels was that the new yachts had an overhanging shallow-sectioned mussel or pram bow instead of a fiddle or clipper bow with a wedge-shaped transverse section; the outline of the under-water profile was hollow, sloping in a concave curve from the deep part of the keel under the mast to the forward end of the water-line; the keel was deep, practically developing into a fin. The new vessels skimmed over the waves instead of cutting and plunging through them. The seaworthiness, speed, weatherliness and general handiness for racing purposes of the cutters of 1893 far exceeded all previous results. Yacht designing and building now became a science demanding the highest tax upon the skill and ingenuity of the naval architect. The cutter "Valkyrie II." visited the United States in 1893, but Lord Dunraven's vessel was beaten by the "Vigilant." Curiously enough, when the crack Herreshoff cutters "Navahoe" and "Vigilant" visited the British Isles they were severely beaten by the British yachts. In 1893 the "Navahoe" started 13 times and only won two first prizes. In 1894 "Vigilant" did a little better, but she only won six races in 19 starts. During the years that followed the "Britannia" held a wonderful record:—

	Starts.	First Prizes.	Other Prizes.	Total.	Prizes Value.
1893 . . .	43	24	9	33	£1572
1894 . . .	48	36	2	38	2799
1895 . . .	50	38	2	40	3040
1896 . . .	58	14	10	24	1562
1897 . . .	20	10	2	12	1000
	219	122	25	147	£9973

Some other famous racing yachts which were built under the length and sail area rule were "Ailsa" (1895), a first-class cutter designed by Fife, "Isolde," a very beautiful 40-rater for Mr Donaldson by the same designer, "Caress," a 40-rater by Watson, and the 20-raters "Audrey," from Lord Dunraven's own model, "Niagara" by Herreshoff, and the "Sibbick"-designed 5-rater "Norman," owned by Captain Orr-Ewing. Since the introduction of Dixon Kemp's rule the smaller classes from 20-rating right down to ½-rating had been built in great numbers, but whilst these classes had flourished exceedingly, the type of boat built had developed a very peculiar form. Each succeeding craft was made lighter and lighter in weight and more extreme in the overhang at the bow and stern. The stability was now attained by means of a cigar-shaped piece of lead placed at the bottom of a steel plate or fin, the hull of the boat being nothing more than the bowl of a dessert spoon resting upon the water.

Fin and Bulb Keels. Downfall of Length and Sail Area Rule.—It was apparent in 1895 that if plate and bulb skimming-dishes could win all the prizes in the 20-rating and smaller classes, it would be easy to design a modified form of fin and bulb yacht to beat "Isolde," "Britannia" and "Ailsa" in the larger classes. It was equally obvious that a skimming-dish of "Britannia's" or "Isolde's" rating would be an utterly useless machine with no cabin accommodation or head room, and that the evolution of such type would be as bad for the sport as the development of the old plank-on-edge had been in 1885. It seemed strange that whilst the old tonnage rule had evolved the plank-on-edge ten years previously, the sail area measurement now evolved a plank-on-side, balanced by a fin. The fact was that designers had solved the problem. The rule measured only the length and the area of canvas. Taking the length of the vessel on the water-line as constant, then the vessel with the smallest possible weight could be driven with less sail at the same speed as vessels with greater weight and greater sail. This solution of the problem was not apparent to designers from 1880 to 1885, because of the difficulty of obtaining stability. From 1880 to 1885 stability was obtained by means of very heavy keels. In 1895 the stability was obtained by means of a light piece of lead placed at the bottom of a deep steel fin. "Niagara," "Audrey" (20-raters) and "Norman" (5-rater) were thus built. They were wonderful sailing machines in heavy weather,—fast, powerful, handy and efficient in all weathers. But if head room and cabin accommodation are considered essential parts of a yacht these fliers, as "yachts," were entirely inefficient.

The First Linear Rating Rule.—To endeavour to check the tendency to build skimming-dishes the Yacht-Racing Association introduced in 1896 a new system of measurement which was proposed by Mr R. E. Froude. The novelty of the system consisted of a tax upon the skin girth of the yacht, whereby a vessel with hollow midship section was penalized by her girth being measured round the skin surface. Froude's first system of rating began on the 1st of January 1896 and ended at the close of the year 1900. It therefore had a career of five seasons. The measurement of the yacht was obtained by the following formula:—

$$\frac{\text{Length L.W.L.} + \text{beam} + \tfrac{3}{4}\,\text{skin girth} + \tfrac{1}{2}\sqrt{\text{sail area}}}{2} = \text{linear rating.}$$

This rule partially failed in its object. It was hoped that the skin-surface measurement would prevent the fin-bulb type being successful, but Froude and his colleagues had under-estimated the possible developments of exaggerated pram bows, immense scow-shaped shoulders and stern-lines, all of which could be introduced into the skimming-dish type with great success. So, notwithstanding the small premium on displacement this rule contained, the dishes could still beat the full-bodied yachts.

Yachts built in the small classes were very shallow bodied, and in the 20-rating and 40-rating, now called the 52 ft. and 65 ft. classes respectively, were uncomfortably shallow. The best vessels in the large classes were undoubtedly well formed and useful yachts; indeed in the larger classes the rule seems to have checked excesses. Under this rule in 1896 the German Emperor ordered a huge first-class cutter, the "Meteor II.," from Watson. By sheer size and power this vessel outsailed "Britannia." She carried a main boom of 96 ft. long against the "Britannia's" boom of 91 ft. In 1900 Watson designed another great cutter called the "Distant Shore," the same size as "Britannia," but she was not launched until 1901. In 1900 also Watson crowned all his previous successes by turning out the yawl "Sybarita," the same size as "Meteor." "Senta Tutty," "Eelin" and "Astrild," and finally "Khama," were amongst the 65-footers, and "Penitent," "The Saint," "Morning Star" and "Senga" about the best 52-footers. Probably the yacht which emphasized the possibilities of the rule more than any of her contemporaries was Captain Orr-Ewing's 36-footer "Sakuntala," built by Sibbick. She was a complete scow-shaped skimming-dish. The 30-footers "Marjory" and "Flatfish" were similar craft, and they outsailed everything in their respective classes in the Solent. Although many fine vessels, including the schooner "Rainbow" and others, were built under this rule, it was obviously insufficient to check the hollow-sectioned type.

The Second Linear Rating Rule.—This rule, also suggested by Froude, was introduced on the 1st of January 1901. The confidence of yachtsmen had been decidedly shaken by the previous rule, and the Y.R.A. agreed to fix this rule for a period of seven years. The object of the rule was to ensure a big-bodied vessel. The formula was:—

$$\frac{\text{Length} + \text{breadth} + \tfrac{3}{4}\,\text{girth} + 4d + \tfrac{1}{2}\sqrt{\text{sail area}}}{2\cdot1} = \text{linear rating.}$$

Now the novelty of this rule was the new tax d. This d represents the difference in feet between the measurement of the girth of the yacht's hull taken round the skin surface and the girth at the same place measured with a string pulled taut. This measurement is taken $\frac{6}{10}$ths of the distance from the fore end of the water-line. It is easy to see that in a full-bodied yacht d = a small unit, whilst in a hollow-bodied yacht d = a larger unit. Four times d being taken, it followed that hollow-bodied yachts were heavily penalized. This ingenious d measurement was evolved by Alfred Benzon, a Danish scientist and yachtsman. The rule, so far as the development of a full-bodied cabin yacht went, proved very successful. It had certain marked faults: the measurement of the girth at a fixed station caused a shallowness of keel at that particular spot, and there was no check upon the full pram bows, which when introduced into vessels of heavy displacement strained the ships terribly as they smashed into a heavy seaway. The new racing yachts generally, however, from 1896 onwards, proved worthy and fast vessels.

As an instance of what could be done with them, in 1901 a memorable match was sailed on the Clyde between the Watson cutter

"Kariad" (originally the "Distant Shore," previously mentioned) and the same designer's 90-foot yawl "Sybarita." It was blowing a gale of wind, and the yachts raced from Rothesay round Ailsa Craig and back, a distance of 75 m., averaging 12·3 knots, with closed reefed sails, housed topmasts and in a mountainous sea. Several steam yachts attempted to accompany them, but all put back owing to the roaring sea that was running near the Craig. The yawl had the advantage of being the larger vessel, and "Sybarita" on this occasion won one of the greatest races ever recorded in Scottish waters.

Class Racing, Handicapping and Cruiser Racing.—Yacht racing may be subdivided under these three heads. Yacht racing by rating measurement or tonnage, when either the first yacht to finish is the winner, or the yacht saving her time by a fixed scale of time allowance in proportion to the rating of the vessel and the length of the course, is called class racing, and it obviously tends to encourage the fastest possible vessel under the current rating rule to be produced. It has always been regarded as the highest form of the sport. It is naturally, however, the most expensive form, because only the most up-to-date and perfectly equipped vessels can keep in the first flight.

From time to time, chiefly from about the years 1884 and 1885 onwards, handicaps framed according to merits have been fashionable amongst yachtsmen. They were originally devised to afford amusement and sport to out-classed racers and cruisers, but they obviously did nothing to encourage owners to build very fast vessels, nor to stimulate improvement in design. When a handicap is allotted to each vessel according to her assumed speed, the slowest and most ill-designed craft should have an equal chance with the best. Nevertheless, owing to the expense of class racing, handicap racing thrived greatly during the period of the first and second Girth Rules. During these periods, too, the third style of yacht racing came into vogue, namely cruiser racing; either very fast cruisers were built specially for the purpose of handicap racing, or a number of yachts of exactly similar design were built specially to the owner's orders for the purpose of racing in a class together. The fast handicap cruisers had the great advantage over class racers from 1896 up to 1906, inasmuch as they were much more strongly built. "Valdora" (107 tons), "Brynhild" (160 tons), "Leander," "Namara," "Rosamond," "Merrymaid" and many others were yachts of the former type. In form they did not differ vastly from the racers of their period, but in scantling of hull, fittings, bulwarks and rig they were more comfortable and better vessels than their class-racing sisters. It was obvious in the larger classes that many yacht-owners were not prepared to put up with the discomfort of the thin-skinned racers. During the whole period of the Girth Rules (1896 to 1906), while the class racers developed a good enough form of body—they were latterly yachts with plenty of cabin room—they were necessarily built in the lightest possible manner, the lightest steel frames being covered with the thinnest planking and decks for the sake of saving weight. The light scantling began to tell severely upon large yacht racing. Meanwhile, in the small classes, the Solent one-design class, South Coast one-design class, numerous Belfast one-design classes, Redwings, Whitewings and a host of others, show how an inexpensive form of cruiser racing had usurped the place of class racing and competitive designing. Many yachtsmen felt that if handicap racing and one-design racing were to usurp the place of the higher form of class racing the whole sport of yachting must soon deteriorate. It was obvious that had handicap racing and the one-design principle been seriously introduced in 1880 or 1886 and obtained a strong hold on yachtsmen such improved types as the modern cruisers of 1906 would never have been evolved. For all the best cruisers, even the "Valdora" and the ketches "Cariad I." and "Cariad II.," are but modified types evolved from the crack racers. Hence yachtsmen began to give careful attention—during the early period of the Second Linear Rating rule—to suggestions that in the future every class-racing yacht should be built according to a fixed table of scantlings, so that her hull should be as strong as a *bona fide* cruiser.

Yachts Built under the Second Linear Rating Rule.—Few large vessels were built expressly for racing under this rule; indeed the Fife 65-footer "Zinita" (1904) was the only light-scantling yacht of any importance. However, two very handsome first-class vessels were constructed to the rule: "White Heather I." by Fife in 1904, and "Nyria" by Nicholson in 1906; they were some 12 ft. shorter than the great cutters of "Britannia's" year and altogether smaller, having less beam and draught and some 1700 sq. ft. less sail area. The growing dissatisfaction of yacht-owners at the extreme light scantling of modern racing yachts was strongly demonstrated by the fact that both "White Heather I." and "Nyria" were specially ordered to be of heavy scantling, and they were classed A1 at Lloyd's. They were therefore of the semi-cruiser type. "Nyria," however, was the extreme type of a yacht of her period in shape, although heavy in construction. The only conspicuous fault to be found with the form of the racing yachts under the rule was a skimping of the mean draught and an exaggeration of the full pram-shaped overhanging bow.

The 52-footers were a very popular class. Fife made a great advance in yacht architecture with a 52-foot cutter called the "Magdalen" (1901). All the other successful vessels under the rule—"Camellia" (Payne), "Lucida" and "Maymon" (Fife), "Moyana" and "Britomart" (Mylne), and the first-class cutter "Nyria"—followed her closely in type. An interesting trial took place in 1906, when the first-class cutter "Kariad" (1900) was brought out to compete with "Nyria" and "White Heather I.," and decidedly out-sailed,—showing that yacht architecture had steadily improved in the past six seasons.

International Rules Introduced.—In April 1904 Mr Heckstall Smith drew the attention of German, French and British yachtsmen to the fact that the yacht measurement rules (then different in the various countries) were generally due to terminate about the end of 1907, and suggested that many advantages would accrue if an international rule could be agreed upon. The Yacht-Racing Association agreed to take the matter up, and at two International Conferences, held in London in January and June 1906, an international rule of yacht measurement and rating was unanimously agreed to by all the nations of Europe. America alone refused to attend the Conference. Mr R. E. Froude struck the keynote of the object of the Conference by a statement that the ideal yacht should be a vessel combining "habitability with speed." The truth of this axiom was generally accepted. Old plank-on-edge types under the tonnage rules were habitable but slow. Skimming-dishes attained the maximum speed, but were uninhabitable. Neither therefore attained the ideal type. A good form was attained in 1901 with "Magdalen," but since that year the bane of light construction had become harmful to yachting. Hence the conference aimed at a rule which would produce a yacht combining habitability with speed. They adopted a form of linear rating comprising certain penalties upon hollow midship section (*i.e.* Benzon's d tax) and also upon full pram bows. The following was adopted as the rule by which all racing yachts in Europe are rated:—

$$\frac{L+B+\frac{1}{2}G+3d+\frac{1}{3}\sqrt{S}-F}{2}=\text{Rating in linear units, i.e. either ft. or metres.}$$

Where L = Length in linear units.
" B = Extreme beam in linear units.
" G = Girth in linear units.
" d = Girth difference in linear units.
" S = Sail area in square units.
" F = Freeboard in linear units.

The length L for the formula is the length on the water-line, with the addition (1) of the difference between the girth, covering-board to covering-board, at the bow water-line ending, and twice the freeboard at that point, and (2) one-fifth of the difference between the girth, covering-board to covering-board, at the stern water-line ending, and twice the freeboard at that point. The additions (1) and (2) penalize the full overhangs and the bow overhang in particular. The girth, G, is the chain girth measured at that part of the yacht at which the measurement is greatest, less twice the freeboard at the same station, but there are certain provisions allowing the measurement of girth generally to be taken 0·55 from the bow end of the water-line. The girth difference, d in the formula, is the difference between the chain girth, measured as above described, from covering-board to covering-board, and the skin girth between the same points, measured along the actual outline of the cross-section.

For racing the yachts are divided into eleven classes. Class A is for schooners and yawls only, above 23 metres (75·4 ft.) of rating, with a time allowance of four seconds per metre per mile. All the yachts in this class must be classed A1. In racing, yawls sail at their actual rating and schooners at 12% less than their actual rating. The other classes are the ten separate cutter classes, in which there is no time allowance whatever:—

International Classes approximating to L.W.L. of Yacht.	Corresponding Classes in English Feet.	Limit to Number of Persons allowed on Board during a Race.
23 metres rating. .	75·4	No limit
19 " " . .	62·3	20
15 " " . .	49·2	14
12 " " . .	39·4	10
10 " " . .	32·8	8
9 " " . .	29·5	6
8 " " . .	26·2	5
7 " " . .	23·0	4
6 " " . .	19·7	3
5 " " . .	16·4	2

Under the international rule the old trouble of ultra-light scantling in racing yachts has been completely abolished, for all yachts must be built under the survey and classed with one of the three classification societies—Lloyd's Register of British and Foreign Shipping, Germanischer Lloyd, or Bureau Veritas; and yachts of the international cutter classes enumerated above so built will be classed R., denoting that their scantlings are as required for their respective rating classes. This rule was introduced on the 1st of January 1908; England, Germany, France, Norway, Sweden, Denmark, Austria-Hungary, Belgium, Holland, Italy, Spain, Finland, Russia and the Argentine Republic agreed to adopt it until December 31st, 1917. England adopted the new system a year before it formally became international, on the 1st of January 1907.

Racing Yachts Built under the International Rules.—The new rule produced the type of yacht desired—a vessel combining habitability with speed. Amongst the handsomest examples were the German Emperor's schooner "Meteor" (1909), and the schooner "Germania" (1908), 400 tons or 31½ metres measurement, Class A, both built by Krupp's at Kiel. German designed, German built, and German rigged and manned, they demonstrated the wonderful strides made by Germany in yachting. A few years before there were not a dozen smart yachts in Germany, and indeed the Kaiserlicher Yacht Club at Kiel was only founded in 1887. The "Germania" holds the record over the old "Queen's course" at Cowes, having in 1908 sailed it a quarter of an hour faster than any other vessel. Her time over the distance of about 47 to 48 nautical m. was 3 hours 35 min. 11 secs., or at the rate of 13·1 knots. In 1910 Herreshoff built a wonderful racing schooner of A class for the international rules called the "Westward," and in the races this Yankee clipper sailed at Cowes she proved the most weatherly schooner ever built.

It is interesting to recall some old records of speed over courses inside the Isle of Wight.

Date.	Yacht.	Distance.	Time.	Remarks.
1858	The Arrow	45 miles	4 h. 19 m.	Cutter } Same
1872	The Arrow	50 "	4 h. 40 m.	Cutter } vessel.
1872	Kriemhilda	50 "	4 h. 37 m.	Cutter.
1883	Marjorie	50 "	4 h. 26 m.	Cutter.
1883	Samoena	50 "	4 h. 15 m.	Cutter.
1885	Lorna	50 "	4 h. 14 m.	Yawl.
1885	Irex	50 "	4 h. 7 m.	Cutter.
1870	Egeria	50 "	4 h. 27 m.	Schooner.
1875	Olga	50 "	4 h. 25 m.	Schooner.
1879	Enchantress	50 "	4 h. 18 m.	American schooner.
1908	Cicely	46 "	3 h. 43 m.	British sch.
1902	Meteor	47 "	3 h. 50 m.	American sch.
1908	Shamrock	47 "	4 h. 0 m.	British cutter, only 75 feet L.W.L.
1908	Germania	47 "	3 h. 35 m.	German sch.

In 1907, 1908, 1909 and 1910, 389 yachts were built under the international rules:—A class, 3; 23 metres class, 3; 15 metres class, 15; 12 metres, 21; 10 metres, 33; 9 metres, 17; 8 metres, 88; 7 metres, 46; 6 metres, 144; and 5 metres, 22. The 23-metre cutters "Shamrock," designed by Fife (1908), belonging to Sir Thomas Lipton, "White Heather II." (Fife; 1907), owned by Mr Kennedy, and "Brynhild" (Nicholson; 1907), owned by Sir James Pender; and also "Ostara," 15 metres (Mylne; 1909), owned by Mr W. P. Burton; "Hispania," 15 metres (Fife; 1909), owned by the king of Spain; "Alachie and Cintra" (Fife) in the 12-metre class, have been amongst the best yachts built for the international rules. During the seasons of 1908, 1909 and 1910 there was splendid sport in England, Germany, France, Belgium, Norway and Sweden, and indeed all over the continent; the yachts were very closely matched, the 15-metres (49·2 ft.), 8-metres (26·2 ft.) and 6-metres (19·7 ft.) proving perhaps the most popular. The national authorities of the countries which adopted the international rules in 1906 have now formed an International Yacht-Racing Union, under the chairmanship of the British Yacht-Racing Association.

YACHT-BUILDING STATISTICS.

The number and tonnage of yachts shown on Lloyd's Register (1909) as built in the several countries are as follows:—

<table>
<tr><th rowspan="3"></th><th colspan="18">COUNTRIES.</th><th colspan="2" rowspan="2">TOTAL.</th></tr>
<tr><th colspan="2">United Kingdom.</th><th colspan="2">British Colonies.</th><th colspan="2">Belgium and Holland.</th><th colspan="2">Denmark.</th><th colspan="2">France.</th><th colspan="2">Germany and Austria.</th><th colspan="2">Italy.</th><th colspan="2">Norway and Sweden.</th><th colspan="2">Other Countries.</th></tr>
<tr><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th><th>No.</th><th>Tons.</th></tr>
<tr><td>Steam and Motor Yachts:— Total .</td><td>1,443</td><td>190,160</td><td>137</td><td>3,775</td><td>76</td><td>2,454</td><td>27</td><td>5,498</td><td>182</td><td>6,745</td><td>86</td><td>6,602</td><td>20</td><td>427</td><td>37</td><td>1,648</td><td>286</td><td>66,107</td><td>2,294</td><td>283,418</td></tr>
<tr><td>Sailing Yachts:— Total .</td><td>3,151</td><td>57,510</td><td>271</td><td>3,231</td><td>129</td><td>2,643</td><td>106</td><td>1,911</td><td>347</td><td>4,062</td><td>647</td><td>6,884</td><td>40</td><td>571</td><td>305</td><td>3,899</td><td>269</td><td>13,298</td><td>5,274</td><td>94,009</td></tr>
<tr><td>Grand Total .</td><td>4,594</td><td>247,670</td><td>408</td><td>7,006</td><td>205</td><td>5,097</td><td>133</td><td>7,409</td><td>529</td><td>10,807</td><td>733</td><td>13,486</td><td>60</td><td>998</td><td>342</td><td>5,547</td><td>555</td><td>79,405</td><td>7,568</td><td>377,427</td></tr>
</table>

American yachts of 75 gross registered tons and upwards are included under "Other Countries"; the number of these yachts built in America is 248 of 67,119 tons.

In 1909, in the United Kingdom, from January to May, the time of the year when yachts are generally constructed, there were building, or built, 27 steam yachts of 3471 tons, and 28 sailing yachts of 963 tons: this includes only yachts of 10 tons and upwards. Excluding the small craft built in America, particulars of which are difficult to obtain, there were on the register 7568 yachts with a tonnage of 377,427. In 1887 there was a total of about 3000 yachts on the register with a tonnage of 132,718. Since that date, therefore, in round figures, 1500 had been added to the number and more than 100,000 tons to the tonnage. This fact seems to show clearly the extension of the pastime of yachting.

The America's Cup.

This international trophy was originally a cup given by the Royal Yacht Squadron at Cowes, Isle of Wight, on the 22nd of August 1851, for a race open to all yachts, with no time allowance of any kind, the course being "round the Isle of Wight, inside the No Man's buoy and Sand Head buoy and outside the Nab." Fifteen vessels took up their stations off Cowes and started from moorings. In the table on the following page are the names of the competitors.

The fleet started at 10 o'clock. At the No Man's buoy the yachts were in a cluster, "Volante" leading, then "Freak" "Aurora," "Gipsy Queen," "America," "Beatrice," "Alarm," "Arrow" and "Bacchante" in the order named. The other six brought up the rear, and the "Wyvern" returned to Cowes. Passing out to the

Yacht.	Rig.	Tons.	Owner.
Beatrice .	Schooner	161	Sir W. P. Carew.
Volante .	Cutter	48	Mr J. L. Craigie.
Arrow .	Cutter	81	Mr T. Chamberlayne.
Wyvern .	Schooner	205	The duke of Marlborough.
Ione .	Schooner	75	Mr A. Hill.
Constance .	Schooner	218	The marquis of Conyngham.
Gipsy Queen	Schooner	160	Sir H. B. Hoghton.
Alarm .	Cutter	193	Mr J. Weld.
Mona .	Cutter	82	Lord Alfred Paget.
America .	Schooner	170	Messrs Stevens.
Brilliant .	3-masted schooner	392	Mr G. H. Ackers.
Bacchante .	Cutter	80	Mr B. H. Jones.
Freak .	Cutter	60	Mr W. Curling.
Eclipse .	Cutter	50	Mr H. S. Fearon.
Aurora .	Cutter	84	Mr T. Le Marchant.

eastward the "America" went inside the Nab, a course which was contrary to the printed programme, but an objection afterwards made on this score against her was not persisted in. Off Sandown Bay the "America" obtained a long lead and in a freshening wind carried away her jibboom. Here the "Aurora" was second boat. The "Volante" sprung her bowsprit and gave up. The "Arrow" ran ashore and the "Alarm" went to her assistance, so both were out of the race. Abreast of Ventnor the American schooner was a mile ahead of "Aurora," which was the last British craft to keep her in sight in a thick haze that blew up from the S.W. late in the afternoon. At the Needles the wind dropped until it was very light, and the "America" was then some 6 m. ahead of "Aurora," the time being about 6 p.m. The finish was:—

America (winner) . .	8.37 p.m.	Aug. 22.
Aurora	8.58 p.m.	Aug. 22.
Bacchante . . .	9.30 p.m.	Aug. 22.
Eclipse . . .	9.45 p.m.	Aug. 22.
Brilliant . . .	1.20 a.m.	Aug. 23.

The "America" was built at New York by the firm of George & James R. Steers for the special purpose of competing with British yachts at Cowes. George Steers, who was born in New York, designed her, the designer being a son of Henry Steers, a shipwright at Dartmouth. The registered owners of the vessel were Mr J. C. Stevens, the commodore of the New York Yacht Club, Mr C. A. Stevens, Mr H. Wilkes and Mr J. B. Finlay. Her crew consisted of thirteen all told, seven seamen before the mast, two mates, cook, steward, boy and master. The cost of building was set down at £24 per ton, and her builder was to receive one-third more should she succeed "in out-sailing any competitors of the same tonnage in England." The vessel had a long lean hollow entrance and rather short but fine run, but her lines were graceful and clean and the transverse sections amidships very gentle and shapely. She had a clipper bow and elliptical stern. Her sails particularly were superior in cut to those of the English vessels. Her masts raked, and she carried a mainsail laced to the boom, which in those days was almost unknown in England, a foresail, and a jib, also set on a boom and on an immensely heavy forestay which was the chief support of the foremast. She carried a small main topsail with a short yard and small jackyard. Occasionally she set also a flying jib on a jibboom, but this was not regarded as of much account. The principal dimensions of the "America" were: tonnage 171; length over all 94 ft.; on the keel 82 ft.; beam 22 ft. 6 in.; foremast 79 ft. 6 in.; mainmast 81 ft. (with a rake of 2¼ in. to the foot in each mast); hollow bowsprit 17 ft. out board only; foregaff 24 ft.; maingaff 28 ft.; mainboom 56 ft. She was ballasted with pig-iron; 21 tons of the iron were permanently built into the vessel and the rest stowed inside. Below deck she was comfortably fitted for the living accommodation of the owner, guests and crew, and a cockpit on deck was a feature that few English yachts of the period possessed.

The cup won at Cowes by the "America," although not originally intended as a challenge cup, was afterwards given to the New York Yacht Club by the owner of the "America" as a challenge trophy and named the "America's cup." In 1887 the sole surviving owner of the cup, George L. S. Schuyler, attached to the trophy a deed of gift which sets forth the conditions under which all races for the cup must take place. In brief the conditions are: (1) That the races must be between one yacht built in the country of the challenging club and one yacht built in the country of the club holding the cup. (2) That the size of the yachts, if of one mast, must be not less than 65 ft. L.W.L. and not more than 90 ft. L.W.L. If of two-masted rig not less than 80 ft. L.W.L. and not more than 115 ft. L.W.L. (3) The challenging club must give ten months' notice of the race, and accompanying the challenge must be sent the name, rig and the following dimensions: length L.W.L.; beam and draught of water of the challenging vessel (which dimensions shall not be exceeded), and as soon as possible a custom-house registry of the vessel. (4) The vessel must proceed under sail on her own bottom to the pla[illegible] is to take place.

The deed of gift, however, is an elastic document, for it contains the following clause which is known as the *Mutual Agreement Clause*: "The club challenging for the cup and the club holding the same may by mutual consent make any arrangement satisfactory to both as to the dates, courses, number of trials, rules and sailing regulations, and any and all other conditions of the match, in which case also the ten months' notice may be waived."

In 1870 Mr James Ashbury of Brighton challenged with the schooner "Cambria," and in 1871 with another schooner the "Livonia." In both cases the event was a test of rival types, "Cambria" and "Livonia" being old-fashioned British schooners while the vessels they met were the pick of the American broader and shallower types. "Cambria" had to meet fourteen opponents, but in 1871 the "Livonia" raced against one opponent only. The Americans, however, although they agreed to race one vessel only against the "Livonia," brought several yachts up to the line and only selected their defender at the last moment. The first defender which "Livonia" had to meet was the "Columbia," which won the first and second events. In the third meeting, however, in a very strong wind the British schooner hammered the "Columbia" severely, and eventually the American yacht, having carried away some gear, was beaten by a quarter of an hour. In the two remaining races of the series the Americans were represented by the "Sappho," which easily defeated the "Livonia."

The next challenges came from Canada in 1876 and 1881, but neither the schooner "Countess of Dufferin" nor the sloop "Atalanta" met with any success.

The races of 1885 and 1886, when Sir Richard Sutton challenged with "Genesta" and Lieutenant Henn, R.N., with "Galatea," were interesting chiefly because they were of the nature of trials between the heavy plank-on-edge type of cutter and the prevailing American type of broad light-draught sloop. The contests proved the superiority of the American sloops.

In 1886 the plank-on-edge type was abandoned in England, and when the Scottish yacht "Thistle" was built in 1887 to challenge for the cup it was hoped that she would meet with success. "Thistle," however, although of greater beam and proportionately lighter displacement than such vessels as "Genesta" and "Galatea," was quite easily defeated by the centre-board sloop "Volunteer." Thus once again did the lighter American type prevail even against the modified form of the "Thistle."

The race between the "Thistle" and "Volunteer" of 1887 may be said to have been the last race for the cup wherein there was any marked difference between the type of the boats contesting. In all subsequent races the form of the challenger and defender became approximately similar, but while the types were gradually converging the American yachts were still usually somewhat lighter in displacement than the challengers. The "Thistle" was the first vessel built in Great Britain expressly for the match, and after her race in 1887 the types in fashion on both sides of the Atlantic rapidly converged, and deep-draught fin-keeled vessels with deep fins and light shallow hulls took the place of the former types of the shallow American sloops and deep-keeled wall-sided British cutters. In 1892 some splendid semi-fin-keeled cutters of the new pattern were built in the 40-rating class for the ordinary English coast regattas, and in 1893 the fin-keel type in England was even more successful. The first class cutters "Britannia," "Valkyrie II.," "Satanita" and "Calluna," built in 1893, handsomely defeated a Herreshoff yacht, the "Navahoe," which went over from America to race against them. On the strength of the victories of "Valkyrie II." and "Britannia" many British yachtsmen anticipated success for Lord Dunraven when he raced for the America's cup with his cutter "Valkyrie II." in the autumn of 1893. The Americans, however, had built a fine fleet of defenders, "Colonia," "Pilgrim," "Jubilee" and "Vigilant," and the latter beat "Valkyrie II." In the following season the "Vigilant" crossed the Atlantic and raced in British waters in 1894 against the "Britannia," and was frequently beaten. G. L. Watson, who had designed "Thistle" and "Valkyrie II." as well as "Britannia," was commissioned by Lord Dunraven to design "Valkyrie III." specially for an "America's cup" race in 1895. "Valkyrie III." was a very extreme fin-keeled boat, and for the first time the challenger appeared to have outbuilt the defending designer. "Valkyrie III." carried 13,027 sq. ft. of sail to the American "Defender's" 12,602. It was said that the Watson boat actually had less displacement. Both were 90 ft. L.W.L., "Valkyrie III." being 129 ft. over all against "Defender's" 123, and "Valkyrie III." 26·2 ft. beam against "Defender's" 23·03 ft. The races were unsatisfactory. In the first race Lord Dunraven claimed that "Valkyrie III." was hampered by the wash of steamers following the race, and his yacht was 8 m. 49 sec. astern. In the second race "Valkyrie" beat "Defender" by 49 seconds on the corrected time and actually by 1 m. 14 sec., but there was a foul at the start in which "Defender" was partially disabled. On protest the English yacht was disqualified, so that both events counted to "Defender." In the third race Lord Dunraven objected that ballast had been added to the American yacht since measurement, and the "Valkyrie III." merely crossed the line and retired, giving the "Defender" the match.

In 1899, 1901 and 1903 Sir Thomas Lipton tried to win the cup with three very costly and extreme vessels, "Shamrock I.," "Shamrock II." and "Shamrock III." No. I. and No. III. were designed by W. Fife, and No. II. by G. L. Watson. In 1899 "Shamrock I." was rather easily defeated by "Columbia." In 1901 the Americans were not especially successful in building the vessel which they had prepared to defend the cup, and in the trial races the old 1899 yacht "Columbia," sailed by Captain Charles Barr—a half-brother of the skipper of the Scottish yacht "Thistle"—defeated the new vessel "Constitution," which had been built for the defence of the trophy for 1901; consequently the New York Yacht Club again selected the "Columbia" to defend the cup against "Shamrock II." After very close racing the "Columbia"—which was the better handled boat—retained the prize.

The next contest for the cup was in 1903. On this occasion Herreshoff turned out in "Reliance" a wonderful example of a large fin-keeled boat with full pram-bow and light skimming-dish hull. She was of the lightest possible construction (bronze with steel web frames), 90 ft. length L.W.L., 144 ft. length over all, with 16,160 sq. ft. of sail area, 25 ft. 10 in. beam, and a draught of 19 ft. 9 in. "Reliance" was a far more extreme vessel than "Shamrock III." The latter had a deeper body and a less prammed overhang forward. With the same water-line as "Reliance," the English yacht had rather over a foot less beam. The chief difference in dimensions, however, was in the sail area; "Shamrock III." carried 14,337 sq. ft., or 1823 sq. ft. less than "Reliance." The result was a very easy victory for the "Reliance."

RACES FOR THE AMERICA'S CUP

Date.	Name.	Tonnage.	Course.	Allows	Elapsed Time.	Corrected Time.	Wins by
				M. S.	H. M. S.	H. M. S.	M. S.
Aug. 22, 1851	America	170	From Cowes around Isle of Wight (Aurora second).	..	10 37 0	10 37 0	18 0
	Aurora	47		..	10 55 0	10 55 0	
Aug. 8, 1870	Magic	97·2	N.Y.Y.C. Course (Cambria tenth).	..	4 7 54	3 58 26	39 12·7
	Cambria	227·6		..	4 34 57	4 37 38	
Oct. 16, 1871	Columbia	220	N.Y.Y.C. Course.	..	6 17 42	6 19 41	27 4
	Livonia	280		..	6 43 0	6 46 45	
Oct. 18, 1871	Columbia	220	20 miles to windward off Sandy Hook Lightship and return.	..	3 1 33½	3 7 41¾	10 33¾
	Livonia	280		..	3 6 49½	3 18 15½	
Oct. 19, 1871	Livonia	280	N.Y.Y.C. Course (Columbia disabled).	..	3 53 5	4 2 25	15 10
	Columbia	220		..	4 12 38	4 17 35	
Oct. 21, 1871	Sappho	310	20 miles to windward off Sandy Hook Lightship and return.	..	5 33 24	5 36 2	33 21
	Livonia	280		..	6 4 38	6 9 23	
Oct. 23, 1871	Sappho	310	N.Y.Y.C. Course.	..	4 38 5	4 46 17	25 27
	Livonia	280		..	5 4 41	5 11 44	
Aug. 11, 1876	Madeleine	151·49	N.Y.Y.C. Course.	..	5 24 55	5 23 54	10 59
	C'tess.of Dufferin	138·20		..	5 34 53	5 34 53	
Aug. 12, 1876	Madeleine	151·49	20 miles to windward off Sandy Hook Lightship and return.	..	7 19 47	7 18 46	27 14
	C'tess.of Dufferin	138·20		..	7 46 0	7 46 0	
Nov. 9, 1881	Mischief	79·27	N.Y.Y.C. Course.	..	4 17 9	4 17 9	28 20½
	Atlanta	84		..	4 48 24½	4 45 29½	
Nov. 10, 1881	Mischief	79·27	16 miles to leeward from Buoy 5 off Sandy Hook and return.	..	4 54 53	4 54 53	38 54
	Atlanta	84		..	5 36 52	5 33 47	
Sept. 14, 1885	Puritan	140	N.Y.Y.C. Course.	..	6 6 5	6 6 5	16 19
	Genesta	80		0 28	6 22 52	6 22 24	
Sept. 16, 1885	Puritan	140	20 miles to leeward off Sandy Hook Lightship and return.	..	5 3 14	5 3 14	1 38
	Genesta	80		0 38	5 5 20	5 4 52	
Sept. 9, 1886	Mayflower	171·74	N.Y.Y.C. Course.	..	5 26 41	5 26 41	12 2
	Galatea	171·14		0 38	5 39 21	5 38 43	
Sept. 11, 1886	Mayflower	171·74	20 miles to leeward off Sandy Hook Lightship and return.	..	6 49 0	6 49 0	29 9
	Galatea	171·14		0 39	7 18 48	7 18 9	
Sept. 27, 1887	Volunteer	209·08	N.Y.Y.C. Course.	..	4 53 18	4 53 18	19 23¾
	Thistle	253·94		0 5	5 12 46¾	5 12 41¾	
Sept. 30, 1887	Volunteer	209·08	20 miles to windward off Scotland Lightship and return.	..	5 42 56¼	5 42 56¼	11 48¾
	Thistle	253·94		0 6	5 54 51	5 54 45	
		Sailing Length.					
				M. S.	H. M. S.	H. M. S.	M. S.
Oct. 7, 1893	Vigilant	96·78	15 miles to windward off Scotland Lightship and return.	..	4 5 47	4 5 47	5 48
	Valkyrie II.	93·11		1 48	4 13 23	4 11 35	
Oct. 9, 1893	Vigilant	96·78	Course—equilateral triangle—30 miles.	..	3 25 1	3 25 1	10 35
	Valkyrie II.	93·11		1 48	3 37 24	3 35 36	
Oct. 13, 1893	Vigilant	96·78	15 miles to windward off Scotland Lightship and return.	..	3 24 39	3 24 39	0 40
	Valkyrie II.	93·57*		1 33	3 26 52	3 25 19	
Sept. 7, 1895	Defender	100·36	15 miles to windward off Scotland Lightship and return.	0 29	5 0 24	4 59 55	8 49
	Valkyrie III.	101·49		..	5 8 44	5 8 44	
Sept. 10, 1895	Defender	100·36	Course—equilateral triangle—30 miles.	0 29	3 56 25	3 55 56	0 47
	Valkyrie III.	101·49		..	3 55 9†	3 55 9	
Sept. 12, 1895	Defender	100·36	15 miles to windward and return from Sandy Hook Lightship.	0 29	4 44 12	4 43 43	..
	Valkyrie III.	101·49		..	‡		
Oct. 16, 1899	Columbia	102·135	15 miles E.S.E. from Sandy Hook Lightship and return—30 miles.	..	4 53 53	4 53 53	10 8
	Shamrock	101·092		0 6	5 4 7	5 4 1	
Oct. 17, 1899	Columbia	102·135	10 miles triangular from Sandy Hook Lightship—30 miles.	..	3 37 0	..	..
	Shamrock	101·092		0 6	§		
Oct. 20, 1899	Columbia	102·135	15 miles S. by W. from Sandy Hook Lightship and return—30 miles.	0 16	3 38 25	3 38 9	6 34
	Shamrock	102·565		..	3 44 43	3 44 43	
Sept. 28, 1901	Columbia	102·355	15 miles E. by S. from Sandy Hook Lightship and return—30 miles.	0 43	4 31 7	4 30 24	1 20
	Shamrock II.	103·79		..	4 31 44	4 31 44	
Oct. 3, 1901	Columbia	102·355	Course—equilateral triangle—30 miles.	0 43	3 13 18	3 12 35	3 35
	Shamrock II.	103·79		..	3 16 10	3 16 10	
Oct. 4, 1901	Columbia	102·355	15 miles S.S.E. from Sandy Hook Lightship and return—30 miles.	0 43	4 33 40	4 32 57	0 41
	Shamrock II.	103·79		..	4 33 38	4 33 38	
Aug. 22, 1903	Reliance	108·41	15 miles to windward and return—30 miles.	..	3 32 17	3 32 17	7 3
	Shamrock III.	104·37		1 57	3 41 17	3 39 20	
Aug. 25, 1903	Reliance	108·41	Course—equilateral triangle—30 miles.	..	3 14 54	3 14 54	1 19
	Shamrock III.	104·37		1 57	3 18 10	3 16 12	
Sept. 3, 1903	Reliance	108·39	15 miles to windward and return—30 miles.	..	4 28 0	4 28 0	..
	Shamrock III.	104·37		1 57	Did not finish.		

* Remeasured. † Disqualified for fouling "Defender." ‡ Withdrew on crossing the line. § Carried away topmast and withdrew.

(B. H.-S.)

YAK, the wild (and domesticated) ox of the Tibetan plateau; a species nearly allied to the bison group. The yak, *Bos (Pŏephagus) grunniens*, is one of the finest and largest of the wild oxen, characterized by the growth of long shaggy hair on the flanks and under parts of the body and the well-known bushy tail. In Europe a false impression of the yak is prevalent, owing to the fact that all the specimens imported have belonged either to a small domesticated breed from Darjiling, or to half-breeds; the latter being generally black and white, instead of the uniform black of the pure-bred and wild animal. None of such half-breeds can compare with the magnificent half-tamed animals kept by the natives of the elevated Rupsu plateau, S. of the Indus, where they afford the only means of transport by this route between Ladak and India. But even these are inferior to the wild yak, which stands nearly 6 ft. at the shoulder, and is absolutely confined to the arid central plateau of Tibet. Yak have the great disadvantage that they will not eat corn, and the large pure-bred animals will not live at low elevations. The tails are used in India as fly-whisks, under the name of chowris. The title of "grunting ox" properly belongs only to the domesticated breed.

Domesticated Yak, *Bos (Pŏephagus) grunniens*.

YAKUB KHAN (1849–   ), ex-amir of Afghanistan, son of the amir Shere Ali, was born in 1849. He showed great ability at an early age, and was made governor of Herat by his father, but broke into open rebellion against him in 1870, and was imprisoned in 1874 in Kabul. However, when Shere Ali in 1878 fled before the British, he handed over the government to Yakub, who, on his father's death in the following February, was proclaimed amir, and signed a treaty of peace with the British at Gandamak. He agreed to receive a British resident, and was in turn to receive a subsidy and support against foreign attack. But in September of the same year his revolted troops attacked the British residency, and the resident, Sir Louis Cavagnari, and his staff and suite were cut to pieces. This outrage was instantly avenged, for in October Earl (then Sir Frederick) Roberts with a large force defeated the Afghans on the 6th and took possession of Kabul on the 12th. Yakub Khan thereupon abdicated, took refuge in the British camp, and was sent to India on the 13th of December.

YAKU-SHIMA, an island belonging to Japan, lying S. of Kiu-shiu, in 30° 30′ N. and 130° 30′ E. It is an irregular pentagon, 14 m. in width and the same in length. It is separated from Tanega-shima by the Vincennes Strait (Yaku-kaikyō), 12½ m. wide, and its surface is broken by lofty mountains, of which Yae-dake rises to a height of 6515 ft., and Eboshi-dake to a height of 4840 ft. It is covered with dense forest, in which are some of the finest cryptomeria in Japan, known as *Yaku-sugi*.

YAKUTSK, a province of E. Siberia, including nearly the whole of the basin of the Lena, and covering an area of 1,530,253 sq. m. It has the Arctic Ocean on the N., the governments of Yeniseisk and Irkutsk on the W., and Irkutsk and Amur on the S., and is separated from the Pacific (Sea of Okhotsk) by the narrow Maritime Province. The Vitim plateau, 2500 to 3500 ft. in altitude, bordered on the S.E. by the Stanovoi Mountains, occupies the S.E. portion of the province. Its moist, elevated valleys, intersected by ranges of flat, dome-shaped hills, which rise nearly 1000 ft. above the plateau, form an immense desert of forest and marsh, visited only by Tungus hunters, save in the S.W., where there are a few gold-mining settlements. The high border-ridge of the plateau (see SIBERIA) stretches from the South Muya Mountains towards the N.E., thus compelling the river Aldan to make a great bend in that direction. An alpine country skirts the plateau all along its N.W. margin, and contains productive gold-mines in the spurs between the Vitim and the Lena. The latter stream drains the outer base of this alpine region. It is a wild land, traversed by several chains of mountains, all having a N.E. strike, and intersected by deep, narrow valleys, down which the mountain-streams tumble uncontrolled. The whole is clothed with dense forests, through which none but the Tunguses can find their way. The summits of the mountains, 4000 to 6000 ft., mostly rise above the limits of tree vegetation, but in no case pass the snow-line. The summits and slopes alike are strewn with *débris* of crystalline rock, mostly hidden under thick incrustations of lichens, amid which the larch alone is able to find sustenance. Birch and aspen grow on the lower slopes; and in the narrow valley bottoms thickets of poplar and willow or patches of grass spring up on the scanty alluvium. All the necessaries of life for the gold-diggings have to be shipped from Irkutsk down the Lena, and deposited at entrepôts, whence they are transported in winter by means of reindeer to their destination. A line drawn from the mouth of the Vitim N.E. towards that of the Aldan separates the mountain regions from the elevated plains (1500 to 2000 ft.) which fringe the highlands all the way from the upper Lena to Verkhne-Kolymsk, and probably to the mouth of the Kolyma. Vast meadows, sometimes marshy, extend over these plains in the S.W.; farther N. mosses and lichens are the predominant vegetation. The surface is much furrowed by rivers and diversified by mountain-chains (Verkhoyansk, Kolymsk and Alazeya) about the real character of which little is known. Beyond the elevated plains vast tundras, carpeted with mosses and lichens, stretch to the shores of the ice-bound ocean.

The Arctic coast is indented by several bays—Borkhaya and Yana E. of the Lena delta, and Omulakh, Kolyma and Chaun still farther E. The islands fall into three groups—the Lyakhov, the Anjou or New Siberian and the De Long Islands. The Medvyezhie (Bear) Islands off the Kolyma and the two Ayun Islands in Chaun Bay are merely littoral. Wrangel Land seems to be the outer island of a great and as yet unknown archipelago. Every year a narrow passage close to the coast is left almost free of ice, enabling a ship or two sometimes to reach the estuary of the Yenisei, or even the delta of the Lena.

The great artery of Yakutsk, the Lena, rises on the W. slope of the Baikal Mountains, close to Lake Baikal. About 60° N. it receives from the right its first great tributary, the Vitim (1250 m. in length), which is navigable by steamers in its lower course. The Olekma (700 m.) is navigable only in the very lowest part of its course, and the Aldan (1155 m.) is navigated from Ust-Maysk. On the left is the Vilyui (1300 m.), which has an immense drainage area on the lower plains, and has been navigated since 1887. The lower course of the Lena is subject to terrible inundations when the ice breaks up on its upper reaches. The Olenek (1200 m.), which enters the Arctic Ocean to the W. of the Lena, is also a considerable river; the Yana (750 m.), Indigirka (950) and Kolyma (1100) all rise in the mountain region between 61° and 62° N., and flow N. and N.E. into the Arctic Ocean.

The granites, granitic syenites and gneisses of the high plateau are wrapped about by a variety of crystalline slates, Huronian and Laurentian; and Silurian and Devonian limestones and sandstones extend over vast areas. Farther N. the Carboniferous, Cretaceous and Jurassic formations are spread over a wide region, and the whole is covered with Glacial deposits in the highlands and with post-Glacial elsewhere. The mineral wealth of Yakutsk is very great; but gold and salt (obtained from springs) only are worked. Coal has been discovered on the Vilyui and on the lower Lena.

Yakutsk has unparalleled extremes of cold and heat. At

Verkhoyansk on the Yana (67° 34′ N. and 134° 20′ E.), frosts of −79·5° F. have been observed, and the average temperature of the three winter months is −53·1°; even that of March only is little above the freezing-point of mercury (−37·9°). Neither Ust-Yansk (70° 55′ N., but close to the sea coast) nor Yakutsk, nor even the polar station of Sagastyr at the mouth of the Lena (73° 23′ N.), has a winter so cold and so protracted. And yet at Sagastyr temperatures of −63·6° have been observed, and the average temperature of February is only −43·6°. At Yakutsk the average temperature of the winter is −40·2°, and the soil is frozen to a depth of 600 ft. (Middendorff). The Lena, both at Kirensk and at Yakutsk, is free from ice for only 161 days in the year, the Yana at Ust-Yansk for 105. At Yakutsk only 145 days and at Verkhoyansk only 73 have no snow; the interval between the latest frosts of one season and the earliest frosts of the next is barely 37 days.

The bulk of the inhabitants are Yakuts; there are some 20,000 Russians, many of them exiles, and a certain number of Tunguses, Tatars, Lamuts and Chukchis. The estimated pop. in 1906 was 300,600. The Yakuts belong to the Turkish stock, and speak a dialect of Turkish, with an admixture of Mongolian words. They call themselves Sokha or Sakhov (pl. Sokhalar or Sakhalov), their present name having been borrowed by the Russians from the Tunguses, who call them Yeko or Yekot. Most probably they once inhabited S. Siberia, especially the upper Yenisei, where a Tatar tribe calling itself Sakha still survives in Minusinsk. They are middle-sized, have dark and rather narrow eyes, a broad flat nose, thick black hair and little beard. They are very laborious and enterprising, and display in schools much more intelligence than the Tunguses or Buryats. Their implements show a great degree of skill and some artistic taste. They live in log *yurtas* or huts, with small windows, into which plates of ice or pieces of skin are inserted instead of glass. During summer they abandon their wooden dwellings and encamp in conical tents of birch bark. Their food is chiefly flesh, and they drink kumiss, or mares' milk. Though nearly all are nominally Christians, they retain much of their original Shamanism. Their settlements are now steadily advancing S. into the hunting domains of the Tunguses, who give way before their superior civilization.

The province is divided into five districts, the chief towns of which are Yakutsk, Olekminsk, Sredne-Kolymsk, Verkhoyansk and Viluisk. Though the production of gold from gold washings has been on the decrease, over 15,000 workers are employed in the Olekma and Vitim gold-mines. Only 43,000 acres are under crops, chiefly barley. Most of the inhabitants are engaged in live-stock breeding, and keep reindeer and sledge-dogs. Fish is an important article of food, especially in the Kolyma region. In the N. hunting is important, the skins taken being principally those of squirrels, ermines, hares, foxes, Arctic foxes, and a few sables, beavers and bears.

The principal channel of communication is the Lena. As soon as the spring arrives, scores of boats are built at Kachungsk, Verkholensk and Ust-Ilginsk, and the goods brought on sledges in winter from the capital of Siberia, including considerable amounts of corn and salt meat, are shipped down the river. A few steamers descend to the delta of the Lena, and return with cargoes of fish and furs. Cattle are brought from Transbaikalia. Two routes, mere horse-tracks, radiate from Yakutsk to Ayan and to Okhotsk. Manufactured goods and groceries are imported to Yakutsk by the former.

See F. Thiess, *Das Gouvernement Jakutsk in Ostsibirien*, in *Petermann's Mitteilungen* (1897), and Maydell, *Reisen und Forschungen im Jakutskischen Gebiet in Ostsibirien* (St Petersburg, 2 vols., 1895–1896). (P. A. K.; J. T. Be.)

YAKUTSK, a town of Asiatic Russia, capital of the province of the same name, in 62° 2′ N. and 129° 44′ E., 1165 m. N.E. of Irkutsk, on a branch of the Lena. Pop. about 7000. The old fort is destroyed, except its five wooden towers. The wooden houses are built upon high basements to protect them from the floods. Yakutsk possesses a theological seminary and a cathedral. Its merchants carry on trade in furs, mammoth ivory and reindeer hides. The town was founded in 1632.

YALE UNIVERSITY, the third oldest university in the United States, at New Haven, Connecticut. The founders of the New Haven colony, like those of Massachusetts Bay, cherished the establishment of a college as an essential part of their ideal of a Christian state, of which education and religion should be the basis and the chief fruits. New Haven since 1644 had contributed annually to the support of Harvard College, but the distance of the Cambridge school from southern New England seemed in those days considerable; and a separate educational establishment was also called for by a divergent development in politics and theology. Yale was founded by ministers selected by the churches of the colony, as President Thomas Clap said, to the end that they might "educate ministers in our own way." Though "College land" was set apart in 1647,[1] Yale College had its actual beginning in 1700 when a few clergymen met in the New Haven with the purpose "to stand as trustees or undertakers to found, erect and govern the College" for which at various times donations of books and money had been made. The formal establishment was in 1701. The Connecticut legislature in October granted a charter which seems to have been partly drafted by Judge Samuel Sewall of Boston; the Mather family also were among those in Boston who welcomed and laboured for the establishment of a seminary of a stricter theology than Harvard, and the ten[2] clergymen who were the founders and first trustees of the College were graduates of Harvard.

The legislature, fearful of provoking in England attention either to the new school or to the powers used in chartering it, assumed merely to license a "collegiate school," and made its powers of conferring degrees as unobtrusive as possible. In 1702 the teaching of Yale began. In the early years the upper students studied where the rector lived, and considerable groups of the lower students were drawn off by their tutors to different towns. In 1716 the trustees purchased a lot in New Haven, and in the next year the College was established there by the legislature. Commencement was held at New Haven in the same year, but the last of the several student bodies did not disband until 1719. The school did not gain a name until the completion of the first building in 1718. This had been made possible by a gift from Elihu Yale (1649–1721), a native of Boston and son of one of the original settlers of New Haven; he had amassed great wealth in India, where he was governor of the East India Company's settlement at Madras. The trustees accordingly named it Yale College in his honour.

The charter of 1701 stated that the end of the school was the instruction of youth "in the arts and sciences," that they might be fitted "for public employment, both in church and civil state." To the clergy, however, who controlled the College, theology was the basis, security and test of "arts and sciences." In 1722 the rector, Timothy Cutler, was dismissed because of a leaning toward Episcopacy. Various special tests were employed to preserve the doctrinal purity of Calvinism among the instructors; that of the students was carefully looked after. In 1753 a stringent test was fixed by the Corporation to ensure the orthodoxy of the teachers. This was abolished in 1778. From 1808 to 1818 the President and tutors were obliged to signify assent to a general formulation of orthodox belief. When George Whitefield, in 1740, initiated by his preaching the "Great Awakening," a local schism resulted in Connecticut between "Old Lights" and "New Lights." When the College set up an independent church the Old Lights made the contention that the College did not owe its foundation to the original trustees, but to the first charter granted by the legislature, which might therefore control the College. This claim President Clap triumphantly controverted (1763), but Yale fell in consequence under popular distrust, and her growth was delayed by the shutting off of financial aid from the legislature.

By the first charter (1701) the trustees of the College were required to be ministers (for a long time, practically,

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[1] In 1668 the Hopkins Grammar School, next after the Boston Latin School the oldest educational institution of this grade in the United States, was established in New Haven.

[2] This number was increased to eleven, the full number allowed by the charter, within a month after it was granted.

Congregationalists) residing in the colony. By a supplementary act of 1723 the rector was made ex-officio a trustee. By a second charter (1745) ample powers were conferred upon the president (rector) and fellows, constituting together a governing board or Corporation. This charter is still in force. In 1792 the governor and lieutenant-governor of the state, and six state senators, were made ex-officio members of the Corporation. In 1872 the six senators were replaced by six graduates, chosen by the alumni body. The clerical element still constitutes one half of the Corporation. In the first half of the 19th century, under the lead of Nathaniel W. Taylor (*q.v.*), the Divinity School of Yale became nationally prominent for " Taylorism " or " New Haven Theology." Daily attendance at prayers is still required of all college students.

The first college professorship established was that of divinity (1755), which, in a sense, was the beginning of extra-college or university work. The theological department was not organized as a distinct school until 1822. In 1770 a second professorship was established, of mathematics and natural philosophy. Timothy Dwight (president, 1795–1817) planned the establishment of professional schools; his term saw the foundation of the Medical School (1813) besides the Divinity School. In 1803 a chair was created for Benjamin Silliman, Sr. (1779–1864) in chemistry and natural history; English grammar and geography did not disappear from the curriculum until 1826, nor arithmetic until 1830; political economy was introduced in 1825, and modern languages (French) in the same year. Not until 1847 did modern history receive separate recognition. The Library had been given the status of an independent department in 1843. Compulsory commons were abolished in 1842, thus removing one feature of a private boarding school. Corporal punishment (" cuffing " of the offender's ears by the President) had disappeared before the War of Independence; and so also had the custom of printing the students' names according to their social rank, and using a " degradation " in precedence as punishment; while Dwight abolished the ancient custom of fagging, and the undemocratic system of fines that enabled a rich student to live as he pleased at the expense only of his pocket. The School of Law was established in 1843. Instruction to graduates in non-professional courses seems to have been begun in 1826. The appointment of Edward E. Salisbury to the chair of Arabic and Sanskrit (1841) was the first provision at Yale for the instruction of graduates by professors independent of the College. About the same time graduate instruction in chemistry became important. (In 1846 also a chair of agricultural chemistry was established—the first in the country.) In 1846 an extra-College department of Philosophy and Arts was created, conferring degrees since 1852; and from this were separated in 1854 the sciences, which were entrusted to a separate Scientific School, the original promoter of agricultural experiment stations in the United States. Since that time this school and the College have developed much as complementary and co-ordinate schools of undergraduates, Yale affording in this respect a very marked contrast with Harvard. Graduate instruction was concentrated in 1871 into a distinct Graduate School This with the three traditional professional schools—the Art School, established in 1866 (instruction since 1869), and the first university art school of the country, the Music School, established in 1894 (instruction since 1890), and the Forest School, established in 1900—make up the University, around the College. For the founding of the Peabody Museum of Natural History, George Peabody, of London, contributed $150,000 in 1866. The Observatory, devoted exclusively to research, was established in 1871. In 1887 the name Yale " University " was adopted. The organic unity of the whole was then recognized by throwing open to students of any department the advantages of all. In 1886, for the first time, a president was chosen who was not of the College faculty, but from the University faculty.

Great as were the changes in the metamorphosis of old Yale, [illegible] more influence upon its real and inner life than the [illegible] extension of the freedom accorded the students in the selection of their studies. In 1854 there was no election permissible until late in the Junior year. In 1876, 1884 and 1893 such freedom was greatly extended. In 1892 the work of the Graduate School was formally opened to women (some professors having admitted them for years past by special consent). Yale was the first college in New England to take this step.

The buildings number sixty-four in all. Connecticut Hall (1750–52), long known as South Middle College, a plain brick building, is the only remainder of the colonial style (restored, 1905). Around it are fourteen buildings forming a quadrangle on the College campus on the W. side of the New Haven Green, between Elm and Chapel Streets. The oldest are the Old Library (1842) and Alumni Hall (1853). Others are the Art School (1864), Farnam Hall (1869), Durfee Hall (1870), Lawrance Hall (1886), Battell Chapel (1876), Osborn Hall (1889), Vanderbilt Hall (1894), Chittenden Hall (1888) and Linsly Hall (1908). Dwight Hall, erected in 1886 for the Yale University Christian Association, Welch Hall (1892) and Phelps Hall complete the quadrangle. Across from the W. side of the quadrangle is the Peabody Museum (1876). On the N. side of Elm Street is a row of buildings, including the Gymnasium (1892), the Divinity School (1870) and the Law School (1897). University Avenue leads N. from the College campus to the University court or campus, on which are the Bicentennial Buildings (1901–2). E. and N.E. of the University court are the buildings of the Sheffield Scientific School. Farther N.E. are the Observatory, Hammond Metallurgical Laboratory, Forestry Building and Infirmary, and to the S.W. of the College campus are the Medical School and University Clinic.

The University is organized in four departments—Philosophy and the Arts, Theology, Medicine, and Law—each with a distinct faculty. The first embraces the Academical Department (College), the Sheffield Scientific School,—named in honour of Joseph Earle Sheffield (1793–1882), a generous benefactor,—the School of the Fine Arts, the Department of Music, the Graduate School and the Forest School, founded in 1900 by a gift of $150,000 from J. W. Pinchot and his wife. Other institutions organized independently of any one department are: the Library, the Peabody Museum of Natural History, the Astronomical Observatory and the Botanical Garden, established in 1900 on the estate of Professor O. C. Marsh. The special treasures of the Library include the classical library of Ernst Curtius; the collection of Oriental books and manuscripts made by Edward E. Salisbury (1814–1901); the Chinese library of Samuel Wells Williams (1812–1884); a Japanese collection of above 3000 volumes; the Scandinavian library of Count Riant; the collection of Arabic manuscripts made by Count Landberg; the political science collection of Robert von Mohl; a copy of Newton's *Principia* presented to the College by the author; manuscripts of Jonathan Edwards; and large parts of a gift of nearly a thousand volumes given to Yale in 1733 by Bishop George Berkeley, who also gave to the College his American farm, as a basis of a scholarship, the first established in America. The Library is especially strong in the departments of American history, medieval history and English dramatic literature. Its total number of volumes in 1910 was nearly 600,000, exclusive of many thousand pamphlets. The Peabody Museum contains an unrivalled collection of Silurian trilobites; a fine collection of pseudomorphs; a beautiful collection of Chinese artistic work in stone made by Samuel Wells Williams; a notable mineralogical collection; a fine collection of meteorites made by Professor Hubert Anson Newton (1830–1896); and the magnificent palaeontological collection of Professor O. C. Marsh. The School of the Fine Arts possesses the Jarves gallery of Italian art, a remarkable collection of Italian " primitives " dating from the 11th to the 17th century; the Alden collection of Belgian wood-carvings, of the 17th century; and a large collection of modern paintings among which are fifty-four pictures by John Trumbull. The organization of the Trumbull collection in 1831 was the first step taken in the United States toward the introduction of the fine arts into a university. The equipment of the Observatory consists principally of a six-inch heliometer by Repsold, an eight-inch equatorial by Grubb, and two sets of equatorially mounted cameras for photographing meteors.

In the College and the Medical School four years are required to complete the course of instruction; in the Divinity School and the Law School, three years; in the Forest School, two years; and in the Scientific School there are both three-year and five-year courses, five years being required for all engineering degrees. Admission to the College is gained only by passing an examination in Latin, Greek or substitutes for Greek, French or German, English, mathematics and ancient history. Admission to the Scientific School is also only by examination. Substantially the equivalent of a college degree is required for admission to the Divinity School, but the Medical School and the Law School require only two years of college work, and a student may obtain a degree from Yale College and a degree in divinity, medicine or law in six years. The Forest School, with an extensive equipment at New Haven and a Forest Experiment Station comprising about

200 acres of forest and open land at Milford, Pike county, Pennsylvania—the estate of J. W. Pinchot—is open only to such graduates of colleges and scientific schools as have had a suitable scientific training, especially in advanced botany. It confers the degree of Master of Forestry.

In the College the individual courses are arranged in twenty-six groups within three divisions, and each student must complete before graduation both a major and a minor in some one of the three divisions and one minor in each of the other two divisions. In the Freshman and Sophomore years the student's freedom of election is further restricted. In the Scientific School there is a somewhat different system of groups. The College confers only the degree of Bachelor of Arts, but the Scientific School confers the degrees of Bachelor of Philosophy, Master of Science (requiring at least one year of resident graduate study), and the engineering degrees. In the Divinity School the student has the choice of three courses—the historical, the philosophical and the practical—or, by the use of electives, he may combine the three; the study of Hebrew is required only in the historical course. In the Law School there is one course for candidates for the degree of Bachelor of Laws and another for candidates for the degree of Bachelor of Civil Law, the latter requiring the study of Roman law and allowing the substitution of certain studies in political science for some of the law subjects. The Graduate School confers the degrees of Master of Arts and Doctor of Philosophy; the School of Music, the degree of Bachelor of Music; and the School of Fine Arts, which is open to both sexes, the degree of Bachelor of the Fine Arts.

In 1910 the body of officers and instructors in all departments numbered 496, and the students 3312.

In addition to the regular work of the departments there are several lecture courses open to all students of the University. Among them are: the Dodge Lectures on the Responsibilities of Citizenship (1900); the Bromley Lectures on Journalism, Literature and Public Affairs (1900); the Lyman Beecher Lectures on Preaching (1871); the Silliman Memorial Lectures (1884) on subjects connected with "the natural and moral world"; the Stanley Woodward Lectures (1907) by distinguished foreigners; the Harvard Lectures (1905) by members of the faculty of Harvard University; the Sheffield Lectures on scientific subjects; and the Medical Alumni Lectures.

The principal publications with which the University is more or less closely associated are: *The Yale Review, a Quarterly Journal for the Scientific Discussion of Economic, Political and Social Questions*, edited by Professors in Political Science and History; the *Yale Law Journal*, edited by a board of students; the *Yale Medical Journal*, edited by members of the Medical Faculty with the assistance of a board of students; the *Yale Alumni Weekly*; and the *Yale News*, a daily paper managed by the students. The Yale Bicentennial Publications contain reprints of *Research Papers from the Kent Chemical Laboratory*, *Studies in Physiological Chemistry* and *Contributions to Mineralogy and Petrography*. Numerous other publications of the Yale University Press are issued only with the approval of the University.

In addition to several million dollars invested in lands and buildings the University possessed at the end of 1909 productive funds amounting to $10,561,830 (in 1886, $2,111,000). The income from all sources for the year 1908–9, exclusive of benefactions ($1,469,515), was $1,240,208. Up to 1908 more than three-fourths of all the University buildings had been erected as private gifts; the rest were built with College funds, or from legislative grants.

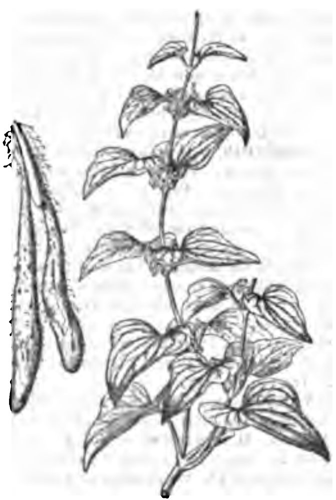
Yale shares with its fellow colleges founded in colonial days the advantages of old traditions and social prestige. In particular it shared these with Harvard so long as New England retained its literary and intellectual dominance over the rest of the country. But the spirit of the two institutions has always been very different. Harvard has on the whole been radical and progressive; Yale conservative. Yale could not draw, like Harvard, on the leaders of the New England schools of letters and philosophy to fill her professorial chairs. Her "comparative poverty, the strength of college feelings and traditions" (President Hadley) united with the lesser stimulus of her intellectual environment to delay her development. Harvard's transformation into a modern university was more spontaneous and rapid; Yale remained much longer under the dominance of collegiate traditions. But, according to Dr Charles F. Thwing (*The American College in American Life*, New York, 1897), of the men filling "the highest political and judicial offices," and coming from American colleges founded before 1770, Yale had helped (up to 1897) to train the largest number. On the roll of her alumni are such names as Philip Livingston, Eli Whitney, John C. Calhoun, James Kent, Samuel F. B. Morse, Chief-Justice Morrison R. Waite and President Taft.

The Presidents have been as follows: in 1701–1707, Abraham Pierson (1645–1707); *pro tem.* 1707–1719, Samuel Andrew (1656–1737); in 1719–1722, Timothy Cutler (1684–1765); in 1722–1726, office filled by the College trustees in rotation; in 1726–1739, Elisha Williams (1694–1755); in 1739–1766, Thomas Clap (1703–1767); *pro tem.* 1766–1777, Naphtali Daggett (1727–1780); in 1777–1795, Ezra Stiles (1727–1795); in 1795–1817, Timothy Dwight (1752–1817); in 1817–1846, Jeremiah Day (1773–1867); in 1846–1871, Theodore Dwight Woolsey (1801–1889); in 1871–1886, Noah Porter (1811–1892); in 1886–1899, Timothy Dwight (b. 1828); and Arthur Twining Hadley (b. 1856).

See *Universities and their Sons* (Boston, 5 vols., 1898–1900); Charles E. Norton, Arthur T. Hadley *et al.*, *Four American Universities* (New York, 1895); Timothy Dwight, *Memories of Yale Life and Men, 1845–1899* (New York, 1903); Franklin Bowditch Dexter, *Sketch of the History of Yale University* (New York, 1887), and *Biographical Sketches of Yale College with Annals of the College History, 1701–1792* (New York, 4 vols., 1885–1907); B. C Steiner, *The History of Education in Connecticut*, Circular of Information No. 2 of the United States Bureau of Education (Washington, 1893); L. S. Welch and Walter Camp, *Yale, Her Campus, Class Room and Athletics* (Boston, 1899); Charles Franklin Thwing, *A History of Higher Education in America* (New York, 1906).

YALTA, a seaport of Russia, in the government of Taurida, on the S. coast of the Crimea, at the foot of the Yaila Mountains, 32 m. S. of Simferopol. Pop. 13,269. It is the *Galita* or *Jalita* of the Arab geographers. Its roadstead is open, and the annual mean temperature is 56·5° F. The town is a fashionable summer resort.

YAM, a term usually applied to the tubers of various species of *Dioscorea*. These are plants with thick tubers (generally a development of the base of the stem), from which protrude long, slender, annual climbing stems, bearing alternate or opposite, entire or lobed leaves and unisexual flowers in long clusters. The flowers are generally small and individually inconspicuous, though collectively showy. Each consists of a greenish bell-shaped or flat perianth of six pieces, enclosing six or fewer stamens in the male flowers, and surmounting a three-celled, three-winged ovary in the female flowers. The ovary ripens into a membranous capsule, bursting by three valves to liberate numerous flattish or globose seeds. The species are natives of the warmer regions of both hemispheres. According to Professor Church's analysis of the Chinese yam, it contains more nitrogenous matter, but less starch, than potatoes: in 100 parts there are of water 82·6, starch 13·1, albumen 2·4, fat 0·2, woody fibre 0·4 and mineral matter 1·3 parts.


Yam (*Dioscorea Batatas*). Branch about ⅓ nat. size. Root much reduced.

D sativa and *D alata* are the species most widely diffused in tropical and subtropical countries. *D. aculeata*, grown in India, Cochin China and the South Sea Islands, is one of the best varieties. *D Batatas*, the Chinese yam, is hardy in Great Britain, but the great depth to which its enormous tubers descend renders its cultivation unprofitable. It has deeply penetrating, thick, club-shaped, fleshy roots, full of starch, which when cooked acquire a mild taste like that of a potato; they grow 3 ft. or upwards in length, and sometimes weigh more than 1½ lb. The plant grows freely in deep sandy soil, moderately enriched. The sets, consisting of pieces of the roots, may be planted in March or April, and require no other culture than the staking of the climbing stems. They should not be dug up before November, the chief increase in their size taking place in autumn. They sometimes strike downwards 2 or 3 ft. into the soil, and must be carefully dug out, the upper slender part being reserved for propagation, and the lower fleshy portion eaten after having been allowed a few days to dry. The tubers of *D. alata* sometimes weigh 100 lb. Most of the yams contain an acrid principle, which is dissipated in cooking.

The only European *Dioscorea* is that known as *D. pyrenaica*, a native of the Pyrenees, a remarkable instance of a species growing at a long distance from all its congeners. True yams must not be confounded with the sweet potato, *Ipomoea Batatas*, as they sometimes are in London markets. The common black bryony (*Tamus communis*) of hedges in England is closely allied to the yams of the tropics, and has a similar root-stock, which is reputed to be poisonous.

For the history of the yam, and its cultivation and uses in India, see G. Watt, *Dictionary of the Economic Products of India*, iii. (1890).

YAMA (Sanskrit "twin," in allusion to his being twin with his sister Yami, traditionally the first human pair), in Hindu mythology, judge of men and king of the unseen world. He was the first mortal to die, and having discovered the way to the other world is the guide of the dead. Three hymns in the Rig Veda are addressed to him.

YAMAGATA, ARITOMO, PRINCE (1838–), Japanese field-marshal, was born in Choshu. He began life as an ordinary *samurai* and rose steadily in reputation and rank, being created a count in 1884, a marquess in 1895 (after the war with China) and a prince in 1907 (after the war with Russia). He twice held the post of premier, and was the leader of Japanese conservatism, being a staunch opponent of party cabinets.

YAMBOLI, a town of Bulgaria, on the river Tunja, 49 m. W. of Burgas by rail. Pop. (1906) 15,708. It has a large agricultural trade, being situated in the centre of one of the chief corn districts. In the town are the remains of old fortifications, and the ruins of a fine mosque. The *bezetlan*, or old market-house, is entire, but is now used as a military magazine. An ancient Macedonian town lay some 4 m. N., but Yamboli is first mentioned in the 11th century, when it was known by the Byzantines as Dampolis or Hyampolis.

YAMÈTHIN, a town and district in the Meiktila division of Upper Burma. The town has a station on the railway 275 m. N. of Rangoon. Pop. (1901) 8680. It is an important centre of trade with the Shan States. The district lies between the Shan States and the Meiktila, Magwe and Toungoo districts; area, 4258 sq. m.; pop. (1901) 243,197, showing an increase of 18% in the decade. The staple crop is rice, which is irrigated from tanks and canals. Millets and oil-seeds are grown in the N., where drought has more than once caused distress. There are special industries of inlaid metal-work and ornamental pottery. Besides the chief town, Pyinmana and Pyawbwè, both also on the railway, carry on an active trade with the Shan States.

YANAON, or YANAM, a French settlement in India, near the mouth of the river Godavari, within the Godavari district of Madras. It is situated in 16° 44′ N. and 82° 13′ E.; area, 5 sq. m.; pop. (1901) 5005. Yanaon was founded about 1750, and followed the vicissitudes of French history in S. India. It was finally restored to the French by the treaty of 1815.

YANCEY, WILLIAM LOWNDES (1814–1863), American political leader, son of Benjamin Cudworth Yancey, an able lawyer of South Carolina, of Welsh descent, was born near the Falls of the Ogeechee, Warren county, Georgia, on the 10th of August 1814. After his father's death in 1817, his mother remarried and removed to Troy, New York. Yancey attended Williams College for one year, studied law at Greenville, South Carolina, and was admitted to the bar. As editor of the Greenville (South Carolina) *Mountaineer* (1834–35), he ardently opposed nullification. In 1835 he married a wealthy woman, and in the winter of 1836–1837 removed to her plantation in Alabama, near Cahaba (Dallas county), and edited weekly papers there and in Wetumpka (Elmore county), his summer home. The accidental poisoning of his slaves in 1839 forced him to devote himself entirely to law and journalism; he was now an impassioned advocate of State's Rights and supported Van Buren in the presidential campaign of 1840. He was elected in 1841 to the state House of Representatives, in which he served for one year; became state senator in 1843, and in 1844 was elected to the national House of Representatives to fill a vacancy, being re-elected in 1845. In Congress his ability and his unusual oratorical gifts at once gained recognition. In 1846, however, he resigned his seat, partly on account of poverty, and partly because of his disgust with the Northern Democrats, whom he accused of sacrificing their principles to their economic interests. His entire energy was now devoted to the task of exciting resistance to anti-slavery aggression. In 1848 he secured the adoption by the state Democratic convention of the so-called "Alabama Platform," which was endorsed by the legislatures of Alabama and Georgia and by Democratic state conventions in Florida and Virginia, declaring that it was the duty of Congress not only to allow slavery in all the territories but to protect it, that a territorial legislature could not exclude it, and that the Democratic party should not support for president or vice-president a candidate "not . . . openly and unequivocally opposed to either of the forms of excluding slavery from the territories of the United States mentioned in these resolutions." When the conservative majority in the national Democratic convention in Baltimore refused to incorporate his ideas into the platform, Yancey with one colleague left the convention and wrote an *Address to the People of Alabama*, defending his course and denouncing the cowardice of his associates. Naturally, he opposed the Compromise of 1850, and went so far as openly to advocate secession; but the conservative element was in control of the state. Disappointment of the South with the results of "Squatter Sovereignty" caused a reaction in his favour, and in 1858 he wrote a letter advocating the appointment of committees of safety, the formation of a League of United Southerners, and the repeal of the laws making the African slave-trade piracy. After twelve years' absence from the national conventions of the Democratic party, he attended the Charleston convention in April 1860, and again demanded the adoption of his ideas. Defeated by a small majority, he again left the hall,[1] followed this time by the delegates of Alabama, Mississippi, Louisiana, South Carolina, Florida, Texas, and two of the three delegates from Delaware. On the next day the Georgia delegation and a majority of the Arkansas delegation withdrew. In the Baltimore convention of the seceders he advocated the nomination of John C. Breckinridge, and he made a tour of the country on his behalf. In Alabama he was the guiding spirit in the secession convention and delivered the address of welcome to Jefferson Davis on his arrival at Montgomery. He refused a place in President Davis's cabinet. On the 31st of March 1861 he sailed for Europe as the head of a commission sent to secure recognition of the Confederate government, but returned in 1862 to take a seat in the Confederate Senate, in which he advocated a more vigorous prosecution of the war. On account of his failing health, he left Richmond early in 1863, and on the 27th of July died at his home near Montgomery.

See J. W. Du Bose, *Life and Times of W. L. Yancey* (Birmingham, Ala., 1892); W. G. Brown, *The Lower South in American History* (New York, 1902); and Joseph Hodgson, *The Cradle of the Confederacy* (Mobile, Ala., 1876).

YANG-CHOW FU, a prefectural city in the province of Kiang-su, China, forming the two distinct cities of Kiang-tu and Kan-ch'üan, on the Grand Canal, in 32° 21′ N., 119° 15′ E. Pop. about 100,000. The walls are between three and four miles in circumference. The streets are well supplied with shops, and there are handsome temples, colleges, and other public buildings. There was a serious religious outbreak in 1868, when Hudson Taylor, the founder of the China Inland Mission, opened a station here; but Yang-chow is now one of the centres of the Protestant missionaries in the province. Yang-chow Fu possesses an early historical connexion with foreigners, for Marco Polo ruled over it for three years by appointment from Kublai Khan (?1282–85).

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[1] It is probable that Yancey was approached with the offer of the vice-presidential nomination on the Douglas ticket by George N. Sanders. There was a movement to nominate him on the ticket with Breckinridge also.

YANGTSZE-KIANG, a great river of China, and the principal commercial watercourse of the country. It is formed by the junction of a series of small streams draining the E. slopes of the Tibetan plateau, and for the first third of its course flows almost parallel with the Mekong and the Salween, each, however, separated from the other by intervening ridges of great height. The total length of the Yangtsze is calculated to be not less than 3000 m. Although the term Yangtsze is applied by Europeans to the whole course of the river, in China it indicates only the last three or four hundred miles, where it flows through a division of the empire which in ancient time was known as "Yang," a name which also survives in the city of Yang-Chow in the province of Kiang-su. The ordinary official name for the whole river is Ch'ang Kiang (pronounced in the north, Chiang) or Ta Chiang, meaning the "long river" or the "great river." Popularly in the upper reaches every section has its local name. As it emerges from Tibet into China it is known as the Kinsha Kiang or river of Golden Sand, and farther down as the Pai-shui Kiang. In Sze-ch'uen, after its junction with the large tributary known as the Min, it is for some distance called the Min-kiang, the people being of opinion that the Min branch is in fact the main river. The fall in the upper reaches is very rapid. At the junction of the two main affluents in Upper Tibet, where the river is already a formidable torrent barely fordable at low water, the altitude is estimated at 13,000 ft. From Patang (8540 ft.) to Wa-Wu in Sze-ch'uen (1900 ft.) the fall is about 8 ft. per mile, thence to Hwang-kwo-shu (1200 ft.) about 6 ft. per mile, and farther down to Pingshan (1039 ft.) the fall is about 3 ft. per mile. At Pingshan, in the province of Sze-ch'uen, the river first becomes navigable, and the fall decreases to about 6 in. per mile down to Chungk'ing (630 ft.). From Chungk'ing through the gorges to Ich'ang (130 ft.), a distance of nearly 400 m., the fall again increases to about 14 in. per mile; but from Ich'ang down to the sea, a distance of 1000 m., the fall is exceedingly small, being as far as Hankow at the rate of 2½ in., and from Hankow to the mouth at the rate of little more than 1 in. per mile. The last 200 m. are practically a dead level, for at low-water season there is a rise of tide enough to swing ships as far up as Wuhu, 200 m. from the mouth.

The principal tributaries, counting from the sea upwards, are: (1) the outlet from Poyang lake, draining the province of Kiang-si; (2) the Han river, entering on the left bank at Hankow; (3) the outlet from Tungt'ing lake on the right bank, draining the province of Hu'nan; (4) the three great rivers of Sze-ch'uen, the Kialing, the To Kiang and the Min, all entering on the left bank; and (5) the Yalung, draining a vast area on the borderland between Sze-ch'uen and Tibet. The whole drainage area is about 650,000 sq. m., of which more than four-fifths lie above Hankow. The period of low water is from December to March. The melting of the snows on the Tibetan highlands combined with the summer rainfall causes an annual rise in the river of from 70 to 90 ft. at Chungk'ing and from 40 to 50 at Hankow and Kiukiang. The mean volume of water discharged into the sea is estimated at 770,000 cub. ft. per second. The quantity of sediment carried in solution and deposited at the mouth is similarly estimated at 6428 million cub. ft. per annum, representing a subaërial denudation of the whole drainage area at the rate of one foot in 3707 years. (See *Journal* of the China Branch of the Royal Asiatic Society, vol. xvi., Dr Guppy.)

The Yangtsze-kiang forms a highway of first-class importance. As the rise in the river is only about 130 ft. for the first 1000 m., it resembles a huge canal expressly formed for steam navigation. Except at winter low water, steamers of 5000 or 6000 tons can reach Hankow with ease. Between Hankow and Ich'ang, especially above the outlet from Tungt'ing lake, the volume of water diminishes very much, and as the channel is continually shifting with the shifting sand-banks, navigation is more difficult. Above Ich'ang, where the river flows between rocky gorges, and where a series of rapids are encountered, navigation is still more difficult. But taking the Yangtsze as a whole, with its numerous subsidiary streams, canals and lakes, it forms a highway of communication unrivalled in any other country in the world. About half the sea-borne commerce of all China is further distributed by means of the Yangtsze and its connexions, not to mention the interchange of native produce between the provinces, which is carried by native sailing craft numbered by thousands.

The Yangtsze valley as a political term indicates the sphere of influence or development which by international agreement was assigned to Great Britain. This was first acquired in a somewhat negative manner by the Chinese government giving an undertaking, which they did in 1898, not to alienate any part of the Yangtsze valley to any other power. A more formal recognition of the British claim was embodied in the agreement between the British and Russian governments in 1899 for the delimitation of their respective railway interests in China, Russia agreeing not to interfere with British projects in the basin of the Yangtsze, and Great Britain agreeing not to interfere with Russian projects north of the Great Wall (Manchuria). The basin or valley of the Yangtsze was defined to comprise all the provinces bordering on the Yangtsze river, together with the provinces of Ho-nan and Chehekiang. This agreement was communicated to the Chinese government, and has been generally acknowledged. The object of the negotiations was to guard against conflict of railway interests; in all other respects the policy known as that of the "open door" was advocated by Great Britain and the chief commercial states. This policy was more fully declared by mutual engagements entered into in 1900 by the Great Powers on the initiative of the United States, whereby each undertook to guarantee equality of treatment to the commerce of all nations within its own sphere. As to railway enterprise, an agreement of 1910 admitted French, German and American financial interests equally with those of great Britain in the projected line from Hankow to Sze-ch'uen. (G. J.)

YANKEE, the slang or colloquial name given to a citizen of the New England states in America, and less correctly applied, in familiar European usage, to any citizen of the United States. It was used by the British soldiers of their opponents during the War of Independence, and during the Civil War by the Confederates of the Federal troops and by the South of the North generally. The origin of the name has given rise to much speculation. In Dr William Gordon's *History of the American War* (ed. 1789, i. 324) it is said to have been a cant word at Cambridge, Mass., as early as 1713, where it was used to express excellency, and he quotes such expressions as "a Yankee good horse." Webster gives the earliest recorded use of its accepted meaning, from *Oppression, a Poem by an American* (Boston, 1765), "From meanness first this Portsmouth Yankee rose," and states that it is considered to represent the Indian pronunciation of "English" or *Anglais*, and was applied by the Massachusetts Indians to the English colonists. On the other hand, the Scots "yankie," sharp or clever, would seem more probable as the origin of the sense represented in the Cambridge expression. Other suggestions give a Dutch origin to the name. Thus it may be a corruption of "Jankin," diminutive of "Jan," John, and applied as a nickname to the English of Connecticut by the Dutch of New York. Skeat (*Etym. Dict.*, 1910) quotes a Dutch captain's name, Yanky, from Dampier's *Voyages* (ed. 1699, i. 38), and accepts the theory that "Yankee" was formed from *Jan*, John, and *Kees*, a familiar diminutive of Cornelius (H. Logeman, *Notes and Queries*, 10th series, iv. 509, v. 15).

YANKTON, a city and the county-seat of Yankton county, South Dakota, U.S.A., on the left bank of the Missouri river, about 60 m. N.W. of Sioux City, Iowa. Pop. (1900) 4125 (850 foreign-born); (1910) 3787. It is served by the Chicago, Milwaukee & St Paul, the Great Northern, and the Chicago & North-Western railways. The Missouri is navigable at this point, and the city has a considerable river traffic. Yankton is the seat of Yankton College (founded by Congregationalists in 1881, opened in 1882; now non-sectarian). The city is built on a nearly level plateau, averaging about 1200 ft. above the sea-level. It is in a rich grain-growing and stock-raising district, has grain-elevators, and manufactures flour, beer and cement The water supply is obtained from artesian wells. The first permanent settlement, a trading post, was made here in 1858, when a treaty was concluded with the Yankton Indians. This was the first settlement made in the Missouri Valley in Dakota. Yankton was laid out in 1859, first chartered as a city in 1869, rechartered in 1873, and in 1910 adopted a commission form of government. In 1861–82 Yankton was the capital of the Territory of Dakota. The name is a corruption of the Sioux name *Ihanktonwan*, meaning "end village."

YAOS, or Ajawa, a Bantu-Negroid people of east-central Africa, whose home is the country around the upper reaches of the Rovuma river, and the north of Portuguese East Africa. They are an enterprising and intelligent race, and have spread into British territory south of Lake Nyasa and throughout the Shiré districts. They are the tallest and strongest of the natives in the Mozambique country, have negroid features and faces which are noticeable for their roundness, and, for Africans, have light skins. They have long been popular among Europeans as carriers and servants. They earned, however, a bad name as slave-traders, and gave much trouble to the British authorities in Nyasaland until 1896, when they were reduced to submission. They do not tattoo except for tribal marks on their foreheads. The women wear disks of ivory or burnished lead in the sides of their nostrils, and some, probably of Anyanja origin, disfigure the lip with the *pelele* or lip-ring. The Yaos have elaborate ceremonies of initiation for the youth of both sexes. They bury their dead in a contracted position, the grave being roofed with logs and earth sprinkled over, in the case of a rich man, some of his property is buried with him and the rest is inherited by his eldest sister's son.

See Miss A. Werner, *The Natives of British Central Africa* (1906); Sir H. H. Johnston, *British Central Africa* (1897); H. L. Duff, *Nyasaland under the Foreign Office* (1903). For the Yao language see Bantu Languages.

YA'QŪBĪ [Aḥmad ibn abī Ya'qūb ibn Ja'far ibn Wahb ibn Wāḍiḥ] (9th century), Arab historian and geographer, was a great-grandson of Wāḍiḥ, the freedman of the caliph Manṣūr. Until 873 he lived in Armenia and Khorasan; then he travelled in India, Egypt and the Maghrib, where he died in 891. His history is divided into two parts. In the first he gives a comprehensive account of the pre-Mahommedan and non-Mahommedan peoples, especially of their religion and literature. For the time of the patriarchs his source is now seen to be the Syriac work published by C. Bezold as *Die Schatzhöhle*. In his account of India he is the first to give an account of the stories of Kalila and Dimna, and of Sindibad (Sinbad). When treating of Greece he gives many extracts from the philosophers (cf. M. Klamroth in the *Zeitschrift der deutschen morgenländischen Gesellschaft*, vols. xl. and xli.). The second part contains Mahommedan history up to 872, and is neither extreme nor unfair, although he inherited Shi'ite leanings from his great-grandfather. The work is characterized by its detailed account of some provinces, such as Armenia and Khorasan, by its astronomical details and its quotations from religious authorities rather than poets.

Edition by T. Houtsma (2 vols., Leiden, 1883). Ya'qūbī's geography, the *Kitāb ul-Buldān*, contains a description of the Maghrib, with a full account of the larger cities and much topographical and political information (ed. M. de Goeje, Leiden, 1892). (G. W. T.)

YĀQŪT, or Yakut (Yāqūt ibn 'Abdallah ur-Rūmī) (1179–1229), Arab geographer and biographer, was born in Greece of Greek parentage, but in his boyhood became the slave of a merchant of Hamah (Ḥamath), who trained him for commercial travelling and sent him two or three times to Kish in the Persian Gulf (on his journeys, cf. F. Wüstenfeld, "Jacut's Reisen" in the *Zeitschr. d deutsch. morg. Gesellschaft*, vol. xviii. pp. 397–493). In 1194 he quarrelled with his master and had to support himself by copying; he took advantage of the opportunity of studying under the grammarian al-'Ukbarī. After five years he returned to his old master and again travelled for him to Kish, but on his return found his master dead, and set up for himself as a bookseller and began to write. During the next ten years he travelled in Persia, Syria, Egypt and visited Merv, Balkh, Mosul and Aleppo. About 1222 he settled in Mosul and worked on his geography, the first draft of which was ready in 1224. After a journey to Alexandria in 1227 he went to Aleppo, where he died in 1229. In his large geography, the *Mu'jam ul-Buldān* (ed. F. Wüstenfeld, 6 vols., Leipzig, 1866–73), the places mentioned in the literature or the stories of the Arabs are given in alphabetical order, with the correct vocalization of the names, an indication whether they are Arabic or foreign and their locality. Their history is often sketched with a special account of their conquest by the Moslems and the name of the governor at the time is recorded. Attention is also given to the monuments they contain and the celebrities who were born in them or had lived there. In this way a quantity of old literature, both prose and poetry, is preserved by Yāqūt.

The parts of this work relating to Persia have been extracted and translated by Barbier de Meynard under the title *Dictionnaire géographique, historique et littéraire de la Perse* (Paris, 1871). Some account of its sources is given in F. J. Heer's *Die historischen und geographischen Quellen in Jacut's geographischem Wörterbuch* (Strassburg, 1898), and the material relating to the Crusades is treated by H. Derenbourg, "Les Croisades d'après le dictionnaire géographique de Jacout" in the volume of the *Centenaire de l'école des langues orientales vivantes*, 71–92. A digest of the whole work was made by Ibn 'Abdulhaqq (d. 1338) under the title *Marāṣid ul-Iṭṭilā* (ed. T. G. J. Juynboll, Leiden, 1850–1864). Yāqūt also wrote a dictionary of geographical homonyms, the *Mushtarik* (ed. F. Wüstenfeld, Göttingen, 1846). Besides all this activity in geography Yāqūt gave his attention to biography, and wrote an important dictionary of learned men, the *Mu'jam ul-Udabā'*. Parts of this work exist in MS. in different libraries; vol. i. has been edited by D. S. Margoliouth, *Irshād al-Arib ilā Ma'rifat al Adīb* (London, 1908). (G. W. T.)

YARKAND (Chinese name Sochē Fu), the chief town of the principal oasis of Chinese Turkestan, on the Yarkand-Darya, in 38° 25′ N., 77° 16′ E., and 3900 ft. above sea-level. The settlements of the Yarkand oasis occupy the S.W. corner of E. Turkestan, and are scattered along the numerous rivers which issue from the steep slopes of the Pamir in the W., and the Karakoram and Kuen-Lun Mountains in the S. The oasis of Kashgar limits it in the N., and a tract of desert separates it from the oasis of Khotan in the S.E. The Yarkand-Darya and its numerous tributaries, which are fed by the glaciers of the mountain regions, as also many rivers which are now lost in the steppe or amidst the irrigated fields, bring abundance of water to the desert; one of them is called Zarafshan ("gold-strewing"), as much on account of the fertility it brings as of its auriferous sands. Numberless irrigation canals carry the water to the fields, which occupy a broad zone of loess skirting the base of the mountains. In the spurs of the mountains there are rich pasturages, where goats, yaks, camels, sheep and cattle are reared. The oasis of Yarkand is regarded as the richest of E. Turkestan, and its population probably numbers about 200,000 inhabitants. Wheat, barley, rice, beans and various oil-yielding plants are grown, and melons, grapes, apples and other fruits. The cotton tree and the mulberry are cultivated in the warmer parts of the oasis. Gold, lead and precious stones are found in the mountains, though only the first-named is worked. Yarkand is renowned for its leather-ware and saddlery. Carpets and silk fabrics, cotton and woollen goods are manufactured. The population consists of Persians, who now speak Turkish, and of Turkish Sarts.

The town of Yarkand, which has a population of about 100,000 (5000 houses in the city, and as many in Yanghishar and the suburbs), is situated on the river of the same name, five days' journey S.E. from Kashgar. It is surrounded by a thick earthen wall, nearly 4 m. long, with towers in the Chinese style of architecture, and is well watered by canals. The square fortress of Yanghishar, which was built by the Chinese, stands within 400 yds. of the walls of the town. This is one of the three strong places in Chinese Turkestan. The ten mosques and madrasas of Yarkand, although poorer than those of Bokhara or Samarkand, enjoy wide renown in the Moslem world. There is a brisk trade, especially in horses, cotton, leather-ware and all kinds of imported manufactured goods.

Yarkand is surrounded by a number of smaller towns, the chief of which are—Yanghi-hissar, which has about 600 houses, Tashkurgan on the Pamirs, Posgam (1600 houses), Kargalyk, at the junction of the routes leading to Ladakh and Khotan (2000 houses), Sanju (2000), Tagarchi, Kartchum, Besh-taryk (1800) and Guma (3000).

Yarkand was very imperfectly known until the second half of the 19th century. Marco Polo visited it between 1271 and 1275, and Goes in 1603; but the continuous wars (see Turkestan) prevented Europeans from frequenting it, so that until 1863 the information borrowed from medieval travellers and from Chinese sources, with that supplied by the pundit Mir Isset Ullah in 1812, was all that was known about the Yarkand region. The first European who reached it in the 19th century was Adolph Schlagintweit, who passed by Yarkand in August 1857, but was killed a few days later at Kashgar. The pundit Mohammed Hamid visited it in 1863 and determined its geographical position and altitude. Later information is due to Robert Shaw and G. W. Hayward, who stayed at Yarkand in 1869, and to Sir Douglas Forsyth, who first visited it in 1870. Three years later he visited it again with an expedition which had Gordon, Bellew, Chapman, Trotter, Biddulph and Stoliczka as members, and afterwards published a detailed report upon the scientific results of the mission. In 1886, after a remarkable journey through E. Turkestan, A. D. Carey reached Yarkand and spent the winter there. It was again visited by Dr Lansdell in 1888, and by Dr Aurel Stein in 1906. The Swedish Protestant missionaries whose headquarters are at Kashgar maintain a medical mission at Yarkand.

YARMOUTH, a seaport town and port of entry, Yarmouth county, Nova Scotia, Canada, on the Dominion & Atlantic railway, 218 m. from Halifax. Pop. (1901) 6430. Steamers run daily to Boston (Mass.), and weekly to St John (N.B.) and Halifax. It contains the county buildings, and has good schools and small local manufactories. Fish and lumber are exported in large quantities.

YARMOUTH (GREAT YARMOUTH), a municipal, county and parliamentary borough, watering-place, and seaport of Norfolk, England (with a small portion in Suffolk), 121 m. N.E. from London by the Great Eastern railway, served also by the Midland & Great Northern joint line. Pop. (1901) 51,316. It lies on a long and narrow peninsula of sand, between the North Sea and the Breydon Water (formed by the rivers Yare and Waveney) and the river Bure. The neighbouring country is very flat, but the Bure affords access to the Norfolk Broads, which give the district its well-known individuality. The old town of Great Yarmouth was built chiefly along the E. bank of the Yare, but the modern town has extended beyond its ancient walls, of which some remains exist, to the seashore, where there are a marine drive and three piers. On the landward or Suffolk side of the estuary is the suburb of Southtown, and farther S. that of Gorleston. The principal features of Yarmouth are the N. and S. quays, and the straight narrow lanes called "rows," 145 in number, running at right angles to them. These rows were at one time inhabited by the wealthy burgesses, and many of the houses, now tenanted by the poorer classes, have panelled rooms with richly decorated ceilings. The old town is connected with Little Yarmouth by a bridge across the Yare of stone and iron, erected in 1854. The Bure is crossed by a suspension bridge. The church of St Nicholas, founded in 1101 by Herbert Losinga, the first bishop of Norwich, and consecrated in 1119, is one of the largest parish churches in England. It is cruciform, with a central tower, which perhaps preserves a part of the original structure, but by successive alterations the form of the church has been completely changed. The Transitional clerestoried nave, with columns alternately octagonal and circular, was rebuilt in the reign of King John. A portion of the chancel is of the same date. About fifty years later the aisles were widened, so that the nave is now the narrowest part of the building. A grand W. front with towers and pinnacles was constructed in 1330–1338, but the building was interrupted by a visitation of the plague. In the 16th century the monumental brasses were cast into weights and the gravestones cut into grindstones. Within the church there were at one time eighteen chapels, maintained by gilds or private families, but these were demolished by the Reformers, who sold the valuable utensils of the building and applied the money to the widening of the channel of the harbour. During the Commonwealth the Independents appropriated the chancel, the Presbyterians the N. aisle and the Churchmen were allowed the remainder of the building. The brick walls erected at this time to separate the different portions of the building remained till 1847. In 1864 the tower was restored, and the E. end of the chancel rebuilt; in 1869–1870 the S. aisle was rebuilt; and in 1884 the S. transept, the W. end of the nave and the N. aisle underwent restoration. The width of the nave is 26 ft., and the total length of the church is 236 ft. St John's is a noteworthy modern church, and the Roman Catholic church is a handsome Gothic building erected in 1850. A grammar-school was founded in 1551, when the great hall of the old hospital, founded in the reign of Edward I. by Thomas Fastolfe, was appropriated to its use. It was closed from 1757 to 1860, was re-established by the charity trustees, and settled in new buildings in 1872. Among the principal public buildings are the town hall and public offices (1883); a picturesque toll-house of the 14th century, carefully preserved and serving as a free library; assembly rooms, museum, drill hall, custom house, barracks at Southtown and theatres. Among charitable and benevolent institutions are a royal naval lunatic asylum, three hospitals, and fishermen's hospital, the North Sea Church Mission and various homes and minor charities. To the S. of the town, on the part of the peninsula known as the South Denes, are a race-course and a Doric column erected in 1817 to commemorate Lord Nelson. To the N. (on the North Denes) are golf links. Winter gardens were opened in 1904. The municipal and parliamentary borough became coextensive by the inclusion in the former of Gorleston in 1890. The parliamentary borough, returning one member, falls between the E. division of Norfolk and the Lowestoft division of Suffolk. Yarmouth is governed by a mayor, 12 aldermen and 36 councillors. Area, 3568 acres.

Yarmouth Roads, off the coast, afford excellent anchorage except in E. or N.E. winds. The channel to the quays was made by Joost Jansen, a Dutch engineer, in 1567, and affords a depth at the bar of 12 ft. at low water. The herring and mackerel fisheries are most important, and fish-curing is an extensive industry, Yarmouth bloaters being widely famous. The fishing fleet numbers some 500 vessels of 20,000 tons, and employs about 3000 hands. The principal imports are coal, timber and seeds, and exports are grain and fish. Other industries are ship and boat building, rope, twine and trawl-net manufactories, silk-crape works and maltings.

Yarmouth (Gernemwa, Yernemuth), which lies near the site of the Roman camp of Garíannonum, is believed to have been the landing-place of Cerdic in the 5th century. Not long afterwards, the convenience of its situation having attracted many fishermen from the Cinque Ports, a permanent settlement was made, and the town numbered seventy burgesses before the Conquest. Henry I. placed it under the rule of a reeve. The charter of King John (1208), which gave his burgesses of Yarmouth general liberties according to the customs of Oxford, a gild merchant and weekly hustings, was amplified by several later charters asserting the rights of the borough against Little Yarmouth and Gorleston. In 1552 Elizabeth granted a charter of admiralty jurisdiction, afterwards confirmed and extended by James I. In 1668 Charles II. incorporated Little Yarmouth in the borough by a charter which with one brief exception remained in force till 1703, when Anne replaced the two bailiffs by a mayor, reducing the aldermen and common councilmen to eighteen and thirty-six. By the Boundary and Municipal Corporation Acts of 1832 and 1855, Gorleston was annexed to the borough, which became a county borough in 1888. Yarmouth returned two members to parliament from 1300 to 1868, when it was disfranchised until 1885. From the 11th to the 18th century the herring trade, which has always been the main industry of Yarmouth, was carried on at an annual fair between Michaelmas and Martinmas. This was regulated by the barons of the Cinque Ports, and many quarrels arose through their jurisdiction and privileges. Yarmouth has had a weekly market at least from the 13th century.

See *Victoria County History, Norfolk*; H. Swinden, *History of Great Yarmouth* (1772); C. J. Palmer, *History of Great Yarmouth* (1854).

YARMOUTH, a small port at the western extremity of the Isle of Wight, England, on the shore of the Solent, where the estuary of the Yar debouches. Pop. (1901) 903. Steamers connect it with the London & South-Western railway at Lymington on the mainland, and it is also served by the Isle of Wight Central line. The church contains a fine monument to Admiral Sir Robert Holmes, who took New Amsterdam, afterwards New York, from the Dutch.

The place appears in the Domesday Survey of 1086 under the name of Ermud; it was then assessed at 1 hide 2½ virgates, and held in parage by Aluric and Wislac, two of the king's thegns who had also held it under Edward the Confessor. The first charter was granted by Baldwin de Redvers in 1135, and was confirmed by Edward I., Henry VI., Edward IV. and Elizabeth, but the earliest to *Household Words.* He wrote several farces which were acted between 1857 and 1860. In 1855 he had begun writing a column for the *Illustrated Times* (under Henry Vizetelly), headed "The Lounger at the Clubs": this was the first attempt at combining "smart" personal paragraphs with the better class of journalism, and in 1858 Yates was made editor of a new paper called *Town Talk*, which carried the innovation a step forward. His first number contained a laudatory article on Dickens, and the second a disparaging one on Thackeray, containing various personal references to private matters. Thackeray, regarding this as a serious affront, brought the article before the committee of the Garrick Club, of which he contended that Yates had made improper use, and the result was that Yates was expelled. Besides editing *Temple Bar* and *Tinsley's Magazine*, Yates during the 'sixties took to lecturing on social topics, and published several books, including his best novel, *Black Sheep* (1867); and under the heading of "Le Flâneur" he continued in the *Morning Star* the sort of "personal column" which he had inaugurated in the *Illustrated Times*. On his retirement from the Post Office in 1872 he went to America on a lecturing tour, and afterwards, as a special correspondent for the *New York Herald*, travelled through Europe. But in 1874, with the help of E. C. Grenville Murray, he established a new London weekly, *The World*, "a journal for men and women," which he edited himself. The paper at once became a success, and Yates bought out Grenville Murray and became sole proprietor. *The World* was the first of the new type of "society papers," abounding in personal criticism and gossip: one of its features was the employment of the first person singular in its columns, a device by which the personal element in this form of journalism was emphasized. After *Truth* was started in 1877 by Mr Henry Labouchere (who was one of Yates's earliest contributors), the rivalry between the two weeklies was amusingly pointed by references in *The World* to what "Henry" said, and in *Truth* to the mistakes made by "Edmund." In 1885 Yates was convicted of a libel in 1884 on Lord Lonsdale, and was imprisoned in Holloway gaol for seven weeks. In the same year he published his *Recollections and Experiences* in two volumes. He died on the 20th of May 1894. He had been the typical *flâneur* in the literary world of the period, an entertaining writer and talker, with a talent for publicity of the modern type—developed, no doubt, from his theatrical parentage—which, through his imitators, was destined to have considerable influence on journalism.

YATES, MARY ANN (1728–1787), English actress, was the daughter of William Graham, a ship's steward. In 1753 she appeared at Drury Lane as Marcia in Samuel Crisp's (d 1783) *Virginia*, Garrick being the Virginius. She was gradually entrusted with all the leading parts. Mrs Yates, whose husband, Richard Yates (*c.* 1706–1796), was a well-known comedian, succeeded Mrs Cibber as the leading tragedian of the English stage, and was in turn succeeded—and eclipsed—by Mrs Siddons.

YATES, RICHARD (1818–1873), American political leader, was born at Warsaw, Kentucky, on the 18th of January 1818. He graduated at the Illinois College at Jacksonville in 1838, was admitted to the bar, and entered politics as a Whig. From 1842 to 1845 and again in 1849 he served in the state House of Representatives. He was a representative in Congress in 1851–1855, but having become a Republican, was defeated for a third term. From 1861 to 1865 he was governor of Illinois, and was successful in enlisting troops and in checking the strong pro-Southern sentiment in the state. He was a member of the United States Senate in 1865–71, and was prominent in Reconstruction legislation. He died at St Louis, Missouri, on the 27th of November 1873. His son Richard (b. 1860) was governor of Illinois from 1901 to 1905.

YATSAUK, called by the Shans Lawksawk, a state in the central division of the southern Shan States of Burma. Area, 2197 sq. m. Pop. (1901), 24,839, of whom less than one-half are Shans; revenue, £2000. The crops grown are rice, segamum, cotton, ground-nuts and oranges. As a whole the state is mountainous, with ranges running N. and S. The main range has a general height of 5000 ft., with peaks, such as Loi Sampa, rising to 7846 ft. The middle and S., however, consist of open rolling country, with an average height of 3500 ft. To the N. the country falls away to the Nam Tu (Myitngè), where there are fine teak forests, as well as along the Nam Lang and Nam Et, which with the Zawgyi form the chief rivers of the state. Most of them disappear underground at intervals, which makes the extraction of timber impossible except for local use. Lawksawk, the capital, stands on the N. bank of the Zawgyi, near a small weedy lake. The old brick walls and the moat are falling into decay. The chief at the time of annexation had been at war with the Burmese, but refused to submit to the British, and fled to Kēng Hūng, where he died some years afterwards. The sawbwa chosen in 1887 belonged to another Shan ruling house. He died in 1900, and was succeeded by his son.

YATUNG, a trade-market of Tibet, situated in the mouth of the Chumbi valley near the Indian frontier. According to the Convention of 1890–93, the market at Yatung was opened to India, and the conduct of the Tibetans in building a wall across the road between Yatung and Tibet was one of the incidents that led up to the British mission of 1904. According to the treaty of that year, a British trade-agent was to be maintained at Yatung.

YAUCO, a city of the department of Ponce, Porto Rico, 20 m. W. by N of the city of Ponce. Pop. (1899) 6108. Yauco is served by the American Railroad of Porto Rico. The city is situated about 150 ft. above the sea, and has a delightful climate. It is connected by a wagon road with its port, Guanica (pop. about 1000), which has an excellent harbour. Coffee and tobacco are the chief industries. Yauco was first settled in 1756.

YAVORSKY, STEPHEN (*c.* 1658–1722), Russian archbishop and statesman, one of the ablest coadjutors of Peter the Great, was educated at the Kiev Academy and various Polish schools. Becoming a monk, he settled at the Kiev Academy as a preacher and professor, being appointed prefect of the institution and prior of the monastery of St Nicholas. He attracted the attention of Peter by his funeral oration over the boyar Shein, and was made archbishop of Ryazan in 1700. In 1702, on the death of the last patriarch of Moscow, Yavorsky was appointed custodian of the spiritualities of the patriarchal see. Notwithstanding frequent collisions with Peter, and his partiality for the unfortunate tsarevich Alexius, Yavorsky was too valuable a man to be discarded. In 1721 he was made first president of the newly erected Holy Synod, but died in the following year.

Yavorsky's chief works are his *Rock of the Faith of the Orthodox-Catholic Eastern Church* and *Dogmatic, Moral and Panegyrical Sermons* See Y T Samarin, *Stephen Yavorsky* (Rus.) (Moscow, 1844); I Morev, "*The Rock of the Faith*" *of the Metropolitan Stephen Yavorsky* (Rus.) (Petersburg, 1904).

YAWL, the name of a special rig of small sailing vessels or yachts, with two masts, the mainmast cutter-rigged, and a small mizzen stepped far aft with a spanker or driving sail. The name has also been applied to a small ship's boat rowed with four or more oars. The word is apparently an adaptation of the Dutch *jol*, skiff.

The English "jolly-boat," a small bluff-bowed, wide-transomed ship's boat, swung at the stern of a vessel for ready use, is probably a corruption of the Danish form of the word *jolle*. Other authorities take it to be a corruption of a late 15th-century *jolywat*, a small ship's boat, which is supposed to represent *galiote*, galliot (see Galley). A galliot, however, was never a small boat, but an independent vessel propelled by oars or sails.

YAWS, the name in use in the British West Indies for a contagious inoculable tropical disease, running a chronic course and characterized by a peculiar eruption, together with more or less constitutional disturbance. It is known by various local names in different parts. In the French Antilles it is called *pian*; in Brazil, *boba*; on the west coast of Africa, *gallu*, *dubè* and *taranga*; in Fiji, *coko*; in the Malay Peninsula, *purru*; in the Moluccas, *bouton d'Amboine*; in Samoa, *tonga* or *tono*; in Basutoland, *makaola*; and in Ceylon it is spoken of under the name of *parangi*. The name *framboesia* was first given to the disease by Sauvages in 1759 from the likeness of the typical excrescences to a raspberry. For many years yaws was thought to be peculiar to the African negro, either in his home (both west and east coasts) or in the West Indies and Brazil. But a disease the same in every respect has long been known in the East Indies (first mentioned by Bontius early in the 17th century), affecting the Malays rather than the negroes, its chief seats being Amboyna, Ternate, Timor, Celebes, Java and Sumatra. It has been identified by De Rochas and other observers in New Caledonia and Fiji.

The general course of the disease is as follows. Previous to the eruption there may or may not be any disorder of health: in children (who form a large part of the subjects of yaws) there will probably be rheumatic pains in the limbs and joints, with languor, debility and upset of the digestion; in adults of ordinary vigour the eruption is often the first sign, and it is attended with few or no constitutional troubles. The eruption begins as small pimples like a pin's head, smooth and nearly level with the surface; they have a little whitish speck on their tops, grow rapidly and reach the size of a sixpence or a shilling. The pustules then break and a thick viscid ichor exudes and dries upon them as a whitish slough and around their base as a yellowish-brown crust. Beneath the whitish slough is the raspberry excrescence or yaw proper, a reddish fungous growth with a nodular surface. The favourite seats of the eruption are the forehead, face, neck, arm-pits, groin, genitals, perinaeum and buttocks. Hairs at the seat of a yaw turn white. In young children or infants the corners of the mouth ulcerate, as in syphilis, and the perineal excrescences resemble condylomata. The pustules and excrescences do not all arise in one crop: some are found mature while others are only starting. If the patient be of sound constitution and good reaction, the yaws may reach the full size of a mulberry in a month, in which case they will probably be few; but in persons of poor health they may take three months to attain the size of a wood-strawberry, in which case they will be numerous inversely to their size. Often there is one yaw much larger than the rest, and longer in falling; it is called the "master yaw" "or mother yaw." On the soles of the feet (less often on the palms of the hands) the bursting yaws are as if imprisoned beneath the horny cuticle; they cause swelling and tenderness of the foot, until set free by paring the callous skin down to the quick; these yaws are called "crab yaws" or *tubbas*. Usually a yaw is painless unless when rubbed or irritated. The absence of pain is used as a diagnostic sign if there be any doubt as to the nature of the attack: a pustule is opened and a little of the juice of capsicum dropped into it; if it be a yaw, no smarting will be felt. In some cases a few yaws will show themselves long after the primary attack is over; these are called "memba yaws" (from "remember"), the term being sometimes applied also to protracted cases with successive crops of eruption. Six weeks is the average time in a good case, from the first of the eruption to the fall of the excrescences; in such regular cases a scar remains, it may be for many months, darker than the rest of the (negro) skin. But the disease is often a much more tedious affair, the more protracted type having become common in the West Indies of recent years. In such cases the eruption comes out by degrees and as if with difficulty, crop after crop; foul, excavating and corroding ulcers may remain, or a limb may be in part seamed and mutilated by the scars of old ulceration. The scars after ulceration are not so dark as the skin around.

Aetiology.—Yaws is a highly contagious disease. It is neither hereditary nor congenital. The disease spreads by contact with previously infected cases, though it has been stated that infection also arises from inhabiting dirty houses, the floors and walls of which are contaminated with yawey matter from former yaw cases; and it is also believed, and has been proved by experiment, that infection may be conveyed by flies, which act as go-betweens, carrying infective material from a yaws sore to an ordinary ulcer. The virus must be introduced directly through a breach of the skin or mucous membrane; an attack in childhood gives a large degree of immunity for the rest of life. A micrococcus was found by Pierez and Nicholls in the tubercles of yaws, but a pure culture of this micro-organism failed to give rise to yaws in animals into whom it was injected experimentally, and in no instance was it present in the blood. In 1905 Aldo Castellani demonstrated in yaws the presence of a slender spirillum, which he named the *Spirochaeta pertenuis* or *Spirochaeta pallidula*. It was also experimentally proved by him (1) that the material taken from persons suffering from yaws and containing the *Spirochaeta pertenuis* is infective to monkeys; (2) that when the *Spirochaeta pertenuis* is removed by filtration the material becomes inert; (3) that the injection of blood from the general circulation of a yaws patient gave positive results in monkeys; (4) by means of the Bordet-Gengou reaction it is possible to detect specific yaws anti-bodies and antigen.

The prophylaxis consists in the segregation of the patients suffering from the disease, the antiseptic dressing of the eruption, the application of a covering to protect it from flies, and the thorough cleansing and disinfection of infected houses and clothing, even the demolition of houses in endemic centres, and finally the compulsory notification of cases of yaws to the local sanitary authority.

As regards treatment, the malady in a person of good constitution runs its course and gets well in a few weeks. Whatever tends to check the eruption, such as exposure to chill, is to be avoided. A week's course of cream of tartar and sulphur (confection of sulphur) at the beginning of the illness is often resorted to, so as to bring the eruption well out. The patient should remain indoors, in a well-aired room, and take daily warm baths and diluent drinks. If the excrescences are flabby and unhealthy, it is an indication for generous diet. When the eruption is declared, iodide of potassium and arsenic are very beneficial. As external applications, weak lotions of zinc or carbolic acid may be used, and, if the excrescences are irritable, a watery solution of opium. Tedious and unhealthy yaws should be dressed with a wash of sulphate of zinc or of copper; the same may be applied to a yaw ulcer. The crab yaws of the horny soles or palms, after they are let through by paring the cuticle, may be dusted with alum powder.

On the whole, the mortality is small. In 7157 West Indian cases treated in various hospitals there were only 185 deaths, a mortality of 25·8 per thousand (Nicholls).

YAZDEGERD ("made by God," *Isdegerdes*), the name of three Sassanid kings of Persia. (1) Yazdegerd I., son of Shapur III., 399–420, called "the sinner" by the Persians, was a highly intelligent ruler, who tried to emancipate himself from the dominion of the magnates and the Magian priests. He punished the nobles severely when they attempted oppression; he stopped the persecution of the Christians and granted them their own organization. With the Roman Empire he lived in peace and friendship, and is therefore as much praised by the Byzantine authors (Procop. *Pers.* i. 2; Agath. iv. 26) as he is blamed by the Persians. After a reign of twenty years he appears to have been murdered in Khorasan. (2) Yazdegerd II., was the son of Bahram V. Gor, 438–457. He persecuted the Christians and Jews, and had a short war with Rome in 441. He tried to extend his kingdom in the East and fought against the Kushans and Kidarites (or Huns). (3) Yazdegerd III., a grandson of Chosroes II., who had been murdered by his son Kavadh II. in 628, was raised to the throne in 632 after a series of internal conflicts. He was a mere child and never really ruled; in his first year the Arabic invasion began, and in 637 the battle of Kadisiya decided the fate of the empire. Ctesiphon was occupied by the Arabs, and the king fled into Media. Yazdegerd fled from one district to another, till at last he was murdered at Merv in 651 (see Caliphate, sect. A. 1). The Parsees, who use the old Persian calendar, continue to count the years from his accession (era of Yazdegerd, beginning June 16th, A.D. 632). (Ed. M.)

YEAST (O.E. *giest* or *gyst*; the root *yes-*, to boil, ferment, is seen in Sansk. *nir-yâsa*, exudations from trees, and Gr. ζεῖν, to boil), a cellular organism produced in the alcoholic fermentation of saccharine liquids (see Fungi, Fermentation, Brewing).

YEATS, WILLIAM BUTLER (1865–), Irish author, son of J. B. Yeats (b. 1839), a distinguished Irish artist and member of the Royal Hibernian Academy, was born at Sandymount, Dublin, on the 13th of June 1865. At nine years old he went to live with his parents in London, and was sent to the Godolphin School, Hammersmith. At fifteen he went to the Erasmus Smith School in Dublin. Later he studied painting for a short time at the Royal Dublin Society, but soon turned to literature, contributing poems and articles to the *Dublin University Review* and other Irish periodicals. In 1888 he was encouraged by Oscar Wilde to try his fortune in London, where he published in 1889 his first volume of verse, *The Wanderings of Oisin*; its original and romantic touch impressed discerning critics, and started a new interest in the "Celtic" movement. The same year and the next he contributed to Mr Walter Scott's "Camelot Series," edited by Ernest Rhys, *Fairy and Folk Tales*, a collection of Irish folklore, and *Tales from Carleton*, with original introductions. In 1891 he wrote anonymously two Irish stories, *John Sherman* and *Dhoya*, for Mr Fisher Unwin's "Pseudonym Library." In 1892 he published another volume of verse, including *The Countess Kathleen* (a romantic drama), which gave the book its title, and in 1893 *The Celtic Twilight*, a volume of essays and sketches in prose. He now submitted his earlier poetical work to careful revision, and it was in the revised versions of *The Wanderings of Usheen* and *The Countess Kathleen*, and the lyrics given in his collected *Poems* of 1895 that his authentic poetical note found adequate expression and was recognized as marking the rise of a new Irish school. In the meantime he had followed *The Countess Kathleen* with another poetical drama, *The Land of Heart's Desire*, acted at the Avenue Theatre for six weeks in the spring of 1894, published in May of that year. He contributed to various periodicals, notably to the *National Observer* and the *Bookman*, and also to the *Book of the Rhymers' Club*—the English *Parnasse Contemporain* of the early 'nineties. With Edwin J. Ellis he edited the *Works of William Blake* (1893), and also edited *A Book of Irish Verse* (1895). In 1897 appeared *The Secret Rose*, a collection of Irish legends and tales in prose, with poetry interspersed, containing the stories of Hanrahan the Red. The same year he printed privately *The Tables of the Law* and the *Adoration of the Magi*, afterwards published in a volume of Mr Elkin Mathews's "Vigo Street Cabinet" in 1904. In 1889 he published *The Wind among the Reeds*, containing some of his best lyrics, and in 1900 another poetical drama, *The Shadowy Waters*. He now became specially interested in the establishment of an Irish literary theatre; and he founded and conducted an occasional periodical (appearing fitfully at irregular intervals), called first *Beltain* and later *Samhain*, to expound its aims and preach his own views, the first number appearing in May 1899. In the autumn of 1901 Mr F. R. Benson's company produced in London the play *Diarmuid and Grania*, written in collaboration by him and George Moore. In 1902 he published his own first original play in prose, *Cathleen ni Houlihan*, which was printed in *Samhain* in October that year. In 1903 he collected and published a volume of literary and critical essays, to which he gave the title, *Ideas of Good and Evil*. In the same and the following years he published a collected edition of his *Plays for an Irish Theatre*, comprising *Where There is Nothing*, *The Hour-Glass*, *Cathleen ni Houlihan*, *The Pot of Broth*, *The King's Threshold* and *On Baile's Strand*. In 1904 he also edited two volumes of *Irish Representative Tales*. Whether or not "Celtic" is the right word for it, Mr Yeats's art was quickly identified by enthusiasts with the literary side of the new Irish national movement. His inspiration may be traced in some measure to the Pre-Raphaelites and also to Blake, Shelley and Maeterlinck; but he found in his native Irish legend and life matter apt for his romantic and often elfin music, with its artful simplicities and unhackneyed cadences, and its elusive, inconclusive charm.

See the section on W. B. Yeats in *Poets of the Younger Generation* by William Archer (1902), and for bibliography up to June 1903, *English Illustrated Magazine*, vol. xxix. (N.S.) p. 288. A library edition of his collected works in prose and verse was issued by Mr Bullen from the Shakespeare Head Works, Stratford-on-Avon, in 8 vols., 1908.

YECLA, a town of E. Spain, in the extreme N. of the province of Murcia, on the Yecla-Villena railway; it is situated on the W. slope of Monte Castillo, which rises above the left bank of the Arroyo del Jua. Pop. (1900) 18,743. The chief buildings are a half-ruined citadel, a modern parish church with a pillared Corinthian façade, and a town hall standing in a fine arcaded square. Yecla has a thriving trade in the grain, wine, oil, fruit and esparto grass produced in the surrounding country.

YEISK, a town of Russia, in the province of Kuban (Caucasus), founded in 1848 on a sandbank which separates the shallow Bay of Yeisk from the Sea of Azov, 76 m. S.W. of Rostov-on-the-Don. Pop. 35,446. Notwithstanding its shallow roadstead, Yeisk has grown with great rapidity, and exports corn, linseed and wool. There are wool-cleansing factories, oil-works and tanneries.

YELLOW FEVER, a specific infective tropical fever, the germ of which is transmitted by the *Stegomyia fasciata* or domestic mosquito, occurring endemically in certain limited areas. The area of distribution includes the West Indies, Mexico, part of Central America, the W. coast of Africa and Brazil.

The first authentic account of yellow fever comes from Bridgetown, Barbados, in 1647, where it was recognized as a "nova pestis" that was unaccountable in its origin, except that Ligon, the historian of the colony, who was then on the spot, connected it with the arrival of ships. It was the same new pestilence that Dutertre, writing in 1667, described as having occurred in the French colony of Guadeloupe in 1635 and 1640; it recurred at Guadeloupe in 1648, and broke out in a peculiarly disastrous form at St Kitts the same year, and again in 1652; in 1655 it was at Port Royal, Jamaica; and from those years onwards it became familiar at many harbours in the West Indies and Spanish Main. It appeared at the Brazilian ports in 1849. In 1853 it appeared in Peru and in 1820 on the W. coast of Africa. In Georgetown (British Guiana) 69% of the garrison died in 1840.

During the great period of yellow fever (1793–1805), and for some years afterwards, the disease found its way time after time to various ports of Spain. Cadiz suffered five epidemics in the 18th century, Malaga one and Lisbon one; but from 1800 down to 1821 the disease assumed much more alarming proportions, Cadiz being still its chief seat, while Seville, Malaga, Cartagena, Barcelona, Palma, Gibraltar and other shipping places suffered severely, as well as some of the country districts nearest to the ports. In the severe epidemic at Barcelona in the summer of 1821, 5000 persons died. At Lisbon in 1857 upwards of 6000 died in a few weeks. In New Orleans 7970 people died in 1853, 3093 in 1867, and 4056 in 1878. In Rio 4160 died in 1850, 1943 in 1852, and 1397 in 1886.

Certain distinct conditions have seemed to be necessary for an outbreak. Foremost we may notice a high atmospheric temperature, one of 75° F. or over. As the thermometer sinks, the disease ceases to spread. Moisture favours the spread of yellow fever, and epidemics in the tropics have usually occurred about the rainy season. Seaport towns are most affected. In many instances the elevated airy and hygienic quarters of a town may escape, while the shore districts are decimated. Usually the disease does not spread to villages or sparsely populated districts. Certain houses become hotbeds of the disease, case after case occurring in them; and it is usually in houses that the disease is contracted. A house may be said to be infected when it contains infected mosquitoes, whether there be a yellow-fever patient there or not. Ships become infected in the same way, the old wooden trading ships affording an ideal hiding-place to the *Stegomyia* in a way that the modern and airy steamship does not.

The incubation period of yellow fever is generally four or five days, but it may be as short as twenty-four hours. There are usually three marked stages: (1) the febrile period, (2) the period of remission or lull, (3) in severe cases, the period of reaction. The illness usually starts with languor, chilliness, headache, and muscular pains, which might be the precursors of any febrile attack. These are followed by a peculiar look of the eyes and face, which is characteristic: the face is flushed, and the eyes suffused at first and then congested or ferrety, the nostrils and lips red, and the tongue scarlet—these being the most obvious signs of universal congestion of the skin, mucous membranes and organs. Meanwhile the temperature has risen to fever heat, and may reach a very high figure (maximum of 110° Fahr., it is said); the pulse is quick, strong and full, but may not keep up in these characters with the high temperature throughout. There are all the usual accompaniments of high fever, including hot skin, failure of appetite, thirst, nausea, restlessness and delirium (which may or may not be violent); albumen will nearly always be found in the urine. The fever is continued; but the febrile excitement comes to an end after two or three days. In a certain class of ambulatory or masked cases the febrile reaction may never come out, and the shock of the infection after a brief interval may lead unexpectedly and directly to prostration and death. The cessation of the paroxysm makes the *stadium*, or lull, characteristic of yellow fever. The hitherto militant or violent symptoms cease, and prostration or collapse ensues. The internal heat falls below the normal; the action of the heart (pulse) becomes slow and feeble, the skin cold and of a lemon-yellow tint, the act of vomiting effortless, like that of an infant, the first vomit being clear fluid, but afterwards black from an admixture of blood. It is at this period that the prospect of recovery or of a fatal issue declares itself. The prostration following the paroxysm of fever may be no more than the weakness of commencing recovery, with copious flow of urine, which even then is very dark-coloured from the presence of blood. The prostration will be all the more profound according to the height reached by the temperature during the acute paroxysm. Much blood in the vomit and in the stools, together with all other haemorrhagic signs, is of evil omen. Death may also be ushered in by suppression of urine, coma and convulsions, or by fainting from failure of the heart. In severe types of the disease an apoplectic, an algid and a choleraic form have been described.

The case mortality averages from 12 to 80%. In Rio in 1898 it reached the appalling height of 94·5%. In cities where it is endemic the case mortality is usually lower. In 269 cases observed by Sternberg, the mean mortality was 27·7%. In 158 cases of yellow fever in Vera Cruz in 1905 there were 91 deaths. The death-rate, however, tends to vary in different epidemics. In the epidemic occurring in Zacapa, Mexico, in 1905 in a population of 6000 there were 700 cases, and the mortality among the infected was 40%.

Treatment.—The patient should be removed from the focus of infection and nursed in a well-ventilated room, screened from mosquitoes. The further treatment is symptomatic. A purgative, followed by hot baths, is useful in the early stages to relieve congestion, high temperature may be controlled by sponging; vomiting, by ice; or, if haemorrhagic, by ergot, perchloride of iron or other styptics; and pilocarpine may be given if the urine be scanty. Sternberg has introduced a system of treatment by alkalis to counteract the hyperacidity of the intestinal contents and increase the flow of urine. Of 301 whites treated by this method only 7·3% died, and of 72 blacks all recovered.

Causation.—The pathology of the disease is discussed in the article PARASITIC DISEASES. In 1881 Dr Charles Finlay, of Havana, propounded the theory that mosquitoes were the carriers of the infection. Numerous theories had previously been brought forward, notably that of the *Bacillus icteroides*, described by Sanarelli; but it is now certain that this organism is not the cause. Other authorities held that the disease was spread by contagion, by miasmata, or some other of the vague agencies which have always been put forward in the absence of exact knowledge. Finlay's mosquito theory remained in abeyance until attention was again drawn to it by the demonstration in recent years of the part played by these insects in the causation of other tropical diseases. The mosquito selected by Finlay was the *Stegomyia fasciata*, a black insect with silvery markings on the thorax, which is exceedingly common in the endemic area. It frequents towns, and breeds in any stagnant water about houses. Specimens were caught, fed upon yellow-fever patients, kept for a fortnight, and then allowed to bite susceptible persons established in a special camp with other susceptible persons as a control. Those bitten developed the fever, the others did not. An American commission was appointed in 1900, consisting of Walter Reed, James Carroll, A. Agramonte and Lazear, and its conclusions were: that the *Stegomyia fasciata* is the agent of infection, that the virus of yellow fever is present in the blood during the first three days of the fever, and is generally absent on the fourth; that the germ is so small that it can pass through a Chamberland porcelain filter; that the bite of all infected *Stegomyia* does not produce yellow fever (about 35% of the experiments proving negative); that mosquitoes fed on yellow-fever blood were not capable of giving rise to infection until after a lapse of twelve or fourteen days, but the insects retained their infective power for at least fifty-seven days. It can therefore be concluded that the virus of yellow fever is a parasite, requiring as in malaria an alternate passage through a vertebrate and an insect host, the analogy to malaria being very complete. E. Marchoux and P. L. Simond, of the French Yellow Fever Commission to Rio de Janeiro, 1906, have observed an interesting fact in connexion with the *S. fasciata*. In order to lay her eggs she must first have a feed of blood, three days after which she lays them. Before she lays her eggs she strikes both day and night, after that period at night only. Persons bitten in the day-time, therefore, do not develop yellow fever, while those bitten at night do. This may explain the impunity with which Europeans may visit an infected district in the day-time provided that they are careful not to sleep there at night. It was stated by Marchoux and Simond that an infected mosquito transmits the parasite to her eggs, the progeny proving infective.

Prophylaxis.—Following on the publication of these experiments there was instituted a vigorous campaign against mosquitoes in Havana in 1901, based on the methods applied to the suppression of malaria, and carried out under the direction of Major W. C. Gorgas of the United States army, chief sanitary officer of Havana. The work was begun on the 27th of February 1901. An order was issued that all receptacles containing water were to be kept mosquito-proof; sanitary inspectors were told off for each district to maintain a constant house-to-house inspection, and to treat all puddles, &c., with oil; receptacles found to contain larvae were destroyed and their owners fined; breeding-grounds near the town were treated by draining and oil; hospitals and houses containing yellow-fever patients were screened; infected and adjacent buildings were fumigated with pyrethrum powder. The results exceeded all expectation, and after January 1902 the disease entirely ceased to originate in Havana. Cases occasionally now come into Havana from Mexican ports, but are treated under screens with impunity in ordinary city hospitals and never at any time infect the city. Thus in 1907 there was one death from yellow fever, and the general death-rate of Havana from all diseases was 17 per thousand. In the *Bulletin of Public Health and Charities of Cuba* it is stated there only occurred between 1905–9 a total of 345 cases of yellow fever in all Cuba, where formerly they numbered many thousands, and in April 1910 the republic was declared to be entirely free from the disease.

Among other modern outbreaks in which sanitary measures have triumphed in the suppression of yellow fever were the outbreak in New Orleans in 1905, in which a medical staff of 50 with subordinates to the number of 1203 started immediately on the outbreak to clean up the city; the outbreak in Belize, British Honduras, in 1905; the anti-yellow-fever campaign undertaken in the British W. Indies in 1906–9. As soon as the Isthmian Canal commissioners took over the administration of the Panama Canal Zone they undertook a vigorous campaign against the mosquito, as the result of which yellow fever was successfully banished. Colonel Gorgas in his 1908 report wrote: "It is now three years since a case of yellow fever has developed in the Isthmus, the last being in November 1905."

Rio de Janeiro, which had lost 28,078 inhabitants in 13 years by yellow fever, and Santo, have also waged war against the disease; as a result of the anti-*Stegomyia* policy the deaths from yellow fever in Rio fell to 42 in 1906, 39 in 1907, 4 in 1908, and 0 in 1909.

See Sir P. Manson, *Tropical Diseases* (1907); article "Yellow Fever" in Allbutt and Rolleston's *System of Medicine*; Sir R. Boyce, *Report on Yellow Fever in Honduras* (1906), and *Health and Administration in the West Indies* (1910); *Bulletins of the U.S. Yellow Fever Institute*; *Annales de l'Institut Pasteur* (January 1906).

YELLOWSTONE NATIONAL PARK, an American national reservation, situated mainly in N.W. Wyoming, U.S.A., dedicated by the United States government as "a public park or pleasure ground for the benefit and enjoyment of the people." It is nearly a rectangle in shape, with a length, from N. to S., of 62 m., a width of 54 m. and an area of approximately 3350 sq. m. It extends into Montana, on the N., about 2½ m. and into Montana and Idaho, on the W., 2 m. Except at its main entrance, through the valley of the Yellowstone on the N., the park is entirely surrounded by national forests: the Gallatin and Absaroka national forests, on the N.; the Shoshone and the Beartooth, on the E.; the Teton, on the S.; and the Targhee, the Madison and the Gallatin, on the W.

The central portion, comprising an area of about 2000 sq. m., is an undulating volcanic plateau with a mean elevation above the sea of about 8000 ft. Along the entire E. border stretches the Absaroka range, with peaks exceeding 11,000 ft. (Index Peak, 11,740 ft.) in height. On the N. is the Snowy range with its snow-capped peaks. W. of the Snowy the Gallatin range extends S. for 20 m. along the W. border. Electric Peak, in the N.W. corner of the park, rises to a height of 11,155 ft. Near the S. end of the park are the Red Mountains, which culminate in Mt. Sheridan (10,385 ft.) and afford a magnificent view of the whole region; and farther S. the N. spur of the lofty Tetons juts across the S. border.

In the production of these mountains and plateau there was first, at the close of the Cretaceous period, an upheaval of the earth's substance to form a mountain rim and a depressed basin. Subsequently, in the Tertiary period, there were two enormous outpourings of volcanic material—first andesitic lava, and later, after a long interval of quiet, rhyolitic—which nearly half filled the basin, converted it into a plateau and broke up the mountain rim. Two centres of volcanic activity were Mt. Sheridan, in the S., and Mt. Washburn, in the N. The volcanoes have long been extinct, but the diminished energy now causes hot springs and geysers in all parts of the plateau, about 100 in number. More than half, including the largest and finest, are in the upper and the lower Geyser basins, near the head of the Madison, here known as the Firehole, river. Several others are farther N. in the Norris basin upon Gibbon river, a branch of the Madison, and others are farther S. in the Shoshone basin.

Excelsior, the largest geyser, with a crater about 300 ft. long and 200 ft. wide, has not been active since 1890, but for several years after its discovery it threw up at intervals a huge mass of water to a height of 200–250 ft. Old Faithful, at regular intervals of 65–70 minutes, throws up a column of hot water 2 ft. in diameter to a height of 125–150 ft., and the eruption lasts 4–4½ minutes. The Giant, at intervals of 2 to 4 days or more, throws up a column to a height of 250 ft. for 90 minutes. The Beehive (so called from the shape of its cone), the Grand and the Lone Star throw up columns to a height of 200 ft. but at irregular intervals. In the Norris basin are the Black Growler and the Hurricane, which consist of small apertures through which steam rushes with such tremendous force that it may be heard for miles. The hot springs are widely distributed over the plateau and number from 3000 to 4000. The water of most of the springs and geysers holds silica in solution in considerable quantities, so that as it cools and evaporates it deposits a dazzling white sinter which has covered many square miles of the valleys and contrasts strongly with the dark green of the surrounding forests. The springs, geysers and steam vents are scattered over it in the most irregular fashion. The silicious matter has also built up around the springs and geysers cones or mounds of considerable size and great beauty of form. The water of many of the springs contains sulphur, iron, alum and other materials in solution, which in places stain the pure white sinter with bright bands of colour. The tints and hues of some of the pools are of matchless beauty. Near the N. boundary of the park there is a group of about 70 active springs, known as the Mammoth Hot Springs, which hold carbonate of lime in solution. Their deposits have built across a small valley or ravine a series of broad, flat, concentric terraces beautiful in form and 300 ft. in height. The water which trickles over the rims of the pools and basins on the upper terraces is a transparent blue, while the formation itself contains a network of fibrous algae which gives it a wonderful variety of colours. In the lower Geyser basin are the Mammoth Paint Pots, a group of mud springs with colours varying according to the mineral ingredients in the steam, which not only colours the mud but also forms it into imitative figures. Near the centre of the park is Mud Caldron, a circular crater about 40 ft. deep with the boiling mud at the bottom. Although there have been some changes in the thermal energy in the park since 1871, there has been no appreciable diminution. Certain springs and geysers lose some of their energy at intervals, while others gain; certain geysers have become quiescent, but some new ones have been formed.

The Continental Divide crosses the park in a S.E. direction from the meeting-point of the states of Wyoming, Idaho and Montana. The small section S. of the Divide is drained by the Snake river into the Columbia river and the Pacific Ocean; the large section N. of the Divide is drained by the Yellowstone and Madison rivers into the Missouri, the Mississippi and the Gulf of Mexico. The Lewis river, a fork of the Snake, has its origin in the beautiful Shoshone Lake, and the Heart river, another fork of the Snake, rises in Heart Lake, under Mt. Sheridan.

The Yellowstone drains the entire E. section. Rising just beyond its S. limits, it flows into and through Yellowstone Lake, a magnificent sheet of water, very irregular in shape, dotted with forested islands, having an area of about 140 sq. m., lying 7741 ft. above the sea and nearly surrounded by lofty mountains. A few miles below the lake, the river, after a succession of rapids, leaps over a cliff, making the Upper Fall, 109 ft. in height. Half a mile lower down it rolls over the Lower Fall, which has a clear descent of 308 ft. The river at this point carries, at the average stage of water, about 1200 cub. ft. per second. With this fall the river enters the "Grand Canyon," which in many scenic effects is unequalled. Its depth is not great, at least as compared with the canyons upon the Colorado river system; it ranges from 600 ft. at its head to 1200 near the middle, where it passes the Washburn Mountains. Its length to the mouth of Lamar river is 24 m. It is cut in the volcanic plateau, and its ragged broken walls, which are inclined at very steep angles, are of a richness of colouring that almost defies description, a colouring that is produced by the action of the thermal springs, at the base of the canyon, upon the mineral pigments in the lava. Bright orange, yellow, red and purple hues predominate and are set off very effectively against the dark green pines with which the margins of the canyon are fringed, and the white foam of the river at the bottom of the chasm. Near the foot of the Grand Canyon, Tower creek, which drains the concavity of the horseshoe formed by the Washburn Mountains, enters the Yellowstone. Just above its mouth this stream makes a beautiful fall of 132 ft. into the gorge in which it joins the river. A few miles farther down, the Yellowstone is joined by an E. branch, Lamar river, which drains a large part of the Absaroka Range. Then it enters the Third Canyon, from which it emerges at the mouth of Gardiner river. The latter stream drains an area of elevated land by means of its three forks, and upon each of them occurs a fine fall in its descent toward the Yellowstone. The Madison rises in the W. of the park and flows in a generally N. and then W. course out of the park. Its waters are mainly collected from the rainfall upon the plateaux, and from the hot springs and geysers, most of which are within its drainage area. Upon this river and its affluents are several fine falls. Indeed, all the streams in this region show evidence, in the character of their courses, of a recent change of level in the surface of the country.

The climate, influenced by the high elevation, is characterized by long and severe winters and short summers with great diurnal extremes of temperature. But the low temperature causes the moisture-laden winds to deposit here greater quantities of rain and snow than in the semi-arid regions below, which not only promote the growth of vegetation, but cause the activity of the springs, geysers and waterfalls. The mean annual temperature at the station of the United States Weather Bureau, near the N. boundary, is 39° F. The summer (June, July and August) mean is 59°; the winter (December, January and February) mean, 20°.

Extremes have ranged from 96° in July to −35° in February. The temperature has fallen to 30° in July, and a warm summer day may at any time be followed by frost at night. The mean annual precipitation is 19·6 in. Much of this is in the form of snow, and nearly half of it is during the four months from December to March; in the four dryest months, from July to October, it is only 4·4 in. Some snow falls in every month except July and August, and the average annual snowfall amounts to 94·7 in. The prevailing winds are S.

About four-fifths of the park is covered with dense forests of black pine (*Pinus Murrayona*), balsam, fir, spruce, cedar and poplar. These trees do not attain a large size. A low blueberry (*Vaccinium myrtilis*) forms a thick underbrush in much of the forest. Choke-cherries, gooseberries, buffalo-berries, red currants and black currants grow along the streams and in moist places of the lower altitudes. In the glades are bunch-grass and a variety of flowering plants; buttercups, daisies, forget-me-nots and other wild flowers may be found near melting snow-banks in August. In the hot-spring districts are plants with peculiarities both of those common to the desert and those common to the seashore. In the N.E. corner of the park fossil forests rise one above the other. After the destruction of one forest by volcanic eruptions another grew over it; it, too, was buried under volcanic material, and the process was repeated several times.

The native fauna is abundant and varied. The policy of the government which protects game, both in the park and in the surrounding national forests, has induced elk, deer, antelope, mountain-sheep, bears, porcupines, coyotes, squirrels, gophers and woodchucks to take shelter here. There are also a few moose and some beavers. Black, brown and grizzly bears may be seen at almost any time during the summer season feeding on the garbage from the hotels. A few wild bison still remain at large, and besides these there is a herd of about 100 confined within a pasture in the Lamar Valley. The lakes and rivers are well stocked with trout and other fish, and visitors have the privilege of catching a limited number with rod and line. Robins, bluebirds, warblers, chickadees, finches, vireos, wrens, yellow-headed blackbirds, nutcrackers, nuthatches, meadow-larks, sparrows, woodpeckers, swifts, kingbirds and several other species of small birds are found in the park, but the number of each is not great. Among birds of prey are the golden eagle, bald eagle, hawks and owls. Geese, ducks, cranes, pelicans and gulls are very numerous in the autumn months.

The park is under the supervision of a superintendent who is appointed and instructed by the Secretary of the Interior. It is policed, however, by troops of United States cavalry with headquarters at Fort Yellowstone, near the Mammoth Hot Springs, and the building of roads and other improvements is under the direction of the Secretary of War. The only railway approaches to the park are a branch of the Northern Pacific railway up the valley of the Yellowstone to the main gate at Gardiner, Montana, and a branch of the Oregon Short Line up the valley of the North Fork of the Snake to Yellowstone, Montana. Automobiles are not allowed within the park, and the principal means of conveyance is by stage coaches and by a steamboat on Yellowstone Lake. There are hotels at the Mammoth Hot Springs, at the principal geyser basins and at Yellowstone Lake. The hotels and stage lines open for the tourist season early in June and close in the middle of September.

The strange phenomena of this region were known to some of the Indians; they were discovered by John Colter, a member of the Lewis and Clark expedition, in 1807; the region was visited by James Bridger before 1840; an account of the geysers was published at Nauvoo, Illinois, in *The Wasp*, a Mormon paper, in 1842; Captain W. F. Raynolds, of the United States Corps of Topographical Engineers, with full knowledge of Bridger's accounts, was ordered to explore the region in 1859, and yet, chiefly because of the persistent incredulity with which the accounts of the phenomena were received, the region remained practically unknown until 1870. From 1863 to 1866 gold seekers repeatedly confirmed the early reports, and the publication of their accounts in Western papers gradually aroused interest. In 1869 a private exploring party, consisting of David E. Folsom, C. W. Cook and William Peterson, set out from the gold-fields of Montana with the express purpose of verifying or refuting the rumours, and they returned full of enthusiasm. In 1870 a semi-official expedition, led by Henry D. Washburn, the surveyor-general of Montana, and Lieutenant Gustavus C. Doane of the Second United States Cavalry, made the "Yellowstone Wonderland" widely known. A year later an expedition under Dr Ferdinand V. Hayden (1829–1887) made a large collection of specimens and photographs, and with these data, together with the reports of this and the Washburn-Doane expedition, Congress was induced to reserve the area from settlement, which was done by an act approved the 1st of March 1872. In that year further explorations were made, and in subsequent years army expeditions continued the work of exploration. In 1878 a map of the park based upon triangulation was drawn up by the Hayden survey, and in 1883–85 a more detailed map was made by the United States Geological Survey, and a systematic study of its geological phenomena was instituted.

See Arnold Hague, *Geology of the Yellowstone National Park* (Washington, 1899), "Geological History of the Yellowstone National Park," in the *Annual Reports* of the Smithsonian Institution (ibid., 1893), and "The Yellowstone National Park," in *Scribner's Magazine* (May, 1904); W. H. Weed, "Formation of Travertine and Siliceous Sinter by the Vegetation of Hot Springs," in the 9th *Annual Report* of the Director of the United States Geological Survey (Washington, 1889); descriptions in the 5th, 6th and 12th *Reports* of the Hayden Geological and Geographical Survey of the Territories (ibid., 1871, 1872 and 1878); J. H. Raftery, *Historical and Descriptive Sketch of the Yellowstone National Park*, Senate Document No. 752, 2nd Session of the 60th Congress (ibid., 1909); H. M. Chittenden, *Yellowstone National Park, Historical and Descriptive* (Cincinnati, 1895); and *Annual Reports* of the Superintendent of the Park (Washington, 1880 sqq.).

YEMEN (*Yaman*), a province of Arabia, forming the S.W corner of the peninsula, between 12° 35′ and 18° N., and 42° and 47° E., bounded on the N. by Asir and on the E. by the Dahna desert and Hadramut. Ptolemy and the ancient geographers in general include the whole peninsula under the name of Arabia Felix (εὐδαίμων), in which sense they translate the Arabic *Yemen*, literally "right hand," for all Arabia S. of the Gulf of Akaba was to the right from their standpoint of Alexandria; the Mahommedan geographers, however, viewing it from Mecca, confine the term to the provinces S. of Hejaz, including Asir, Hadramut, Oman and part of southern Nejd. The Turkish vilayet of Yemen includes Asir, and extends along the Red Sea coast from El Laith in the N. to Shekh Said at the straits of Bab-el-Mandeb; its land boundary on the E. is undefined, except in the S.E., where the boundary between Turkish territory and that of the independent tribes under British protection was defined by an agreement between Great Britain and Turkey in 1904, by a line running approximately N.E. from Shekh Said to the Dahna desert. The main physical characteristics of the province are described in the article Arabia. A lowland strip 20 to 30 m. wide extends along its western and southern coasts, skirting the great mountain range which runs along the whole western side of the Arabian peninsula, and attains its greatest height in the Jibal, or highlands of Yemen; beyond this mountain zone the interior plateau falls gradually towards the N.E. to the Dahna desert.

The lowland, or Tehama, is hot and generally sterile; it contains oases, however, near the foot of the mountains, fertilized and irrigated by hill streams and supporting many large villages and towns. The most important of these are Abu Arish, Bet el Fakih and Zubed in the western Tehama, the latter a thriving town of 20,000 inhabitants and the residence of a Turkish kaimakām; and Abyan and Lahej, the chief place of the independent Abdali tribe, in the southern Tehama. Hodeda and Aden are the only ports of commercial importance, Lohaia and Ghalefika have sunk to insignificant fishing villages, and Mokha, the old centre of the coffee trade, is now almost deserted. The Jibal forms a mountainous zone some 50 m. in width rising steeply from the foothills of the Tehama to an average height of 9000 ft.; many summits exceed 10,000 ft.—the highest fixed by actual survey is Jebel Manar, 10,565 ft., about 10 m. E. of the town of Ibb. With its temperate climate and regular rainfall, due to the influence of the S.W. monsoon, the Jibal must be considered the most favoured district of Arabia. The villages are substantially built of stone, often picturesquely situated on the spurs and crests of the hills, the houses clustering round the *dars* or towers which dominate the cultivated slopes and valleys. The principal crops are wheat, barley, millet and coffee, the last-named more particularly on the western slopes of the range within reach of the moist sea-breezes. In many places the hillsides, otherwise too steep for cultivation, are cut into terraced fields supported by stone walls; the name given by the Greek geographers to the range of S. Arabia was no doubt intended to describe the step-like appearance of the hills due to this method of cultivation. A special characteristic of the Yemen highlands is that fields and inhabited sites are found at the highest elevations, the mountain-tops forming extensive plateaux, often scarped on every side and only accessible by difficult paths cut in the cliffs which encircle them like the escarpments of a natural fortress; a remarkable example of this is Jebel Jihaf on the Aden border, 8000 ft.

above sea-level and 4000 ft. above the Kataba valley, an isolated plateau some 6 m. long, containing thirty or forty villages.

The principal town of the Jibal is Ta'iz, the seat of a Turkish mutassarif; its present population does not exceed 4000, but it was formerly a large city, and from its position in the centre of a comparatively fertile district at the junction of several trade routes it must always be important. It contains five mosques and the Turkish government offices and barracks, and in the business quarter several cafés and shops kept by Greeks. The climate is unhealthy, perhaps owing to its position in a low valley, 4400 ft. above sea-level, at the foot of the lofty Jebel Sabur (9900 ft.), and even in Niebuhr's time many of the houses in the city were in ruins. Thirty miles further N. are the small towns of Ibb (6700 ft.) and Jibla, about 5 m. apart, typical hill towns with their high stone-built houses and paved streets. To the E. on the main road to the coast via Zubed is Udĕn, the centre of a coffee-growing district; 80 m. to the N. is Manākha, a Turkish post on the main road from Hodeda to the capital, and the chief place of Jebel Harāz, which produces the best coffee in Yemen. Another group of hill towns lies still further N. in the mountain mass between the Wadi Maur and Wadi La'a, where the strongholds of Dhāfir, Afār, Haja and Kaurka'bān held out for long against the Turkish advance; the last-named town, now almost deserted, was once a city of 20,000 inhabitants, and the capital of a small principality which preserved its independence during the earlier Turkish occupation between 1536 and 1630.

The inner or plateau zone of Yemen stretches along the whole length of the province, with an average width of 120 m; it lies entirely to the E. of the high range, and has therefore a smaller rainfall than the Jibal; its general character is that of a steppe increasing in aridity towards the E. where it merges in the desert, but broken in places by rocky ranges, some of which rise 2000 ft. above the general level, and which in the Hamdan district N. of Sana show evidence of volcanic action. It is intersected by several *wadi* systems, of which the principal are those in the N. uniting to form the Wadi Nejrān, in the centre the Wadi Khārid and Shibwān running to the Jauf, and in the S. the Wadi Ḅana and its affluents draining to the Gulf of Aden. The plateau has a gradual fall from the watershed near Yarim, 8500 ft. above sea-level, to less than 4000 ft. at the edge of the desert.

The northern part nearly down to the latitude of Sana, is the territory of the warlike Hāshid and Bakīl tribes, which have never submitted to the Turks, and in 1892 and again in 1904–5 drove the Turkish troops from almost every garrison in the province, and for a time held the capital Sana itself for the Imām Muhammad Yahiya, the representative of the old dynasty that ruled in Yemen from the expulsion of the Turks in 1630 till its reconquest in 1871. The principal places are Sa'da, the residence of the Imām, an important town on the old pilgrim road 120 m. N. of Sana, Khaiwān and Khamr. In the N.E., bordering on the desert, is the district of Nejrān, a mountainous country with several fertile valleys including the Wadi Nejrān, Bedr and Habuna, all probably draining N.E. to the Wadi Dāwasir. Further S. is the oasis of Jauf, a hollow or depression, as its name signifies, containing many villages, and of great antiquarian interest as the central point of the old Minaean and Sabaean kingdoms, known to the ancients from the earliest historical times through their control of the frankincense trade of S. Arabia. Ma'in, identified by Halévy as the seat of the former, is on a hilltop surrounded by walls still well preserved. Numerous other ruins were found by him in the neighbourhood, together with inscriptions supporting the identification. Mārib, the Sabaean capital, was celebrated for its great dam, built according to tradition by the Queen of Sheba, and the bursting of which in A.D. 120 is said to have led to the abandonment of the city. This was, however, more probably due to the deterioration of the country through desiccation, which has forced the settled population farther westward, where Sana became the centre of the later Himyaritic kingdom. The Arhab district drained by the Wadi Khārid and Shibwān between Sana and the Jauf is covered with Himyaritic ruins, showing that the land formerly supported a large settled population where owing to the want of water cultivation is now impossible.

South of this independent tribal territory the principal places are Amran and Shibām on the road leading N. from the capital Sana; Dhamar (a town of 4000 inhabitants, the residence of a kaimakām, and the seat of an ancient university) and Yarim are on the road leading S. to Aden; and two days' journey to the E. is Rada in the extreme S.E. of Turkish Yemen, formerly a large town, but now much decayed. From near Rada the boundary runs S.W. to the small town of Ka'taba through which the direct road passes from Aden to Sana. The territory to the S. and E. is occupied by independent tribes under British protection, of which the principal are the Yafa', the Haushabi and the Abdali.

The inhabitants of Yemen are settled, and for the most part occupied in agriculture and trade, the conditions which favour the pastoral or Bedouin type found in Hejaz and Nejd hardly existing. As in the adjoining province of Hadramut, with which Yemen has always been closely related, the people are divided into four classes: (1) The Seyyids or Ashrāf, descendants of the prophet, forming a religious aristocracy; (2) the Kabail, or tribesmen, belonging to the Kahtanic or original S. Arabian stock, who form the bulk of the population, and are the only class habitually carrying arms; (3) the trading class; (4) the servile class, mostly of mixed African descent, and including a number of Jews. These latter wear a distinctive garb and occupy separate villages, or quarters in the towns. Owing to the hardships to which they have been exposed through the disturbed state of the country, many are emigrating to Jerusalem.

See C. Niebuhr, *Travels and Description of Arabia* (Amsterdam, 1774); D. G. Hogarth, *Penetration of Arabia* (London, 1904); E. Glaser, *Geschichte und Geographie Arabiens* (Berlin, 1890), and in *Petermann's Mitt.* (1886); R. Manzoni, *Il Yemen* (Rome, 1884); A. Deflers, *Voyage en Yemen* (Paris, 1889); S. M. Zwemer, *Arabia* (Edinburgh, 1900); W. B. Harris, *A Journey through Yemen* (London, 1893); H. Burchardt, *Z. d. Ges. für Erdkunde* (Berlin, 1902), No. 7. (R. A. W.)

YENISEI, a river of Asia, which rises in two principal head-streams, the Bei-kem and the Khua-kem, on the plateau of N.W. Mongolia—the former on the S. flank of the Sayan Mountains in 97° 30′ E. and 52° 20′ N., and the latter in marshes a few miles W. of Lake Kosso-gol. They have a westerly course, but after uniting they turn N., through the Sayan Mountains in the wild gorge of Kemchik, in 92° E. Thence the river makes its way across the Alpine region that borders the Sayan Mountains on the N. until it emerges upon the steppes at Sayansk (53° 10′ N.). Augmented by the Abakan on the left and the Tuba on the right, it traverses the mining region of Minusinsk, approaches within 6 m. of the Chulym, a tributary of the Ob, intersects the Siberian railway at Krasnoyarsk, and is joined first by the Kan and then by the Upper (Verkhnyaya), the Stony (Podkamennaya), and the Lower (Nizhnyaya) Tunguzka, all from the right. The Upper Tunguzka, known also as the Angara, drains Lake Baikal, and is navigable from Irkutsk. The Yenisei continues N. to the Arctic Ocean, joined on the left by the Zym, Turukhan and Ingarevka, and on the right by the Kureika and Daneshkina. After the confluence of the Angara, the stream continues to widen out to 30 m., its bed being littered with islands until it breaks into its delta (240 m. long). The length of the river is nearly 3000 m., and the area of its drainage basin 970,000 sq. m. It is navigable as far up as Minusinsk, a distance of 1840 m., and is free from ice on the average for 155 days at Turukhansk and for 196 days at Krasnoyarsk. A canal connects the Great Kaz, a tributary of the Yenisei, with the Ket, an affluent of the Ob.

YENISEISK, a government of E. Siberia, extending from the Chinese frontier to the shores of the Arctic Ocean, with an area of 986,908 sq. m. It has the governments of Tobolsk and Tomsk on the W., Yakutsk and Irkutsk on the E., N.W. Mongolia on the S. and the Arctic Ocean on the N. Its southern extremity being in 51° 45′ N. and its northern (Cape Chelyuskin) in 77° 38′, it combines a great variety of orographical types, from the Sayan alpine regions in the S. to the tundras of the Arctic littoral.

The border-ridge of the high plateau of N.W. Mongolia, which is known under the general name of the Western Sayans, and reaches altitudes of 7000 to 8000 ft., limits it on the S. This is flanked on the north-western slope by a zone, nearly 100 m. wide, characterized by narrow valleys separating parallel chains of mountains, which are built up of crystalline slates, 6000 to 7000 ft. high. Here in the impenetrable forests a few Tungus families live by hunting. Towards the S., in the basins of the Tuba, Sisim, Yus, Kan, Agul and Biryusa, the valleys of the alpine tracts contain rich auriferous deposits, and numerous gold-washings have been established along the *taiga*. A flattened range of mountains, hardly attaining more than 3000 to 3500 ft., shoots N.E. from the Kuznetskiy Ala-tau, and separates the dry steppes of Minusinsk and Abakan from the next terrace of plains, 1200 to 1700 ft. in altitude, which also stretch N.E. from Barnaul in the government of Tomsk to Krasnoyarsk, and into the upper basin of the Vilui. Another system of mountains, known as the Yeniseisk Taiga, rises on the outer border of this terrace, in the space between the upper Tunguzka, or Angara, and the Podkamennaya Tunguzka. This system consists of several parallel chains running S.W. to N.E., and reaching 2500 to 3500 ft. in altitude, though they are much lower on the left bank of the Yenisei. For many years past the Yeniseisk Taiga has been one of the most productive auriferous regions of Siberia, on account not so much of the percentage of gold in its alluvial deposits (which are poor in comparison with those of Olekminsk) as of the facilities for supplying the gold-fields with food produced in the steppes of Minusinsk.

Beyond the Yeniseisk Taiga begin the lowlands, which at no point rise more than a few hundred feet above the sea. They slope gently towards the Arctic Ocean and are covered with lakes, scanty forests and marshes; and, as they approach the ocean, they assume more and more the character of barren tundras. Beyond 70° N. trees occur only along the courses of the rivers. Two ranges, however, break the monotony of the lowlands—the Tungusk, which stretches N.E., between the Khatanga and Anabar rivers, and the Byrranga mountains, which skirt the N.W. shore of the Taimyr peninsula. The shores of the Arctic Ocean are indented by deep estuaries, that of the Taz penetrating 600 m. into the interior of the continent, and that of the Yenisei 300 m. Taymyr, Thaddeus and Khatanga Bays are wide and deep indentations, ice-bound almost all the year round. Taymyr peninsula, between the Yenisei and the Khatanga, is a stony tundra.

The government is drained by the Yenisei and its affluents. In 55° N. this river approaches the Chulym, a tributary of the Ob, from which it is separated by an isthmus only 6 m. in width. The possibility of connecting the two great river systems of Siberia at this point has often been discussed; the difficulty is that the Chulym valley is 440 ft. higher than the other.

Yeniseisk is rich in all kinds of metals and minerals. Gold dust appears in the N. Yeniseisk Taiga, in the region of the Kuznetskiy Ala-tau and its spurs, with the basins of the Tuba, Sisim and Black and White Yus, and in the upper parts of the tributaries of the Kan and Agul. Silver ore is found in the basin of the Abakan, but the mines have been abandoned. Iron ore occurs almost everywhere in S. Yeniseisk, but there is only one iron-work on the Abakan. Salt lakes are common.

The climate, though very severe throughout, offers great varieties. The Minusinsk steppes have a dry and relatively mild climate. At Krasnoyarsk (55° 1′ N.) the climate is more severe, and the winds are disagreeable. The yearly fall of snow is so small that the winds blow it away in the neighbourhood of the town. The town of Yeniseisk (58° 27′ N.) has an average temperature below freezing-point, and at Turukhansk the coldest month (February) averages −24° F. On the Taymyr peninsula the average summer temperature hardly reaches 45°.

The highlands of Sayan and Ala-tau are thickly clothed with forests of cedar, pitch-pine, larch, elder and birch, with rhododendrons, *Berberis* and *Ribes*; the Scotch fir appears only in the lower and drier parts of the valleys. The summits and slopes of the mountains are strewn with débris and boulders, and thickly carpeted with lichens and mosses; but there are patches of meadow-land brightened with flowers, most of which are known in Europe. Still, the flora is poor as a rule, and Dr Martianov, after several years' labour, succeeded in collecting only 104 species of phanerogams.[1] On the other hand, the Minusinsk plains and the steppes of the Abakan are bright with flowers scattered amid the common *Gramineae*, and in June and July with the *Polygala*, *Dianthus*, *Medicago*, *Lathyrus*, yellow sweet-scented lily, and scores of other flowers, mostly familiar in Europe, but attaining in Yeniseisk a larger size and greater brilliancy of colour. The rich carpet of grass and flowers is overtopped by the tall white blossoms of *Archangelica* and *Spiraea Ulmaria*, and by the blue masses of *Veronica longifolia*. The meadows of the moister localities, surrounded by thickets of willow, poplar, wild cherry and hawthorn, are still more attractive, on account of their wealth in anemones, violets, gentians and so on, and the numerous creepers which festoon the trees and shrubs. Dr Martianov's lists enumerate a total of 760 flowering and 760 cryptogamic plants. Of the lower Fungi and parasitical Myxomycetes 1300 species were noted, and out of the 823 species hitherto described by specialists no fewer than 124 have proved to be new. Farther N. the flora is similar in character to that of the Siberian lowlands (see Siberia). In the Taimyr peninsula it is represented by only 124 species of flowering plants.

The steppes of the upper Yenisei have been inhabited from a very remote antiquity, and numberless *kurgans*, or burial-mounds, graves, rock inscriptions and smelting furnaces of the successive inhabitants are scattered all over the prairies of Abakan and Minusinsk.[2] The present population exhibit traces of all their predecessors. Numerous survivals of Turkish and Samoyedic tribes are found in the steppes and in the Sayans; but some of them are greatly reduced in numbers. The estimated population in 1906 was 657,900. It is almost entirely Russian, the rest (about 10%) consisting of Samoyedes, Tatars, Tunguses, Yakuts, Mongols and Ostyaks. The government is divided into five districts, the chief towns of which are Krasnoyarsk, Achinsk, Kansk, Minusinsk and Yeniseisk.

Some 1,117,000 acres (0·2%) are under crops, the principal being rye, wheat, oats, barley and potatoes. Live-stock, including reindeer, breeding is very extensively carried on. Fishing, especially on the lower Yenisei, is of great importance. Sables are not now to be found, and the hunters obtain chiefly squirrels, foxes, Arctic foxes and bears. In the middle of the 19th century 350,000 to 525,000 oz. of gold were obtained annually in N. and S. Yeniseisk, but by the end of the century the output had dropped to less than 100,000 oz. Salt is extracted as well as Epsom salts. Coal has been found on the Lower Tunguzka, near the mouth of the Yenisei, and in many places in the S. of the government. Silver, copper, lead, brown coal or lignite, rock-salt, graphite and mica all exist in large quantities, but are not regularly mined. There are several distilleries. The trade is in furs (exported), and in groceries and manufactured goods (imported). The gold-fields of the Yeniseisk Taiga are supplied with grain and cattle by river from the Minusinsk region, and with salt, spirits and iron by the Angara. The government is traversed from W. to E. by the Siberian railway, and considerable efforts have been made to establish regular steamer communication between the mouth of the Yenisei and W. Europe. For some years before the close of the 19th century steamers (*e.g.* that of the English Captain Wiggins) reached the mouth of the Yenisei, importing provisions and machinery for the gold mines. Efforts have been made to clear the rapids of the Angara, so as to bring Lake Baikal into steamer communication with the Yenisei. Owing to the shallowness, however, of the small tributaries of the Yenisei, the canal connecting the Yenisei with the Ob has not proved as serviceable as was expected. (P. A. K.; J. T. Be.)

YENISEISK, a town of Asiatic Russia, capital of the government of the same name, on the right bank of the Yenisei, 170 m. N.N.W. of Krasnoyarsk, with which it has regular communication by steamer. Pop. 12,000. It is the centre of a gold-mining region, and has a public library and a natural history and archaeological museum. The town was founded in 1618.

YEOLA, a town of British India, in the Nasik district of Bombay, on the chord line of the Great Indian Peninsula railway, 18 m. from Manmad junction. Pop. (1901) 16,559. There are important manufactures of cotton and silk cloth and thread, and also of gold and silver wire. At the time of its foundation Yeola was under the emperor of Delhi; it subsequently passed into the hands of the rajas of Satara and then the Peshwas. Finally it was given in grant to Vithal, the ancestor of the present chief of Vinchur.

YEOMAN, a term of which the various meanings fall into two main divisions, first that of a class of holders of land, and secondly that of a retainer, guard, attendant or subordinate officer or official. The word appears in M.E. as *ȝemen*, *ȝomen* and *yemon*; it does not appear in O.E. Various explanations of the first part have been suggested, such as *jung-mann*, young man, and *yeme-mon*, attendant, from *yeme*, care; but it is generally accepted that the first part is the same word as the Ger. *Gau*, district, province, and probably occurs in O.E. as *gēa* in *Sūðri-gēa*, Surrey, *i.e.* southern district, and other place-names. Thus in O. Frisian is found *gāman*, a villager; Bavarian, *gäumann*, peasant. "Yeoman" thus meant a countryman, a man of the district, and it is this sense which has survived in the special use of the word for a class of landholders, treated below. For the transition in meaning to a guard of the sovereign's body and to officials of a royal household see Yeomen of the Guard and Valet. In the British royal household there are, besides the Yeomen of the Guard, a yeoman of the wine and beer cellar, a yeoman of the silver pantry and yeoman state porters. The term also occurs in the title of the first assistant to the Usher of the Black Rod, the Yeoman Usher of the Black Rod. In the British navy there are petty officers in charge of the signalling styled "Yeomen of Signals." For the history and present organization of the "yeomanry cavalry" see Yeomanry and United Kingdom (§ *Army*).

The extent of the class covered by the word "yeoman" in England has never been very exactly defined. Not only has the meaning of the word varied from century to century, but men writing about it at the same time have given to it different interpretations. One of the earliest pictures of a yeoman is that given by Chaucer in the Prologue to the *Canterbury Tales*. Here, represented as a forester, he follows the esquire as a retainer or dependant. The yeomen of the ages succeeding Chaucer are, however, practically all occupied in cultivating the land, although, doubtless from its younger sons, the class furnished retainers for the great lords, men-at-arms and archers for the wars, and also tradesmen for the towns. Stubbs (*Const. Hist.* vol. iii.) refers to them as "a body which in antiquity of possession and purity of extraction was probably superior to the classes that looked down upon it as ignoble," and Medley (*Eng. Const. Hist.*) describes the yeomen as in the 15th century representing on the whole "the small freeholders of the feudal manor." Holinshed, in his *Chronicle*, following Sir T. Smyth (*De republica Anglorum*), and W. Harrison (*Description of England*), describes them as having free land worth £6 annually, and in times past 40s., and as not entitled to bear arms, being for the most part farmers to gentlemen, and this description may be accepted as the popular idea of the yeoman in the 16th century. He formed the intermediate class between the gentry and the labourers and artisans, the line of demarcation, however, being not drawn very distinctly.

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[1] N. Martianov, "Materials for a Flora of the Minusinsk Region," in *Trudy* of the Kazan Society of Naturalists (xi. 3, 1882).

[2] See W. Radlov, *Aus Sibirien* (2 vols., Leipzig, 1880), and N. Savenkov, in *Izvestia* of the East Siberian Geographical Society (xvii., 1887).

The yeomen were the smaller landholders, and in the 15th century were practically identical with the forty-shilling freeholders who exercised the franchise under the act of 1430. Occasionally they found their way into parliament, for in 1446 the sheriffs were forbidden to return *valletti* (*i.e.* yeomen) as members, but this prohibition had very little result. Soon, however, the name appears to have included tenant farmers as well as small freeholders. Thus Latimer, in his famous sermon before Edward VI., says: "My father was a yeoman, but had no land of his own"; the bishop represents the yeoman as an exceedingly prosperous person, and the same opinion had been expressed about a century before by Sir John Fortescue in his *Governance of England*. The decay of the class began with the formation of large sheep farms in the 16th century, but its decline was very slow, and the yeomen furnished many sturdy recruits to the parliamentary party during the Civil War. Their decay was accelerated during the 18th century, when many of them were bought out by the large landowners, while they received another blow when the factory system destroyed the country's domestic industries. Many writers lament the decay of the yeoman in the 18th and 19th centuries, but this is partly accounted for by the fact that they exclude all tenant farmers from the class, which they confine to men cultivating their own land. Thus the wheel has come full circle and the word means to-day much the same as it meant in the early part of the 15th century.

YEOMANRY, the name given to the volunteer mounted troops of the home defence army of Great Britain, ever since their original formation; it indicated that recruiting, organization and command were upon a county basis, the county gentlemen officering the force, the farmers and yeomen serving in its ranks, and all alike providing their own horses. Although the yeomanry was created in 1761, it was not organized until 1794. Under the stimulus of the French War recruiting was easy, and 5000 men were quickly enrolled. A little later, when more cavalry was needed, the Provisional Cavalry Act was passed, whereby a sort of revived knight-service was established, every owner of ten horses having to find and equip a horseman, and all who owned fewer than ten, grouped by tens of horses, similarly finding one. But an amending act was soon passed, by which yeomanry cavalry could be substituted for provisional cavalry in the county quota. This gave a great stimulus to yeomanry recruiting, as similar enactments had done in the case of the infantry volunteers. But even so the provisional cavalry, which was embodied only in counties that did not supply the quota in yeomanry, was stronger than the yeomanry at the peace of Amiens. At that peace, partly with a view to preserving internal order, partly because of the probable renewal of the war, the yeomanry was retained, although the provisional cavalry was disbanded. There was thus a nucleus for expansion when Napoleon's threatened invasion (1803-5) called out the defensive powers of the country, and as early as December 1803 there were in England, Scotland and Ireland 44,000 yeomen. At the same time the limitations as to place of service (some undertaking to serve in any part of Great Britain, some within a specified military district, most only in their own county) were abolished. The unit of organization was the troop of 80-100, but most of the force was grouped in regiments of five or more troops, or in "corps" of three or four troops. Permanent paid adjutants and staff sergeants were allowed to corps and regiments, but no assistance was given in the shape of officers on the active list and serving non-commissioned officers of the army and militia. Equipment, supply and mobilization arrangements were purely regimental, and through all the war years most of the troops and squadrons were ready to take the field, with equipment, food and forage, complete at a day's notice. They were trained as light cavalry, and armed with sabre and pistol. But a few town corps had mounted riflemen, and several corps, both in town and country, had one or more dismounted troops, who were carried on vehicles similar to the "Expedition or Military Fly" pictured by Rowlandson.

From the extinction of Chartism to the South African War the history of the yeomanry is uneventful. The strength of the force gradually sank to 10,000. But when it became apparent that mounted troops would play a decisive part in the war against the Boers, the yeomanry again came to the front. Of its 10,000 serving officers and men, 3000 went to South Africa in newly formed battalions of "Imperial Yeomanry," armed and organized purely as mounted rifles, and to these were added over 32,000 fresh men, for whom the yeomanry organization at home and at the seat of war provided the cadres and training, while the home yeomanry not only filled up its gaps but expanded. In 1901 the yeomanry, now all styled "Imperial," was remodelled; and the strength of regiments was equalized on a four-squadron basis. In the prevailing conditions practically all regiments were able to recruit up to the increased establishment, and the strength of the force was more than trebled. Fresh regiments were formed, some in the towns, others on the nucleus of special corps disbanded at the close of the South African War. In 1907 the yeomanry became part of the new Territorial Force (see UNITED KINGDOM, § *Army*).

YEOMEN OF THE GUARD, originally "Yeomen of the Guard of (the body of) our Lord the King," or in the 15th-century Latin, "Valecti garde (corporis) domini Regis," the title (maintained with but a slight variation since their institution in 1485, the official wording under Edward VII. being "The King's Body Guard of the Yeomen of the Guard") of a permanent military corps in attendance on the sovereign of England, as part of the royal household, whose duties, now purely ceremonial, were originally that of the sovereign's personal bodyguard. They are the oldest existing body of the kind, having an unbroken record from 1485, as well as the oldest military body in England. Before that time there had been forms of royal guard, but no permanent institution. Under Edward I. we find in England the "crossbowmen of the household," and under Edward II. an "Archer guard of the King's body"; but the "Archers of the King," "of the crown" or "of the household," who appear in the records up to 1454, seem to have had no continuous establishments. Apparently each sovereign, on coming to the throne, established a new Guard of his own particular followers. It was not till Henry VII. created the "Yeomen of the Guard" that the royal bodyguard came into regular existence. The first warrants to individual "Yeomen of the Guard" date from September 16, 1485, and it is a fair inference that the Guard was created by the king on the battlefield of Bosworth (August 22, 1485), its first members being men who had shared Henry's exile in Brittany, followed him on his return, and fought as his private Guard in that action. The warrant of September 18, 1485, now in the Record Office, "to William Brown, Yeoman of the King's Guard," corroborates this view—"in consideration of the good service that oure humble and faithful subject William Browne Yeoman of oure Garde hath heretofore doon unto us as well beyonde the see as at our victorieux journeye." It is argued by Sir Reginald Hennell that the title of "Yeomen of the Guard" signified Henry VII.'s intention to choose the special protectors of his person not from the ranks of the nobility, but from the class just below them (see YEOMAN), who had proved in war the backbone of the national strength. The term *valecti*, or "valets" (see VALET), was already in use, as signifying personal attendants, with none of the modern menial sense of the word.

The first official recorded appearance of the king's bodyguard of the Yeomen of the Guard was at the coronation of its founder Henry VII. at Westminster Abbey on the 31st of October 1485, when it numbered 50 members. This number was rapidly increased, for there is an authentic roll of 126 attending the king's funeral in 1509. Henry VIII. raised the strength of the Guard to 600 when he took it to visit Francis I. of France at the Field of the Cloth of Gold. In Queen Elizabeth's reign it numbered 200. The corps was originally officered by a captain (a post long associated with that of vice-chamberlain), an ensign (or standard-bearer), a clerk of the cheque (or chequer roll, his duty being to keep the roll of every one connected with the household), besides petty officers, captains, sergeants or ushers. In 1669 Charles II. reorganized the Guard and gave it a fixed establishment of 100 yeomen, officered by a captain, a lieutenant, an ensign, a clerk of the cheque and four corporals, which is the present organization and strength. The only variation is that the captaincy is now a ministerial appointment filled by a nobleman of distinction under the lord chamberlain, and that the old rank of "corporals" has been changed to "exon," a title derived from "exempt," *i.e.* exempted from regular regimental duty for employment on the staff. Formerly officers on the active list were given these appointments in addition to their own.

The original duties of the Guard were of the most comprehensive nature. They were the king's personal attendants day and night at home and abroad. They were responsible for his safety not only on journeys and on the battlefield, but also within the precincts of the palace itself. The regulations for making of the king's bed in Tudor times were of the most elaborate formality. No one but the Yeomen of the Guard under an officer might touch it. Each portion was separately examined. Each sheet or coverlet was laid with the greatest ceremony, and the sovereign could not retire to rest until the work was reported as well and truly done. The existence of the custom is verified at the present day by the designations Y.B.H. ("Yeomen Bed-Hangers") and Y.B.G. ("Yeomen Bed-Goers"), which are still affixed against the names of certain yeomen on the roll of the Guard. Another of their duties outside the palace is retained, viz. the searching of the vaults of the houses of parliament at the opening of each session, dating from the "Gunpowder Plot" in 1605, when the Yeomen of the Guard seized Guy Fawkes and his fellow-traitors and conveyed them to the Tower. Owing to the destruction by fire of most of the records of the Guard in St James's Palace in 1809, the precise history of the search is a matter of controversy. It is recorded in the papers of the House of Lords that the Guard conducted it in 1690 and that it has been continuous since 1760, but Sir Reginald Hennell's contention is that it dated from 1605 and has since been regularly observed.

Though the corps from the earliest day was composed of foot-soldiers, during royal progresses and journeys a portion of the Guard formed a mounted escort to the sovereign until the end of the Georgian period.

The dress worn by the Yeomen of the Guard is in its most striking characteristics the same as it was in Tudor times. It has consisted from the first of a royal red tunic with purple facings and stripes and gold lace ornaments. Sometimes the sleeves have been fuller and the skirts longer. Red knee-breeches and red stockings (white in Georgian period only), flat hat, and black shoes with red, white and blue rosettes are worn. Queen Elizabeth added the ruff. The Stuarts replaced the ruff and round hats with fancy lace and plumed hats. Queen Anne discarded both the ruff and the lace. The Georges reintroduced the ruff, and it has ever since been part of the permanent dress. But the most interesting point connected with the dress is that the gold-embroidered emblems on the back and front of the coats tell the history of the consolidation of the kingdoms of Great Britain and Ireland. From 1485, when the Guard was created, till 1603, the emblems were the Tudor crown with the Lancastrian rose, and the initials of the reigning sovereign. When the Stuarts succeeded the Tudors in 1603, they substituted the St Edward's crown for the Tudor, and added under it and the initials the motto "Dieu et mon Droit," which is still worn. When William and Mary came to the throne in 1689, their initials were entwined, W.M.R.R. (William, Mary, Rex, Regina), the only instance of the queen and king's initials being so placed. Anne restored the Tudor crown, and added the thistle to the rose on the official union with Scotland in 1709. The Georges reverted to the St Edward's crown, and on the union with Ireland in 1801 George III. added the shamrock to the rose and thistle. No change was made during Queen Victoria's reign. But Edward VII. ordered the Tudor crown to be substituted for the St Edward's, and now the coats of the Guard are as they were in 1485, with the additions of the motto "Dieu et mon Droit" and the shamrock and the thistle.

Up to 1830 the officers of the Guard wore the same Tudor dress as the non-commissioned officers and men, but when William IV. ordered that in future no civilian should be appointed, and that the purchase and sale of officers' commissions should cease, the old Tudor dress was discontinued, and the officers were given the dress of a field officer of the Peninsular period.

There has also been little or no change in the arms of the Guard. No doubt they retained during Henry VII.'s reign (1485–1509) the pikes with which they had helped to win the battle of Bosworth Field. Under Henry VIII. archery became a national pastime, and the long-bow and arrow were issued to at least one-half of his Guard. When firearms came into use, a certain portion were armed with the harquebus, the Guard being given buff cross belts to support the weight on service. When on duty in the palace gold-embroidered cross belts took the place of the service buff, and are worn now as part of the state dress. The present weapons of the Guard are a steel gilt halberd with a tassel of red and gold, and an ornamental sword.

The real fighting days of this Guard ended with the Tudor period, but it was only at the end of the reign of George II. that the Guard's function of attending a sovereign on the battlefield ceased. Their last duty in this nature was at the battle of Dettingen (1743), when they accompanied the king as personal attendants. For a brief period during the Georgian era the Guard lost to a certain extent its distinctive military character, and a custom crept in of filling vacancies with civilians, who bought their places for considerable sums, the appointments of the yeomen proper and the officers being of great value. But William IV. put a stop to the practice. The last civilian retired in 1848, and the Guard regained its original military character. Every officer (except the captain), non-commissioned officer and yeoman must have served in the Home or Indian army or Royal Marines. They are selected for distinguished conduct in the field, and their pay is looked upon as a pension for the same. The officers must be of the rank of captain and over, and the yeomen of that of sergeant or warrant officer.

The Guard has a permanent orderly room in St James's Palace, where the routine of duty is carried on by the adjutant and "clerk of the cheque," the latter old true designation being retained after the former modern title Under the orderly room is a guard room lined with lockers in which the uniforms are stored. They are in charge of a resident wardrobe-keeper. Here the division for duty musters once a week in the season and once a fortnight at other times, and here the yeomen dress for state functions. These now are confined to receptions of foreign potentates, levees, courts and state banquets, the Guard still taking part in the searching of the houses of parliament, the ceremony of the distribution of Maundy money in Westminster Abbey and in the Epiphany offerings of gold, frankincense and myrrh in the Chapel Royal, St James's Palace. The yeomen live in their own homes.

The nickname "Beef-eaters," which is sometimes associated with the Yeomen of the Guard, had its origin in 1669, when Count Cosimo, grand duke of Tuscany, was in England, and, writing of the size and stature of this magnificent Guard, said, "They are great eaters of beef, of which a very large ration is given them daily at the court, and they might be called Beef-eaters." The supposed derivation from "Buffetier" (*i.e.* one who attends at the sideboard) has no authority.

A singular misapprehension exists as regards the Tower warders. Wearing as they do the same uniform, except the cross belt which used to hold the harquebus, and being so much more before the public in their daily duty as warders of the Tower, they are often thought erroneously to be Yeomen of the Guard. They had their origin in 1509–10 in the twelve Yeoman of the Guard whom young King Henry VIII. left, when he gave up the Tower of London as a permanent residence, to show that it was still a royal palace. When the Tower was finally given up as a royal residence they became warders and were deprived of the dress, but were given it back in Edward VI.'s reign, on a petition from the lord protector, who had been confined there and to whom the warders had been most considerate. They are now a distinct body, but in an honorary sense still termed "Extraordinary of the Guard." But they perform no state functions, being solely yeomen warders under the orders of the constable of the Tower. They are all old soldiers.

A brief notice of the other royal guard will be appropriate. In 1509, Henry VIII., envying the magnificence of the bodyguard of Francis I. of France, decided to have a noble guard of his own, which he accordingly instituted and called "The Gentlemen Speers." It was composed of young nobles gorgeously attired. In 1539 this guard was reorganized and called "Gentleman Pensioners." This title it retained till William IV.'s reign, when the corps regained its military character, the king on their petition giving them their present designation, "The Honourable Corps of Gentlemen-at-Arms."

See *The History of the King's Body Guard of the Yeomen of the Guard*, by Colonel Sir Reginald Hennell, D.S.O., Lieutenant of the Yeomen of the Guard (1904). (R. He.)

YEOTMAL, a town and district of India, in Berar. The town stands at an elevation of 1476 ft. Pop. (1901) 10,545. It was formerly the headquarters of Wun district, but in 1905 a new district of Yeotmal was established, covering the former Wun district, with additions from the district of Basim. Cotton-ginning and pressing are carried on. The town is also the chief trading centre in the district, and is connected by road with Dhamangaon station, 29 m. distant.

The District of Yeotmal has an area of 5183 sq. m. It is a wild hilly country, intersected by offshoots from the Ajanta mountains. The hills are bare, or clothed only with dwarf teak or small jungle; but on the heights near Wun town the bamboo grows abundantly, and small bamboos are found in the ravines. The Wardha and Penganga, which bound the district on the E. and S., unite at its S.E. corner. The Penganga drains the greater part of the district. The tiger, leopard and hyena abound; bears, wolves and jackals are also numerous; while small game is plentiful. The climate is enervating and unhealthy; the annual rainfall averages about 41 in. Pop. (1901) 575,957. The principal crops are millets, cotton, pulses, oil-seeds and wheat. Coal has been found, and iron ore abounds.

See *Yeotmal District Gazetteer* (Calcutta, 1908).

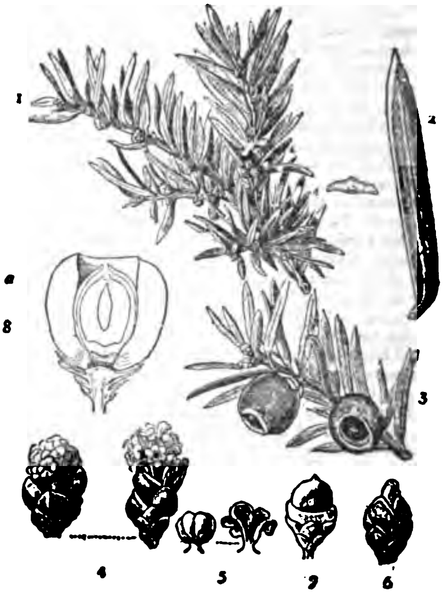
YEOVIL, a market town and municipal borough in the S. parliamentary division of Somersetshire, England, on the Great Western and South-Western railways, 127 m. W. by S. of London. Pop. (1901) 9861. The town lies on the river Yeo, and is a thriving place, with a few old houses. The church of St John the Baptist is a perpendicular cruciform structure, consisting of chancel, nave of seven bays, aisles, transepts and lofty western tower. There are some 15th- and 16th-century brasses, a dark cradle roof, and an early 13th-century crypt under the chancel. The town is famous for its manufacture of gloves (dating from 1565). Its agricultural trade is considerable. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 654 acres. Yeovil (Gyoele, Evill, Ivle, Yeoele) before the Conquest was part of the private domains of the Anglo-Saxon kings. The town owed its origin to trade, and became of some size in the 13th century. In 14th-century documents it is described as a town or borough governed by a portreeve, who frequently came into conflict with the parson of St John's church, who had become lord of the manor of Yeovil during the reign of Henry III. The corporation in the 18th century consisted of a portreeve and eleven burgesses, and was abolished when the town was reincorporated in 1853.

Fairs on the 17th of July and the 6th of November were held under grant of Henry VII., and were important for the sale of leather and of woollen cloth, both made in the town. The Friday market dates from 1215. There is a great market every other Friday and a monthly horse sale.

YERKES, CHARLES TYSON (1837–1905), American capitalist, was born of Quaker parentage, in Philadelphia, Pennsylvania, on the 25th of June 1837. He was a clerk in a grain-commission house, an exchange broker (1858–61) and a banker (1861–86). When he failed in 1871 he refused to give any preference to the city of Philadelphia for bonds sold on its account, and was convicted of "misappropriating city funds," and sentenced to two years and nine months in the penitentiary. After serving seven months of this sentence he was pardoned, and the City Council afterward passed an ordinance cancelling the municipality's claim against him. He established a banking business in Chicago in 1881; in 1886 got control of the Chicago City Railway Company; and within the next twelve years organized a virtual monopoly of the surface and elevated railway service of Chicago. He disposed of his street railway interests in Chicago, and removed to London (1900). There he acquired in 1901 a controlling interest in the Metropolitan District railway, and by organizing the finances of the Underground Electric Railways Company he took an important initiative in extending the system of London electric railways. Yerkes gave to the university of Chicago the great telescope installed in the Yerkes Observatory at Lake Geneva, Wisconsin, and gathered in his New York residence a remarkable collection of paintings, tapestries and rugs, which were sold at auction in April 1910 for $2,034,450. He died in New York on the 29th of December 1905.

YETHOLM, a village of Roxburghshire, Scotland. Pop. (1901) 571. It is situated on Bowmont Water, 7½ m. S.E. of Kelso, and 5 m. S.S.W. of Mindrum in Northumberland, the nearest railway station. It is divided into two quarters, Kirk Yetholm on the right and Town Yetholm on the left of the stream. The name is said to be the O.E. *yet*, "gate," and *holm* (here the same as *ham*), "hamlet," meaning "the hamlet at the gate" of Scotland, the border being only 1½ m. distant. Since about the middle of the 17th century the district has been the headquarters of a tribe of gipsies.

YEW (*Taxus baccata*), a tree which belongs to a genus of Coniferae (see Gymnosperms), in which the ordinarily woody cone is represented by a single seed surrounded by a fleshy cup. Usually it forms a low-growing evergreen tree of very



Yew. 1, shoot with male flowers; 2, leaf and in section; 3, branch bearing two ripe seeds each with its crimson aril; 4, male flowers; 5, stamens; 6, 7, female flower in different stages; 8, section of ripe seed and aril, a. 1, slightly reduced; 2, and 4 to 8, enlarged.

diverse habit, but generally with dense spreading branches, thickly covered with very dark green linear leaves, which are given off from all sides of the branch, but which, owing to a twist in the base of the leaf, become arranged in a single series on each side of it. The trees are usually dioecious, the male flowers being borne on one individual and the female on another, although instances occur in which flowers of both sexes are formed on the same tree. The male flowers are more or less globular and occur in the axils of the leaves. They consist of a number of overlapping brownish scales, gradually increasing in size from below upwards and surrounding a naked stalk that bears at its summit a head of four to eight stamens. Each stamen has a flat five-lobed top, something like a shield; from its under surface, five, six or more pollen cases hang down, and these open lengthwise to liberate the globose pollen-grains. The female flowers are also placed each separately in the axil of a leaf, and consist of a number of overlapping scales, as in the male. These scales surround a cup which is at first shallow, green and thin (the so-called aril), but which subsequently becomes fleshy and red, while it increases so much in length as almost entirely to conceal the single straight seed. It is clear that the structure of the female flower differs from that of most conifers, from which it is now often separated in a distinct order, Taxaceae.

The poisonous properties, referred to by classical writers such as Caesar, Virgil and Livy, reside chiefly if not entirely in the foliage. This, if eaten by horses or cattle, especially when it has been cut and thrown in heaps so as to undergo a process of fermentation, is very injurious. The leaves have also been used for various medicinal purposes, but are not employed now. An alkaloid *taxine*, said to depress the circulation, is extracted. It forms white crystals soluble in alcohol and ether. As a timber tree the yew is used for cabinet-work, axle-trees, bows and the like, where strength and durability are required.

The yew occurs wild over a large area of the northern hemisphere. In N.E. America and in Japan trees are found of a character so similar that by some botanists they are all ranged under one species. Generally, however, the European yew, *T. baccata*, is regarded as native of Europe, N. Africa, and Asia as far as the Himalayas and the Amur region, while the American and Japanese forms are considered to represent distinct species. The yew is wild in Great Britain, forming a characteristic feature of the chalk downs of the southern counties and of the vegetation of parts of the Lake District and elsewhere. The evidence of fossil remains, antiquities and place-names indicates that it was formerly more widely spread in Europe than at the present day. The varieties grown in the United Kingdom are numerous, one of the most striking being that known as the Irish yew—a shrub with the pyramidal or columnar habit of a cypress, in which the leaves spread from all sides of the branches, not being twisted, as they usually are, out of their original position. In the ordinary yew the main branches spread more or less horizontally, and the leaves are so arranged as to be conveniently exposed to the influence of the light; but in the variety in question the branches are mostly vertical, and the leaves assume a direction in accordance with the ascending direction of the branches. The plants have all sprung from one of two trees found growing wild more than a hundred years ago on the mountains of Co. Fermanagh in Ireland, and afterwards planted in the garden of Florence Court, a seat of the earl of Enniskillen.

The yew is a favourite evergreen tree, either for planting separately or for hedges, for which its dense foliage renders it well suited. Its dense growth when pruned has led to its extensive use in topiary work, which was introduced by John Evelyn and became very prevalent at the close of the 17th and the beginning of the 18th centuries. The wood is very hard, close-grained and of a deep red-brown colour internally. The planting of the yew in churchyards was at one time supposed to have been done with a view to the supply of yew staves. But, while importation from abroad was fostered, there seems to have been no statute enforcing the cultivation of the yew in Great Britain; a statute, however, of Edward I. (cited in *The Gardeners' Chronicle*, 6th March 1880, p. 306) states that the trees were often planted in churchyards to defend the church from high winds. The Crowhurst yew, mentioned by Evelyn as 30 ft. in circumference, still exists. The large yew at Ankerwyke, near Staines, with a trunk 30½ ft. in circumference, in sight of which Magna Carta was signed (1215), probably exceeds a thousand years of age. The fine yew in Buckland churchyard, near Dover, was removed in 1880 to a distance of 60 yds. The trunk had been split so that it had a direction nearly parallel with the soil. This huge tree was moved with a ball of soil round its roots, 16 ft. 5 in. by 15 ft. 8 in., by 3 ft. 6½ in. in depth, the weight of the entire mass being estimated at 56 tons. The dimensions of the tree in 1880 were as follows: "circumference of the main trunk, 22 ft.; of the upright portion of the trunk, 6 ft. 10 in.; second horizontal trunk, 10 ft. 10 in.; do., south limb forking off at 9 ft. from the main trunk, 7 ft. 10 in.; do., west limb forking off at 9 ft. from the main trunk, 8 ft. 8 in.; extent of branches from centre of main trunk southwards, 30 ft. 10 in., and from north to south, 48 ft.; they extend from the main trunk westward 33 ft." The tree was replanted so that the horizontal portions were replaced in their original erect position and the natural symmetry restored.

For further details see Veitch, *Manual of Coniferae* (1900); Elwes and Henry, *Trees of Great Britain and Ireland* (1906).

YEZD, or Yazd, a province of Persia, bounded S. by Kerman, W. by Fars and Isfahan, and N. and E. by the central Persian deserts. It contains an area of about 20,000 sq. m., but its population barely exceeds 100,000, of whom about half inhabit the capital of the province. Its subdivisions are: (1) the city of Yezd and immediate environs; (2) Ardakan; (3) Bafk; (4) Taft; (5) Kuhistan (Pish Kuh, Mian Kuh, Pusht Kub, on the slopes and in the valleys of the Shir Kuh, a part of the great Central Range of Persia W. of the city of Yezd, and rising to an elevation of 11,000 ft.); and (6) Shahr i Babek. The last is situated far S. near Kerman, and sometimes is regarded as part of that province. The revenues slightly exceed £60,000 a year. Much silk is grown in the district, but is not sufficient for the silk stuffs which Yezd manufactures with its 1000 looms, and raw silk (about 75,000 lb yearly) has to be obtained from Khorasan and Gilan. Great quantities of felts (*nimads*), white and yellow cotton stuffs, the latter a kind of nankeen made of *Gossypium herbaceum*, are also manufactured and exported. Other exports are opium, madder and almonds. The grain produced suffices for only two or three months' consumption, and supplies have to be brought from Khorasan, so that wheat and barley are dearer than at other places in Persia. The part of the district situated in the plain is much exposed to moving sands, which render cultivation difficult and at times impossible.

YEZD, the capital of the province of the same name in Persia, situated 192 m. N.W. of Kerman, 162 m. S.E. of Isfahan, in 31° 54′ N. and 54° 22′ E., at an elevation of 4240 ft. Its population, 100,000 in 1810, is now estimated at 50,000, including 2000 Jews and 1300 Zoroastrians.[1] The city is divided into the Shahr i nau (new town) and Shahr i kohneh (old town), separated by a wall with two gates. The ark, or citadel, in the E. of the town, is fortified with walls, bastions and dry ditch, and contains the governor's residence. The bazaar is in good repair and well stocked; other parts of the town are irregularly planned, with dark, narrow streets. There are eighteen mosques, one, the Masjed i Jama, also called Masjed i Mir Chakhmak, is an old and decayed structure originally built in 1119, with a lofty and imposing frontage dating from 1472. There are seven colleges. The caravanserais number thirty-three. There are telegraph (English staff since 1903) and post offices. The Englishman in charge of the telegraph office acts as British vice-consul.

YEZIDIS, a sect of devil-worshippers, calling themselves Dasni, who are found in Kurdistan, Armenia and the Caucasus. Their religion has points of connexion with old Iranian and Assyrian beliefs and traces of Manichaeism and Nestorianism. Thus they regard the devil as the creative agent of the Supreme God, a reinstated fallen angel who is the author of evil. They avoid mentioning his name and represent him by the peacock. They regard Christ as an angel in human form and recognize

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[1] In 1879 the Zoroastrian community of Yezd numbered 6483, 1242 residing in the city, 5241 in the villages; in 1892 the community numbered 6908, and as many have emigrated, it is computed that it now numbers not more than 7000.

Mahomet as a prophet with Abraham and the patriarchs. They believe in a future life and practise both circumcision and baptism. The name is probably derived from the Kurdish and Persian *Yazdân*, God; though some have connected it with the city of Yezd, or with Yezid, the second Omayyad caliph (720–24). Their sacred book is called *Al-Yalvah*, and its chief exponent was Shaikh Adi (*c.* 1200).

See Layard, *Ninevah and its Remains* (London, 1850); Menant, *Les Yézidis* (Paris, 1892).

YEZO, or Ezo, the most northerly of the five principal islands forming the Japanese empire, the five being Yezo, Nippon, Shikoku, Kiushiu and Formosa. It is situated between 45° 30′ and 41° 21′ N. and between 146° 7′ and 139° 11′ E.; its coast-line measures 1423·32 m., and it has an area of 30,148·41 sq. m. On the N. it is separated from Sakhalin by Soya Strait (La Pérouse) and on the S. from Nippon by Tsugaru Strait. Its northern shores are washed by the Sea of Okhotsk, its southern and eastern by the Pacific Ocean, and its western by the Sea of Japan.

Orography.—The highest mountain in the island is Ishikaridake (6955 ft.) and the next in importance is Tokachi-dake (6541 ft.). Yubari-take in Ishikari has a height of 6508 ft., and in the province of Kushiro are O-akan-dake (4470 ft.) and Meakan-take (4500 ft.). Dr Rein's investigations led him to state that Tokachi-dake forms a species of central elevation whence most of the principal rivers flow towards the sea, and that the mountain system is a continuation, on the W., of the Sakhalin range, and on the E. of the Kuriles range; the former consisting of granite and old schists, the latter chiefly of volcanic formations. Near Hakodate are two conspicuous volcanic peaks, Komaga-take (3822 ft.) and Tokatsu-dake (3800 ft.); and 24 m. from Kushiro (by rail) is a volcano called Atosa-nobori, or Iwo-zan (sulphur mountain), whence great quantities of first-rate sulphur are exported to the United States. Mention must also be made of Rishiri, an islet on the extreme N.W. of Yezo, which has a peak of the same name rising to a height of nearly 6000 ft.

Rivers.—Yezo boasts the largest river in the Japanese empire, the Ishikari-gawa, which is estimated to measure 275 m. Its other large rivers are the Teshio-gawa (192 m.), the Tokachi-gawa (120 m.), the Shiribeshi-gawa (88 m.), the Kushiro-gawa (81 m.), the Toshibetsu-gawa (64 m.), and the Yubetsu-gawa (64 m.). The valley of the Ishikari is believed to be the most fertile part of the island; the Tokachi is navigable to a point 56 m. from its mouth, but the Teshio has a bar which renders its approach extremely difficult. A peculiarity of several of the rivers is that, on approaching the sea-shore, they run parallel to it for some distance before finding an exit. Those flowing to the S. coast take a W. direction, those flowing to the E. coast a N. direction. This is attributed to the fact that the prevailing winds set up the sand so as to deflect the rivers from their straight course. Nearly all these rivers abound with salmon, the most remarkable in that respect being the Nishibetsu-gawa, which yields an average of over 2000 tons of fish annually.

Lakes.—There are no large lakes, the most extensive—Toyako, Shikotsuko and Kushiroko—not having a circumference of more than 25 m. Lagoons, however, are not uncommon. The largest of these—Saruma-ko in Kitami—is some 17 m. long by 7 wide. It abounds with oysters nearly as large as those for which the much smaller lagoon at Akkeshi is famous, the molluscs measuring about 18 in. in length.

Climate.—The climate differs markedly from that of the main island of Japan, resembling rather the climate of the British Isles, though the winter is longer and more severe, and the atmosphere in the warm season contains a greater quantity of moisture. During five months the country is under snow, its depth averaging about 2 ft. in the regions along the southern coast and more than 6 ft. in the northern and western regions. An ice-drift, setting from the north and working southwards as far as Nemuro, stops all sea trade on the E. coast during January, February and March, though the W. coast is protected by the warm current of the Kuro-shiwo. Fogs prevail along the E. coast during the summer months, and it is not uncommon to find a damp, chilly atmosphere near the sea in July, whereas, a mile inland, the thermometer stands at 80° or 90° F. in the shade, and magnolia trees are in full blossom.

Zoology.—Tsugaru Strait has been shown by Captain T. W. Blakiston, R.A., to form a line of zoological division. Pheasants and monkeys are not found on the Yezo side of this line, though they abound on Nippon. and, on the other hand, Yezo has grouse and solitary snipe which do not exist in Nippon. The Yezo bear, too, is of a distinct species, and the island has an abundance of singing birds which are absent S. of the strait. There are also notable differences in the flora, the trees and flowers of Yezo resembling those of the British Isles rather than those of Japan.

Population.—The island seems to have been originally peopled by a semi-barbarous race of pit-dwellers, whose modern representatives are to be found in the Kuriles or their neighbours of Kamchatka and Sakhalin. These autochthons were driven out by the Ainu, and the latter, in their turn, succumbed to the Japanese. The population of Yezo is 605,742, of whom 17,573 are Ainu. There is a steadily growing but not large emigration from Japan proper to Yezo. Yezo is divided into ten provinces, the names of which, beginning from the S., are Oshima, Shiribeshi, Ishikari, Teshio, Kitami, Iburi, Hidaka, Tokachi, Kushiro and Nemuro. Of these, Oshima, Shiribeshi and Ishikari are by far the most important. There are only three towns having a population of over 20,000, viz. Hakodate (50,314), Sapporo (46,147) and Otaru (34,586). Other towns of importance are Fukuyama (formerly called Matsumae), the seat of government in feudal days, Esashi, Mombetsu, Oiwake, Tomakomai, Piratori (the chief Ainu settlement), Mororan, Kushiro, Akkeshi, Nemuro, Horobetsu, Yunokawa, Abashiri and Mashike. Yunokawa, 4½ m. from Hakodate, is much frequented for its hot springs; Oiwake is the junction of the main line of railway with the branch to the Yubari collieries; Kushiro exports coal and sulphur; Akkeshi is celebrated for its oysters.

Industries and Products.—Marine products constitute the principal wealth of Yezo. Great quantities of salmon, sardines and codfish are taken. The salmon are salted for export to Nippon and other parts of Japan; the sardines are used as an agricultural fertilizer, their value varying from £2 to £5 per ton; and the codfish serve for the manufacture of oil. An immense crop of edible seaweed is also gathered and sent to Chinese markets as well as to Japanese. This *kombu*, as it is called, sometimes reaches a length of 90 ft. and a width of 6 in. The herring fishery, too, is a source of wealth, and the canning of Akkeshi oysters as well as of salmon gives employment to many hands. Vast tracts are covered with a luxuriant growth of ash, oak, elm, birch, chestnut and pine, but, owing to difficulties of carriage, this supply of timber has not yet been much utilized. One of the earliest acts of the *Meiji* government was to develop the resources of Yezo and encourage Japanese to emigrate thither. Free grants of agricultural land were made, roads were constructed, model farms established, beet-sugar factories and sawmills opened, horse-breeding undertaken, foreign fruit trees planted and railways laid. The outlays incurred did not immediately bear fruit, but they attracted large numbers of settlers. During recent years attention has been attracted to the mineral resources of Yezo. Coal of fair quality is abundant, and a railway has been built for its carriage; an apparently inexhaustible supply of sulphur is obtained from a mountain near Kushiro lake; petroleum seems likely to pay exploiters, and in 1899 gold was discovered at Usotannai, Pankanai and other places along the Poropetsu river, near Esashi in Kitami province.

Communications.—The roads are few and in bad order, but there is a railway which, setting out from Hakodate in the extreme S., runs, via Sapporo and Iwamizawa, to the extreme N., with branches from Iwamizawa, S. to Mororan and E. to Poronai, and from Oiwake N.E. to the Yubari coal-mines. There is also a line W. along the S. coast from Nemuro. In districts beyond the railway, travelling is done on horseback, there being an abundant supply of ponies. There is good coastwise communication by steamer.

History.—Yezo was not brought under Japan's effective control until medieval times. In 1604 the island was granted in fief to Matsumae Yoshihiro, whose ancestor had overrun it, and from the close of the 18th century the E. was governed by officials sent by the shôgun, whose attention had been attracted to it by Russian trespassers. In 1871 the task of developing its resources and administering its affairs was entrusted to a special bureau, which employed American agriculturists to assist the work and American engineers to construct roads and railways; but in 1881 this bureau was abolished, and the government abandoned to private hands the various enterprises it had inaugurated.

YGGDRASIL, in Scandinavian mythology, the mystical ash tree which symbolizes existence, and binds together earth, heaven and hell. It is the tree of life, of knowledge, of fate, of time and of space. Its three roots go down into the three great realms—(1) of death, where, in the well Hvergelmer, the dragon Nidhug (Niðhöggr) and his brood are ever gnawing it; (2) of the giants, where, in the fountain of Mimer, is the source of wisdom; (3) of the gods, Asgard, where, at the sacred fountain of Urd, is the divine tribunal, and the dwelling of the Fates. The stem of Yggdrasil upholds the earth, while its branches overshadow the world and reach up beyond the heavens. On its topmost bough sits an eagle, between whom and Nidhug the squirrel Ratatöskr runs to and fro trying to provoke strife. Honey-dew falls from the tree, and on it Odin hung nine nights, offering himself to himself. G. Vigfusson and York Powell (*Corpus Poeticum Boreale*, Oxford, 1883) see in Yggdrasil not a primitive Norse idea, but one due to early contact with Christianity, and a fanciful adaptation of the cross.

YO-CHOW FU, a prefectural city in the Chinese province of Hu-nan, standing on high ground E. of the outlet of Tung-t'ing Lake, in 29° 18′ N., 113° 2′ E. Pop. about 20,000. It was opened to foreign trade in 1899. The actual settlement is at Chinling-ki, a village 5½ m. below Yo-chow and half a mile from the Yangtsze. From Yo-chow the cities of Chang sha and Chang tê are accessible for steam vessels drawing 4 to 5 ft. of water by means of the Tung-t'ing Lake and its affluents, the Siang and Yuen rivers. The district in which Yo-chow Fu stands is the ancient habitat of the aboriginal San Miao tribes, who were deported into S.W. China, and who, judging from some non-Chinese festival customs of the people, would appear to have left traditions behind them. The present city, which was built in 1371, is about 3 m. in circumference and is entered by four gates. The walls are high and well built, but failed to keep out the T'aip'ing rebels in 1853. Situated between Tung-t'ing Lake and the Yangtsze-kiang, Yo-chow Fu forms a depot for native products destined for export, and for foreign goods on their way inland. The net value of the total trade of the port in 1906 was 747,000 taels.

YOGI, a Hindu religious ascetic. The word *yoga* means union, and first occurs in the later *Upanishads*; and *yogi* means one who practises *yoga*, with the object of uniting his soul with the divine spirit. This union, when accomplished by the individual soul, must enhance its susceptibilities and powers, and so the *yogis* claim a far-reaching knowledge of the secrets of nature and extensive sway over men and natural phenomena. The most usual manifestation of this power is a state of ecstasy, of the nature of self-hypnotism.

YOKOHAMA, a seaport of Japan on the W. shore of Tokyo Bay, 18 m. S. of Tokyo by rail. It stands on a plain shut in by hills, one of which, towards the S.E., terminates in a promontory called Honmoku-misaki or Treaty Point. The temperature ranges from 95° to 43° F., and the mean temperature is 57·7°. The cold in winter is severe, owing to N. winds, while the heat is great in summer, though tempered by S.W. sea breezes. The rainfall is about 70 in. annually. In 1859, when the neighbouring town of Kanagawa was opened to foreigners under the treaty with the United States, Yokohama was an insignificant fishing village; and notwithstanding the protests of the foreign representatives the Japanese government shortly afterwards chose the latter place as the settlement instead of Kanagawa. The town grew rapidly—in 1886 the population was 111,179 (3904 foreigners, including 2573 Chinese, 625 British and 256 Americans, while in 1903 there were 314,333 Japanese and 2447 foreigners (1089 British, 527 Americans, 270 Germans, 155 French) besides about 3800 Chinese. The Japanese government constructed public works, and excellent water was supplied from the Sagamigawa. The foreign settlement has well-constructed streets, but the wealthier foreigners reside S. of the town, on the Bluff. The land occupied by foreigners was leased to them by the Japanese government, 20% of the annual rent being set aside for municipal expenses. The harbour, which is a part of Tokyo Bay, is good and commodious, somewhat exposed, but enclosed by two breakwaters. There is a pier 2000 ft. long, and two docks were opened in 1897 and 1898, with lengths of 351 ft. and 478 ft. 10 in., and depths of 26 ft. 2 in. and 28 ft. on the blocks at ordinary spring tides. The average depth in the harbour at high water is about 46 ft., with a fall of tide of about 8 ft., the entrance being marked by a lightship and two buoys. The railway connecting Yokohama with Tokyo was the first in Japan, and was constructed in 1872. The value of exports and imports, which in 1880 was £3,792,991 and £5,378,385, and in the ensuing five years averaged £4,638,635 and £4,366,507, had increased in 1905 to £14,861,823 and £19,068,221. Metals and metal goods, rice, wool and woollen goods, and cotton and cotton goods are the chief imports; and silk, silk goods and tea are the chief exports.

YOKOSUKA, a seaport and naval station of Japan, on the W. shore of Tokyo Bay, 12 m. S. of Yokohama. The town is connected by a branch line with the main railway from Tokyo. The port is sheltered by hills and affords good anchorage. The site was occupied by a small fishing village until 1865, when the shogun's government established a shipyard here. In 1868 the Japanese government converted the shipyard into a naval dockyard, and subsequently carried out many improvements. In 1884 the port became a first-class naval station; and naval barracks, warehouses, offices, hospitals, &c., were established here. The dockyard was first constructed by French engineers; but after 1875 the work passed entirely into the hands of Japanese engineers.

YOLA, once a native state of West Africa, forming part of the Fula emirate of Adamawa, now a province in the British protectorate of Nigeria. The province, which has an area of 16,000 sq. m., occupies the S.E. of the protectorate and both banks of the upper Benue. It is bounded S. and E. by the German colony of Cameroon, N. by the British province of Bornu, and W. by the British provinces of Bauchi and Muri. It has an estimated population of 300,000. The capital is Yola, a town founded by the Fula conqueror Adama about the middle of the 19th century. It was the capital of the emirate of Adamawa, the greater part of which is now a German protectorate. The town is situated in 9° 12′ N., 12° 40′ E. and is built on the left or S. bank of the Benue, 480 m. by river from Lokoja. It can be reached by shallow draught steamers when the river is in flood. The Niger Company had trading relations with Yola before the establishment of British administration in Northern Nigeria. In 1901 the reigning emir, a son of Adama, forced them to evacuate their station, and, all attempts to establish friendly relations proving unavailing, the British government despatched an expedition from Lokoja in August 1901. The emir was deposed and a new emir installed in his place. The hostility of certain pagan tribes had to be overcome by British expeditions in January and April of 1902. By 1903 the province was brought fairly under administrative control, and divided into three administrative divisions—the N.W. with a station at Gazi, the N.E. and the S. with Yola for its station. The new emir proved friendly and loyal, but though appointed in 1901 was not formally installed till October 1904, when he took the customary oath of allegiance to the British crown and accepted all the conditions with regard to the suppression of slavery, &c. The slave markets were immediately closed as a result of British occupation, and any slave-trading which is still done is smuggled. In 1903 an exploring expedition was sent up the Gongola, one of the principal rivers of the Yola province, and as a result the navigability of the river for steam launches as far as Gombe at high water was demonstrated. An important means of communication with the province of Bornu was thus established, and a rich agricultural district opened to development. The Gongola valley was in ancient times extensively cultivated, and the population are readily returning to the land. Cotton, rice and tobacco are among the heavy crops (see NIGERIA, ADAMAWA).

YOLANDE (or ISABELLA) **OF BRIENNE** (1212–1228), the daughter of John of Brienne, who had married Mary, daughter of Conrad of Montferrat, heiress on the death of Amalric II. of the kingdom of Jerusalem. Yolande inherited the throne on her mother's death in 1212, but her father ruled as her guardian. In 1225 she married the emperor Frederick II., the pope hoping by this bond to attach the emperor firmly to the crusade. Immediately upon his marriage Frederick demanded all the rights of sovereignty in the kingdom of Jerusalem, which he claimed to exercise in his wife's name. His action led to difficulties with John, who did not relish the loss of his position. Yolande died in 1228 after the birth of a son, Conrad, and her husband then continued to rule, though not without opposition.

YONGE, CHARLOTTE MARY (1823–1901), English novelist and writer on religious and educational subjects, daughter of William

Crawley Yonge, 52nd Regiment, and Frances Mary Bargus, was born on the 11th of August 1823 at Otterbourne, Hants. She was educated by her parents, and from them inherited much of the religious feeling and High Church sympathy which coloured her work. She resided at Otterbourne all her life, and was one of the most prolific writers of the Victorian era. In 1841 she published five works of fiction, including *The Clever Woman of the Family*, *Dynevor Terrace* and *The Trial*; and after that she was the author of about 120 volumes, including novels, tales, school manuals and biographies. Her first conspicuous success was attained with *The Heir of Redclyffe* (1853), which enjoyed an enormous vogue. *The Daisy Chain* (1856) continued the success; and among her other popular books may be mentioned *Heartsease* (1854), *The Young Stepmother* (1861) and *The Dove in the Eagle's Nest* (1866). In more serious fields of literature she published *Landmarks of History* (three series, 1852–57), *History of Christian Names* (1863), *Cameos of English History* (1868), *Life of Bishop Patteson* (1874), *English Church History for Use in Schools* (1883) and many others. She also edited various educational works, and was for more than thirty years editor of the *Monthly Packet*. She died at Otterbourne on 23rd March 1901. Her books err on the side of didacticism, but exercised a wide and wholesome influence. The money realized by the early sales of *The Daisy Chain* was given to the building of a missionary college at Auckland, N.Z., while a large portion of the proceeds of *The Heir of Redclyffe* was devoted to the missionary schooner "The Southern Cross."

See *Charlotte Mary Yonge: an Appreciation*, by Ethel Romanes (1908).

YONGE, JOHN (1467–1516), English ecclesiastic and diplomatist, was born at Heyford, Oxfordshire, and educated at Winchester and New College, Oxford, where he became a fellow in 1485. He was ordained in 1500 and held several livings before receiving his first diplomatic mission to arrange a commercial treaty with the archduke of Austria in 1504, and in the Low Countries in 1506 in connexion with the projected marriage between Henry VII. and Margaret of Savoy. In 1507 he was made Master of the Rolls, and in the following year was employed in various diplomatic missions. He was one of the ambassadors who arranged the Holy League in 1513, and accompanied Henry VIII. during the ensuing campaign. In 1514 he was made dean of York in succession to Wolsey, and in 1515 he was one of the commissioners for renewing the peace with Francis I. He died in London on the 25th of April 1516. Yonge was on terms of intimate friendship with Dean Colet, and was a correspondent of Erasmus.

YONGE, SIR WILLIAM, Bart. (*c.* 1693–1755), English politician, was the son of Sir Walter Yonge of Colyton, Devonshire, and great-great-grandson of Walter Yonge of Colyton (?1581–1649), whose diaries (1604–45), more especially four volumes now in the British Museum (Add. MSS. 18777–18780), are valuable material for history. In 1722 he was elected to parliament as member for Honiton; and he succeeded his father, the third baronet, in 1731. In the House of Commons he attached himself to the Whigs, and making himself useful to Sir Robert Walpole, was rewarded with a commissionership of the treasury in 1724. George II., who conceived a strong antipathy to Sir William, spoke of him as "Stinking Yonge"; but Yonge conducted himself so obsequiously that he obtained a commissionership of the admiralty in 1728, was restored to the treasury in 1730, and in 1735 became secretary of state for war. He especially distinguished himself in his defence of the government against a hostile motion by Pulteney in 1742. Making friends with the Pelhams, he was appointed vice-treasurer of Ireland in 1746; and, acting on the committee of management for the impeachment of Lord Lovat in 1747, he won the applause of Horace Walpole by moving that prisoners impeached for high treason should be allowed the assistance of counsel. In 1748 he was elected F.R.S. He died at Escott, near Honiton, on the 10th of August 1755. By his second wife, Anne, daughter and coheiress of Thomas, Lord Howard of Effingham, he had two sons and six daughters. He enjoyed some reputation as a versifier, some of his lines being even mistaken for the work of Pope, greatly to the disgust of the latter; and he wrote the lyrics incorporated in a comic opera, adapted from Richard Brome's *The Jovial Crew*, which was produced at Drury Lane in 1730 and had a considerable vogue.

His eldest son, Sir George Yonge (1731–1812), was member of parliament for Honiton continuously from 1754 to 1794, and held a number of different government appointments, becoming a lord of the admiralty (1766–70), vice-treasurer for Ireland (1782), secretary of state for war (1782–94, with an interval from April to December 1783), master of the mint (1794–99). In 1799 he was appointed governor of the Cape of Good Hope. Serious charges being brought against his administration, which was marked by great lack of judgment, he was recalled in 1801. He died on the 25th of September 1812. The baronetcy became extinct at his death.

YONKERS, a city of Westchester county, New York, U.S.A., on the E. bank of the Hudson river, immediately adjoining New York City on the N. Pop. (1900) 47,931, of whom 14,634 were foreign-born and 1005 were negroes; (1910, U.S. census) 79,803. Yonkers is served by three divisions of the New York Central & Hudson River railway, and is connected with New York City and other places E. and N. by interurban electric lines. It has also during most of the year steamboat service on the Hudson. There are two principal residential districts: one in the N., including Amackassin Heights and (about 1 m. W.) Glenwood, where are the old Colgate Mansion and "Greystone," the former home of Samuel J. Tilden; the other in the S., including Ludlow, Van Cortlandt Terrace and Park Hill (adjoining Riverdale in the borough of the Bronx), a park-like reserve with winding streets and drives. The business and manufacturing districts occupy the low lands along the river. Among the public buildings are the City Hall, the High School and a Manual Training School, and Yonkers is the seat of St Joseph's Theological Seminary (Roman Catholic; 1896), the Halsted School (founded 1874) for girls, and a business college. It has a good public library (established 1893; 25,000 vols. in 1910), and the Woman's Institute (1880) and the Hollywood Inn Club (1897; for working-men) have small libraries. Philipse Manor Hall, built originally about 1682 as the mansion of the son of Frederick Philipse (1626–1702), the lord of Philipsburgh, and enlarged to its present dimensions in 1745, is of some historic interest. It was confiscated by act of the legislature in 1779 because its owner, Frederick Philipse (1746–1785), was suspected of Toryism, and was sold in 1789. In 1867 it passed into the possession of Yonkers, and from 1872 to 1908 was used as the city hall. In 1908 it was bought by the state, and is now maintained as a museum for colonial and revolutionary relics. It is one of the best examples of colonial architecture in America. In the square before it stands a monument to the soldiers and sailors of the Civil War. Yonkers is an important manufacturing city, and in 1905 the value of its factory products was $33,548,688.

On the site of Yonkers stood an Indian village known as Nappeckamack, or town of the rapid water, at the time of the settlement of the Dutch in New Amsterdam; and a great rock, near the mouth of the Nepperhan Creek, was long a place of Indian worship. The territory was part of the "Keskeskick purchase," acquired from the Indians by the Dutch W. India Company in 1639. In 1646 the tract was included in the grant to Adrian van der Donck, the first lawyer and historian of New Netherland, author of *A Description of New Netherland* (1656), in Dutch. His grant, known as "Colen Donck" (Donck's Colony), embraced all the country from Spuyten Duyvil Creek, N. along the Hudson to the Amackassin Creek, and E. to the Bronx river. Some squatters settled here before 1646. Van der Donck encouraged others to remove to his lands along the Hudson river, and in 1649 he built a saw-mill near the mouth of the Nepperhan Creek, which for many years was called "Saw-Mill river." The whole settlement soon came to be called "De Jonkheer's Land" or "De Jonkheers"—meaning the estate of the young lord, as Van der Donck was called by his tenants—and afterwards Yonkers. Subsequently the tract passed largely into the hands of Frederick Philipse and became part of the manor of Philipsburgh. Early in the War of Independence Yonkers was occupied for a time by part of Washington's army, and was the scene of several skirmishes. The town of Yonkers was incorporated in 1788 and the village in 1855. In 1872 Yonkers became a city; at the same time the southern part was separately incorporated as Kingsbridge, which in 1874 was annexed to New York.

See Frederic Shonnard and W. W. Spooner, *History of Westchester County* (New York, 1900); J. T. Scharf, *History of Westchester County* (New York, 1886); and Allison, *History of Yonkers* (New York, 1896).

YONNE, a department of central France, formed partly from the province of Champagne proper (with its dependencies, Sénonais and Tonnerrois), partly from Burgundy proper (with its dependencies, the county of Auxerre and Avallonnais) and partly from Gâtinais (Orléanais and Île-de-France). It is bounded by Aube on the N.E., Côte-d'Or on the S.E., Nièvre on the S., Loiret on the W. and Seine-et-Marne on the N.W. Pop. (1906) 315,199. Area, 2880 sq. m. The highest elevation (2000 ft.) is in the granitic highlands of Morvan, in the S.E., where other peaks range from 1300 to 1600 ft. The department belongs to the basin of the Seine, except a small district in the S.W. (Puisaye), which belongs to that of the Loire. The river Yonne flows through it from S. to N.N.W., receiving on the right bank the Cure, the Serein and the Armançon, which water the S.E. of the department. Farther N. it is joined by the Vanne, between which and the Armançon lies the forest-clad plateau of the Pays d'Othe. To the W. of the Yonne, in the Puisaye, are the sources of the Loing, another tributary of the Seine, and of its affluents, the Ouanne and the Lunain. The Yonne is navigable throughout the department, and is connected with the Loire by the canal of Nivernais, which in turn is connected with that of Briare, which connects the Seine and the Loire. The climate is temperate, except in the Morvan, where the extremes of heat and cold are greater, and where the rainfall is most abundant. The prevailing winds are S.W. and W.

The department is essentially agricultural. Wheat and oats are the chief cereals; potatoes, sugar-beet, lucerne, mangold-wurzel and other forage plants are also cultivated, and there is much good pasture.

The vineyards of the Tonnerrois and Auxerrois produce the finest red wines of lower Burgundy, and those of Chablis the finest white. The wine of the Côte St Jacques (Joigny) is also highly esteemed. Cider-apples are the chief fruit. Charny is a centre for the rearing of horses. Forests cover considerable areas of the department and consist chiefly of oak, beech, hornbeam, elm, ash, birch and pine. Quarry products include building-stone, ochre and cement. Among the industrial establishments are tanneries, tile-works, saw-mills and breweries, but there is little manufacturing activity. Cereals, wines, firewood, charcoal, ochre and bark are exported.

The department is served chiefly by the Paris-Lyon railway. The canal of Burgundy, which follows the valley of the Armançon, has a length of 57 m. in the department, that of Nivernais, following the valley of the Yonne, a length of 33 m. The department constitutes the archiepiscopal diocese of Sens, has its court of appeal in Paris, its educational centre at Dijon, and belongs to the district of the V. army corps. It is divided into five arrondissements (37 cantons, 486 communes), of which the capitals are Auxerre, also capital of the department, Avallon, Sens, Joigny and Tonnerre, which with those of Chablis, St Florentin and Vézelay are its most noteworthy towns and are treated separately. Yonne is rich in objects of antiquarian and architectural interest. At Pontigny there is a Cistercian abbey, where Thomas Becket spent two years of his exile. Its church is an excellent type of the Cistercian architecture of the 12th century. The fine 12th-century château of Druyes, which stands on a hill overlooking the village, once belonged to the counts of Auxerre and Nevers. Villeneuve-sur-Yonne has a medieval keep and gateways and a church of the 13th and 16th centuries. The Renaissance châteaux of Fleurigny, Ancy-le-France and Tanlay, the last-named for some time the property of the Coligny family, and the château of St Fargeau, of the 13th century, rebuilt by Mademoiselle de Montpensier under Louis XIV., are all architecturally remarkable. At St Moré there are remains of the Roman road from Lyons to Gallia Belgica and of a Roman fortified post.

YORCK VON WARTENBURG, HANS DAVID LUDWIG, COUNT (1759-1830), Prussian general field-marshal, was of English ancestry. He entered the Prussian army in 1772, but after seven years' service was cashiered for disobedience. Entering the Dutch service three years later he took part in the operations of 1783-84 in the East Indies as captain. Returning to Prussia in 1785 he was, on the death of Frederick the Great, reinstated in his old service, and in 1794 took part in the operations in Poland, distinguishing himself especially at Szekoczyn. Five years afterwards Yorck began to make a name for himself as commander of a light infantry regiment, being one of the first to give prominence to the training of skirmishers. In 1805 he was appointed to the command of an infantry brigade, and in the disastrous Jena campaign he played a conspicuous and successful part as a rearguard commander, especially at Altenzaun. He was taken prisoner, severely wounded, in the last stand of Blücher's corps at Lübeck. In the reorganization of the Prussian army which followed the peace of Tilsit, Yorck was one of the leading figures. At first major-general commanding the West Prussian brigade, afterwards inspector-general of light infantry, he was finally appointed second in command to General Grawert, the leader of the auxiliary corps which Prussia was compelled to send to the Russian War of 1812. The two generals did not agree, Grawert being an open partisan of the French alliance, and Yorck an ardent patriot; but before long Grawert retired, and Yorck assumed the command. Opposed in his advance on Riga by the Russian General Steingell, he displayed great skill in a series of combats which ended in the retirement of the enemy to Riga. Throughout the campaign he had been the object of many overtures from the enemy's generals, and though he had hitherto rejected them, it was soon borne in upon him that the Grand Army was doomed. Marshal Macdonald, his immediate French superior, retreated before the corps of Diebitsch, and Yorck found himself isolated. As a soldier his duty was to break through, but as a Prussian patriot his position was more difficult. He had to judge whether the moment was favourable for the war of liberation; and, whatever might be the enthusiasm of his junior staff-officers, Yorck had no illusions as to the safety of his own head. On December 30th the general made up his mind. The Convention of Tauroggen "neutralized" the Prussian corps. The news was received with the wildest enthusiasm, but the Prussian Court dared not yet throw off the mask, and an order was despatched suspending Yorck from his command pending a court-martial. Diebitsch refused to let the bearer pass through his lines, and the general was finally absolved when the treaty of Kalisch definitely ranged Prussia on the side of the Allies. Yorck's act was nothing less than the turning-point of Prussian history. His veterans formed the nucleus of the forces of East Prussia, and Yorck himself in public took the final step by declaring war as the commander of those forces. On March 17th, 1813, he made his entry into Berlin in the midst of the wildest exuberance of patriotic joy. On the same day the king declared war. During 1813-14 Yorck led his veterans with conspicuous success. He covered Blücher's retreat after Bautzen and took a decisive part in the battles on the Katzbach. In the advance on Leipzig his corps won the action of Wartenburg (October 4) and took part in the crowning victory of October 18th. In the campaign in France Yorck drew off the shattered remnants of Sacken's corps at Montmirail, and decided the day at Laon. The storm of Paris was his last fight. In the campaign of 1815 none of the older men were employed in Blücher's army, in order that Gneisenau (the ablest of the Prussian generals) might be free to assume command in case of the old prince's death. Yorck was appointed to a reserve corps in Prussia, and, feeling that his services were no longer required, he retired from the army. His master would not accept his resignation for a considerable time, and in 1821 made him general field-marshal. He had been made Count Yorck von Wartenburg in 1814. The remainder of his life was spent on his estate of Klein-Öls, the gift of the king. He died there on the 4th of

October 1830. A statue (by Rauch) was erected to him in Berlin in 1855.

See Seydlitz, *Tagebuch des Preussischen Armee Korps 1812* (Berlin, 1823); Droysen, *Leben des G. F. M. Grafen Yarck von Wartenburg* (Berlin, 1851).

YOREDALE SERIES, in geology, a local phase of the lower Carboniferous rocks of the N. of England. The name was introduced by J. Phillips on account of the typical development of the phase in Yoredale (Wensleydale), Yorkshire. In the Yorkshire dales the Carboniferous rocks assume an aspect very different from that which obtains in the S. Beds of detrital sediment, sandstones, shales and occasional ironstones and thin coals separate the limestones into well-defined beds. These limestone beds have received various names of local significance (Hardraw Scar, Simonstone, Middle, Underset, Main and many others), and owing to the country being little disturbed by faulting and being much cut up by the streams, they stand out as escarpments on either side of the valleys. The first indication of the intercalation of thick detrital deposits within the massive limestone is seen in Ingleborough and Penyghent; but as the rocks are traced N. the detrital matter increases in quantity and the limestones diminish, till in Northumberland the whole Carboniferous series assumes the Yoredale phase, and consists of alternations of detrital and calcareous beds, no massive limestone being seen.

The Yoredale limestones are characterized by the presence of *Productus giganteus* and the brachiopod fauna usually associated with it. The main limestone of Weardale is full of corals, including *Lonsdaleia floriformis*, *Dibunophyllum* sp., *Cyclophyllum pachyendothecum*, &c., and has a typical Viséan fauna; it would therefore correspond, palaeontologically, with the upper part of the Carboniferous Limestone of Derbyshire. On Ingleborough the limestones are not very fossiliferous, but the Main Limestone contains small corals of a zaphrentoid type and an upper Viséan fauna. *Posidonomya Becheri* occurs fairly low down in the series in the Shale above the Hardraw Scar and Gayls limestones, but it is not accompanied by any of the goniatites or other cephalopods and lamellibranchs which characterize the *Posidonomya Becheri* beds of the Pendleside Series, the faunas of the Yoredale and Pendleside phases being very distinct. The Red Bed Limestone of Leyburn, the uppermost limestone of the series, is very rich in fish remains, which are identical in many cases with those found in the topmost beds of the massive Carboniferous Limestone at Bolt Edge quarry in Derbyshire. The shales between the limestones are rich in fossils and contain abundant single corals referable to *Zaphrentis enniskilleni*, *Cyclophyllum pachyendothecum* and others; these, though high-zonal forms, occur low down in the Yoredale strata; even in the shale above the Hardraw Scar limestone. In the Derbyshire area and farther N. these corals would indicate the uppermost beds of the limestone series of those districts, and their early appearance in the Yoredale area is probably entirely due to conditions of environment. Attempts have been made to correlate rocks in a number of widely separated areas with the Yoredale strata, but on wholly insufficient grounds. It is clear that the exact relationship which the Yoredale series of the type area bears as a whole to the lower Carboniferous rocks of the Midlands, N. and S. Wales, &c., on the one hand, and to the Pendleside series on the other, has yet to be established on a firm palaeontological basis.

See *Mem. Geol. Survey*, "Geology of Mallerstang"; W. Hind, *Proc. Yorks. Geol. and Poly. Soc.* (1902), xiv. part iii.; and *Rep. Brit. Ass.*, "Life Zones Brit. Carb. Rocks" (1901).

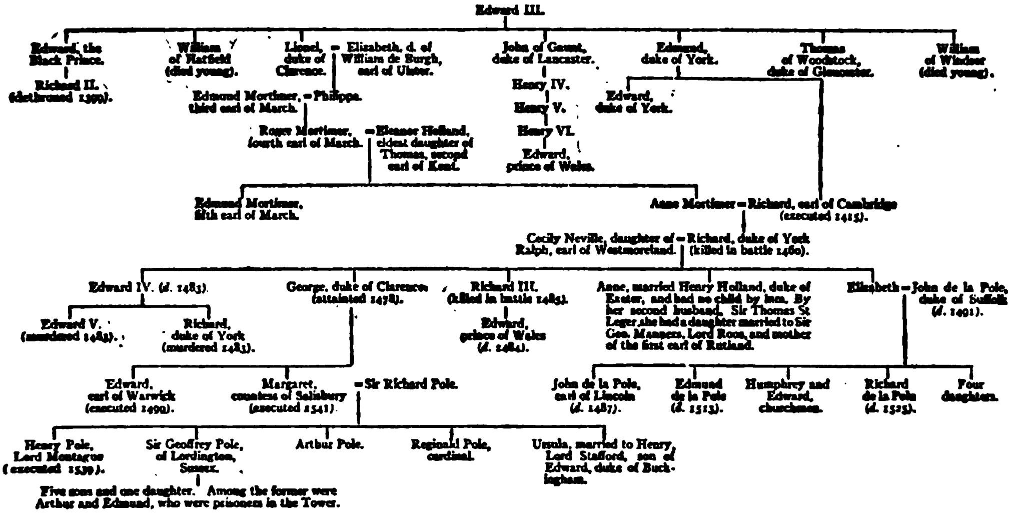
YORK (House of), a royal line in England, founded by Richard, duke of York (*q.v.*), who claimed the crown in opposition to Henry VI. It may be said that his claim, at the time it was advanced, was rightly barred by prescription, the house of Lancaster having then occupied the throne for three generations, and that it was really owing to the misgovernment of Margaret of Anjou, and her favourites that it was advanced at all. Yet it was founded upon strict principles of lineal descent. For the duke was descended from Lionel, duke of Clarence, the third son of Edward III., while the house of Lancaster came of John of Gaunt, a younger brother of Lionel. One thing which might possibly have been considered an element of weakness in his claim was that it was derived (see the Table) through females—an objection actually brought against it by Chief-Justice Fortescue. But a succession through females could not reasonably have been objected to after Edward III.'s claim to the crown of France; and, apart from strict legality, the duke's claim was probably supported in the popular estimation by the fact that he was descended from Edward III. through his father no less than through his mother. For his father, Richard, earl of Cambridge, was the son of Edmund, duke of York, fifth son of Edward III.; and he himself was the direct lineal heir of this Edmund, just as much as he was of Lionel, duke of Clarence. His claim was also favoured by the accumulation of hereditary titles and estates. The earldom of Ulster, the old inheritance of the De Burghs, had descended to him from Lionel, duke of Clarence; the earldom of March came from the Mortimers, and the dukedom of York and the earldom of Cambridge from his paternal ancestry. Moreover, his own marriage with Cecily Neville, though she was but the youngest daughter of Ralph, 1st earl of Westmorland, allied him to a powerful family in the north of England, to whose support both he and his son were greatly indebted.

The reasons why the claims of the line of Clarence had been so long forborne are not difficult to explain. Roger Mortimer, 4th earl of March, was designated by Richard II. as his successor; but he died the year before Richard was dethroned, and his son Edmund, the 5th earl, was a child at Henry IV.'s usurpation. Henry took care to secure his person; but the claims of the family troubled the whole of his own and the beginning of his son's reign. It was an uncle of this Edmund who took part with Owen Glendower and the Percies; and for advocating the cause of Edmund Archbishop Scrope was put to death. And it was to put the crown on Edmund's head that his brother-in-law Richard, earl of Cambridge, conspired against Henry V. soon after his accession. The plot was detected, being revealed, it is said, by the earl of March himself, who does not appear to have given it any encouragement; the earl of Cambridge was beheaded. The popularity gained by Henry V. in his French campaigns secured the weak title of the house of Lancaster against further attack for forty years.

Richard, duke of York, seems to have taken warning by his father's fate; but, after seeking for many years to correct by other means the weakness of Henry VI.'s government, he first took up arms against the ill advisers who were his own personal enemies, and at length claimed the crown in parliament as his right. The Lords, or such of them as did not purposely stay away from the House, admitted that his claim was unimpeachable, but suggested as a compromise that Henry should retain the crown for life, and the duke and his heirs succeed after his death. This was accepted by the duke, and an act to that effect received Henry's own assent. But the act was repudiated by Margaret of Anjou and her followers, and the duke was slain at Wakefield fighting against them. In little more than two months, however, his son was proclaimed king at London by the title of Edward IV., and the bloody victory of Towton immediately after drove his enemies into exile and paved the way for his coronation. After his recovery of the throne in 1471 he had little more to fear from the rivalry of the house of Lancaster. But the seeds of distrust had already been sown among the members of his own family, and in 1478 his brother Clarence was put to death—secretly, indeed, within the Tower, but still by his authority and that of parliament—as a traitor. In 1483 Edward himself died; and his eldest son, Edward V., after a nominal reign of two months and a half, was put aside by his uncle, the duke of Gloucester, who became Richard III., and then caused him and his brother Richard, duke of York, to be murdered. But in little more than two years Richard was slain at Bosworth by the earl of Richmond, who, being proclaimed king as Henry VII., shortly afterwards fulfilled his pledge to marry the eldest daughter of Edward IV. and so unite the houses of York and Lancaster.

Here the dynastic history of the house of York ends, for its claims were henceforth merged in those of the house of Tudor. But, although the union of the Roses ought to have extinguished controversy, a host of debatable questions and plausible pretexts for rebellion remained. The legitimacy of Edward IV.'s children had been denied by Richard III. and his parliament, and, though the act was denounced as scandalous, the slander might still be reasserted. The duke of Clarence had left two

Genealogical Table of the House of York


Edward III.
Edward, the Black Prince.
Richard II. (dethroned 1399).
William of Hatfield (died young).
Lionel, duke of Clarence. = Elizabeth, d. of William de Burgh, earl of Ulster.
Edmund Mortimer, third earl of March. = Philippa.
Roger Mortimer, fourth earl of March. = Eleanor Holland, eldest daughter of Thomas, second earl of Kent.
Edmund Mortimer, fifth earl of March.
John of Gaunt, duke of Lancaster.
Henry IV.
Henry V.
Henry VI.
Edward, prince of Wales.
Edmund, duke of York.
Edward, duke of York.
Thomas of Woodstock, duke of Gloucester.
William of Windsor (died young).
Anne Mortimer = Richard, earl of Cambridge (executed 1415).
Cecily Nevill, daughter of Ralph, earl of Westmoreland. = Richard, duke of York (killed in battle 1460).
Edward IV. (d. 1483).
Edward V. (murdered 1483).
Richard, duke of York (murdered 1483).
George, duke of Clarence (attainted 1478).
Edward, earl of Warwick (executed 1499).
Margaret, countess of Salisbury (executed 1541). = Sir Richard Pole.
Henry Pole, Lord Montague (executed 1539).
Sir Geoffrey Pole, of Lordington, Sussex.
Five sons and one daughter. Among the former were Arthur and Edmund, who were prisoners in the Tower.
Arthur Pole.
Reginald Pole, cardinal.
Ursula, married to Henry, Lord Stafford, son of Edward, duke of Buckingham.
Richard III. (killed in battle 1485).
Edward, prince of Wales (d. 1484).
Anne, married Henry Holland, duke of Exeter, and had no child by him. By her second husband, Sir Thomas St Leger she had a daughter married to Sir Geo. Manners, Lord Roos, and mother of the first earl of Rutland.
Elizabeth = John de la Pole, duke of Suffolk (d. 1491).
John de la Pole, earl of Lincoln (d. 1487).
Edmund de la Pole (d. 1513).
Humphrey and Edward, churchmen.
Richard de la Pole (d. 1525).
Four daughters.

children, a son and a daughter, and the attainder of their father could not be a greater bar to the crown than the attainder of Henry VII. himself. Seeing this, Henry had, immediately after his victory at Bosworth, secured the person of the son, Edward, earl of Warwick, and kept him a prisoner in the Tower of London. Yet a formidable rebellion was raised in his behalf by means of Lambert Simnel, who was defeated and taken prisoner at the battle of Stoke in 1487. The earl of Warwick lived for twelve years later in unjust confinement, and was ultimately put to death in 1499 because he had consented to a plot for his own liberation. As to his sister Margaret, she was married to one of Henry VII.'s Welsh followers, Sir Richard Pole (or Poole), and could give no trouble, so that, when Henry VIII. came to the throne, he thought it politic to treat her with kindness. He made her countess of Salisbury, reversed her brother's attainder, created her eldest son, Henry, Lord Montague, and caused one of her younger sons, Reginald, who displayed much taste for learning, to be carefully educated. This, however, was the very thing which involved the whole family in ruin. For Henry looked to the learning and abilities of Reginald Pole to vindicate before Europe the justice of his divorce from Catherine of Aragon; and, when Pole was conscientiously compelled to declare the very opposite, the king's indignation knew no bounds. Pole himself was safe, having secured some time before a retreat in Italy. He was even made a cardinal by the pope. But this only made matters worse for his family at home: his brother, Lord Montague, and even his mother, the aged countess of Salisbury, were beheaded as traitors because they had continued to correspond with him. Cardinal Pole, however, came back to his own country with great honour in the reign of Queen Mary, and was made archbishop of Canterbury on the deprivation of Cranmer.

Early in the reign of Queen Elizabeth, two nephews of the cardinal, Arthur and Edmund Pole, being ardent young men, conspired to go over to the duke of Guise in France, hoping to return with an army into Wales and so promote the claims of Mary Queen of Scots to the crown of England, for which service the elder, Arthur, expected to be restored to the dukedom of Clarence. The result was that they were condemned to death, but were only imprisoned for the rest of their days in the Tower, where they both carved inscriptions on the walls of their dungeon, which are still visible in the Beauchamp tower.

Another branch of the house of York might have given trouble to the Tudors if they had not been narrowly watched and ultimately extinguished. Of the sisters of Edward IV., the eldest, Anne, who married the duke of Exeter, left only one daughter by her second husband, Sir Thomas St Leger; but the second, Elizabeth, married John de la Pole, duke of Suffolk, and had several children. Their eldest son was created earl of Lincoln during his father's life, and Richard III., after the death of his own son, had designated him as his successor. Disappointed of a kingdom by the success of Henry VII., he joined in Simnel's rebellion and was killed at the battle of Stoke. His brother Edmund thus became heir to his father; but in the reduced circumstances of the family he agreed to forbear the title of duke and take that of earl of Suffolk. He continued for some years in favour with the king, who made him a knight of the Garter; but, having killed a man in a passion, he fled abroad and was entertained at the court of the emperor Maximilian, and afterwards at that of Philip, king of Castile, when resident in the Low Countries before his departure for Spain. Philip, having been driven on the English coast when going to take possession of his Spanish kingdom, was entertained at Windsor by Henry VII., to whom he promised to deliver up the fugitive on condition that his life should be spared. Edmund de la Pole accordingly was brought back to England and lodged in the Tower. Though the promise to spare his life was kept by the king who gave it, his son Henry VIII. caused him to be executed in 1513, when war broke out with France, apparently for treasonable correspondence with his brother Richard, then in the French service. After his death Richard de la Pole, remaining in exile, called himself earl of Suffolk, and was flattered occasionally by Francis I. with faint hopes of the crown of England. He was killed at the battle of Pavia in 1525. There were no more De la Poles who could advance even the most shadowy pretensions to disturb the Tudor dynasty. (J. Ga.)

YORK, EDMUND OF LANGLEY, Duke of (1341–1402), fifth son of Edward III., was born at King's Langley in Hertfordshire on the 5th of June 1341. He accompanied his father on a campaign in France in 1359, was created earl of Cambridge in 1362, and took part in expeditions to France and Spain, being present at the sack of Limoges in 1370. After marrying Isabella (d. 1393), daughter of Peter the Cruel, king of Castile, he was appointed one of the English lieutenants in Brittany, whither he led an army in 1375. A second campaign in Brittany was followed in 1381 by an expedition under the earl's leadership to aid Ferdinand, king of Portugal, in his struggle with John I., king of Castile; but after a period of inaction Edmund was compelled to return to England as Ferdinand had concluded an independent peace with Castile. Accompanying Richard II. on his march into Scotland, he was created duke of York in August 1385, and subsequently on three occasions he acted as regent of England. In this capacity he held a parliament in 1395, and he was again serving as regent when Henry of Lancaster, afterwards Henry IV., landed in England in July 1399. After a feeble attempt to defend the interests of the absent king, York joined the victorious invader; but soon retired from public life, and, in the words of Froissart as translated by Lord Berners, "laye styll in his castell, and medled with nothynge of the busynesse of Englande." He died at King's Langley on the 1st of August 1402. York was a man who preferred pleasure to business, and during the critical events of his nephew's reign he was content to be guided by his more ambitious brothers, the dukes of Lancaster and Gloucester. His second wife was Joan, or Johanna (d. 1434), daughter of Thomas Holland, earl of Kent, but his only children were two sons and a daughter, Constance (d. 1416), by his first wife.

YORK, EDWARD, Duke of (*c.* 1373–1415), elder son of the preceding, was created earl of Rutland in 1390. Being an intimate friend of his cousin, Richard II., he received several important appointments, including those of admiral of the fleet, constable of the tower of London and warden of the Cinque Ports. He accompanied the king to Ireland in 1394 and was made earl of Cork; arranged Richard's marriage with Isabella, daughter of Charles VI. of France; and was one of the king's most active helpers in the proceedings against the "lords appellant" in 1397. As a reward he secured the office of constable of England and the lands in Holderness which had previously belonged to his murdered uncle, Thomas of Woodstock, duke of Gloucester, together with other estates and the title of duke of Aumerle or Albemarle. He appears to have deserted Richard in 1399, but only at the last moment; and in Henry IV.'s first parliament he was vigorously denounced as the murderer of Gloucester. After declaring that his part in the proceedings of 1397 had been performed under constraint, his life was spared, but he was reduced to his former rank as earl of Rutland, and deprived of his recent acquisitions of land. It is uncertain what share Rutland had in the conspiracy against Henry IV. in January 1400, but his complete acquittal by parliament in 1401, and the confidence subsequently reposed in him by the king, point to the conclusion that he was not seriously involved. Serving as the royal lieutenant in Aquitaine and in Wales, Rutland, who became duke of York on his father's death in 1402, was, like all Henry's servants, hampered by want of money, and perhaps began to feel some irritation against the king. At all events he was concerned in the scheme, concocted in 1405 by his sister, Constance, widow of Thomas le Despencer, earl of Gloucester, for seizing the young earl of March, and his brother Roger Mortimer, and carrying them into Wales. On her trial Constance asserted that her brother had instigated the plot, which also included the murder of the king, and York was imprisoned in Pevensey castle. Released a few months later, he was restored to the privy council and regained his estates, after which he again served Henry in Wales and in France. York led one division of the English army at Agincourt, where, on the 25th of October 1415, he was killed by "much hete and thronggid." He was buried in Fotheringhay church. The duke left no children and was succeeded as duke of York by his nephew, Richard.

York compiled the *Maystre of the Game*, a treatise on hunting which is largely a translation of the *Livre de Chasse* of Gaston Phochus, count of Foix. This has been edited by W. A. and F. Baillie-Grohman (1904).

YORK, FREDERICK AUGUSTUS, Duke of (1763–1827), second son of George III., was born at St James's Palace on the 16th of August 1763. At the age of six months his father secured his election to the rich bishopric of Osnabrück. He was invested a knight of the Bath in 1767, a K.G. in 1771, and was gazetted colonel in 1780. From 1781 to 1787 he lived in Germany, where he attended the manœuvres of the Austrian and Prussian armies. He was appointed colonel of the 2nd horse grenadier guards (now 2nd Life Guards) in 1782, and promoted major-general and appointed colonel of the Coldstream Guards in 1784. He was created duke of York and Albany and earl of Ulster in 1784. but retained the bishopric of Osnabrück until 1803. On his return to England he took his seat in the House of Lords, where, on December 15, 1788, he opposed Pitt's Regency Bill in a speech which was supposed to have been inspired by the prince of Wales. A duel fought on Wimbledon Common with Colonel Lennox, afterwards duke of Richmond, served to increase the duke of York's popularity, his acceptance of the challenge itself and his perfect coolness appealing strongly to the public taste. In 1791 he married Princess Frederica Charlotte Ulrica Catherina (b. 1767), daughter of Frederick William II. of Prussia. The princess was enthusiastically received in London, but the marriage was not happy, and a separation soon took place. The princess retired to Oatlands Park, Weybridge, where she died on the 6th of August 1820.

In 1793 the duke of York was sent to Flanders in command of the English contingent of Coburg's army destined for the invasion of France (see French Revolutionary Wars). On his return in 1795 the king promoted him field-marshal, and on April 3rd, 1798, appointed him commander-in-chief. His second command was with the army sent to invade Holland in conjunction with a Russian *corps d'armée* in 1799. Sir Ralph Abercromby and Admiral Sir Charles Mitchell in charge of the vanguard had succeeded in capturing the Dutch ships in the Helder, but from time of the duke's arrival with the main body of the army disaster followed disaster until, on the 17th of October, the duke signed the convention of Alkmaar, by which the allied expedition withdrew after giving up its prisoners. Although thus unsuccessful as commander of a field army the duke was well fitted to carry out reforms in the army at home, and to this task he devoted himself with the greatest vigour and success until his enforced retirement from the office of commander-in-chief on the 18th of March 1809, in consequence of his relations with Mary Ann Clarke (1776–1852), who was convicted of profiting by her intimacy with the duke to extract money from officers by promising to recommend them for promotion. A select committee was appointed by the House of Commons to inquire into the matter, and the duke was acquitted of having received bribes himself by 278 votes to 196. Two years later, in May 1811, he was again placed at the head of the army by the prince regent, and rendered valuable services in this position. He died on the 5th of January 1827 and was buried at St George's Chapel, Windsor.

A firm friendship seems to have existed between the duke and his elder brother, afterwards George IV., and he is also said to have been his father's favourite son. He was very popular, thanks to his amiable disposition and a keen love of sport, but it is as the organizing and administrative head of the army that he has left his mark. He was untiring in his efforts to raise the tone of the army, restore discipline, weed out the undesirables, and suppress bribery and favouritism. He founded the Duke of York's School for the sons of soldiers at Chelsea, and his name is also commemorated by the Duke of York's column in Waterloo Place.

YORK, RICHARD, Duke of (1411–1460), was born on the 21st of September 1411, the son of Richard, earl of Cambridge, second son of Edmund of Langley, duke of York. By the death of his uncle Edward at Agincourt he became duke of York, and on the death of Edmund Mortimer in 1425 he succeeded to his claims as representing in the female line the elder branch of the royal family. He had been kindly treated by Henry V., and his name appears at the head of the knights made by the little Henry VI. at Leicester on the 19th of May 1426. York's first service was in France during 1430 and 1431. In 1432 he obtained livery of his lands and afterwards went over to Ireland to take possession of his estates there. In January 1436 he was appointed lieutenant-general of France and Normandy, but did not enter on his command till June. He showed vigour and capacity, and recovered Fécamp and some other places in

Normandy. Probably he was not supported cordially by the home government, and in 1437 applied to be recalled. One authority alleges that his council thwarted him in his desire to relieve Montereau, because he had been discharged from his office (*Chronicles of London*, 143). York returned to England in the autumn of 1437. From this time at all events he attached himself to the war-party of which Humphrey of Gloucester was head, in opposition to the government under Cardinal Beaufort. By his marriage in 1438 to Cicely, sister of the earl of Salisbury, he allied himself to the rising family of the Nevilles. On the 2nd of July 1440 York was again appointed to the French command. His previous experience made him stipulate for full powers and a sufficient revenue. He did not, however, go to Rouen till June 1441. During his second governorship York maintained, if he could not improve, the English position in Normandy. He was again hampered by his political opponents at home, and at the end of 1446 was recalled, on the pretext that his term of office had expired. The death of Humphrey of Gloucester in February 1447 made York the first prince of the blood. Suffolk, now Henry's chief minister, found a convenient banishment for a dangerous rival by appointing York to be lieutenant of Ireland for ten years (9th of December 1447). York, however, contrived to put off his departure for eighteen months. During his absence in Ireland English discontent came to a crisis in Jack Cade's rebellion. The use made of the names of Mortimer and York, however unauthorized, shows the trend of popular opinion. In September 1450 York landed in Wales. His opponents endeavoured to waylay him, but he came to London with an armed retinue and forced himself into the king's presence. Nevertheless he declared his loyalty and that he desired only justice and good government. He took part in the punishment of Cade's supporters, and discountenanced a proposal in parliament that he should be declared heir to the crown. In March 1452 he came once more in arms to London, and endeavoured to obtain Somerset's dismissal. On a promise that his rival should be held in custody he disbanded his men, and thus outwitted found himself virtually a prisoner. However, a nominal agreement was concluded, and York accepted the king's pardon. The situation was changed by the birth of a prince of Wales and the king's illness in October 1453. After a struggle with the queen and Somerset, York secured his recognition as protector on the 27th of March 1454. He declared that he accepted the post only as a duty, and, though he put his own friends in power, exercised his authority with moderation and on the side of good order. But at the end of the year the king's sudden recovery brought York's protectorate to an end. When it was clear that the queen and Somerset would proceed to extremities, York and his friends took up arms in self-defence. Even when the two armies met at St Albans, York endeavoured to treat for settlement. The issue was decided by the defeat and death of Somerset on the 22nd of May 1455. York used his success with moderation. He became constable of England, and his friends obtained office. This was no more than a change of ministers. But a return of the king's illness in October 1455 made York again for a brief space protector. Henry recovered in February 1456, and Margaret, his queen, began to assert herself. Finally, at Coventry, in October, the Yorkist officials were displaced. Still there was no open breach, and in March 1458 there was even a ceremonial reconciliation of all parties at St Paul's in London. York would not again accept honourable banishment to Ireland, but made no move till the queen's preparations forced him to act. In September 1459 both parties were once more in arms. York protested that he acted only in self-defence, but the desertion of his best soldiers at Ludlow on the 12th of October left him helpless. With a few followers he escaped to Ireland, where his position as lord-lieutenant was confirmed by an Irish parliament, and he ruled in full defiance of the English government. In March 1460 the earl of Warwick came from Calais to concert plans with his leader. York himself only landed in England on the 8th of September, two months after Warwick's victory at Northampton. All pretence of moderation was put aside, and he marched on London, using the full arms of England, and with his sword borne upright before him. On reaching Westminster, York took up his residence in the royal palace, and formally asserted his claim to the throne in parliament. In the end a compromise was arranged, under which Henry was to retain the crown for life, but Richard was to succeed him. On the 8th of November he was accordingly proclaimed heir-apparent and protector. Meantime the queen was gathering her friends, and early in December, Richard went north with a small force. He kept Christmas at Sandal Castle near Wakefield. There, on the 30th of December, he was hemmed in by a superior force of Lancastrians. Declaring that he had never kept castle in the face of the enemy, Richard rashly offered battle, and was defeated and slain. His enemies had his head cut off, and set it up on the walls of York adorned with a paper crown.

Richard of York was not a great statesman, but he had qualities of restraint and moderation, and might have made a good king. He had four daughters and four sons. Edmund, earl of Rutland, his second son, was killed at Wakefield. The other three were Edward IV., George, duke of Clarence, and Richard III.

See *The Paston Letters* with Dr Gairdner's Introduction; *Three Fifteenth Century Chronicles*, and *Collections of a London Citizen* (published by the Camden Society); *Chronicles of London* (ed. C. L. Kingsford, 1905); J. S. Stevenson's *Wars of the English in France* (Rolls Series). The French chronicles of Matthieu d'Escouchy, T. Basin and Jehan Waurin should also be consulted (these three are published by the *Société de l'Histoire de France*). For modern accounts see especially Sir James Ramsay's *Lancaster and York*, and *The Political History of England*, vol. iv., by Professor C. Oman.

(C. L. K.)

YORK, a city, municipal, county and parliamentary borough, the seat of an archbishop, and the county town of Yorkshire, England, 188 m. N. by W. from London by the Great Northern railway. It is an important junction of the North-Eastern railway. Pop. (1901) 77,914. It lies in a plain watered by the river Ouse, at the junction of the Foss stream with the main river. It has narrow picturesque streets, ancient walls, and, besides the cathedral, many churches and buildings of architectural interest.

York was a Roman station (see below), and large collections of Roman remains are preserved in the hospitium of St Mary's Abbey. Of these a great proportion came from the cemetery and from the foundations of the railway station. A noteworthy relic of the Roman occupation, however, appears in its original place. This is the so-called multangular tower, on the N.W. of the city walls. Its base is Roman, of mingled stone and brick work. The city walls date in part from Norman times, but are in the main of the 14th century. Their circuit is a little over 2½ m., and the area enclosed is divided by the river Ouse, the larger part lying on the left bank. The walls have been carefully preserved and are remarkably perfect. On the E. for a short distance the river Foss took the place of a wall. Of the gates, called Bars, the best specimen is Micklegate Bar on the S.W., where the heads of traitors were formerly exposed. It is a square tower built over a circular, probably Norman, arch, and has embattled corner turrets. Others are Bootham Bar, the main entrance from the N., also having a Norman arch; Monk Bar (N.E.), formerly called Goodramgate, but renamed in honour of General Monk, and Walmgate Bar, of the time of Edward I., retaining the barbican repaired in 1648. The castle stands in the angle between the Ouse and the Foss immediately above their junction. Of the fortress built by William the Conqueror in 1068 some portions were probably incorporated in Clifford's tower, the shell of which, showing an unusual ground plan of four intersecting circles, rises from an artificial mound. The castle serves as the prison and county courts.

The cathedral of St Peter, commonly known as the minster, has no superior in general dignity of form among English cathedrals. It is in the form of a Latin cross, consisting of nave with aisles, transepts, choir with aisles, a central tower, and two W. towers. The palace of the archbishops is at Bishopthorpe, 2½ m. S. of York. It is of various dates, and includes slight remains of the Early English palace of Archbishop Grey. The diocese includes over half the parishes in Yorkshire, and also covers very small portions of Durham, Nottinghamshire and Lincolnshire.

The extreme external length of the cathedral is 524 ft. 6 in., the breadth across the transepts 250 ft., the height of the central tower 213 ft., and the height of the western towers 202 ft. The material is magnesian limestone. The cathedral occupies the site of the wooden church in which King Edwin was baptized by Paulinus (*q.v.*) on Easter Day 627. After his baptism Edwin, according to Bede, began to construct "a large and more noble basilica of stone," but it was partly destroyed during the troubles which followed his death, and was repaired by Archbishop Wilfrid. The building suffered from fire in 741, and, after it had been repaired by Archbishop Albert, was described by Alcuin as "a most magnificent basilica." At the time of the Norman invasion the Saxon cathedral, with the library of Archbishop Egbert, perished in the fire by which the greater part of the city was destroyed, the only relic remaining being the central wall of the crypt. It was reconstructed by Archbishop Thomas of Bayeux (1070–1100); but of this building few portions remain. The apsidal choir and crypt were reconstructed by Archbishop Roger (1154–81), the S. transept by Archbishop Walter de Grey (1216–1255), and the N. transept and central tower by John Romanus, treasurer of the cathedral (1228–56). With the exception of the crypt, the transepts are the oldest portions of the building now remaining. They represent the Early English style at its best, and the view across the great transept is unsurpassed for architectural effect. The S. transept is the richest and most elaborate in its details, one of its principal features being the magnificent rose window; and the N. transept contains a series of beautiful lancet windows called the Five Sisters. The foundation of the new nave was laid by Archbishop Romanus (1286–96), son of the treasurer, the building of it being completed by Archbishop William de Melton about 1340. The chapter-house, a magnificent ornate building, was built during the same period. The W. front, consisting of a centre and two divisions corresponding with the nave and aisles, has been described as "more architecturally perfect as a composition and in its details than that of any other English cathedral," the great window above the door being considered by some superior to the famous E. window at Carlisle.

In 1361 Archbishop Thoresby (1352–73) began the lady chapel and presbytery, both in the Early Perpendicular style. The rebuilding of the choir, begun about the same period, was not completed till about 1400. It is Late Perpendicular, the great E. window being one of the finest in the world. With the rebuilding of the choir the whole of the ancient Norman edifice was removed, the only Norman architecture now remaining being the E. portion of the crypt of the second period, built by Archbishop Roger (1154–1191). To correspond with later alterations, the central tower was recased and changed into a Perpendicular lantern tower, the work being completed in 1444. The S.W. tower was begun in 1432 during the treasurership of John de Bermingham, and the N.W. tower in 1470. With the erection of this tower the church was completed as it now stands, and on the 3rd of February 1472 it was reconsecrated by Archbishop Neville. On the 2nd of February 1829 the woodwork of the choir was set on fire by Jonathan Martin, a madman. On the 2nd of May 1840 a fire broke out in the S.W. tower, reducing it to a mere shell. The stained glass both in the cathedral and in other churches of the city is particularly noteworthy; its survival may be traced to the stipulation made by the citizens when surrendering to parliament in the civil wars that it should not be damaged.

The following is a list of the archbishops of York:—

1. Paulinus, 627–633.
*2. Chad, 664–669.
*3. Wilfrid, 669–678. (He again held the see in 686—for how long is not certain—Bosa retiring in his favour.)
*4. Bosa, 678–*c.* 705.
*5. John of Beverley, 705–718.
*6. Wilfrid II., 718–732.
7. Egbert, 732–766.
8. Albert, 766–782.
9. Eanbald I., 782–796.
10. Eanbald II., 796–812.
11. Wulfsi, 812–831.
12. Wigmund, 837–854.
13. Wulfhere, 854–890.
14. Ethelbald, 890–895.
15. Redewald, 895–928.
16. Wulfstan, 928–956.
17. Oskytel, 956–972.
18. Ethelwold, 972.
19. Oswald, 972–992.
20. Adulf, 992–1002.
21. Wulfstan, 1002–1023.
22. Alfric Puttoc, 1023–1050.
23. Kinsi, 1050–1060.
24. Ealdred, 1060–1067.
25. Thomas of Bayeux, 1070–1100.
26. Gerard, 1101–1108.
27. Thomas, 1108–1114.
28. Thurstan, 1114–1140.
29. William Fitzherbert, 1143–1147. (His election was disputed, and he was deprived by the pope.)
30. Henry Mordac, 1147–1153.
William Fitzherbert, reinstated, 1153 to 1154.
31. Roger of Pont l'Evêque, 1154–1181.
(The see was now vacant for ten years.)
32. Geoffrey, 1191–1207.
(The see was vacant for nine years.)
33. Walter de Grey, 1216–1255
34. Sewal de Bovil, 1256–1258.
35. Geoffrey of Ludham, 1258–1265.
36. Walter Giffard, 1266–1279.
37. William of Wickwaine, 1279–1286.
38. John Romanus, 1286–1296.
39. Henry of Newark, 1298–1299.
40. Thomas of Corbridge, 1300–1304.
41. William Greenfield, 1306–1315.
42. William de Melton, 1317–1340.
43. William la Zouche, 1342–1352.
44. John Thoresby, 1352–1373.
45. Alexander Neville, 1374–1388.
46. Thomas Fitzalan, 1388–1396.
47. Robert Waldby, 1397–1398.
48. Richard Scrope, 1398–1405.
49. Henry Bowet, 1407–1423.
50. John Kemp, 1426–1452.
51. William Booth, 1452–1464.
52. George Neville, 1464–1476.
53. Laurence Booth, 1476–1480.
54. Thomas Scott, 1480–1500.
55. Thomas Savage, 1501–1507.
56. Christopher Bainbridge, 1508–1514.
57. Thomas Wolsey, 1514–1530.
58. Edward Lee, 1531–1544.
59. Robert Holgate, 1545–1554.
60. Nicholas Heath, 1555–1559.
61. Thomas Young, 1561–1568.
62. Edward Grindal, 1570–1576.
63. Edwin Sandys, 1577–1588.
64. John Piers, 1588–1594.
65. Matthew Hutton, 1595–1606.
66. Tobias Matthew, 1606–1628.
67. George Monteign, 1628.
68. Samuel Harsnett, 1628–1631.
69. Richard Neile, 1632–1640.
70. John Williams, 1641–1650.
71. Accepted Frewen, 1660–1664.
72. Richard Sterne, 1664–1683.
73. John Dolben, 1683–1686.
74. Thomas Lamplugh, 1688–1691.
75. John Sharp, 1691–1714.
76. William Dawes, 1713–1724.
77. Lancelot Blackburne, 1724–1743.
78. Thomas Herring, 1743–1747.
79. Matthew Hutton, 1747–1757.
80. John Gilbert, 1757–1761.
81. Robert Hay Drummond, 1761–1776.
82. William Markham, 1777–1807.
83. Edward Vernon Harcourt, 1808–1847.
84. Thomas Musgrave, 1847–1860.
85. Charles Thomas Longley, 1860–1862.
86. William Thomson, 1863–1891.
87. William Connor Magee, 1891.
88. William Dalrymple Maclagan, 1891–1908.
89. Cosmo Gordon Lang, 1908–

Next to the cathedral, the most interesting building in York is St Mary's Abbey, situated in Museum Gardens, founded for Benedictines by Alan, lord of Richmond, in 1078, its head having the rank of a mitred abbot with a seat in parliament. The principal remains of the abbey (see ABBEY) are the N. wall and the ruins of the church, in the Early English and Decorated styles, and the principal gateway with a Norman arch. They lie near the cathedral, outside the walls. The hospitium, of which the upper part is of wood, contains a collection of Roman antiquities; the building is of the 14th and 15th centuries. A considerable portion of the abbey was employed for the erection of the king's manor, a palace for the lord president of the north, now occupied as a school for the blind. In the gardens is also the ambulatory of St Leonard's hospital, founded by King Aethelstan and rebuilt by Stephen. St William's College, near the minster, was founded in 1453 as a college for priests holding chantries in the minster; its restoration as a church house and meeting-place for convocation was undertaken in 1906. York also possesses a large number of churches of special architectural interest, including All Saints, North Street, Early English, Decorated and Perpendicular, with a spire 120 ft. in height; Christ Church, with S. door in the Decorated style, supposed to occupy the site of the old Roman palace; Holy Trinity, in Goodramgate, Decorated and Perpendicular, with Perpendicular tower; Holy Trinity, Micklegate, formerly a priory church, now restored, showing Roman masonry in its walls; St Denis, Walmgate, with rich Norman doorway and Norman tower arches; St Helen's, St Helen's Square, chiefly Decorated; St John's, North Street, chiefly Perpendicular; St Margaret's, Walmgate, celebrated for its curiously sculptured Norman porch and doorway; St Mary the Elder, Bishophill, Early English and Decorated, with brick tower, rebuilt in 1659; St Mary the Younger, Bishophill, with a square tower in the Saxon style, rebuilt probably in the 13th century; St Mary, Castlegate, with Perpendicular tower and spire 154 ft. in height, the body of the church dating back to transitional Norman times; St Michael-le-Belfry, founded in 1066, but rebuilt in 1538 in Late Perpendicular style; St Martin's-le-Grand, fine Perpendicular; and St Martin's cum Gregory, Early English and Perpendicular. Among modern churches is the Roman Catholic pro-cathedral, standing near the cathedral.

The guild-hall, with a fine old room in Perpendicular style erected in 1446, contains a number of stained-glass windows. Adjoining it are handsome municipal buildings (1891), and near it is the mansion house, built in 1725 from designs by the earl of Burlington. The courts of justice were opened in 1892. Assembly rooms, a corn exchange, barracks and a theatre are the other chief buildings.

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* These bishops did not receive the pall as metropolitans.

The public institutions include the Yorkshire Philosophical Society, whose museum, in the Grecian style, was opened in 1830 and the free library in the building of the York Institute of Science and Art. The principal schools are St Peter's cathedral grammar-school (originally endowed in 1557), Archbishop Holgate's grammar-school, the York and diocesan grammar-school, and the bluecoat school for boys (founded in 1705), with the associated greycoat school for girls. There are numerous charities.

The chief industrial establishments are iron foundries, railway and motor engineering works, breweries, flour-mills, tanneries and manufactories of confectionery, artificial manure, &c. There is water communication by the Ouse with the Humber, and by the Foss Navigation to the N.E. This is under the control of the corporation. The parliamentary borough returns 2 members. The county borough was created in 1888. The municipal borough is under a lord mayor, 12 aldermen and 36 councillors. The city within the municipal limits constitutes a separate division of the county. The municipal city and the Ainsty (a district on the S.W. included in the city bounds in 1449) are for parliamentary purposes included in the N. Riding, for registration purposes in the E. Riding, and for all other purposes in the W. Riding. The parliamentary borough extends into the E. Riding. Area, 3730 acres.

History.—York is known to have been occupied by the Britons, and was chosen by the Romans as their most important centre in north Britain and named *Eborăcum* or *Eburacum*. The fortress of Legio VI. Victrix was situated near the site of the cathedral, and a municipality (*colonia*) grew up, near where the railway station now is, on the opposite side of the Ouse. Many inscriptions and a great quantity of minor objects have been found. The emperor Hadrian visited York in A.D. 120, and, according to tradition, the body of the emperor Severus who died there in A.D. 211 was burnt on Severus Hill, near the city. After the death of Constantine Chlorus, which also took place in York; his son Constantine the Great, who, according to an ancient but incorrect tradition, was born there, was also inaugurated emperor there. A bishop of York is mentioned, along with, and with precedence of, bishops of London and Lincoln (the last name is uncertain) as present at the council of Arles in 314. Nothing is known of the history of the city from the time the Romans withdrew from Britain in 410 until 627, when King Edwin was baptized there, and where shortly afterwards Paulinus, the first archbishop, was consecrated. In the time of Archbishop Egbert (732–766) and of Alcuin, at first a scholar and afterwards master of the cloister school, York became one of the most celebrated places of education in Europe. It was also one of the chief Danish boroughs, and Earl Siward is said to have died there in 1055. In 1066 it was taken by Harold Hardrada, and in 1068 the men of the north of England, rising under Edgar Aetheling and Earl Waltheof, stormed the castles which William I. had raised, putting to death the whole of the Norman garrison. The Conqueror in revenge burnt the town and laid waste the country between the Humber and Tees. York was frequently visited by the kings of England on the way to Scotland, and several important parliaments were held there, the first being that of 1175, when Malcolm, king of Scotland, did homage to Henry II. In the reign of Richard I., the citizens rose against the Jews, who fled to the castle. Here, however, they were obliged to surrender, many killing themselves after putting to death their wives and children, the rest being massacred by the citizens. The council of the North was established in York in 1537 after the suppression of the Pilgrimage of Grace. In 1642 York was garrisoned by Royalists and besieged by the parliament. It was relieved by Prince Rupert, but surrendered after the battle of Marston Moor. Being under the rule of the earls of Northumbria, York is not mentioned in the Domesday Survey. In the first charter (which is undated) Henry II. granted the citizens a merchant gild and all the free customs which they had in the time of Henry I. Richard I. in 1194 granted exemption from toll, &c., throughout the kingdom, and King John in 1200 confirmed the preceding charters, and in 1212 granted the city to the citizens at a fee-farm of £160 a year. These charters were confirmed by most of the early kings. Richard II. conferred the title of lord mayor, and a second charter, given in 1392, shows that the government then consisted of a lord mayor and aldermen, while a third in 1396 made the city a county of itself and gave the burgesses power to elect two sheriffs. Edward IV. in 1464 incorporated the town under the title of "Lord Mayor and Aldermen," and in 1473 directed that all the citizens should choose the mayor from among the aldermen. As this led to constant disputes, Henry VII. arranged that a common council, consisting of two men from each of the more important gilds and one from each of the less important ones, should elect the mayor. The city is now governed under a charter of Charles II., confirming that of 1464, the governing body consisting of a lord mayor, 12 aldermen and 36 councillors. The city has returned two members to parliament since 1295. During the 14th century there were constant quarrels between the citizens and the abbey of St Mary's about the suburb of Bootham, which the citizens claimed as within the jurisdiction of the city, and the abbey as a separate borough. In 1353 the king took the borough of York into his own hands, "to avoid any risk of disturbance and possible great bloodshed such as has arisen before these times," and finally in the same year an agreement was brought about by Archbishop Thoresby that the whole of Bootham should be considered a suburb of York except the street called St Marygate, which should be in the jurisdiction of the abbey.

From the time of the conquest York was important as a trading and commercial centre. There were numerous trade gilds, one of the chief being that of the weavers, which received a charter from Henry II. During the 17th and 18th centuries the trade declined, partly owing to the distance of the city from the sea, and partly owing to the regulations of the trade gilds.

See Francis Drake, *Eboracum: or the History and Antiquities of the City of York, from its original to the present time* (1736); *Extracts from the Municipal Records of the City of York during the Reigns of Edward IV., Edward V. and Richard III.* (1843); *Victoria County History, Yorkshire*; J. Raine, *York* (1893); A. P. Purey-Cust, *York Minster* (1897), *Heraldry of York Minster* (Leeds, 1890); B. S. Rowntree, *Poverty: a Study of Town Life* (1901).

YORK, a township of York county, Maine, U.S.A., on the Atlantic coast about 45 m. S.W. of Portland, and 9 m. by rail N.E. of Portsmouth, New Hampshire. Pop. (1910) 2802. Area, 64 sq. m. York is at the terminus of the York Harbor and Beach division of the Boston & Maine railway. In York village is the county gaol (1653–54), preserved by the Old York Historical and Improvement Society as a museum of local antiquities. Two colonial taverns also remain. York Harbor, York Beach, York Cliffs and Long Beach are attractive summer villages. The first settlement was made about 1624. In April 1641 Sir Ferdinando Gorges, proprietor of the province of Maine, erected this into the Borough of Agamenticus, and on the 1st of March 1642 he chartered it as a city under the name of Gorgeana. In 1652, when Massachusetts extended her jurisdiction over Maine, the city of Gorgeana became the town of York. In 1692 most of the houses were burned by the Indians and the inhabitants killed or taken captive. York was the shire town of Yorkshire from 1716 to 1735, the shire town with Portland (then Falmouth) of the district of Maine from 1735 to 1760, and a county-seat of York county from 1760 to 1832. During the middle of the 18th century York had considerable trade with the West Indies and along the coast, and as late as the middle of the 19th century it had important fishing interests. Its development as a summer resort was begun about 1873, but until 1887, when the railway reached it, its chief means of access was by stage from Portsmouth.

See J. P. Baxter, *Agamenticus, Bristol, Gorgeana, York* (Portland, 1904); G. A. Emery, *Ancient City of Gorgeana and Modern Town of York* (Boston, 1873); and Pauline C. Bouvé, "Old York; a Forgotten Seaport," in the *New England Magazine* (July 1902).

YORK, a city and the county-seat of York county, Nebraska, U.S.A., about 46 m. W. by N. of Lincoln. Pop. (1900) 5132; (1910) 6235. It is served by the Chicago, Burlington & Quincy and Chicago & North-Western railways. It is the seat of the School of the Holy Family and of York College (founded in 1890, co-educational). The city is situated in a farming and stock-raising region, and among its manufactures are foundry products, bricks and flour. York was settled in 1864, was laid out in 1869, was incorporated as a town in 1875 and was chartered as a city in 1877.

YORK, a city and the county seat of York county, Pennsylvania, U.S.A., about 100 m. W. of Philadelphia and about 28 m. S.E. of Harrisburg. Pop. (1900) 33,708—1304 being foreign-born and 776 negroes; (1910) 44,750. York is served by the Maryland & Pennsylvania, the Northern Central (Pennsylvania) and the Western Maryland railways. Among the public buildings are the County Court House (1899) and a large Federal Building (1910). York is the seat of the York Collegiate Institute (1873), founded by Samuel Small (d. 1885) and of the York County Academy (1785). The Historical Society of York (1895) has a valuable collection of documents relating to local history. York is the commercial centre for a rich agricultural region, and has manufactures of foundry and machine-shop products, silk goods, &c. The total factory product in 1905 was valued at $14,258,696.

York, the first permanent settlement in the state W. of the Susquehanna, was laid out in 1741 in what was then the Manor of Springettsbury (named in honour of Springett Penn, a grandson of William Penn) by Thomas Cookson, a surveyor for Richard and Thomas Penn, then the proprietors of the colony, and was named after York, England. The first settlers were chiefly Germans from the Rhenish Palatinate, who were Lutherans, Reformed, Mennonites and Moravians. English Quakers and Scotch-Irish settled here also. The settlement lay on the Monocacy road, the main line of travel to the S. and S.W., and it grew rapidly, especially between 1748 and 1751. In 1749 the county of York was erected (from Lancaster county) and York was made the county-seat. In 1754 York had 210 houses and 1000 inhabitants. Troops from York took part in the Seven Years' War and the War of American Independence. In the old county court-house (built in 1754–56, pulled down in 1841) the Continental Congress sat from the 30th of September 1777 to the 27th of June 1778, having left Philadelphia on the approach of the British, and having held a day's session at Lancaster. At York the Congress passed the Articles of Confederation (15th of November 1777) and received news of the American victory at Saratoga and of the signing of treaties between the United States and France. The Conway cabal came to an end here, and the arrival here of Baron Steuben and of Lafayette in 1777 helped the American cause. In September 1778, $1,500,000 in silver lent by France to the United States was brought to York; and Benjamin Franklin's press, removed from Philadelphia, issued $10,000,000 of Continental money. Thomas Paine here wrote part of his *Fifth Crisis*. Philip Livingston, a signer of the Declaration of Independence, is buried here. In the Civil War, Confederate troops under General John B. Gordon entered York on the 28th of June 1863, and a small Federal force retreated before them; and the battle of Gettysburg was fought about 28 m. E. York was incorporated as a borough in 1787 and was chartered as a city in 1887.

See G. R. Prowell, *The City of York, Past and Present* (York, 1904), and C. A. Hawkins and H. E. Landis, *York and York County* (ibid. 1901).

YORKE, CHARLES (1722–1770), English lord chancellor, second son of Philip Yorke, 1st earl of Hardwicke, was born in London on the 30th of December 1722, and was educated at Corpus Christi College, Cambridge. His literary abilities were shown at an early age by his collaboration with his brother Philip in the *Athenian Letters*. In 1745 he published an able treatise on the law of forfeiture for high treason, in defence of his father's treatment of the Scottish Jacobite peers; and in the following year he was called to the bar. His father being at this time lord chancellor, Yorke obtained a sinecure appointment in the Court of Chancery in 1747, and entered parliament as member for Reigate, a seat which he afterwards exchanged for that for the university of Cambridge. He quickly made his mark in the House of Commons, one of his earliest speeches being in favour of his father's reform of the marriage law. In 1751 he became counsel to the East India Company, and in 1756 he was appointed solicitor-general, a place which he retained in the administration of the elder Pitt, of whose foreign policy he was a powerful defender. He resigned with Pitt in 1761, but in 1762 became attorney-general under Lord Bute. He continued to hold this office when George Grenville became prime minister (April 1763), and advised the government on the question raised by Wilkes's *North Briton*. Yorke refused to describe the libel as treasonable, while pronouncing it a high misdemeanour. In the following November he resigned office. Resisting Pitt's attempt to draw him into alliance against the ministry he had quitted, Yorke maintained, in a speech that extorted the highest eulogy from Walpole, that parliamentary privilege did not extend to cases of libel; though he agreed with Pitt in condemning the principle of general warrants. Yorke, henceforward a member of the Rockingham party, was elected recorder of Dover in 1764, and in 1765 he again became attorney-general in the Rockingham administration, whose policy he did much to shape. He supported the repeal of the Stamp Act, while urging the simultaneous passing of the Declaratory Act. His most important measure was the constitution which he drew up for the province of Quebec, and which after his resignation of office became the Quebec Act of 1774. On the accession to power of Chatham and Grafton in 1767, Yorke resigned office, and took little part in the debates in parliament during the next four years. In 1770 he was invited by the duke of Grafton, when Camden was dismissed from the chancellorship, to take his seat on the woolsack. He had, however, explicitly pledged himself to Rockingham and his party not to take office with Grafton. The king exerted all his personal influence to overcome Yorke's scruples, warning him finally that the great seal if now refused would never again be within his grasp. Yorke yielded to the king's entreaty, went to his brother's house, where he met the leaders of the Opposition, and feeling at once overwhelmed with shame, fled to his own house, where in three days he was a dead man (January 20, 1770). The patent raising him to the peerage as Baron Morden had been made out, but his last act was to refuse his sanction to the sealing of the document.

Charles Yorke was twice married. His son by his first marriage became earl of Hardwicke; his eldest son by his second marriage, Charles Philip Yorke (1764–1834), member of parliament for Cambridgeshire and afterwards for Liskeard, was secretary of state for war in Addington's ministry in 1801, and was a strong opponent of concession to the Roman Catholics. He made himself exceedingly unpopular in 1810 by bringing about the exclusion of strangers, including reporters for the press, from the House of Commons under the standing order, which led to the imprisonment of Sir Francis Burdett in the Tower and to riots in London. In the same year Yorke joined Spencer Perceval's government as first lord of the admiralty; he retired from public life in 1818, and died in 1834. Charles Yorke's second son by his second marriage was Sir Joseph Sydney Yorke (1768–1831), an admiral in the navy, whose son succeeded to the earldom of Hardwicke.

See under Hardwicke, Philip Yorke, 1st Earl of.

YORKSHIRE, a north-eastern county of England, bounded N. by Durham, E. by the North Sea, S.E. by the Humber estuary (separating it from Lincolnshire), S. by Nottinghamshire and Derbyshire, S.W. for a short distance by Cheshire, W. by Lancashire and N.W. by Westmorland. It is the largest county in England, having an area of 6066·1 sq. m., and being more than double the size of Lincolnshire, which ranks next to it. In a description of the county it is constantly necessary to refer to its three great divisions, the North Riding, East Riding and West Riding (see Riding, and map of England, Sections I., II.).

The centre of the county is a plain, which in the S., about the head of the Humber, resembles the Fens in character. The hills W. of the central plain, covering nearly the whole of the W. Riding and the N.W. of the N. Riding, are part of the great Pennine Chain (*q.v.*). These hills consist of high-lying moorland, and are not generally remarkable for great beauty of outline. The higher parts are bleak and wild, and the slope towards the central plain is gradual. The chief beauty of the district is to be found in the numerous deeply scored valleys or dales, such as Teesdale, Swaledale, Wensleydale (*q.v.*), Nidderdale, Wharfedale and Airedale, in which the course of the streams is often broken by waterfalls, such as High Force in Teesdale and Aysgarth Force in Wensleydale.

The hills E. of the central plain cannot be similarly considered as a unit. In the N., wholly within the N. Riding, a line of heights known as the Cleveland Hills, forming a spur of the N. Yorkshire Moors, ranges from 1000 to nearly 1500 ft., and overlooks rather abruptly the lowest part of the Tees valley. The line of greatest elevation approaches the central plain, and swings sharply S. in the Hambleton Hills to overlook it, while to the S. of the line long deep dales carry tributary streams S. to the river Derwent, thus draining to the Ouse. Eastward the N. Yorkshire moors give immediately upon the coast. Their higher parts consist of open moorland. The remarkable upper valley of the Derwent (*q.v.*) marks off the N. Yorkshire moors from the Yorkshire wolds of the E. Riding, the river forming the boundary between the N. and E. Ridings. The wolds superficially resemble the moors, inasmuch as they abut directly on the coast E., run thence W., and swing S. to overlook the central plain. At the S. extremity they sink to the shore of the Humber. Their greatest elevation is found near the W. angle (Howardian Hills), but hardly reaches 800 ft. Eastward they encircle a low-lying fertile tract bounded S. by the Humber and E. by the North Sea. The name of Holderness is broadly applied to this low tract, though the wapentake of that name includes properly only the E. of it.

The diverse character of the coast may be inferred from the foregoing description. In the north, S. of Teesmouth, it is low for a short distance; then the E. abutments of the Cleveland Hills form fine cliffs, reaching at Boulby the highest elevation of sea-cliffs in England (666 ft.). Picturesque valleys bearing short streams break the line, notably that of the Esk, reaching the sea at Whitby. The trend of the coast is at first S.E. and then S. South of Scarborough it sinks with the near approach of the Derwent valley, begins to rise again round the shallow sweep of Filey Bay, and then springs seaward in the fine promontory of Flamborough Head (see BRIDLINGTON). South of this, after the sharp incurve of Bridlington Bay, the low coast-line of Holderness succeeds, long and unbroken, as far as Spurn Point, which encloses the mouth of the Humber. Encroachments of the sea are frequent, but much land has been reclaimed.

There are several watering-places on the coast in high favour with visitors from the manufacturing districts. The principal, from N. to S. are Redcar, Saltburn-by-the-Sea, Whitby, Robin Hood's Bay, Scarborough (the largest of all), Filey, Bridlington and Hornsea. There are numerous mineral springs in Yorkshire, the principal being those at Harrogate. There is also a spa at Scarborough, and others are Askern near Doncaster, Boston Spa near Harrogate, Croft on the Tees near Darlington, Hovingham, near Malton, Guisbrough in Cleveland and Slaithwaite near Huddersfield. The springs are chiefly sulphurous and chalybeate.

By far the greater part of Yorkshire is within the drainage basin of the Ouse, which with the Trent makes the estuary of the Humber (*q.v.*). It is formed in the central plain by the junction of the Ure and Swale, both rising in the Pennine hills; but whereas the Swale drains the N. of the plain, the Ure, traversing Wensleydale, is enclosed by the hills over the greater part of its course. The Ouse also receives from the Pennine district the Nidd, traversing Nidderdale, the Wharfe, the Aire, with its tributary the Calder, and the Don. The Aire rises in the fine gorge of Malham Cove, from the subterranean waterways in the limestone. None of these tributaries is naturally navigable, but the Aire, Calder and Don are in part canalized. From the E. the principal tributary is the Derwent, which on entering the central plain follows a course roughly parallel to that of the Ouse, and joins it in its lower part, between Selby and Howden. The Foss joins the Ouse at York. In the W. the county contains the headwaters of several streams of the W. slope of the Pennines, draining to the Irish Sea; of these the principal is the Ribble. In the N. the Tees forms most of the boundary with the county of Durham, but receives no large tributary from Yorkshire. In the S. of the W. Riding a few streams drain to the Trent. In Holderness, debarred by the wolds from the general drainage system of the county, the chief stream is the Hull. The only sheets of water of any size are Semmer Water, in a branch of Wensleydale; Malham Tarn, near the head of Airedale, the effluent of which quickly disappears into an underground channel; and Hornsea Mere, near the flat seacoast at Hornsea.

Geology.—The great variety in the scenery of Yorkshire is but a reflection of the marked differences in the geological substructure. The stratification is for the most part regular, but owing to a great line of dislocation nearly coincident with the W. boundary of the county the rocks dip towards the E., while the strike of the strata is from N. to S. The bold and picturesque scenery of the western hills and dales is due to the effects of denudation among the harder rocks, which here come to the surface. The strata in the Pennines consist of (1) older Palaeozoic rocks, viz. a faulted inlier of Silurian and Ordovician at Horton in Ribblesdale, and a small patch of Silurian at Sedbergh with inliers of Coniston limestone; (2) the Carboniferous or Mountain Limestone, which has been subjected to great dislocations, the more important of which are known as the N. and S. Craven faults; (3) the Yoredale series, consisting of shales, flagstones, limestones and thin seams of coal; and (4) the Millstone Grit, forming part of the hilly moorlands, and capping many of the loftier eminences. In the W. Riding the Pennine range forms part of the elevated country of Craven and Dent. The scenery in the W. of the N. Riding is somewhat similar to that in Craven, except that the lower hills are of sharper outline owing to the perpendicular limestone scars. To the intermingling of the limestone with the softer rocks are due the numerous "forces" or waterfalls, which are one of the special features of the scenery of this district. The action of water on the limestone rocks assisted by joints and faults has given rise to extensive caverns, of which the best examples are those of Clapham and Ingleton in the W. Riding, as well as to subterranean watercourses. At Brimham, Plumpton and elsewhere there are fantastic masses of rocks due to irregular weathering of the Millstone Grit. The Pennine region is bounded on the S.E. by the Coal Measures, forming the N. of the Derbyshire, Nottingham and Yorkshire coal-field, which in Yorkshire extends from Sheffield N. to Leeds. The noted fireclays of the Leeds district are obtained from this formation. To the E. the Coal Measures dip beneath the unconformable Permian beds, with magnesian limestone and marl slate, of which a narrow band crops up from Masham southwards. The Permian strata are overlain to the E. by the Trias or New Red Sandstone, scarcely ever exposed, but having been partly worn away is covered with Glacial deposits of clay and gravel, forming the low-lying Vale of York, extending from the Tees S. to Tadcaster and E. beyond York to Market Weighton. Near Middlesbrough red rock with gypsum and rock-salt (100 ft.) have been proved. Farther E. the Triassic beds are overlain by Lias and Oolite; Rhaetic beds have been recorded from near Northallerton. The Lias crops to the surface in a curve extending from Redcar to the Humber. In the Middle Lias there is a seam of valuable iron ore, the source of the prosperity of the Cleveland region. The moorlands extending from Scarborough and Whitby are formed of Liassic strata, topped with the estuarine beds of Lower Oolite, rising gradually to the N.E. and attaining at Burton Head a height of 1489 ft., the greatest elevation of the Oolite formation in England. In the Oolitic "Dogger" series the magnetic iron ore of Rosedale is worked. Corallian rocks form the scarp of the Hambleton hills and extend E. on the N. of the Vale of Pickering through Hackness to the coast, and S.W. of the vale to the neighbourhood of Malton. The Vale of Pickering is underlaid by faulted Kimeridge Clay. Lias and Oolites fringe the E. of the Vale of York to Ferriby on the Humber In the S.E. of the county, Cretaceous rocks cover up the older strata, N. to the Vale of Pickering and W. to the Vale of York. The Chalk forms the Yorkshire wolds and the country S. through Driffield, Beverley and Holderness.

The Yorkshire coast between Redcar and Flamborough presents a continuous series of magnificent exposures of the strata from the Lower Lias to the Chalk. The Upper Lias fossils and jet of Whitby and alum shale of Saltwick are well known. At Scarborough the Corallian, Oxford Clay, Kellaways Rock, Cornbrash and Upper Estuarine beds are well exposed in the cliffs. In Filey Bay the Kimeridge Clay appears on the coast, but it is covered farther S. by the historic beds of Speeton, representing the marine equivalents of Portland, Purbeck, Wealden, and Lower Greensand of S. England. Over the Speeton beds lies the Red Chalk, the Yorkshire equivalent of the Upper Greensand and Gault. The evidences of glacial action are of unusual interest and variety; the great thickness of boulder clay on the coast is familiar to all, but inland also great deposits of glacial clay, sand and gravel obscure the older geology. The Vale of Pickering and many of the smaller northern valleys were at one period the sites of Glacial lakes, and the "warp" which covers much of the Vale of York is a fluvio-glacial deposit. The Cleveland Dike is an intrusive igneous dike of augite-andesite of Tertiary age which can be traced across the country in a N.W. direction from the neighbourhood of Fylingdales Moor.

Minerals.—The coal-field in the W. Riding is one of the chief sources of mineral wealth in Yorkshire, the most valuable seams being the Silkstone, which is bituminous and of the highest reputation as a house coal, and the Barnsley Thick Coal, the great seam of the Yorkshire coal-field, which is of special value, on account of its semi-anthracitic quality, for use in iron-smelting and in engine furnaces. Associated with the Upper Coal Measures there is a valuable iron ore, occurring in the form of nodules. Large quantities of fireclay are also raised, as well as of gannister and oil-shale. Middlesbrough is the most important centre of pig-iron manufacture in the kingdom. Lead ore is obtained in the Yoredale beds of the Pennine range in Wharfedale, Airedale, Nidderdale, Swaledale, Arkendale and Wensleydale. Slates and flagstones are quarried in the Yoredale rocks. In the Millstone Grit there are several beds of good building stone, but that most largely quarried is the magnesian limestone of the Permian series, which, however, is of somewhat variable quality.

Agriculture.—Nearly nine-tenths of the E. Riding is under cultivation, but of the N. and W. Ridings only from three-fifths to seven-tenths—proportions explained by the different physical conditions. The till or boulder clay of Holderness is the richest soil in Yorkshire, and the chalk wolds, by careful cultivation, form one of the best soils for grain crops The central plain bears all kinds of crops excellently. Wheat is grown in the E. and W. Ridings, but oats are the principal grain crop in these ridings, and barley exceeds wheat in all three. The bulk of the acreage under green crops is devoted to turnips and swedes. A little flax is grown, and liquorice is cultivated near Pontefract. The proportion of hill pasture is greatest in the N. Riding and least in the E., and the N. and W. Ridings are among the principal sheep-farming districts in England. Cattle; for the rearing of which the W. Riding is most noted, do not receive great attention. The Teeswater breed, however, is increasing in Yorkshire, and in Holderness there is a short-horned breed, chiefly valuable for its milking qualities. Cheese-making is largely carried on in some districts. Of sheep perhaps the most common breeds are the Leicester, Lincoln and South Down, and crosses between the Cheviot and the Leicester. Large numbers of pigs are kept at the dairy farms and fed mainly on whey. The small breed is that chiefly in favour. Yorkshire bacon is famous. Draught horses are generally of a somewhat mixed breed, but the county is famed for its hunters and carriage and saddle horses. The breed of Cleveland bays is much used for carriages.

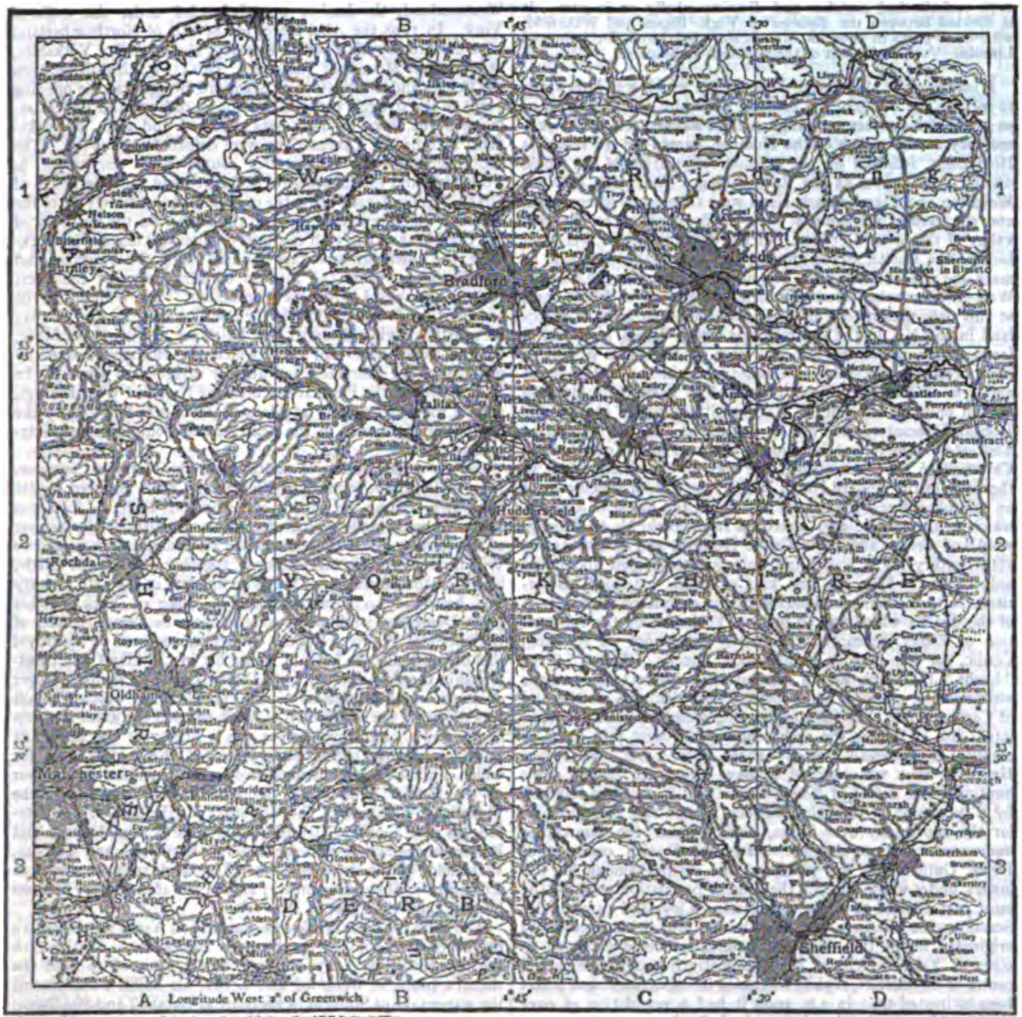
Manufactures.—The industrial district of south Yorkshire occupies the S. of the W. Riding, and may be taken as marked off approximately by the watershed from the similar district in S. Lancashire. The W. Riding is now the chief seat of the woollen manufacture of the United Kingdom, and has almost a monopoly in the production of worsted cloths. The early development of the industry was in part due to the abundance of water-power, while later the presence of coal helped to maintain it on the introduction of steam-power. In this industry nearly all the most important towns are engaged, while the names of several of the largest are connected with various specialities. Thus, while almost every variety of woollen and worsted cloth is produced at Leeds, Bradford is especially concerned with yarns and mixed worsted goods, Dewsbury and Batley with shoddy, Huddersfield with fancy goods and Halifax with carpets. The cotton industry of Lancashire has also penetrated to the neighbourhood of Halifax. Among the characteristics of the industrial population, the love of music should be mentioned. Choral societies are numerous, and the work of some of those in the larger towns, such as Sheffield, Leeds and Bradford, has attracted wide notice. Next to the woollen industry comes the manufacture of iron and steel machinery and implements of every variety, which is common to most of the larger centres in the district. Sheffield is especially famous for iron-work, fine metal-work and cutlery. The development of the iron ore deposits of Cleveland dates only from the middle of the 19th century. About two and a half million tons of pig-iron are produced in this district annually, and there are considerable attendant industries, such as the production of steel, and shipbuilding. The chemical manufacture is important both here and in the W. Riding, where also a great variety of minor industries have sprung up. Such are leather working (at Leeds), the manufacture of clothing, printing and bleaching, and paper-making. Besides coal and iron ore, great quantities of clay, limestone and sandstone are raised. Excellent building-stone is obtained at several places in the W. Riding. The sea-fisheries are of some importance, chiefly at Hull, Scarborough, Whitby and Filey.

Communications.—N. and E. of Leeds communications are provided almost wholly by the North-Eastern railway, the main line of which runs from Leeds and from Doncaster N. by York, Thirsk and Northallerton. The main junction with the Great Northern line is effected immediately N. of Doncaster, at which town are the Great Northern works. This company serves the chief centres of the W. Riding, as do also the Midland, Great Central, London & North-Western, Lancashire & Yorkshire, and North-Eastern companies, the trains working over a close network of lines, while the system of running-powers held by one or more companies over the lines of another assists intercommunication. The Midland main line to Carlisle runs by Leeds, Skipton and Settle through the hilly country of the W. The Hull & Barnsley line runs from Hull to Barnsley. A complete system of canals links the centres of the southern W. Riding with the sea both E. and W., the Aire & Calder Navigation communicating with the Ouse at Goole; the Huddersfield canal runs S.W. into Lancashire, crossing the watershed by the long Standedge tunnel, and other canals are the Leeds & Liverpool, Calder & Nebble Navigation, and the Sheffield & South Yorkshire Navigation, which gives access from Sheffield to the Trent. The Aire & Calder Navigation, the most important of these canals, which has branches from Castleford to Leeds and Wakefield, and other branches to Barnsley, Bradford and Selby, has a total length of 85 m., and has been much improved since its construction. It was projected by John Rennie and opened in 1826, with a depth of 7 ft. and locks measuring 72 by 18 ft. Its depth now varies from 8 ft. 6 in. to 10 ft., and over a distance of 28 m., between Goole and the collieries, the locks have been enlarged to 460 by 25 ft., and the width of the canal to 90 ft. The chief ports are Middlesbrough on the Tees, Hull on the Humber, and Goole on the Ouse.

Population and Administration.—The area of the ancient county is 3,882,328 acres. Its population in 1891 was 3,208,521, and in 1901, 3,584,762. The population increased over fivefold between 1801 and 1901; the increase in the W. Riding exceeding sevenfold. The manner in which the population is distributed may be inferred from the following statement of the parliamentary divisions, parliamentary, county and municipal boroughs, and urban districts in the three ridings. It should be premised that each of the three ridings is a distinct administrative county; though there is one high sheriff for the whole county. The city of York (pop. 77,914) is situated partly in each of the three ridings.

The West Riding has an area of 1,771,562 acres, with a population in 1891 of 2,445,033, and in 1901 of 2,750,493. Of this area the S. industrial district, considered in the broadest application of the term as extending between Sheffield and Skipton, Sheffield and Doncaster, and Leeds and the county boundary, covers rather less than one-half. The area thus defined includes the parliamentary divisions of Barnsley, Colne Valley, Elland, Hallamshire, Holmfirth, Keighley, Morley, Normanton, Pudsey, Rotherham, Shipley, Sowerby, Spen Valley. It also includes parts of the divisions of Barkston Ash, Doncaster, Osgoldcross, Otley and Skipton (a small part). The remaining parts of these last divisions, with that of Ripon, cover the rest of the riding. Each division returns one member. The following are parliamentary boroughs: Bradford, returning 3 members, Dewsbury 1, Halifax 1, Huddersfield 1, Leeds 5, Pontefract 1, Sheffield 5, Wakefield 1. All these are within the industrial district. Within this district are the following municipal boroughs (pops. in 1901): Barnsley (41,086), Batley (30,321), Bradford, city and county borough (279,767), Brighouse (21,735), Dewsbury (28,060), Doncaster (28,932), Halifax, county borough (104,936), Huddersfield, county borough (95,047), Keighley (41,564), Leeds, city and county borough (428,968), Morley (23,636), Ossett (12,903), Pontefract (13,427), Pudsey (14,907), Rotherham (54,349), Sheffield, city and county borough (409,070), Todmorden (partly in Lancashire, 25,418), Wakefield, city (41,413). The only municipal boroughs elsewhere in the riding are Harrogate (28,423) and Ripon (cathedral city, 8230). Within the industrial region there are 113 other urban districts, those with populations exceeding 10,000 being Bingley (18,449), Castleford (17,386), Cleckheaton (12,524), Elland (10,412), Featherstone (12,093), Handsworth (13,404), Hoyland Nether (12,464), Liversedge (13,980), Mexborough (10,430), Mirfield (11,341), Normanton (12,352), Rawmarsh (14,587), Rothwell (11,702), Saddleworth (12,320), Shipley (25,573), Skipton (11,986), Sowerby Bridge (11,477), Stanley (12,290), Swinton (12,127), Thornhill (10,290), Wombwell (13,252), Worsborough (10,336). The only urban districts in the West Riding not falling within the industrial region are—Goole (16,576), Ilkley (7455), Knaresborough (4979) and Selby (7786).

The North Riding has an area of 1,362,378 acres, with a population in 1891 of 359,547 and in 1901 of 377,338. It comprises the parliamentary divisions of Richmond, Cleveland, Whitby, and Thirsk and Malton, each returning one member; and the parliamentary boroughs of Middlesbrough (one member), Scarborough (one member), and parts of Stockton-on-Tees and York. The municipal boroughs are Middlesbrough, county borough (91,302), Richmond (3837), Scarborough (38,161) and Thornaby-on-Tees (16,054). The urban districts are Eston (11,199), Guisborough (5645), Hinderwell (1937), Kirklington-cum-Upsland (255), Loftus (6508), Malton (4758), Masham (1955), Northallerton (4009), Ormesby (9482), Pickering (3491), Redcar (7695), Saltburn-by-the-Sea (2578), Scalby (1350), Skelton and Brotton (13,240), South



Bank in Normanby (9645), Whitby (11,755). Of these, all except Kirklington, Malton, Masham, Northallerton, Pickering and Whitby are in the populous Cleveland district. Besides Pickering, there lie at the S. of the Cleveland hills the small towns of Kirkby Moorside (1550) and Helmsley (1363). South of the last-named is the village of Ampleforth, with its large Roman Catholic college, founded in 1802, and accommodating, in fine modern buildings, about 120 students.

The East Riding has an area of 750,039 acres, with a population in 1891 of 341,560 and in 1901 of 385,007. It comprises the parliamentary divisions of Buckrose, Howdenshire and Holderness, each returning one member; and contains the parliamentary borough of Hull, returning three members, and part of that of York. The municipal boroughs are Beverley (13,183), Bridlington (12,482), Hedon (1010), and Hull, or Kingston-upon-Hull, a city and county of a city and county borough (240,259). The urban districts are Cottingham, near Hull (3751), Filey (3003), Driffield (5766), Hessle, near Hull (3754), Hornsea (2381), Norton, near Malton (3842), Pocklington (2463) and Withernsea (1426).

The West Riding comprises 9 wapentakes and the liberty of Ripon. It has one court of quarter sessions and is divided into 26 petty sessional divisions. The boroughs of Bradford, Doncaster, Leeds, Pontefract, Rotherham and Sheffield, and the liberty of Ripon, have separate courts of quarter sessions and commissions of the peace; and Barnsley, Batley, Brighouse, Dewsbury, Halifax, Harrogate, Huddersfield, Keighley, Morley, Ossett and Wakefield have commissions of the peace. The liberty and borough of Ripon are rated separately from the West Riding for the purposes of the county rate.

The North Riding comprises 11 wapentakes, and the liberties of E. and W. Langbaurgh and of Whitby Strand. It has one court of quarter sessions and is divided into 19 petty sessional divisions. The boroughs of Richmond and Scarborough have separate courts of quarter sessions and commissions of the peace, and the borough of Middlesbrough has a commission of the peace. The East Riding comprises 6 wapentakes and has one court of quarter sessions, and is divided into 12 petty sessional divisions, while Hull has a separate court of quarter sessions and commission of the peace, and Beverley has a separate commission of the peace. The city of York has a separate court of quarter sessions and commission of the peace. Yorkshire is in the N.E. circuit. The total number of civil parishes is 1586. The county contains

1178 ecclesiastical parishes and districts wholly or in part. It is divided between the dioceses of York, Ripon and Wakefield, with small parts in those of Manchester, Southwell, Durham and Lincoln. York is the seat of the northern archdiocese.

History.—The kingdom of Deira (*q.v.*), which was afterwards to include the whole of the modern Yorkshire, is first known to us in the 6th century, an Anglian tribe having seized the promontory at the mouth of the Humber, named by the invaders Holderness, followed by the gradual subjugation of the whole district now known as the East Riding. The wolds between Weighton and Flamborough Head were then mere sheep-walks, and the earliest settlements were chiefly confined to the rich valley of the lower Derwent, but the district around Weighton became the Deiran sacred ground, and Goodmanham is said to mark the site of a temple. The area computed in the modern West Riding constituted the British kingdom of Elmet, and at this date presented a desolate and unbroken tract of moorland in the N.; in the central parts about Leeds stretched a forest region where the last wolf seen in Yorkshire is said to have been slain by John of Gaunt; while in the S. the forest and fen of Hatfield Chase presented a barrier to invasion broken only by the line of Watling Street, which crossed the Don at Doncaster, the Aire at Castleford and the Wharfe at Tadcaster. The N. continuation of the road from York through Catterick to the Tees opened the way to the fertile plain in the heart of the modern North Riding, the S.E. of which offered an unbroken forest area, later known as the forest of Galtres, which in the middle ages stretched from York N. to Easingwold and Craike and E. to Castle Howard, and as late as the 16th century lay a waste and unfrequented region abounding only in deer. Ella, the first king of Deira, extended his territory N. to the Wear, and his son Edwin completed the conquest of the district which was to become Yorkshire by the subjugation of Elmet, prompted thereto by vengeance on its king, Cerdic, for the murder of his uncle Hereric. Traces of the "burhs" by which Edwin secured his conquests are perhaps visible in the group of earthworks at Barwick and on the site of Cambodunum, but the district long remained scantily populated, and as late as the 17th century deer were said to be as plentiful in Hatfield Chase as "sheep upon a hill," for Prince Henry in 1609 was asserted to have killed 500 in one day's hunting. The defeat of Edwin at Hatfield in 633 was followed by a succession of struggles between Mercia and Northumbria for the supremacy over Deira, during which the boundaries underwent constant changes. After the Danish conquest of Deira, Guthrum in 875 portioned the district among his followers, under whose lordship the English population were for the most part allowed to retain their lands. Cleveland came under Scandinavian influence, and the division into tithings probably originated about this date, the boundaries being arranged to meet at York, which, as the administrative and commercial centre of the district, rapidly increased in importance, and it has been estimated that in A.D. 1000 it had a population of over 30,000. At the battle of Stamford Bridge in 1066 Harold Hardrada, who had seized York, and Earl Tosti were both defeated and slain by Harold of England. The merciless harrying with which the Conqueror punished resistance to his claims is proved by the reiterated entries of waste land in the Domesday Survey, and for many years all the towns between York and Durham lay uninhabited. In 1138 the forces of David of Scotland were defeated near Northallerton in the Battle of the Standard. In the barons' wars of the reign of Henry II. Thirsk and Malgeard Castles, which had been garrisoned against the king by Roger de Mowbray, were captured and demolished. In the harrying of the northern counties by the forces of Robert Bruce in 1318, Northallerton, Boroughbridge, Scarborough and Skipton were reduced to ashes. In 1322, at the battle of Boroughbridge, the rebel barons were defeated by the forces of Edward II. In 1399 Richard II. was murdered in Pontefract Castle. In 1405 Archbishop Scrope and Thomas Mowbray joined in the insurrection against Henry IV., and led the citizens of York to Skipton Moor, where, after a defeat by the earl of Westmorland, the leaders were beheaded under the walls of York. In 1408 the rebel forces of the earl of Northumberland were defeated by Sir Thomas Rokesby, high sheriff of Yorkshire, at Bramham Moor near Tadcaster. In 1453 a skirmish between the Percies and the Nevilles at Stamford Bridge was the opening event in the struggle between the houses of York and Lancaster; in 1460 the duke of York was defeated and slain at Wakefield; in 1461 the Lancastrians were defeated at Towton. The suppression of the monasteries roused deep resentment in Yorkshire, and the inhabitants flocked to join the Pilgrimage of Grace, Skipton Castle being the only place immediately N. of the Humber which remained loyal to the king. On the outbreak of the Civil War of the 17th century, opinion was divided in Yorkshire, the chief parliamentary families being the Fairfaxes and the Hothams, while the Puritan clothing-towns of the West Riding also sided with the parliament. Sir William Savile captured Leeds and Wakefield for the king in 1642, and in 1643 Newcastle, having defeated the Fairfaxes at Adwalton Moor, held all Yorkshire except Hull, which the Hothams, moved by jealousy of the Fairfaxes, had already designed to give up. In 1644, however, the Fairfaxes secured the East and West Ridings, while Cromwell's victory at Marston Moor was followed by the capture of York, and in the next year of Pontefract and Scarborough.

On the redistribution of estates after the Norman Conquest, Alan of Brittany, founder of Richmond Castle, received a vast fief which became the honour of Richmond; Ilbert de Laci was rewarded with lands which afterwards constituted the honour of Pontefract. Earl Harold's estate at Coningsburgh passed to William de Warenne, earl of Surrey, together with Sandal Castle, which on the expiration of the Warenne line in the 14th century was bestowed on Edmund Langley, duke of York. Other great Domesday landholders were William de Percy, founder of the abbey of Whitby; Robert de Bruce, ancestor of the royal line of Scotland, the head of whose fief in Cleveland was transferred in the 12th century from Danby Castle to Skelton; Roger de Busli owned a large tract in S. Yorkshire, of which Tickhill was the head; the archbishop of York enjoyed the great lordship of Sherburn, and Howdenshire was a liberty of the bishop of Durham. Among the great lordships of the middle ages for which Yorkshire was distinguished were: Topcliffe, the honour of the Percies; Thirsk, of the Mowbrays; Tanfield, of the Marmions; Skipton, of the Cliffords; Middleham, of the Fitz-Hughes and Nevilles; Helmsley, of the de Roos; Masham and Bolton, of the Scropes; Sheffield, of the Furnivalls and Talbots; Wakefield, of the duke of York. The Fairfaxes were settled in Yorkshire in the 13th century, and in the 16th century Denton became their chief seat.

The shire court for Yorkshire was held at York, but extensive privileges were enjoyed by the great landholders. In the 13th century Henry de Lacy, earl of Lincoln, claimed to hold the sheriff's tourn at Bradford and Leeds; his bailiff administered the wapentake of Stainclif in his court at Bacskalf and Slaidburn; and his steward judged cases of felony in his court at Almondbury. The archbishop of York held the sheriff's tourn at Otley, and had his own coroners at York, Hull, Beverley and Ripon. Eudo la Zouche held the sheriff's tourn at Bingley, and Thomas de Furnivall in Hallamshire. The bailiffs of Tickhill Castle also held tourns in place of the sheriff. The bishop of Durham had a court at Hoveden, and the king's bailiffs were excluded from executing their office in his estates of Howdenshire and Allertonshire. The abbot of St Mary's York had his own coroners in the wapentake of Ryedale, and the abbot of Bella Landa in Sutton. The prior of Bradenstoke held a court in his manor of Wales. The archbishop of York, Robert de Ros, and the abbot of St Mary's York judged felonies at their courts in Holderness. The liberty of Ripon (*q.v.*), city of Ripon, still constitutes a franchise of the archbishops of York.

In the 13th century the diocese of York included in this county the archdeaconry of York, comprising the deaneries of York, Pontefract, Doncaster and Craven; the archdeaconry of Cleveland, comprising the deaneries of Bulmer, Cleveland

and Ryedale; the archdeaconry of East Riding, comprising the deaneries of Harthill (Hull), Buckrose, Dickering and Holderness; and the archdeaconry of Richmond, comprising the deaneries of Richmond, Catterick, Boroughbridge and Lonsdale. In 1541 the deaneries of Richmond were transferred to Henry VIII.'s new diocese of Chester. Ripon was created an episcopal see by act of parliament in 1836, and the deaneries of Craven and Pontefract were formed into the archdeaconry of Craven within its jurisdiction, together with the archdeaconry of Richmond. The archdeaconry of Sheffield was created in 1884 to include the deaneries of Sheffield, Rotherham, Ecclesfield and Wath. In 1888 the area of the diocese of Ripon was reduced by the creation of the see of Wakefield, including the archdeaconry of Halifax with the deaneries of Birstall, Dewsbury, Halifax, Silkstone and Wakefield, and the archdeaconry and deanery of Huddersfield. The diocese of Ripon now includes in this county the archdeaconries of Craven with three deaneries, Richmond with three deaneries and Ripon with seven deaneries. The diocese of York includes the archdeaconries of York with six deaneries, Sheffield with four deaneries, East Riding with thirteen deaneries and Cleveland with nine deaneries.

The great woollen industry of Yorkshire originated soon after the Conquest, and the further development of this and other characteristic industries may be traced in the articles on the various industrial centres. The time of the American War marked the gradual absorption by Yorkshire of the clothing trade from the E. counties. Coal appears to have been used in Yorkshire by the Romans, and was dug at Leeds in the 13th century. The early fame of Sheffield as the centre of the cutlery and iron trade is demonstrated by the line in Chaucer, "a Sheffield whitel bore he in his hose." In the 13th century a forge is mentioned at Rosedale; and the canons of Gisburn had four "fabricae" in blast in Glaisdale in Cleveland. In the 16th century limestone was dug in many parts of Elmet, and Huddlestone, Hesselwood and Tadcaster had famous quarries; Pontefract was famous for its liquorice, Aberford for its pins, Whitby for its jet. Alum was dug at Guisborough, Sandsend, Dunsley and Whitby in the 17th century, and a statute of 1659 forbade the importation of alum from abroad, in order to encourage its cultivation in this country. Bolton market was an important distributive centre for cotton materials in the 17th century, and in 1787 there were eleven cotton mills in the county.

Parliamentary Representation.—The county of York was represented by two knights in the parliament of 1295, and the boroughs of Beverley, Hedon, Malton, Pickering, Pontefract, Ripon, Scarborough, Thirsk, Tickhill, Yarm and York each by two burgesses. Northallerton acquired representation in 1298, Boroughbridge in 1300, Kingston-on-Hull and Ravensburgh in 1304. In most of the boroughs the privilege of representation was allowed to lapse, and from 1328 until 1547 only York, Scarborough and Kingston-on-Hull returned members. Hedon, Thirsk, Ripon and Beverley regained the franchise in the 16th century, and Boroughbridge, Knaresborough, Aldborough and Richmond also returned members. Pontefract was represented in 1623, New Malton and Northallerton in 1640. In 1826 two additional knights were returned for the shire of York, and 14 boroughs were represented. Under the Reform Act of 1832 the county returned 6 members in 3 divisions—2 for each riding; Aldborough, Boroughbridge and Hedon were disfranchised; Northallerton and Thirsk lost 1 member each; Bradford, Halifax, Leeds and Sheffield acquired representation by 2 members each, and Wakefield and Whitby by 1 member each. Under the act of 1868 the representation of the West Riding division was increased to 6 members in 3 divisions; Dewsbury and Middlesbrough were enfranchised, returning 1 member each; Leeds now returned 3 members; Knaresborough, Malton, Richmond and Ripon lost 1 member each. Beverley was disfranchised in 1870. (For arrangements under the act of 1885 see § *Administration.*)

Antiquities.—Of ancient castles Yorkshire retains many interesting examples. The fine ruins at Knaresborough, Pickering, Pontefract, Richmond, Scarborough and Skipton are described under their respective headings. Barden Tower, picturesquely situated in upper Wharfedale, was built by Henry de Clifford (d. 1523), called the "shepherd lord" from the story that he was brought up as a shepherd. He was a student of astronomy and astrology. Bolton Castle, which rises majestically above Wensleydale, was pronounced by Leland "the fairest in Richmondshire." It is a square building with towers at the corners, erected in the reign of Richard II. by Richard Scrope, chancellor of England. It was occupied by Queen Mary while under the charge of Lord Scrope, was besieged during the civil wars, and rendered untenable in 1647. Of Bowes Castle, in the North Riding near Barnard Castle, there remains only the square keep, supposed to have been built by Alan Niger, 1st earl of Richmond, in the 12th century, but the site was occupied by the Romans. Cawood Castle, on the Ouse near Selby, retains its gateway tower erected in the reign of Henry VI. The castle, said to have been founded by Æthelstan in 620, was the palace of the archbishops of York, and Wolsey resided in it. Conisborough Castle stands by the Don between Rotherham and Doncaster. Its origin is uncertain, but dates probably from Saxon times. The keep and portions of the walls remain; and the ruin possesses additional interest from its treatment in Scott's *Ivanhoe*. The ruins of Danby Castle, which is supposed to have been built shortly after the Conquest by Robert de Bruce or Brus, are of various dates. Harewood Castle in lower Wharfedale was founded soon after the Conquest, but contains no portions earlier than the reign of Edward III. The keep of Helmsley Castle was built late in the 12th century probably by Robert de Ros, surnamed Fursan; the earthworks are apparently of much earlier date. There are picturesque remains of the quadrangular fortress of Middleham in Wensleydale, built in the 12th century by Robert FitzRanulph, afterwards possessed by the Nevilles, and rendered untenable by order of parliament in 1647. Mulgrave Castle, near the modern residence of the same name in the Whitby district, is said to have been founded two centuries before the Conquest by a Saxon giant named Wade or Wadda. Parts are clearly Norman, but some of the masonry suggests an earlier date. The castle was dismantled after the civil wars. There are slight remains of the 15th century, of Ravensworth Castle, near Richmond. This was probably an early foundation of the family of Fitz Hugh. Sheriff Hutton Castle, between York and Malton, was the foundation of Bertram de Bulmer in the reign of Stephen; the remains are of the early part of the 15th century, when the property passed to the Nevilles. Spofforth Castle, near Harrogate, was erected by Henry de Percy in 1309. Its ruins range from the period of foundation to the 15th century. Of Tickhill Castle, near Doncaster, built or enlarged by Roger de Busli in the 11th century, there are foundations of the keep and fragments of the walls. Of Whorlton Castle in Cleveland, the Perpendicular gatehouse is very fine. One side remains of the great quadrangular fortress of Wressell, E. of Selby, built by Thomas Percy, earl of Worcester, in the reign of Richard II. Some of the mansions in the county incorporate remains of ancient strongholds, such as those at Gilling, under the Hambleton Hills in the North Riding, Ripley near Harrogate, and Skelton in Cleveland. Medieval mansions are numerous, a noteworthy example being the Elizabethan hall of Burton Agnes, in the N. of Holderness.

In ecclesiastical architecture Yorkshire is extraordinarily rich. At the time of the Dissolution there were 28 abbeys, 26 priories, 23 nunneries, 30 friaries, 13 cells, 4 commanderies of Knights Hospitallers and 4 preceptories of Knights Templars. The principal monastic ruins are described under separate headings and elsewhere. These are Bolton Abbey (properly Priory), a foundation of Augustinian canons; Fountains Abbey, a Cistercian foundation, the finest and most complete of the ruined abbeys in England; the Cistercian abbey of Kirkstall near Leeds (*q.v.*); the Cistercian abbey of Rievaulx, and the Benedictine abbey of St Mary, at York. For the plans and buildings of Fountains, Kirkstall and St Mary's, York, see ABBEY. Separate reference is also made to the ruins of Jervaulx (Cistercian) and Coverham (Premonstratensian) in Wensleydale, and to the remains at Bridlington, Guisborough, Malton, Whitby, Easby near Richmond, Kirkham near Malton, Monk Bretton near Barnsley, and Mount Grace near Northallerton. There are fine though scanty remains of Byland Abbey, of Early English date, between Thirsk and Malton; the abbey was founded for Cistercian monks in the 12th century, and was previously established at Old Byland near Rievaulx. There was a house of Premonstratensians at Egglestone above the Tees near Barnard Castle. Other ruins are the Cistercian foundations of the 12th century at Meaux in Holderness, Roche, E. of Rotherham, and Sawley in Ribblesdale; the Benedictine nunneries of Marrick in upper Swaledale, and Rosedale under the high moors of the N.E.; and the Gilbertine house of Watton in Holderness, of the 12th century, converted into a dwelling.

Descriptions are given in the articles on the respective cities and towns of the cathedral or minster at York, and of the numerous churches in that city; of the cathedral churches at Ripon and Wakefield; of the minster and the church of St Mary at Beverley; and of the fine parish churches at Bradford, Bridlington (the old priory church), Hedon, Hull, Rotherham, Selby (abbey church), Sheffield and Thirsk. In Holderness are the splendid churches of Howden and Patrington, both in the main Decorated; and the fine late Norman building at Kirkburn. A very perfect though small example of a Norman church is seen at Birkin on the Aire below Pontefract. At Nun Monkton near York is a beautiful Early English church, formerly belonging to a Benedictine nunnery. Goodmanham in the S. Wolds is the scene, in all probability, of the conversion by Paulinus of Edwin of Northumbria in 625, who was afterwards baptized at York. At Kirkdale near Kirkby Moorside in the N. Riding is a singular example of an inscribed sundial of pre-Conquest date. At Lastingham in the same district is a very fine and early Norman crypt.

See *Victoria County History, Yorkshire*; T. Allen, *History of the County of York* (3 vols., London, 1828–31); T. Baines, *Yorkshire Past and Present*, including an account of the woollen trade

of Yorkshire by E. Baines (2 vols., London, 1871–77); John Burton, *Monasticon Eboracense* (London, 1758–59); W. Smith, *Old Yorkshire* (London, 1881); G. Frank, *Ryedale and North Yorkshire Antiquities* (York, 1888); G. R. Park, *Parliamentary Representation of Yorkshire* (Hull, 1886); A. D. H. Leadman, *Proelia Eboracensia, Battles fought in Yorkshire* (London, 1891); T. D. Whitaker, *History of Richmondshire* (London, 1823), *History of Craven* (London, 1878), *History of Leeds and Elmet* (2 vols., Leeds, 1816); J. Wainwright, *Yorkshire; Wapentake of Strafford and Tickhill*, vol. i. (Sheffield, 1826); W. Grainge, *Castles and Abbeys of Yorkshire* (York, 1855); J. Hunter, *South Yorkshire* (2 vols., London, 1828–31); J. J. Sheahan and T. Whellan, *History of the City of York, the Ainsty Wapentake, and the East Riding of Yorkshire* (3 vols., Beverley, 1855–57); T. Langdale, *Topographical Dictionary of Yorkshire* (Northallerton, 1809); G. H. de S. N. Plantagenet Harrison, *History of Yorkshire* (London, 1879, &c.); see also publications of the Yorkshire Archaeological and Topographical Society.

YORKTOWN, a town and the county-seat of York county, Virginia, U.S.A., on the York river 10 m. from its mouth, and about 60 m. E.S.E. of Richmond. Pop. (1910) 136. It is served by the Baltimore, Chesapeake & Richmond steamship line, and about 6½ m. distant is Lee Hall, a station on the Chesapeake & Ohio railway. Large deposits of marl near the town are used for the manufacture of cement. In the main street is the oldest custom-house in the United States, and the house of Thomas Nelson (1738–1789), a signer of the Declaration of Independence. In commemoration of the surrender of Lord Cornwallis in October 1781, there is a monument of Maine granite (100 ft. 6 in. high) designed by R. M. Hunt and J. Q. A. Ward; its corner-stone was laid in 1881 during the centennial celebration of the surrender, and it was completed in 1883. Yorktown was founded in 1691, as a port of entry for York county. It became the county-seat in 1696, and although it never had more than about 200 houses its trade was considerable until it was ruined by the War of Independence. In that war the final victory of the Americans and their French allies took place at Yorktown.

Yorktown campaign, 1781.

Baffled by General Nathanael Greene in his campaign in the Carolinas, his diminished force (fewer than 1400) sadly in need of reinforcement, and persuaded that the more southern colonies could not be held until Virginia had been reduced, Lord Cornwallis marched out of Wilmington, N. Carolina, April 25th, 1781, arrived at Petersburg, Virginia, on May 20th, and there with the troops which had been under William Phillips and Benedict Arnold and with further reinforcements from New York raised his army to more than 7000 men. Facing him in Richmond was Lafayette, whom Washington had sent earlier in the year with a small force of light infantry to check Arnold, and who had now been placed in command of all the American troops in Virginia. Cornwallis's first attempt was to prevent the union of Lafayette and General Anthony Wayne. Failing in this, he retired down the James in the hope, it is thought, of receiving further reinforcements from General Henry Clinton. Clinton, who had not approved Cornwallis's plan against Virginia, at first ordered him to send a portion of his troops to aid in the defence of New York; but as other reinforcements came to New York, and as the home government approved Cornwallis's plan, Clinton resolved to establish a permanent base in the Chesapeake and directed Cornwallis to fortify a post for the protection of the British navy. Cornwallis seized Yorktown and Gloucester early in August and immediately began to fortify them. While Cornwallis was marching from N. Carolina to Virginia, Washington learned that a large French fleet under Count de Grasse was to come up from the West Indies in the summer and for a brief period co-operate with the American and French armies. At a conference (May 21st) at Wethersfield, Connecticut, with the French commanders, Washington favoured a plan for a joint attack on New York when De Grasse should arrive. An attack on the British in Virginia was, however, considered, and the minutes of the conference with some suggestions from Rochambeau having been sent to De Grasse, he announced in a letter received the 14th of August that he should sail for the Chesapeake for united action against Cornwallis. About the same time Washington learned from Lafayette that Cornwallis was fortifying Yorktown. Sir Samuel Hood with 14 ships-of-the-line arrived at the Chesapeake from the West Indies three days ahead of De Grasse, and proceeding to New York warned Admiral Thomas Graves of the danger. Graves took command of the combined fleet, 19 ships-of-the-line, and on the 31st of August sailed for the Chesapeake in the hope of preventing the union of the French fleet from Newport, under Count de Barras, with that under De Grasse. He arrived at the Chesapeake ahead of De Barras, but after an encounter with De Grasse alone (September 5th), who had 24 ships-of-the-line, he was obliged to return to New York to refit, and the French were left in control of the coast. Leaving only about 4000 men to guard the forts on the Hudson, Washington set out for Virginia with the remainder of his army immediately after learning of De Grasse's plan, and the French land forces followed. The French fleet transported the allied army from the head of the Chesapeake to the vicinity of Williamsburg, and on the 28th of September it marched to Yorktown. Receiving, on the same day, a despatch from Clinton promising relief, and fearing the enemy might outflank him, Cornwallis abandoned his outposts during the following night and withdrew to his inner defences, consisting of seven redoubts and six batteries connected by intrenchments, besides batteries along the river bank. The allies, 16,000 strong, took possession of the abandoned posts and closed in on the town in a semicircle extending from Wormley Creek below it to about a mile above it, the Americans holding the right and the French the left. On the night of October 5th–6th the allies opened the first parallel about 600 yds. from the British works, and extending from a deep ravine on the N.W. to the river bank on the S.E., a distance of nearly 2 m. Six days later the second parallel was begun within 300 yds. of the British lines, and it was practically completed on the night of the 14th and 15th, when two British redoubts were carried by assault, one by the Americans led by Alexander Hamilton and one by the French led by Lieut.-Colonel G. de Deux-Ponts. In the morning of the 16th Cornwallis ordered Lieut.-Colonel Abercrombie to make an assault on two French batteries. He carried them and spiked eleven guns, but they were recovered and the guns were ready for service again twelve hours later. On the night of the 16th and 17th Cornwallis attempted to escape with his army to Gloucester on the opposite side of the river, but a storm ruined what little chance of success there was in this venture. In grave danger of an assault from the allies, Cornwallis offered to surrender on the 17th; two days later his whole army, consisting of 7073 officers and men, was surrendered, and American Independence was practically assured. The British loss during the siege was about 156 killed and 326 wounded; the American and French losses were 85 killed and 199 wounded.

In 1862 the Confederate defences about Yorktown were besieged for a month (April 4–May 3) by the Army of the Potomac under General M'Clellan. There was no intention on the part of the Confederate commander-in-chief, Joseph Johnston, to do more than gain time by holding Yorktown and the line of the Warwick river as long as possible without serious fighting, and without imperilling the line of retreat on Richmond; and when after many delays M'Clellan was in a position to assault with full assistance from his heavy siege guns, the Confederates fell back on Williamsburg.

See T. N. Page, "Old Yorktown," in *Scribner's Magazine* (October, 1881); H. P. Johnston, *The Yorktown Campaign and the Surrender of Cornwallis* (New York, 1881); A. S. Webb, *The Peninsular Campaign* (New York, 1882); and J. C. Ropes, *Story of the Civil War*, vol. ii.

YORUBAS; YORUBALAND. The Yoruba, a group of Negro tribes, have given their name to an extensive area in West Africa, in the hinterland of Lagos. The Yoruba are of true Negro stock, in many respects typical of the race, but among them are found persons with lighter skins and features recalling the Hamitic or Semitic peoples. This arises, in all probability, from an infiltration of Berber and Arab blood through the Fula (*q.v.*). The Yoruba themselves have traditions of an Oriental origin. They are divided into many tribes, among the best known being the Oyo = Yoruba proper, the Egba, Jebu, Ife and Ibadan. They are sometimes called by the French Nago, and are known to the Sierra Leonis, many of whom are of Yoruba descent, as Aku. A considerable proportion of the American negroes are also said to be of Yoruba origin. For a long period the Yoruba were raided by the Dahomeyans and other coast tribes, to sell as slaves to the white traders. They are both an urban and agricultural people. Pottery, weaving, tanning, dyeing, and forging are among their industries. The houses of chiefs, often containing fifty rooms, are well built, and decorated with carvings representing symbolic devices, fabulous animals and scenes of war or the chase.

The Yoruba have considerable administrative ability. Their system of government places the power in a council of elders presided over by a chief who owes his position to a combination of the principles of heredity and election.[1] The ruling chief must always be taken from the members of one of two families, the succession in many cases passing from one to the other family alternately. Primogeniture is not necessarily considered.

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[1] R. E. Dennett states that the government is based on the rule of four great chiefs who respectively represent the phases of family life, namely, (1) the deified head of the family, called Orisha; (2) the

Before the introduction of letters the Yoruba are said to have employed knotted strings for recording events. Their language, which has been reduced to writing and carefully studied, has penetrated as far E. as Kano in the Hausa country. The best known dialectic varieties are those of Egba, Jebu, Ondo, Ife, Illorin and Oyo (Yoruba proper, called also Nago); but the discrepancies are slight. The most marked feature, a strong tendency towards monosyllabism—produced by phonetic decay—has given rise to the principle of intonation, required to distinguish words originally different but reduced by corruption to the condition of homophones. Besides the tones, of which there are three,—high, low and middle,—Yoruba has also developed a degree of vocalic harmony, in which the vowels of the affixes are assimilated to that of the root. Inflexion, as in Bantu, is effected chiefly by prefixes; and there is a remarkable power of word-formation by the fusion of several relational elements in a single compound term. The Bible and several other books have been translated into Yoruba, which as a medium of general intercourse in West Africa ranks in importance next to Hausa and Mandingan. The Yoruba religion is that usually known as fetishism.

The Yoruba country extends from Benin on the E. to Dahomey on the W. (where it somewhat overlaps the French frontier), being bounded N. by Borgu and S. by the coastlands of Lagos. It covers about 25,000 sq. m. Most of it is included in the British protectorate of Southern Nigeria. The land is moderately elevated and a large part of it is densely forested. It is well watered; the rivers belong mainly to the coast systems, though some drain to the Niger. The history of Yorubaland, as known to Europeans, does not go back beyond the close of the 17th century. At that time it was a powerful empire, and had indirectly come—through its connexion with Benin and Dahomey—to some extent under European influence. There was also a much slighter Moslem influence. One tradition brought the founder of the nation from Bornu. The Yoruba appear to have inhabited their present country at least as early as A.D. 1000. In the 18th century the Yoruba were constantly engaged in warfare with their Dahomeyan neighbours, and in 1738 they captured Kana, the sacred city of the kings of Dahomey. From 1747 to the time of King Gezo (1818) the Dahomeyans paid tribute to Yoruba. It was not until the early years of the 19th century that the Yoruba came as far S. as the sea, when they founded a colony at Lagos. About 1825 the province of Illorin, already permeated by Moslem influences from the north, declared itself independent of the Yoruba, and shortly afterwards Yorubaland was overrun by Fula invaders. From this time (1830–35) the Yoruba empire—there had been six confederate kingdoms—was broken up into a number of comparatively weak states, who warred with one another, with the Dahomeyans and with their Moslem neighbours. The advent of the British at first led to further complications and fighting, but gradually the various tribes gained confidence in the colonial government and sought its services as peacemaker. A treaty placing their country under British protection was signed by the Egba in January 1893, and the subsequent extension of British control over the other portions of Yorubaland met with no opposition.

Though divided into semi-independent states, the Yoruba retain a feeble sense of common nationality. The direct representative of the old Yoruba power is the *alafin* or king of Oyo occupying the N. and central parts of the whole region. Round this central state, which has lost much of its importance, are grouped the kingdoms of Illorin, Ijesa, Ife and Ondo in the E., Mahin and Jebu in the S. and Egba in the W. The ruler of each of these states has a title characteristic of his office. Thus the chief of Ife bears the title of *oni* (a term indicating spiritual supremacy). To the oni of Ife or the alafin of Oyo all the other great chiefs announce their succession. The oni, says Sir William MacGregor, is regarded as the fountain of honour, and without his consent no chief can assume the privilege of wearing a crown. The most important of the Yoruba [illegible] Y[illegible] alafin [illegible] which has [illegible] lying [illegible] Oyo is [illegible] where the [illegible] mutual protection [illegible] important towns of [illegible] Ibadan on a branch of [illegible] capital of the Illorin [illegible] population of some 40,000 [illegible]

See A. Dalzell, *The History of* [illegible] Ellis, *The Yoruba-speaking Peoples* [illegible] (London, 1894); R. E. Dennett, [illegible] *and Political System of the Yoruba* [illegible] Battersby, *Niger and Yoruba Notes* [illegible] and NIGERIA.

YŌSAI [Kikuchi] (1781–1878), Japanese [illegible] son of a *samurai* named Kawara, of Y[illegible] by the Kikuchi family, who were old [illegible] the Tokugawa clan. When eighteen, he [illegible] Takata Enjō; but, after studying the principles of [illegible] Shijō, and Maruyama schools—in the latter, [illegible] Ōzui, a son of Ōkyo—he developed an independent [illegible] having some affinities with that of Tani Buncho [illegible] one of the last of the great painters of Japan; and his illustrated history of Japanese heroes, the *Zenken Kojitsu*, is a [illegible] specimen of his power as a draughtsman in black and white.

YOSEMITE, a famous valley on the W. slope of the Sierra Nevada of California, about 150 m. E. of San Francisco and 4000 ft. above the sea. It is 7 m. long, half a mile to a mile wide, and nearly a mile deep, eroded out of hard massive granite by glacial action. Its precipitous walls present a great variety of forms, and the bottom, a filled-up lake basin, is level and park-like. The most notable of the wall rocks are: El Capitan, 3300 ft. high, a sheer, plain mass of granite; the Three Brothers, North Dome, Glacier Point, the Sentinel, Cathedral, Sentinel Dome and Cloud's Rest, from 2800 to nearly 6000 ft. high; and Half Dome, the noblest of all, which rises at the head of the valley to the height of 4740 ft. These rocks illustrate on a grand scale the action of ice in mountain sculpture. For here five large glaciers united to form the grand trunk glacier that eroded the valley and occupied it as its channel. Its moraines, though mostly obscured by vegetation and weathering, may still be traced; while on the snowy peaks at the headwaters of the Merced a considerable number of small glaciers, once tributary to the main Yosemite glacier, still exist. The Bridal Veil Fall, 900 ft. high, is one of the most interesting features of the lower end of the valley. Towards the upper end the great Yosemite Fall pours from a height of 2600 ft. The valley divides at the head into three branches, the Tenaya, Merced and South Fork canyons. In the main (Merced) branch are the Vernal and Nevada Falls, 400 and 600 ft. high. The Nevada is usually ranked next to the Yosemite among the five main falls of the valley, and is the whitest of all the falls. The Vernal, about half a mile below the Nevada, is famous for its afternoon rainbows. At flood-time it is a nearly regular sheet about 80 ft. wide, changing as it descends from green to purplish-grey and white. In the S. branch, a mile from the head of the main valley, is the Illilouette Fall, 600 ft. high, one of the most beautiful of the Yosemite choir.

Considering the great height of the snowy mountains about the valley, the climate of the Yosemite is remarkably mild. The vegetation is rich and luxuriant. The tallest pines are over 200 ft. high; the trunks of some of the oaks are from 6 to 8 ft. in diameter; violets, lilies, golden-rods, ceanothus, manzanita, wild rose and azalea make broad beds and banks of bloom in the spring; and on the warmest parts of the walls flowers blossom in every month of the year.

[illegible] rly fifty when he decided to take holy orders. [illegible] the author of *Night Thoughts* was not, in his [illegible] ment to religion and morality which he [illegible] his intimacy with the duke of Wharton [illegible] not improve his reputation. A [illegible] robably gives the correct view. [illegible] us, though without common [illegible] no guide, was perpetually [illegible] made him pass a foolish [illegible] his having a very good [illegible] character when he [illegible] ls with honour" [illegible] e was made one [illegible] to the college [illegible] 1731 Lady [illegible] ield. Her [illegible] ncis Lee, [illegible] nerston. [illegible] Her [illegible] hese [illegible] in [illegible] d

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fatherhood; (3) motherhood; (4) sonship. The chief representing motherhood is brother to the mother, and in the developed state has become the Balogun or war lord.

The valley was discovered in 1851 by a military company in pursuit of marauding Indians; regular tourist travel began in 1856. The first permanent settler in the valley was Mr J. C. Lamon, who built a cabin in the upper end of it in 1860 and planted gardens and orchards. In 1864 the valley was granted to the state of California by act of Congress on condition that it should be held as a place of public use, resort and recreation inalienable for all time, was re-ceded to the United States by California on the 3rd of March 1905, and is now included in the Yosemite National Park.

In the number and height of its vertical falls and in the massive grandeur of El Capitan and Half Dome rocks Yosemite is unrivalled. But there are many other valleys of the same kind. The most noted of those in the Sierra, visited every summer by tourists, hunters and mountaineers, are the Hetch Hetchy Valley, a wonderful counterpart of Yosemite in the Tuolumne canyon; Tehipitee Valley, in the Middle Fork canyon of King's river; and the King's river Yosemite in the South Fork canyon, the latter being larger and deeper than the Merced Yosemite. All are similar in their trends, forms, sculpture and vegetation, and are plainly and harmoniously related to the ancient glaciers. The Romsdal and Naerödal of Norway and Lauterbrunnen of the Alps are well characterized glacial valleys of the Yosemite type, and in S.E. Alaska many may be observed in process of formation.

See the *Annual Reports* (Washington, 1891 sqq.) of the Superintendent of the Park; the *Guide to the Yosemite* published by the California Geological Survey; John Muir, *Our National Parks* (Boston, 1901); and Bunnell's *Discovery of the Yosemite* (New York, 1893). (J. Mu.*)

YOUGHAL (pronounced *Yawl*), a seaport, market town and watering-place of county Cork, Ireland, on the W. side of the Blackwater estuary, and on the Cork & Youghal branch of the Great Southern & Western railway, 26¾ m. E. of Cork. Pop. (1901) 5393. The collegiate church of St Mary, in the later Decorated style, was erected in the 11th century, but rebuilt in the 13th, and since that time frequently restored. It contains a beautiful monument to the 1st earl of Cork. The college was founded by an earl of Desmond in 1464. There are still a few fragments of the Dominican friary founded in 1269. The Clock Gate (1771) is noticeable, and portions of the old walls are to be seen. Myrtle Grove was formerly the residence of Sir Walter Raleigh. He was mayor of Youghal in 1588–89, and is said to have first cultivated the potato here. The harbour is safe and commodious, but has a bar at the mouth. At the N. extremity of the harbour the river is crossed by a bridge on wooden piles. The principal exports are corn and other agricultural produce; the imports are coal, culm, timber and slate. Coarse earthenware and bricks are manufactured. Fine point-lace commanding high prices is made by the Presentation Sisters. The Blackwater is famous for salmon, and sea-fishing is important. The Strand, the modern portion of the town, has all the attributes of a seaside resort.

Youghal (*Eochaill*, "the Yew wood") was made a settlement of the Northmen in the 9th century, and was incorporated by King John in 1209. The Franciscan monastery, founded at Youghal by FitzGerald in 1224, was the earliest house of that order in Ireland. Sir Roger Mortimer landed at Youghal in 1317. The town was plundered by the earl of Desmond in 1579. In 1641 it was garrisoned and defended by the earl of Cork. In 1649 it declared for the parliament, and was occupied as his headquarters by Cromwell. It sent two members to parliament from 1374 till the Union, after that only one down to 1885.

YOUNG, ARTHUR (1741–1820), English writer on agriculture and social economy, second son of the Rev. Arthur Young, rector of Bradfield, in Suffolk, chaplain to Speaker Onslow, was born on the 11th of September 1741. After being at a school at Lavenham, he was in 1758 placed in a mercantile house at Lynn, but showed no taste for commercial pursuits. He published, when only seventeen, a pamphlet *On the War in North America*, and in 1761 went to London and started a periodical work, entitled *The Univers[illegible] Museum*, which was dropped by the advice of Samuel Johnson. He also wrote fr[illegible]*tions on the Present State of Affairs at Home and Abroad* in 1759. After his father's death in 1759, his mother had given him the direction of the family estate at Bradfield Hall; but the property was small and encumbered with debt. From 1763 to 1766 he devoted himself to farming on his mother's property. In 1765 he married a Miss Allen; but the union is said not to have been happy, though he was of domestic habits and an affectionate father. In 1767 he undertook on his own account the management of a farm in Essex. He engaged in various experiments, and embodied the results of them in *A Course of Experimental Agriculture* (1770). Though Young's experiments were, in general, unsuccessful, he thus acquired a solid knowledge of agriculture. He had already begun a series of journeys through England and Wales, and gave an account of his observations in books which appeared from 1768 to 1770—*A Six Weeks' Tour through the Southern Counties of England and Wales*, *A Six Months' Tour through the North of England* and the *Farmer's Tour through the East of England*. He says that these books contained the only extant information relative to the rental, produce and stock of England that was founded on actual examination. They were very favourably received, being translated into most European languages by 1792.

In 1768 he published the *Farmer's Letters to the People of England*, in 1771 the *Farmer's Calendar*, which went through a great number of editions, and in 1774 his *Political Arithmetic*, which was widely translated. About this time Young acted as parliamentary reporter for the *Morning Post*. He made a tour in Ireland in 1776, publishing his *Tour in Ireland* in 1780. In 1784 he began the publication of the *Annals of Agriculture*, which was continued for 45 volumes: this work had many contributors, among whom was George III., writing under the *nom de plume* of "Ralph Robinson." Young's first visit to France was made in 1787. Traversing that country in every direction just before and during the first movements of the Revolution, he has given valuable notices of the condition of the people and the conduct of public affairs at that critical juncture. The *Travels in France* appeared in 2 vols. in 1792. On his return home he was appointed secretary of the Board of Agriculture, then (1793) just formed under the presidency of Sir John Sinclair. In this capacity he gave most valuable assistance in the collection and preparation of agricultural surveys of the English counties. His sight, however, failed, and in 1811 he had an operation for cataract, which proved unsuccessful. He suffered also in his last years from stone. He died on the 20th of April 1820. He left an autobiography in MS., which was edited (1898) by Miss M. Betham-Edwards, and is the main authority for his life; and also the materials for a great work on the "Elements and practice of agriculture."

Arthur Young was the greatest of all English writers on agriculture; but it is as a social and political observer that he is best known, and his *Tour in Ireland* and *Travels in France* are still full of interest and instruction. He saw clearly and exposed unsparingly the causes which retarded the progress of Ireland. He strongly urged the repeal of the penal laws which pressed upon the Catholics; he condemned the restrictions imposed by Great Britain on the commerce of Ireland, and also the perpetual interference of the Irish parliament with industry by prohibitions and bounties. He favoured a legislative union of Ireland with Great Britain, though he did not regard such a measure as absolutely necessary, many of its advantages being otherwise attainable.

The soil of France he found in general superior to that of England, and its produce less. Agriculture was neither as well understood nor as much esteemed as in England. He severely censured the higher classes for their neglect of it. "Banishment (from court) alone will force the French nobility to execute what the English do for pleasure—reside upon and adorn their estates." Young saw the commencement of violence in the rural districts, and his sympathies began to take the side of the classes suffering from the excesses of the Revolution. This change of attitude was shown by his publication in 1793 of a tract entitled *The Example of France a Warning to England*. Of the profounder significance of the French outbreak he seems to have had little idea, and thought the crisis would be met by a constitutional adjustment in accordance with the English type. He strongly condemned the *métayer* system, then widely prevalent in France, as "perpetuating poverty and excluding instruction"—as, in fact, the ruin of the country. Some of his phrases have been often quoted by the advocates of peasant proprietorship as favouring their view. "The magic of property turns sand to gold." "Give a man the secure possession of a bleak rock, and he will turn it into a garden; give him a nine years' lease of a garden, and he will convert it into a desert." But these sentences, in which the epigrammatic form exaggerates a truth, and which might seem to represent the possession of capital as of no importance in agriculture, must not be taken as conveying his approbation of the system of small properties in general. He approved it only when the subdivision was strictly limited, and even then with great reserves; and he remained to the end what J. S. Mill calls him, "the apostle of *la grande culture*."

The Directory in 1801 ordered his writings on the art to be translated and published at Paris in 20 volumes under the title of *Le Cultivateur anglais*. His *Travels in France* were translated in 1793–94 by Soulès; a new version by M. Lesage, with an introduction by M. de Lavergne, appeared in 1856. An interesting review of the latter publication, under the title of *Arthur Young et la France de 1789*, will be found in M. Baudrillart's *Publicistes modernes* (2nd ed., 1873).

YOUNG, BRIGHAM (1801–1877), second president of the Church of Jesus Christ of Latter-Day Saints, was born in Whittingham, Vermont, on the 1st of June 1801. He died in Salt Lake City, Utah, on the 29th of August 1877. (See MORMONS.)

YOUNG, CHARLES MAYNE (1777–1856), English actor, was the son of a surgeon. His first stage appearance was in Liverpool in 1798 as Douglas, in Home's tragedy. His first London appearance was in 1807 as Hamlet. With the decline of John Philip Kemble, and until the coming of Kean and Macready, he was the leading English tragedian. He retired in 1832.

YOUNG, EDWARD (1683–1765), English poet, author of *Night Thoughts*, son of Edward Young, afterwards dean of Salisbury, was born at his father's rectory at Upham, near Winchester, and was baptized on the 3rd of July 1683. He was educated on the foundation at Winchester College, and matriculated in 1702 at New College, Oxford. He soon removed to Corpus Christi, and in 1708 was nominated by Archbishop Tenison to a law fellowship at All Souls', for the sake of Dean Young, who died in 1705. He took his degree of D.C.L. in 1719. His first publication was an *Epistle to . . . . Lord Lansdowne* (1713). It was followed by a *Poem on the Last Day* (1713), dedicated to Queen Anne; *The Force of Religion: or Vanquish'd Love* (1714), a poem on the execution of Lady Jane Grey and her husband, dedicated to the countess of Salisbury; and an epistle to Addison, *On the late Queen's Death and His Majesty's Accession to the Throne* (1714), in which he made indecent haste to praise the new king. The fulsome style of these dedications ill accords with the pious tone of the poems, and they are omitted in the edition of his works drawn up by himself. About this time began his connexion with Philip, duke of Wharton, whom he accompanied to Dublin in 1717. In 1719 his play of *Busiris* was produced at Drury Lane, and in 1721 his *Revenge*. The latter play was dedicated to Wharton, to whom it owed, said Young, its "most beautiful incident." Wharton promised him two annuities of £100 each and a sum of £600 in consideration of his expenses as a candidate for parliamentary election at Cirencester. In view of these promises Young said that he had refused two livings in the gift of All Souls' College, Oxford, and had also sacrificed a life annuity offered by the marquess of Exeter if he would act as tutor to his son. Wharton failed to discharge his obligations, and Young, who pleaded his case before Lord Chancellor Hardwicke in 1740, gained the annuity but not the £600. Between 1725 and 1728 Young published a series of seven satires on *The Universal Passion*. They were dedicated to the duke of Dorset, Bubb Dodington (afterwards Lord Melcombe), Sir Spencer Compton, Lady Elizabeth Germain and Sir Robert Walpole, and were collected in 1728 as *Love of Fame, the Universal Passion*. This is qualified by Samuel Johnson as a "very great performance," and abounds in striking and pithy couplets. Herbert Croft asserted that Young made £3000 by his satires, which compensated losses he had suffered in the South Sea Bubble. In 1726 he received, through Walpole, a pension of £200 a year. To the end of his life he continued to urge on the government his claims to preferment, but the king and his advisers persisted in regarding this sum as an adequate settlement.

Young was nearly fifty when he decided to take holy orders. It was reported that the author of *Night Thoughts* was not, in his earlier days, "the ornament to religion and morality which he afterwards became," and his intimacy with the duke of Wharton and with Lord Melcombe did not improve his reputation. A statement attributed to Pope probably gives the correct view. "He had much of a sublime genius, though without common sense; so that his genius, having no guide, was perpetually liable to degenerate into bombast. This made him pass a foolish youth, the sport of peers and poets; but his having a very good heart enabled him to support the clerical character when he assumed it, first with decency and afterwards with honour" (O. Ruffhead, *Life of A. Pope*, p. 291). In 1728 he was made one of the royal chaplains, and in 1730 was presented to the college living of Welwyn, Hertfordshire. He married in 1731 Lady Elizabeth Lee, daughter of the 1st earl of Lichfield. Her daughter, by a former marriage with her cousin Francis Lee, married Henry Temple, son of the 1st viscount Palmerston. Mrs Temple died at Lyons in 1736 on her way to Nice. Her husband and Lady Elizabeth Young died in 1740. These successive deaths are supposed to be the events referred to in the *Night Thoughts* as taking place "ere thrice yon moon had filled her horn" (Night i.). In the preface to the poem Young states that the occasion of the poem was real, and Philander and Narcissa have been rather rashly identified with Mr and Mrs Temple. M. Thomas suggests that Philander represents Thomas Tickell, who was an old friend of Young's, and died three months after Lady Elizabeth Young. It was further supposed that the infidel Lorenzo was a sketch of Young's own son, a statement disproved by the fact that he was a child of eight years old at the time of publication. *The Complaint*, or *Night Thoughts on Life, Death and Immortality*, was published in 1742, and was followed by other "Nights," the eighth and ninth appearing in 1745. In 1753 his tragedy of *The Brothers*, written many years before, but suppressed because he was about to enter the Church, was produced at Drury Lane. *Night Thoughts* had made him famous, but he lived in almost uninterrupted retirement, although he continued vainly to solicit preferment. He was, however, made clerk of the closet to the princess dowager in 1761. He was never cheerful, it was said, after his wife's death. He disagreed with his son, who had remonstrated, apparently, on the excessive influence exerted by his housekeeper Miss (known as Mrs) Hallows. The old man refused to see his son before he died, but is said to have forgiven him, and left him his money. A description of him is to be found in the letters of his curate, John Jones, to Dr Samuel Birch. He died at Welwyn on the 5th of April 1765.

Young is said to have been a brilliant talker. He had an extraordinary knack of epigram, and though the *Night Thoughts* is long and disconnected it abounds in brilliant isolated passages. Its success was enormous. It was translated into French, German, Italian, Spanish, Portuguese, Swedish and Magyar. In France it became one of the classics of the romantic school. The suspicion of insincerity that damped the enthusiasm of English readers acquainted with the facts of his career did not exist for French readers. If he did not invent "melancholy and moonlight" in literature, he did much to spread the fashionable taste for them. Madame Klopstock thought the king ought to make him archbishop of Canterbury, and some German critics preferred him to Milton. Young wrote good blank verse, and Samuel Johnson pronounced *Night Thoughts* to be one of "the few poems" in which blank verse could not be changed for rhyme but with disadvantage.

Other works by Young are: *The Instalment* (to Sir R. Walpole, 1726); *Cynthio* (1727); *A Vindication of Providence* . . . (1728), a sermon; *An Apology for Punch* (1729); a sermon; *Imperium Pelagi, a Naval Lyrick* . . . (1730); *Two Epistles to Mr Pope concerning the Authors of the Age* (1730); *A Sea-Piece* . . . (1733); *The Foreign Address, or The Best Argument for Peace* (1734); *The Centaur not Fabulous; in Five Letters to a Friend* (1755); *An Argument . . . for the Truth of His* [Christ's] *Religion* (1758), a sermon preached before the king; *Conjectures on Original Composition* . . . (1759), addressed to Samuel Richardson; and *Resignation* . . . (1762), a poem.

Night Thoughts was illustrated by William Blake in 1797, and by Thomas Stothard in 1799. *The Poetical Works of the Rev. Edward Young . . .* were revised by himself for publication, and a completed edition appeared in 1778. *The Complete Works, Poetry and Prose, of the Rev. Edward Young . . .*, with a life by John Doran, appeared in 1854. His *Poetical Works* are included in the *Aldine Edition of the British Poets*, with a life by J. Mitford (1830–1836, 1857 and 1866). Sir Herbert Croft wrote the life included in Johnson's *Lives of the Poets*, but the critical remarks are by Johnson. For Young's influence on foreign literature see Joseph Texte, *Jean Jacques Rousseau, A Study of the Literary Relations between France and England during the Eighteenth Century* (Eng. trans., 1889), pp. 304–14; and J. Barnstoff, *Young's Nachtgedanken und ihr Einfluss auf die deutsche Litteratur* (1895). See also W. Thomas, *Le Poète Edward Young* (Paris, 1901), who gives an exhaustive study of Young's life and work.

YOUNG, JAMES (1811–1883), Scottish industrial chemist, was born in Glasgow on the 13th of July 1811. During his apprenticeship to his father, a carpenter, he attended evening classes at Anderson's College, where he had Lyon Playfair and David Livingstone for fellow-pupils; and the ability he showed was such that Thomas Graham, the professor of chemistry, chose him as lecture assistant in 1832. About 1839, on the recommendation of Graham, whom in 1837 he had accompanied to University College, London, he was appointed chemist at James Muspratt's alkali works in Lancashire; in connexion with alkali he showed that cast-iron vessels could be satisfactorily substituted for silver in the manufacture of caustic soda, and worked out improvements in the production of chlorate of potash. But his name is best known in connexion with the establishment of the Scottish mineral-oil industry. In 1847 Lyon Playfair informed him of a spring of petroleum which had made its appearance at Ridding's Colliery at Alfreton in Derbyshire, and in the following year he began to utilize it for making both burning and lubricating oils. This spring was practically exhausted by 1851. It had served to draw Young's attention to the question of oil-production, and in 1850 he took out his fundamental patent for the distillation of bituminous substances. This was soon put into operation in Scotland, first with the Boghead coal or Torbanehill mineral, and later with bituminous shales, and though he had to face much litigation Young successfully employed it in the manufacture of naphtha and lubricating oils, and subsequently of illuminating oils and paraffin wax, until in 1866, after the patent had expired, he transferred his works to a limited company. In 1872 he suggested the use of caustic lime to prevent the corrosion of iron ships by the bilge water, which he noticed was acid, and in 1878 he began a determination of the velocity of white and coloured light by a modification of H. L. Fizeau's method, in collaboration with Professor George Forbes (b. 1849), at Pitlochry. The final results were obtained in 1880–81 across the Firth of Clyde from Kelly, his house at Wemyss Bay, and a hill above Inellan, and gave values rather higher than those obtained by M. A. Cornu and A. A. Michelson. Young was a liberal supporter of David Livingstone, and also gave £10,500 to endow a chair of technical chemistry at Anderson's College. He died at Wemyss Bay on the 14th of May 1883.

YOUNG, THOMAS (1773–1829), English man of science, belonged to a Quaker family of Milverton, Somerset, where he was born on the 13th of June 1773, the youngest of ten children. At the age of fourteen he was acquainted with Latin, Greek, French, Italian, Hebrew, Persian and Arabic. Beginning to study medicine in London in 1792, he removed to Edinburgh in 1794, and a year later went to Göttingen, where he obtained the degree of doctor of physic in 1796. In 1797 he entered Emmanuel College, Cambridge. In the same year the death of his grand-uncle, Richard Brocklesby, made him financially independent, and in 1799 he established himself as a physician in Welbeck Street, London. Appointed in 1801 professor of physics at the Royal Institution, in two years he delivered ninety-one lectures. These lectures, printed in 1807 (*Course of Lectures on Natural Philosophy*), contain a remarkable number of anticipations of later theories. He resigned his professorship in 1803, fearing that its duties would interfere with his medical practice. In the previous year he was appointed foreign secretary of the Royal Society, of which he had been elected a fellow in 1794. In 1811 he became physician to St George's Hospital, and in 1814 he served on a committee appointed to consider the dangers involved by the general introduction of gas into London. In 1816 he was secretary of a commission charged with ascertaining the length of the seconds pendulum, and in 1818 he became secretary to the Board of Longitude and superintendent of the *Nautical Almanac*. A few years before his death he became interested in life assurance, and in 1827 he was chosen one of the eight foreign associates of the French Academy of Sciences. He died in London on the 10th of May 1829.

Young is perhaps best known for his work in physical optics, as the author of a remarkable series of researches which did much to establish the undulatory theory of light, and as the discoverer of the interference of light (see INTERFERENCE). He has also been called the founder of physiological optics. In 1793 he explained the mode in which the eye accommodates itself to vision at different distances as depending on change of the curvature of the crystalline lens; in 1801 he described the defect known as astigmatism; and in his *Lectures* he put forward the hypothesis, afterwards developed by H. von Helmholtz, that colour perception depends on the presence in the retina of three kinds of nerve fibres which respond respectively to red, green and violet light. In physiology he made an important contribution to haemadynamics in the Croonian lecture for 1808 on the "Functions of the Heart and Arteries," and his medical writings included *An Introduction to Medical Literature, including a System of Practical Nosology* (1813) and *A Practical and Historical Treatise on Consumptive Diseases* (1815).

In another field of research, he was one of the first successful workers at the decipherment of Egyptian hieroglyphic inscriptions; by 1814 he had completely translated the enchorial (demotic) text of the Rosetta stone, and a few years later had made considerable progress towards an understanding of the hieroglyphic alphabet (see EGYPT, § *Language and Writing*). In 1823 he published an *Account of the Recent Discoveries in Hieroglyphic Literature and Egyptian Antiquities*. Some of his conclusions appeared in the famous article of Egypt which in 1818 he wrote for the *Encyclopaedia Britannica*.

His works were collected, with a *Life* by G. Peacock, in 1855.

YOUNG MEN'S CHRISTIAN ASSOCIATION,[1] an organization for social and religious work among young men, founded in England by Sir George Williams (1821–1905), a merchant of London. Williams's organization grew out of meetings he held for prayer and Bible-reading among his fellow-workers in a dry goods business in the city of London, and was founded in 1844; on the occasion of its jubilee its originator was knighted. Similar associations, indeed, had been in existence in Scotland at a much earlier date. In 1824 David Naismith, who also founded city missions in London and Glasgow, started the Glasgow Young Men's Society for Religious Improvement, a movement which spread to various parts of the United Kingdom, France and America: later the name was changed to the Glasgow Young Men's Christian Association. The object of such associations is to provide in large towns a rendezvous for young men who are compelled to live in lodgings or in the apartments provided by the great business houses. An associate of the Y.M.C.A. must not only be of good moral character, but must also express his adherence to the objects and principles of the association. To be a member means a definite acceptance of the doctrines of the Evangelical Christian faith. In 1910 there were about 400 associations in England, Ireland and Wales, and 226 in Scotland—besides various soldiers' and other auxiliaries. The total membership was about 146,000. Some of the buildings, notably in the Midlands and the north of England, are very fine. The London Association, which from 1880 until shortly before its demolition in 1908 used Exeter Hall, Strand, has erected a handsome block of buildings in Tottenham Court Road, designed to provide, in addition to the usual features, bedrooms at a reasonable rent.

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[1] Commonly abbreviated Y.M.C.A.

The Young Men's Christian Association is seen at its best in the United States. It is true that Germany has more associations than any other country, but of its 2129 branches only 142 have their own buildings, and the total membership is only 125,000. In America, however, the associations have been built on a broad basis and worked with enterprise and business skill. Thus they have been able to secure the generous support of many of the leaders of commerce. America has over 1900 associations, and the total membership is 456,000. In Greater Britain the associations are numerous and flourishing, and Canada has 35,000 members. There are many active associations in Switzerland, Norway, Denmark and the Netherlands, and indeed the Y.M.C.A. is now well known all over the world. Even in Japan, China and Korea there are 150 branches with a membership of nearly 12,000. The value of association buildings all over the world is £11,940,000 (America, £8,900,000; Greater Britain, £1,912,000; United Kingdom, £1,128,000).

The *Young Women's Christian Association* was founded in 1855, by two ladies simultaneously. In the south of England Miss Robarts started a Prayer Union with a purely spiritual aim; in London Lady Kinnaird commenced the practical work of opening homes and institutes for young women in business. In 1877 the two branches united in the Young Women's Christian Association, which seeks to promote the all-round welfare of young women by means of residential and holiday homes, club rooms, restaurants, noon rest rooms, classes and lectures, and other useful departments. The Young Women's Christian Association has spread all over the world, and the total membership is about half a million.

YOUNGSTOWN, a city and the county-seat of Mahoning county, Ohio, U.S.A., on the Mahoning river, about 60 m. S.E. of Cleveland. Pop. (1900) 44,885 (12,207 being foreign-born especially English, Irish and German); (1910 census) 79,066. It is served by the Baltimore & Ohio, the Erie, the Lake Shore & Michigan Southern, the Pennsylvania, and the Pittsburg & Lake Erie railways, and by interurban electric lines. The Rayen High School (incorporated 1856) was endowed under the will of Judge William Rayen (1776–1854). The Reuben McMillan Public Library (about 25,000 volumes in 1910) is housed in a building finished in 1910 and is named in honour of Reuben McMillan (1820–1898), formerly superintendent of schools. Among other public buildings are the post office and Federal court house, the county court house, the city and the Mahoning Valley hospitals, and the Y.M.C.A. building. The business district lies in the valley on the N. of the river; the residential districts are chiefly on the neighbouring hills. Youngstown has four parks, including Mill Creek (483 acres), East End (60 acres) and Wick (48 acres), presented to the city by the Wick family, descendants of the merchant Henry Wick (1771–1845). The value of its factory products increased from $33,908,459 in 1900 to $48,126,885 in 1905. The most important establishments are blast-furnaces, iron and steel works (of the U.S. Steel Corporation) and rolling mills.

Youngstown was named in honour of John Young (1763–1825), a native of Petersborough, New Hampshire, who in 1796 bought from the Connecticut Land Company a tract of land upon which the city now stands, and lived there from 1799 until 1803. The first permanent settlement was made probably in 1796 by William Hillman. The tract was set off as a township in 1800, and the first township government was organized in 1802; the town was incorporated in 1848, and was chartered as a city of the second class in 1867. The county-seat of Mahoning county was removed from Canfield to Youngstown in 1876, and after much litigation the legality of this removal was confirmed by the United States Supreme Court in 1879. The first iron-mining in the region was done in 1803 by Daniel Eaton, who in 1804 built the first blast-furnace W. of Pennsylvania and N. of the Ohio river. Eaton also built in 1826 the first blast-furnace within the present limits of Youngstown.

YPRES (Flemish *Yperen*), a town of Belgium, in the province of West Flanders, of which it was formerly considered the capital. Pop. (1904) 17,073. It is situated 35 m. S. of Ostend and 12 m. W. of Courtrai, on the Yperlée, a small river flowing into the Yser, both of which have been canalized. In the 14th century it ranked with Bruges and Ghent, and its population in its prime reached 200,000. It is remarkable chiefly for its fine Halles or cloth market, with a façade of over 150 yds. in length. The main building was begun in 1201 and completed in 1304. The cathedral of St Martin dates from the 13th century, with a tower of the 15th century. Jansen, bishop of Ypres and the founder of the Jansenist school, is buried in the cathedral. The Butchers' Hall is also of interest and dates from the 15th century. Although Ypres is unlikely to regain the importance it possessed when its "red-coated" contingent turned the day in the great battle of Courtrai (1302), it has an important linen and lace trade and a great butter market. The Belgian cavalry training-school is established at Ypres.

YPSILANTI, or HYPSILANTI, the name of a family of Phanariot Greeks claiming descent from the Comneni. ALEXANDER YPSILANTI (1725–1805) was dragoman of the Porte, and from 1774 to 1782 hospodar of Wallachia, during which period he drew up a code for the principality. He was again appointed hospodar just before the outbreak of the war with Austria and Russia in 1790. He allowed himself to be taken prisoner by the Austrians, and was interned at Brünn till 1792. Returning to Constantinople, he fell under the suspicion of the sultan and was executed in 1805. His son CONSTANTINE (d. 1816), who had joined in a conspiracy to liberate Greece and, on its discovery, fled to Vienna, had been pardoned by the sultan and in 1799 appointed by him hospodar of Moldavia. Deposed in 1805, he escaped to St Petersburg, and in 1806, at the head of some 20,000 Russians, returned to Bucharest, where he set to work on a fresh attempt to liberate Greece. His plans were ruined by the peace of Tilsit; he retired to Russia, and died at Kiev. He left five sons, of whom two played a conspicuous part in the Greek war of independence.

ALEXANDER YPSILANTI (1792–1828), eldest son of Constantine Ypsilanti, accompanied his father in 1805 to St Petersburg, and in 1809 received a commission in the cavalry of the Imperial Guard. He fought with distinction in 1812 and 1813, losing an arm at the battle of Dresden, and in 1814 was promoted colonel and appointed one of the emperor's adjutants. In this capacity he attended Alexander I. at the congress of Vienna, where he was a popular figure in society (see La Garde-Chambonas, *Souvenirs*). In 1817 he became major-general and commander of the brigade of hussars. In 1820, on the refusal of Count Capo d'Istria to accept the post of president of the Greek *Hetairia Philike*, Ypsilanti was elected, and in 1821 he placed himself at the head of the insurrection against the Turks in the Danubian principalities. Accompanied by several other Greek officers in the Russian service he crossed the Pruth on the 6th of March, announcing that he had the support of a "great power." Had he advanced on Ibraila he might have prevented the Turks entering the principalities and so forced Russia to accept the *fait accompli*. Instead, he remained at Jassy, disgracing his cause by condoning the massacres of Turkish merchants and others. At Bucharest, whither he advanced after some weeks' delay, it became plain that he could not rely on the Vlach peasantry to rise on behalf of the Greeks; even the disconcerting expedient of his Vlach ally Theodore Vladimiresco, who called on the peasants to present a petition to the sultan against Phanariot misrule, failed to stir the people from their apathy. Then, wholly unexpectedly, came a letter from Capo d'Istria upbraiding Ypsilanti for misusing the tsar's name, announcing that his name had been struck off the army list, and commanding him to lay down his arms. Ypsilanti's decision to explain away the tsar's letter could only have been justified by the success of a cause which was now hopeless. There followed a series of humiliating defeats, culminating in that of Dragashan on the 19th of June

Alexander, accompanied by his brother Nicholas and a remnant of his followers, retreated to Rimnik, where he spent some days in negotiating with the Austrian authorities for permission to cross the frontier. Fearing that his followers might surrender him to the Turks, he gave out that Austria had declared war on Turkey, caused a *Te Deum* to be sung in the church of Kosia, and, on pretext of arranging measures with the Austrian commander-in-chief, crossed the frontier. But the Austria of Francis I. and Metternich was no asylum for leaders of revolts in neighbouring countries. Ypsilanti was kept in close confinement for seven years, and when released at the instance of the emperor Nicholas I. of Russia, retired to Vienna, where he died in extreme poverty and misery on the 31st of January 1828.

Demetrios Ypsilanti (1793–1832), second son of Prince Constantine, distinguished himself as a Russian officer in the campaign of 1814, and in the spring of 1821 went to the Morea, where the war of Greek independence had just broken out. He was one of the most conspicuous of the Phanariot leaders during the earlier stages of the revolt, though he was much hampered by the local chiefs and by the civilian element headed by Mavrocordato. In January 1822 he was elected president of the legislative assembly; but the ill-success of his campaign in central Greece, and his failure to obtain a commanding position in the national convention of Astros, led to his retirement early in 1823. In 1828 he was appointed by Capo d'Istria commander of the troops in East Hellas. He succeeded, on the 25th of September 1829, in forcing the Turkish commander Aslan Bey to sign a capitulation at the Pass of Petra, which ended the active operations of the war. He died at Vienna on the 3rd of January 1832.

Gregory Ypsilanti (d. 1835), third son of Prince Constantine, founded a princely family still settled near Brünn. Nicholas Ypsilanti wrote *Mémoires* valuable as giving material for the antecedents of the insurrection of 1820 and the part taken in them by Alexander I. of Russia. They were published at Athens in 1901.

See the works cited in the bibliography of the article Greek Independence, War of, especially the *Δοκίμιον ἱστορικὸν* of J. Philemon.

YPSILANTI, a city of Washtenaw county, Michigan, U.S.A., on the Huron river, 30 m. W. by S. of Detroit. Pop. (1900) 7378; (1904) 7587; (1910) 6230. It is served by the Michigan Central and the Lake Shore & Michigan Southern railways, and is the seat of the Michigan State Normal College (1849). There are various manufactures. Ypsilanti was laid out and named in honour of Demetrius Ypsilanti, the Greek patriot, in 1825; it was incorporated as a village in 1832, and chartered as a city in 1858.

YSAŸE, EUGÈNE (1858–), Belgian violinist, was born at Liége, where he studied with his father and under R. Massart, at the Conservatoire, until he was fifteen; he had some lessons from Wieniawski, and later from Vieuxtemps. In 1879 Ysaÿe played in Germany, and next year acted as leader of Bilse's orchestra in Berlin; he appeared in Paris in 1883, and for the first time in London at a Philharmonic concert in 1889. He was violin professor at the Brussels Conservatoire from 1886 to 1898, and instituted the celebrated orchestral concerts of which he was manager and conductor. Ysaÿe first appeared as conductor before a London audience in 1900, and in 1907 conducted *Fidelio* at Covent Garden. The sonata concerts in which he played with Raoul Pugno (b. 1852), the French pianist, became very popular in Paris and Brussels, and were notable features of several London concert seasons. As a violinist he ranks with the finest masters of the instrument, with extraordinary temperamental power as an interpreter. His compositions include a Programme Symphony (played in London, 1905), a Piano Concerto, and a "Suite Wallonne."

YSTAD, a seaport of Sweden on the S. Baltic coast, in the district (*län*) of Malmöhus, 39 m. E.S.E. of Malmö by rail. Pop. (1900) 9862. Two of its churches date from the 13th century. Its artificial harbour, which admits vessels drawing 19 ft., is freer from ice in winter than any other Swedish Baltic port. Apart from a growing import trade in coal and machinery, its commerce has declined; but it is among the first twelve manufacturing places in Sweden, having large mechanical workshops.

YTTERBIUM (Neo-Ytterbium) [symbol, Yb; atomic weight, 172·0 (O = 16)], a metallic chemical element belonging to the rare earth group. Mixed with scandium it was discovered by Marignac in gadolinite in 1878 (see Rare Earths). The oxide, Yb_2O_3, is white and forms colourless salts; the crystallized chloride, $YbCl_3 \cdot 6H_2O$, forms colourless, deliquescent crystals; the anhydrous chloride sublimes on heating (C. Matignon, *Ann. chim. phys.*, 1906 (8), 8, p. 440). In 1907 G. Urbain separated ytterbium into two new elements, neo-ytterbium and lutecium (atomic weight, 174·0); and in 1908 C. A. von Welsbach published the same result, naming his elements aldebaranium and cassiopeium (on the question of priority see F. Wenzel, *Zeit. anorg. Chem.*, 1909, 64, p. 119).

YTTRIUM [symbol, Y; atomic weight, 89·0 (O = 16)], a metallic chemical element. In its character yttrium is closely allied to, and in nature is always associated with, cerium, lanthanum, didymium and erbium (see Rare Earths). For the preparation of yttrium compounds the best raw material is gadolinite, which, according to König, consists of 22·61% of silica, 34·64 of yttria, Y_2O_3, and 42·75 of the oxides of erbium, cerium, didymium, lanthanum, iron, beryllium, calcium, magnesium and sodium. The extraction (as is the case with all the rare earths) is a matter of great difficulty. Metallic yttrium is obtainable as a dark grey powder by reducing the chloride with potassium, or by electrolysing the double chloride of yttrium and sodium. It decomposes water slowly in the cold, and more rapidly on heating. Yttria, Y_2O_3, is a yellowish white powder, which at high temperatures radiates out a most brilliant white light. It is soluble, slowly but completely, in mineral acids. It is recognized by its very characteristic spark spectrum. Solutions of yttria salts in their behaviour to reagents are not unlike those of zirconia. The atomic weight was determined by Cleve.

YUCATAN, a peninsula of Central America forming the S.E. extremity of the republic of Mexico and including the states of Campeche and Yucatan and the territory of Quintana Roo. Small parts of British Honduras and Guatemala are also included in it. The natural boundary of the peninsula on the S. is formed in part by the ridges extending across N. Guatemala, the line terminating E. at the lower part of Chetumal Bay, and W. at Laguna de Terminos. From this base the land extends N. between the Gulf of Mexico and Caribbean Sea in nearly rectangular form for about 280 m., with about the same extreme width in longitude. It has a mean breadth of about 200 m., a coast-line of 700 m. and an area of about 55,400 sq.m.

The coast on the N. and W. is low, sandy and semi-barren, and is made dangerous by the Campeche banks, a northward extension of the peninsula, covered with shifting sands. The outer shore-line on the N. for nearly 200 m. consists of a narrow strip of low sand dunes, within which is a broad channel terminating to the E. in a large lagoon. There are a number of openings through the outer bank and several small towns or ports have been built upon it. The E. coast consists of bluffs, indented with bays and bordered by several islands, the larger ones being Cozumel (where Cortés first landed), Cancum, Mujeres and Contoy. There is more vegetation on this coast, and the bays of Chetumal, Espiritu Santo, Ascencion and San Miguel (on Cozumel Island) afford good protection for shipping. It is, however, sparsely settled and has little commerce.

The peninsula is almost wholly composed of a bed of coralline and porous limestone rocks, forming a low tableland, which rises gradually toward the S. until it is merged in the great Central American plateau. It is covered with a layer of thin, dry soil, through the slow weathering of the coral rocks. The surface is not so level and monotonous as it appears on many maps; for, although there are scarcely any running streams, it is diversified by a few lakes, of which Bacalar and Chichankanab are the largest, as well as by low isolated hills and ridges in the W., and in the E. by the Sierra Alta, a range of moderate elevation traversing the whole peninsula from Catoche Point S. to the neighbourhood of Lake Peteu in Guatemala. The culminating points of the W. ridges do not exceed 900 ft., and some authorities estimate it at 500 ft.

The climate of Yucatan is hot and dry; the Gulf Stream, which sweeps by its N. shores, adds to its naturally high temperature, and the absence of high mountainous ridges to intercept the moisture-bearing clouds from the Atlantic gives it a limited rainfall. The temperature ranges from 75° to 98° F. in the shade, but the heat is modified by cool sea winds which prevail day and night throughout the greater part of the year. The atmosphere is also purified by the fierce *temporales*, or "northers," which occasionally sweep down over the Gulf and across this open region. The dry season lasts from October to May, the hottest months appear to be in March and April, when the heat is increased by the burning of the corn and henequén fields. The rains are quickly absorbed by the light porous soil and leave only temporary effects on the surface, where arboreal growth is stunted and grasses are commonly thin and harsh. For the most part the climate of Yucatan is healthy, though enervating. There are undrained, swampy districts in Campeche, in the vicinity of the Terminos Lagoon, where malarial diseases are prevalent, and the same conditions prevail along the coast where mangrove swamps are found. Yellow fever epidemics are common on the Campeche coast, and sometimes appear at Progreso and Mérida. The sites of some of the old Maya cities are also considered dangerous at certain seasons.

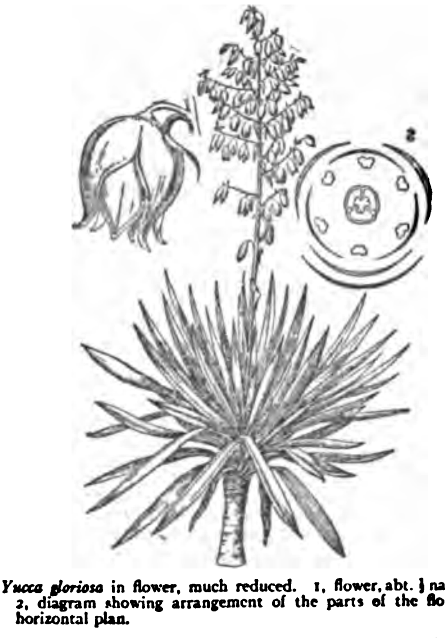
All the N. districts, as well as the greater part of the Sierra Alta, are destitute of large trees; but the coast-lands on both sides towards Tabasco and British Honduras enjoy a sufficient rainfall to support forests containing the mahogany tree, several valuable cabinet woods, vanilla, logwood and other dye-woods. Logwood forests fringe all the lagoons and many parts of the seaboard, which are flooded during the rainy season. The chief cultivated plants are maize, the sugar-cane, tobacco, cotton, coffee and especially henequén, the so-called "Sisal hemp," which is a strong, coarse fibre obtained from the leaves of the *Agave rigida*, var. *elongata*. It requires very little moisture, grows luxuriantly on the thin calcareous soil of Yucatan and is cultivated almost exclusively by the large landowners. It is used chiefly in the manufacture of coarse sackcloth, cordage and hammocks, and is exported in large quantities. The labour needed in this industry is supplied by Indian *peons*, who live in a state of semi-servitude and are paid barely enough to sustain life.

History and Antiquities.—The modern history of Yucatan begins with the expedition of Francisco Hernandez de Cordova, a Spanish adventurer settled in Cuba, who discovered the E. coast of Yucatan in February 1517, when on a slave-hunting expedition. He followed the coast round to Campeche, but was unable to penetrate the interior. In 1518 Juan de Grijalva followed the same coast, but added nothing to the information sought by the governor of Cuba. In 1519 a third expedition, under Hernando Cortés, the conqueror of Mexico, came into collision with the natives of the island of Cozumel. In 1525 the inland part of the peninsula was traversed by Cortés during an expedition to Honduras. The conquest of the peninsula was undertaken in 1527 by Francisco de Montejo, who encountered a more vigorous opposition than Cortés had on the high plateau of Anáhuac. In 1549 Montejo had succeeded in establishing Spanish rule over barely one-half of the peninsula, and it was never extended further. The Spaniards found here the remains of a high aboriginal civilization which had already entered upon decline. There were deserted cities falling into ruins, and others, like Chichen-itza, Uxmal and Tuloom, which were still inhabited by remnants of their former Maya populations. The Mayas have left no record of their institutions or of the causes of their decline, beyond what may be deduced from their ruined structures. The number and extent of these ruins (temples, palaces, ball courts, market-places, &c.) indicate large towns in the midst of thickly settled, productive districts, for there were then, so far as can be determined, no means of supporting large urban populations through commercial exchanges. The exhaustion of the soil in the vicinity of towns, or epidemics brought on by insanitary habits, might easily cause depopulation in so hot a climate. Other remains which bear witness to the civilization of the Mayas are the paved highways and the artificial reservoirs (*aguadas*) designed for the preservation of water for towns through the long dry season. These *aguadas* were huge basins, paved and cemented, with underground cisterns; also lined with stone and cement, which may have been used for the protection of water against heat when the principal supply had become exhausted. The great problem in all the Maya settlements of Yucatan was that of securing and preserving a water supply for the dry season. Some of their towns were built near large underground reservoirs, called *cenotes*, that afforded a perennial supply. Since the Spanish conquest, the Mayas have clung to the semi-barren, open plains of the peninsula, and have more than once revolted. They seceded in 1839 and maintained their independence until 1843. In 1847 another revolt followed, and the Indians were practically independent throughout the greater part of the peninsula until near the beginning of the Diaz administration. In 1910 there was another revolt with some initial successes, such as the capture of Valladolid, but then the Indians withdrew to the unknown fastnesses of Quintana Roo.

The Mexican STATE OF YUCATAN is bounded N. by the Gulf of Mexico, E. and S. by the territory of Quintana Roo, S. and W. by the state of Campeche. Pop. (1900) about 306,000. The railways include the three lines of the United Railways of Yucatan (373 m.), and a line from Mérida to Peto (145 m.). The capital is Mérida, and its principal towns, inhabited almost exclusively by Indians and *mestizos*, are Valladolid, Acanceh, Tekax, Motul, Temax, Espita, Maxcanú, Hunucmá, Tixkokob, Peto and Progreso, the port of Mérida.

Quintana Roo was separated from the state of Yucatan in 1902 and received a territorial government under the immediate supervision of the national executive. It comprises the sparsely settled districts along the E. coast of the peninsula, and the wooded sections of the S., which have not been thoroughly explored. Its population is estimated at 3000, but as its inhabitants never submitted to Spanish and Mexican rule, and have maintained their independence against overwhelming odds for almost four centuries, this estimate should be accepted as a conjecture. Little is known of the wild tribes of the territory.

YUCCA,[1] a genus of the order Liliaceae (*q.v.*), containing about thirty species. They occur in greatest frequency in Mexico and the S.W. United States, extending also into Central America, and occurring in such numbers in some places as to form straggling



Yucca gloriosa in flower, much reduced. 1, flower, abt. ½ nat. size; 2, diagram showing arrangement of the parts of the flower in horizontal plan.

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[1] A Spanish word meaning "bayonet," recalling the form and character of the leaves.

forests. They have a woody or fibrous stem, sometimes short, and in other cases attaining a height of 15 to 20 ft., and branching at the top into a series of forks. The leaves are crowded in tufts at the ends of the stem or branches, and are generally stiff and sword-shaped, with a sharp point, sometimes flaccid and in other cases fibrous at the edges. The numerous flowers are usually white, bell-shaped and pendulous, and are borne in much-branched terminal panicles. Each flower has a perianth of six regular pieces, and has as many hypogynous stamens, with dilated filaments, bearing relatively small anthers. The three-celled ovary is surmounted by a short thick style, dividing above into three stigmas, and ripens into a succulent berry in some of the species, and into a dry three-valved capsule in others. The flowers are fertilized by the agency of moths.

A coarse fibre is obtained by the Mexicans from the stem and foliage, which they utilize for cordage, and in the S.E. United States the leaves of some species, under the name "bear-grass," are used for seating chairs, &c. The fruits, which resemble small bananas, are cooked as an article of diet; and the roots contain a saponaceous matter used in place of soap.

Many of the species are hardy in Great Britain, and their striking appearance renders them attractive in gardens even when not in flower. They thrive in a rich, light soil, and are propagated by divisions planted in the open ground, or by pieces of the thick, fleshy roots in sandy soil under heat. Their rigid foliage, invested by thick epidermis, enables them to resist the noxious air of towns better than most plants. A popular name for the plant is "Adam's needle." The species which split up at the margins of their leaves into filaments are called "Eve's thread."

YUE-CHI (or YUEH-CHIH), the Chinese name of a central Asiatic tribe who ruled in Bactria and India, are also known as Kushans (from one of their subdivisions) and Indo-Scythians. They appear to have been a nomad tribe, inhabiting part of the present Chinese province of Kan-suh, and to have been driven W. by Hiung-nu tribes of the same stock. They conquered a tribe called the Wusun, who lived in the basin of the Ili river, and settled for some time in their territory. The date of these events is placed between 175 and 140 B.C. They then attacked another tribe known as Sakas, and drove them to Persia and India. For about twenty years it would seem that the Yue-Chi were settled in the country between the rivers Chu and Syr-Darya, but here they were attacked again by the Hiung-nu, their old enemies, with whom was the son of the defeated Wusun chieftain. The Yue-Chi then occupied Bactria, and little is heard of them for a hundred years. During this period they became a united people, having previously been a confederacy of five tribes, the principal of which, the Kushans (or Kwei-Shwang), supplied the new national name. They also to some extent gave up their nomadic life and became civilized. Bactria about this time was said to contain a thousand cities, and though this may be an exaggeration it was probably a meeting-place of Persian and Hellenic culture: its kings Demetrius and Eucratides had invaded India. It is therefore not surprising to find the warlike and mobile Yue-Chi following the same road and taking fragments of Persian and Greek civilization with them.

The chronology of this invasion and of the history of the Kushans in India must be regarded as uncertain, though we know the names of the kings. Indian literature supplies few data for the period, and the available information has been collected chiefly from notices in Chinese annals, from inscriptions found in India, and above all from coins. From this evidence it has been deduced that a king called Kozulokadphises, Kujulakasa or Kieu-tsieu-k'io (? A.D. 45–85) united the five tribes, conquered the Kabul valley and annihilated the remnants of Greek dominion. He was succeeded, possibly after an interval, by Ooemokadphises (Himakapisa or Yen-kao-tsin-tai), who completed the annexation of N. India. Then followed Kanishka (? c. A.D. 123–53), who is celebrated throughout eastern Asia as a patron of the Buddhist church and convener of the third Buddhist council. He is also said to have conquered Kashgar, Yarkand and Khotan. His successors were Huvishka and then Vasudeva, who may have died c. A.D. 225. After Vasudeva's reign the power of the Kushans gradually decayed, and they were driven back into the valley of the Indus and N.E. Afghanistan. Here, according to Chinese authorities, their royal family was supplanted by a dynasty called Ki-to-lo (Kidara), who were also of Yue-Chi stock, but belonged to one of the tribes who had remained in Bactria when the Kushans marched to India. The subsequent migration of the Kitolo S. of the Hindu Kush was due to the movements of the Jwen-Jwen, who advanced W. from the Chinese frontier. Under this dynasty a state known as the Little Kushan kingdom flourished in Gandhâra (E. Afghanistan) about A.D. 430, but was broken up by the attacks of the Hûnas.

Some authorities do not accept the list of Kushan kings as given above, and think that Kanishka must be placed before Christ and perhaps as early as 58 B.C.: also that there was another king with a name something like Vasushka before or after Huvishka. In any case the invasion of the Yue-Chi cannot have been very long before or very long after the Christian era, and had an important influence on Indian civilization. Their coins show a remarkable union of characteristics, derived from many nations. The general shape and style are Roman: the inscriptions are in Greek or in a Persian language written in Greek letters, or in Kharoshthi: the reverse often bears the figure of a deity, either Greek (Herakles, Helios, Selene) or Zoroastrian (Mithra, Vata, Verethraghna) or Indian (generally Śiva or a war god). One figure called Sarapo appears to be the Egyptian Serapis, and others are perhaps Babylonian deities. On the obverse is generally the king, who, in the earlier coins at any rate, wears a long open coat, knee boots and a tall cap—clearly the costume of a nomad from the north. The Gandhâra school of sculpture, of which the best specimens come from the neighbourhood of Kanishka's capital, Purushpura (the modern Peshawar), is a branch of Graeco-Roman art adapted to Oriental religious subjects. The Yue-Chi were probably the principal means of disseminating it in India, though all movements which kept open the communications between Bactria and Persia and India must have contributed, and the first introduction was due to the short-lived Graeco-Bactrian conquest (180–130 B.C.). The importance of the Gandhâran influence on the art of India and all Buddhist Asia is now recognized. Further, it is probably in the mixture of Greek, Persian and Indian deities which characterizes the pantheon of the Kushan kings that are to be sought many of the features found in Mahâyânist Buddhism and Hinduism (as distinguished from the earlier Brahmanism). Kanishka and other monarchs were zealous but probably by no means exclusive Buddhists, and the conquest of Khotan and Kashgar must have facilitated the spread of Buddhist ideas to China. It is also probable that the Yue-Chi not only acted as intermediaries for the introduction of Greek and Persian ideas into India, and of Indian ideas into China, but left behind them an important element in the population of N. India.

It is hard to say whether the Yue-Chi should be included in any of the recognized divisions of Turanian tribes such as Turks or Huns. Nothing whatever is known of their original language. Such of the inscriptions on their coins as are not in Greek or an Indian language are in a form of Persian written in Greek uncials. In this alphabet the Greek letter þ (or rather a very similar letter with the loop a little lower down) is used to represent *sh*, and there are some peculiarities in the use of *o* apparently connected with the expression of the sounds *h* and *w*. Thus PAONANO PAO KANHPKI KOPANO is to be read as something like *Shâhanân Shâh Kanishki Koshan*: Kanishka the Kushan, king of kings. This Persian title became in later times the special designation of the Kushan kings and is curiously parallel to the use of Arabic and Persian titles (padishah, sultan, &c.) by the Ottoman Turks. The physical type represented on these coins has a strong prominent nose, large eyes, a moderately abundant beard and somewhat thick or projecting lips. Hence, as far as any physical characters can be formulated for the various tribes (and their validity is very doubtful) the Yue-Chi type is Turkish rather than Mongol or Ugro-Finnic. In such points of temperament as military ability and power of assimilating Indian and Persian civilization, the Yue-Chi also resemble the Turks, and some authorities think that the name Turushka or Turukha sometimes applied to them by Indian writers is another evidence of the connexion. But the national existence and name of the Turks (*q.v.*) seem to date from the 5th century A.D., so that it is an anachronism to speak of the Yue-Chi as a division of them. The Yue-Chi and Turks, however, may both represent parallel developments of similar or even originally identical tribes. The Mahommedan writer Alberuni states that in former times the kings of the Hindus (among whom he mentions Kanik or Kanishka) were Turks by race, and this may represent a native tradition as to the affinities of the Yue-Chi. Some authors consider that the Yue-Chi are the same as the Getae and that the original form of the name was Yüt or Get, which is also supposed to appear in the Indian Jât.

See Vincent Smith, *Early History of India* (1908); Hoernle and Stark, *History of India* (1905); Rapson, *Indian Coins* (1898); Gardner, *Coins of Greek and Scythian Kings in India* (1886); Franke, *Beiträge aus Chinesischen Quellen zur Kenntnis der Turkvölker und*

Skythen (1904), and numerous articles by Cunningham, Fleet, A. Stein, Vincent Smith, Sylvian Levi, E. H. Parker and others in the *Journal of the Royal Asiatic Society*, *Journal asiatique*, *Asiatic Quarterly*, &c. Owing to the new evidence which is continually being brought forward, the most recent writings on this subject are generally to be preferred. (C. El.)

YUKON, the largest river in Alaska, and the fifth largest in N. America. With its longest tributaries not in Alaska, the Lewes and the Teslin (or Hootalinqua), its length is about 2300 m., in the form of a great arc, beginning in the Yukon District of British Columbia, near the Pacific Ocean, and ending at the Bering Sea coast. Its catchment area is about 330,000 sq. m., more than one-half of which lies in Canada. The Lewes river rises in Lake Bennet (Yukon District) on the N. slope of the Coast Range, about 25 m. inland from the Lynn Canal (at the head of Chatham Strait), and flows N. through a chain of lakes, its confluence with the Pelly river, at Selkirk, Yukon District, about 120 m. due E. of the Alaskan-Canadian boundary, forming the headwaters of the Yukon. Flowing thence N.W., the Yukon turns abruptly to the S.W. near Fort Yukon, Alaska, on the Arctic Circle, and continues nearly at right angles to its former course to a point S. of the head of Norton Sound, where it turns again and flows in a N.W. direction, emptying into the Sound from its S. shore. The length of the river, from its headwaters to its mouth, is about 1500 m.

The Yukon Valley comprises four sub-provinces, or physiographic divisions; in their order from the headwaters of the river these divisions have been called the "Upper Yukon," "Yukon Flats," "Rampart Region" and "Lower Yukon." The "Upper Yukon" Valley is about 450 m. long and from 1 to 3 m. broad, and is flanked by walls rising to the plateau level from 1500 to 3000 ft. above the stream. In this part of its course the Yukon receives from the S. the Selwyn river (about 40 m. below the junction of the Lewes and Pelly rivers); from the W. the White river (about 60 m. below the Selwyn); from the N. the Stewart river (about 10 m. below the White), one of the largest tributaries of the Yukon; from the E. the Klondike river (near 64° N.); from the W. Fortymile Creek (about 40 m. above the Alaskan-Canadian boundary line), and many other smaller streams. The "Yukon Flats" flank the river for about 200 m. and are from 40 to 100 m. wide. Here the stream varies in width from 10 to nearly 20 m., and involves a confused network of constantly changing channels. Here, too, the river makes its great bend to the S.W., and its channels are constantly changing. The "Flats" are monotonous areas of sand bars and low islands, thickly wooded with spruce. The principal tributaries here are the Porcupine river (an important affluent, which enters the main stream at the great bend about 3 m. N. of the Arctic Circle); the Chandlar river, also confluent at the great bend, from the N., and, near the W. edge of the Flats, the Dall river, also from the N. The "Rampart Region" begins near 66° N., where the "Flats" end abruptly, and includes about 110 m. of the valley, from 1 to 3 m. wide, and extending to the mouth of the Tanana. No large tributaries are received in this part of the river. The Lower Yukon includes that portion between the Ramparts and the sea, a stretch of about 800 m. At the mouth of the Tanana (which enters the main stream from the S.) the gorge opens into a lowland from 15 to 20 m. wide. Along the N.W. boundary of the valley are low mountains whose base the Yukon skirts, and it continues to press upon its N. bank until the delta is reached. The valley is never less than 2 or 3 m., and the river has many channels and numerous islands; it has walls nearly to the head of the delta, though about 100 m. above the delta the S. wall merges into the lowland coastal plain; the relief is about 1000 ft.

At the W. edge of the Ramparts the Yukon receives the Tanana river, its longest tributary lying wholly within Alaska. The Tanana Valley is about 400 m. long, nearly parallel to the Yukon from about due W. of its headwaters to the great bend, and drains about 25,000 sq. m. Its sources are chiefly glaciers in the Alaskan Range and it receives many tributaries. The Yukon delta begins near 63° N. Here the main stream branches into several channels which follow N. or N.W. courses to Norton Sound. The northernmost of these channels is the Apoon Pass, and the most southerly is Kwikluak Pass; their outlets are about 75 m. apart on the coast, and from 40 to 50 m. from the head of the delta. Between them is a labyrinth of waterways, most of the intervening land being not more than 10 ft. above low tide. The stream is mud-laden throughout its course, and though the sediment is heavier above the "Flats" than below them (where the slower current permits the settling of much of the silt), so much of it is carried to the river's mouth that the delta is being steadily extended. Immediately S. of the Yukon delta proper is that of the Kuskokwim, into which undoubtedly the Yukon's waters once found their way.

The Yukon is navigable from May till September, and steamers ply on several of its larger tributaries, making the aggregate navigable waters about 3500 m., about three-fourths of which are in Alaska. The nearest harbour for ocean-going vessels is a poor one at St Michael's Island, about 60 m. N.E. of the delta; here freight and passengers are transferred to flat-bottomed river steamers. These enter the delta and the river by the Apoon Pass, which is about 4 ft. deep at mean low water, the current varying from 1½ to 4 m. an hour. The Lewes (about 400 m. long) is navigable (with some difficulty, during low water, at Lake Lebarge) as far as White Horse Rapids, which, with Miles Canyon, obstruct the river for a few miles; above them the stream is again navigable to its source, about 100 m. beyond. The Pacific & Arctic railway from Skagway to White Horse (111 m.) overcomes these obstructions, however, for traffic and travel; and even the dangerous White Horse Rapids may be run by a skilful pilot in a small boat, as was done repeatedly by the gold-seekers in 1896–97. The Stewart river, seldom less than 150 yds. wide, is navigable by light-draught steamers to Frazer Falls, a distance of nearly 200 m. The Porcupine is navigable, in high water, to about the Alaska-Yukon boundary line (*c.* 90 m.); the Chandlar for a few miles; the Tanana (which is about 500 m. long) for about 225 m. to the Chena river (which is navigable for about 100 m.); and the Tolovana, another affluent of the Tanana, is also navigable for about 100 m.

In 1842–43 the Yukon was explored by the Russian Lieutenant Zagoskin, who built a trading post at Nulato, ascended the river (which he called the Kwikpak) as far as the Tanana, made a track survey of the stream to that point and reported that it was not navigable beyond there. In 1861 Robert Kennicott made his way overland by the Hudson Bay route from the Mackenzie river down the Yukon to Fort Yukon, and in 1865 he and Captain Charles S. Bulkley led the expedition sent out by the Western Union Telegraph Company to survey a route for a land telegraph line to Europe by way of Alaska and Siberia. Kennicott died at Nulato in 1866, and the expedition was abandoned in that year, but explorations were continued by other members, notably Dr William H. Dall,[1] with the result that valuable surveys were made and the Yukon identified as the Kwikpak of the earlier Russian surveys. Captain C. W. Raymond made a reconnoissance of the Yukon in 1869; the Indian route by the Lewes to the headwaters of the Yukon was used by gold prospectors as early as 1881, while in 1883 Lieutenant Frederick Schwatka (1849–1892) crossed the Chilkoot Pass (which he called "Perrier Pass"), descended the Lewes to Fort Selkirk, and down the river to the sea. Charles W. Homan, who accompanied Schwatka, made the first sketch survey of the great system; since then it has been frequently explored, but much of the region has not been mapped.

See Alfred H. Brooks, *The Geography and Geology of Alaska*, U.S. Geol. Survey, Document No. 201 (Washington, 1906); also G. M. Dawson, *Yukon District and British Columbia*, Annual *Report* of the Geol. and Natural History Survey of Canada, vol. 3, pt. 1 (1889); William Ogilvie, *The Klondike Official Guide* (Buffalo, N.Y., 1898); C. W. Haynes, "An Expedition through the Yukon District," *Nat. Geog. Mag.* vol. 4 (1892); R. G. McConnell, *Salmon River Gold Fields*, Summary of *Report* of Geol. Survey of Canada (1901); idem, *The Macmillan River, Yukon District*, Summary of *Report* of the Geological Survey of Canada for 1902; A. H. Brooks, *A Reconnaissance in the Tanana and White River Basins in 1898*, Twentieth Annual *Report*, U.S. Geol. Survey (Washington, 1900); and *A Reconnaissance from Pyramid Harbor to Eagle City, Alaska*, Twenty-first Annual *Report*, ibid. (Washington, 1900), and other sources cited by Brooks in the first-named work.

YUKON TERRITORY, the most westerly of the northern territories of Canada, bounded S. by British Columbia, W. by Alaska, N. by the Arctic Ocean and E. by the watershed of Mackenzie river. It has an area of 207,076 sq. m. The territory is chiefly drained by the Yukon river and its tributaries, though at the S.E. corner the headwaters of the Liard river, flowing into the Mackenzie, occupy a part of its area. The margins of the territory are mountainous, including part of the St Elias range with the highest mountains in Canada at the S.W. corner (Mount Logan and Mount St Elias), and the N. extension of the Rocky Mountains along the S. and N.E. sides; here, however, not very lofty. The interior of the territory is high toward the S.E. and sinks toward the N.W., and may be described as a much-dissected peneplain with low mountains to the S. The most important feature of the hydrography is the Yukon (*q.v.*) and the rivers which flow into it. The Klondike gold mines are reached by river boats, either coming up from St Michael at its mouth, or down 460 m. from White Horse. The White Horse route is now used almost entirely, since the White Pass railway, 111 m. long, was constructed from Skagway, on Lynn Canal, an inlet of the Pacific. As the voyage up the Pacific coast from Vancouver or Victoria is almost entirely through sheltered waters, the journey to the Klondike is very attractive in summer. Comparatively little snow is seen in crossing White Pass during summer, though there are patches on the low mountains on each side. The Rocky Mountains, N.E. of the interior plateau, are somewhat snowy, but apparently with no large glaciers; but the St Elias range to the S.W. is buried under immense snowfields, from which great glaciers project into the valleys. The rocks are largely ancient schists and eruptives, Palaeozoic or Archean, but considerable areas are covered with Mesozoic and Tertiary rocks, some of which include important seams of lignite or coal, the latter especially in the neighbourhood of White Horse. There have been comparatively recent volcanic eruptions in the region, as shown by a layer of white ash just beneath the soil for many miles along the river, and by a quite perfect cone with a crater and lava stream; but there are no records of volcanic outbreaks within the short modern history of the territory.

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[1] William Healey Dall (1845–), American naturalist, was born in Boston, Massachusetts, served with the United States Coast Survey of Alaska from 1871 to 1884, became honorary curator of the United States National Museum in 1880, and in 1893 was appointed professor of invertebrate palaeontology at the Wagner Institute of Science, Philadelphia. He was palaeontologist to the United States Geological Survey in 1884–1909. The white mountain sheep, or Dall's sheep (*Ovis dalli*), discovered in 1884, was named in his honour.

Before the discovery of gold on the Forty Mile and other rivers flowing into the Yukon the region was inhabited only by a few Indians, but the sensational finds of rich placers in the Klondike (*q.v.*) in 1896 brought in a vigorous population centred in the mines and at Dawson City, which was made the capital of the newly constituted Yukon Territory. When the White Pass railway was built, White Horse at its N. terminus became of importance, and since then a fluctuating body of prospectors and miners has been at work, not only in the Klondike but at various points along the other rivers. The territory is ruled by a governor and council, partly elective, seated at Dawson, and has a representative in the parliament of the Dominion. Almost the only economic product of the territory was at first gold, but copper and other ores later began to attract attention in the S. near White Horse. Though so near the Pacific the Yukon territory has a rigorous continental climate with very cold winters seven months long, and delightful sunny summers. Owing to the lofty mountains to the W. the amount of rain and snow is rather small, and the line of perpetual snow is more than 4000 ft. above sea-level, so that glaciers are found only on the higher mountains; but the moss-covered ground is often perpetually frozen to a depth of 100 or 200 ft. Vegetation is luxuriant along the river valleys, where fine forests of spruce and poplar are found, and the hardier grains and vegetables are cultivated with success. (A. P. C.)

YULE, SIR HENRY (1820–1889), British Orientalist, was born on the 1st of May 1820, at Inveresk, near Edinburgh, the son of Major William Yule (1764–1839), translator of the *Apothegms* of Ali. He was educated at Edinburgh, Addiscombe and Chatham, and joined the Bengal Engineers in 1840. He served in both the Sikh wars, was secretary to Colonel (afterwards Sir) Arthur Phayre's mission to Ava (1855), and wrote his *Narrative of the Mission to the Court of Ava* (1858). He retired in 1862 with the rank of colonel, and devoted his leisure to the medieval history and geography of Central Asia. He published *Cathay and the Way Thither* (1866), the *Book of Ser Marco Polo* 1871–75), for which he received the gold medal of the Royal Geographical Society, and brought out with Dr Arthur C. Burnell *Hobson-Jobson* (1886), a dictionary of Anglo-Indian colloquial phrases. For the Hakluyt Society, of which he was for some time president, he edited (1863) the *Mirabilia descripta* of Jordanus and *The Diary of William Hedges* (1887–89). The latter contains a biography of Governor Pitt, grandfather of Chatham. From 1875 to 1889 Yule was a member of the Council of India, being appointed K.C.S.I. on his retirement. He died on the 30th of December 1889.

See Memoir by his daughter, prefixed to the posthumous third edition of *Marco Polo* (1903).

YULE, the season of Christmas (*q.v.*). This word is chiefly used alone as an archaism or in poetry or poetical language, but is more common in combination, as in "yule-tide," "yule-log," &c. The Old English word appears in various forms, *e.g. geóla*, *iula*, *geol*, *gehhol*, *gehhel*; cognate forms are Icel, *jól*; Dan. *juul*; Swed. *jul*. It was the name of two months of the year, December and January, the one the "former yule" (*se ærra geóla*), the other the "after yule" (*se æftera geóla*), as coming before and after the winter solstice (*Cotton MS.* Tib. B. i.; and Bede, *De Temporum Ratione*, 13, quoted in Skeat, *Etym. Dict.*, 1898). According to A. Fick (*Vergleichendes Wörterbuch der Indogermanischen Sprachen*, vol. iii. 245, 1874) in proper meaning is noise, clamour, the season being one of rejoicing at the turning of the year among Scandinavian peoples before Christian times.

YUN-NAN (*i.e.* Cloudy South), a S.W. province of China, bounded N. by Sze-ch'uen, E. by Kwei-chow and Kwang-si, S. by Burma and the Lao tribes and W. by Burma and Tibet; area estimated at from 122,000 to 146,000 sq. m. Though the second largest province of the empire, its population is estimated at only 12,000,000. The inhabitants include many races besides Chinese, such as Shans, Lolos and Maotsze. The Musus, in N.W. Yun-nan, once formed an independent kingdom which extended into E. Tibet. Many of the inhabitants are nominally Moslems. The greater part of the province may be said to consist of an extensive plateau, generally from 5000 to 7000 ft. in altitude, containing numerous valley plains, which is divided in the N. by mountain ranges that enter at the N.W. corner and separate the waters of the Yangtsze-kiang, the Mekong and the Salween. The mountains attain heights of 16,000 ft. The climate is generally healthy and equable; on the plateau the summer heat seldom exceeds 86°, and in winter there is little snow. The principal rivers are the Yangtsze-kiang (locally known as the Kinsha-kiang = Golden Sand river), which enters Yun-nan at its N.W. corner, flows first S.E. and then N.E., forming for a considerable distance the N. boundary of the province; the Mekong, which traverses the province from N. to S. on its way to the sea through Annam; the Salween, which runs a parallel course through its W. portion; and the headwaters of the Songkoi, which rises in the S.E. of the province. This last-named river is navigable from the Gulf of Tongking to Man-hao, a town ten days' journey from Yun-nan Fu. There are two large lakes—one in the neighbourhood of Ta-li Fu, which is 24 m. long by 6 m. broad, and the other near Yun-nan Fu, which measures from 70 to 80 m. in circumference.

Besides Yun-nan Fu, the capital, the province contains thirteen prefectural cities, several of which—Teng-ch'uen Fu, Ta-li Fu, Yung-ch'ang Fu, Ch'u-siung Fu and Lin-gan Fu, for example—are situated in the valley plains. Mengtsze, Szemao and Momein (or Têng-yueh) are open to foreign trade. Yun-nan Fu is connected by railway (1910) with Tongking. The line which starts from Haiphong runs, in Yun-nan, via Mengtsze hsien (a great commercial centre), to the capital. Several important roads intersect the province; among them are—1. The road from Yun-nan Fu to Bhamo in Burma via Ta-li Fu (12 days), Têng-yueh Chow or Momein (8 days) and Manwyne—beyond Ta-li Fu it is a difficult mountain route. 2. The road from Ta-li Fu N. to Patang via Li-kiang Fu, which thus connects W. Yun-nan with Tibet. 3. The ancient trade road to Canton, which connects Yun-nan Fu with Pai-sê Fu, in Kwang-si, on the Canton West River, a land journey which occupies about twenty days. From this point the river is navigable to Canton.

Agricultural products include rice and maize (the principal crops), wheat, barley and oats. The poppy was formerly extensively cultivated, but after the anti-opium edict of 1906 vigorous measures were taken to stamp out the cultivation of the plant. In certain localities the sugar-cane is grown. Tea from Pu-êrh Fu in S. Yun-nan is appreciated throughout the empire. Fruits and vegetables are plentiful, and there are large herds of buffaloes, goats and sheep. Silkworms are reared. The chief wealth of Yun-nan consists, however, in its minerals. Copper is the most important of the minerals worked. Silver and gold are produced, but they are not known to exist in any large quantities. Lead is of frequent occurrence, and indeed the area through which copper, silver, lead, tin and zinc are distributed in sufficient quantities to make mining answer, comprises at least 80,000 sq. m. Coal is also found and several salt mines are worked. The ores are generally of good quality, and are easy of extraction. Cotton yarn and cloth, petroleum, timber and furs are among the chief imports; copper, tin, hides and tea are important exports; medicines in the shape not only of herbs and roots, but also of fossils, shells, bones, teeth and various products of the animal kingdom; and precious stones, principally jade and rubies, are among the other exports.

Yun-nan, long independent, was subdued by Kublai Khan, but was not finally incorporated in the empire until the 17th century. It was the principal centre of the great Mahommedan rebellion, which lasted sixteen years and was suppressed in 1872. Even in 1910 the province had not wholly recovered from the effects of that struggle and the barbarity with which it was stamped out. The opening of Christian (Protestant) mission work in Yun-nan began in 1877, and was one result of the murder of Mr Margary (see CHINA, *History*, § *D*).

See H. R. Davies, *Yun-nan, the Link between India and the Yangtse* (Cambridge, 1909); A. Little, *Across Yunnan* (London, 1910); Rev. J. M'Carthy, "The Province of Yunnan," in *The Chinese Empire* (London, 1907); L. Richard, *Comprehensive Geography of the Chinese Empire* (Shanghai, 1908).

YUN-NAN FU, the capital of the province of Yun-nan, China, in 25° 6′ N., 102° 52′ E. It is about 500 m. by rail N.N.W. of the port of Haiphong, Tongking. The population was returned in 1907 at 45,000. Originally the surrounding district was known as the "land of the southern barbarians." The city is situated on a plain, and is surrounded by fortified walls, 6½ m. in circuit. For many years Mahommedans have been numerous in the city and neighbourhood; and in 1855 a Mahommedan rising occurred. Before the rebellion Yun-nan Fu had a prosperous aspect; the shops were large and well supplied with native silken goods, saddlery, &c., while English cotton, Russian cloths and raw cotton from Burma constituted the main foreign merchandise. Employment for large numbers of work-people was found in the copper factories. A mint at Yun-nan Fu issued annually 101,000,000 cash. Nearly ruined by the rebellion, the city took many years to recover its prosperity. A fresh impetus to commerce was given by the opening in 1910 of the railway from Tongking, a line built by French engineers and with French capital. The construction of a British railway to connect Burma with Yun-nan Fu and onwards to the Yangtsze-kiang has been in contemplation.

YURIEV (formerly DORPAT, also *Dörpt*; Russian, *Derpt*; Esthonian, *Tarto* and *Tartolin*; in Lettish, *Tehrbata*), a town of W. Russia, in the government of Livonia, situated on the Embach, 158 m. by rail N.E. of Riga, in 58° 23′ N. and 26° 23′ E. Pop. 42,421. The principal part of the town lies S. of the river, and the more important buildings are clustered round the two eminences known as the Domberg (cathedral hill) and the Schlossberg (castle hill), which in the middle ages were occupied by the citadel, the cathedral and the episcopal palace. Owing to a great fire in 1777, the town is almost entirely modern; and its fortifications have been transformed into promenades. Besides a good picture gallery in the Ratshof, and the 13th-century church of St John, Yuriev possesses a university, with an observatory, an art museum, a botanical garden and a library of 250,000 volumes, which are housed in a restored portion of the cathedral, burned down in 1624. The university was founded by Gustavus Adolphus of Sweden in 1632; but in 1699 teachers and students removed to Pernau on the advance of the Russians, and on the occupation of the country by Peter the Great again took flight to Sweden. In spite of the treaty of 1710 and the efforts of the Livonian nobles, it was not till 1802 that its restoration was effected under the patronage of Alexander I. Down to 1895, in which year it was thoroughly Russified, the university was German in spirit and in sentiment. It is now attended by some 1700 students annually. The astronomical department is famous, owing partly to the labours of F. G. W. von Struve (1820–39), and partly to Fraunhofer's great refracting telescope, presented by the emperor Alexander I. There are monuments to the naturalist K. E. von Baer (1886) and Marshal Barclay de Tolly (1849), and the town is the headquarters of the XVIII. army corps.

The foundation of Dorpat is ascribed to Yaroslav, prince of Kiev, and is dated 1030. In 1224 the town was seized by the Teutonic Knights, and in the following year Bishop Hermann erected a cathedral on the Domberg. From that date till about 1558 the town enjoyed great prosperity, and the population reached 50,000. In 1558 it was captured by the Russians, but in 1582 was yielded to Stephen Bathori, king of Poland. In 1600 it fell into the hands of the Swedes, in 1603 reverted to the Poles, and in 1625 was seized by Gustavus Adolphus of Sweden. The Russians again obtained temporary possession in 1666, but did not effect a permanent occupation till 1704. In 1708 the bulk of the population were removed to the interior of Russia.

YUSAFZAI, a large group of Pathan tribes, originally immigrants from the neighbourhood of Kandahar, which includes those of the Black Mountain, the Bunerwals, the Swatis, the people of Dir and the Panjkora valley, and also the inhabitants of the Yusafzai plain in Peshawar district of the North-West Frontier Province of India. Three sections of the tribe, the Hassanzais, Akazais and Chagarzais, inhabit the W. slopes of the Black Mountain, and the Yusafzai country stretches thence to the Utman Khel territory. The trans-border Yusafzais are estimated at 65,000 fighting men, giving a total population of about 250,000. The Yusafzais are said to be descended from one Mandai, who had two sons, Umar and Yusaf. Umar died, leaving one son, Mandan; from Mandan and Yusaf come the two primary divisions of the Yusafzais, which are split into numerous subdivisions, including the Isazais, Malizais, Akazais, Ranizais and Utmanzais.

YUZGAT, the chief town of a sanjak of the same name in the Angora vilayet of Asia Minor, altitude 4380 ft., situated 105 m. E. of Angora, near the head of a narrow valley through which the Angora-Sivas road runs. The town was built largely out of the ruins of Nefez Keui (anc. *Tavium*), by Chapan Oghlu, the founder of a powerful Dere Bey family. There is a trade in yellow berries and mohair. The sanjak is very fertile, and contains good breeding-grounds, upon which horses, camels and cattle are reared. The population, about 15,000, includes a large Armenian community.

YVETOT, a town of N. France, capital of an arrondissement in the department of Seine-Inférieure, 24 m. N.W. of Rouen on the railway to Havre. Pop. (1906) 6214. Cotton goods of various kinds and hats are made here, and trade is carried on in agricultural products. The church (18th century) contains a marble altar from the Carthusian monastery at Rouen, fine woodwork of the 17th century from the abbey of St Wandrille, and a handsome pulpit. The town is the seat of a sub-prefect and has tribunals of first instance and of commerce, and a chamber of arts and manufactures. The lords of Yvetot bore the title of king from the 15th till the middle of the 16th century, their petty monarchy being popularized in one of Béranger's songs. In 1592 Henry IV. here defeated the troops of the League

Z the twenty-sixth letter of the English alphabet and the last, although till recent times the alphabets used by children terminated not with *z* but with &, or &. For & the English name is *ampersand*, *i.e.* "and *per se* and," though the Scottish name *epershand*, *i.e.* "*Et*, *per se* and," is more logical and also more clearly shows its origin to be the Latin *et*, of which it is but the manuscript form. To the following of *z* by & George Eliot refers when she makes Jacob Storey say, "He thought it (*z*) had only been put to finish off th' alphabet like, though *ampusand* would ha' done as well, for what he could see." *Z* is put at the end of the alphabet because it occupied that position in the Latin alphabet. In early Latin the sound represented by *z* passed into *r*, and consequently the symbol became useless. It was therefore removed from the alphabet and *G* (*q.v.*) put in its place. In the 1st century B.C. it was, like *y*, introduced again at the end, in order to represent more precisely than was before possible the value of the Greek *Z*, which had been previously spelt with *s* at the beginning and *ss* in the middle of words: *sona* = ζώνη, "belt"; *tarpessita* = τραπεζίτης, "banker." The Greek form was a close copy of the Phoenician symbol I, and the Greek inscriptional form remained in this shape throughout. The name of the Semitic symbol was *Zayin*, but this name, for some unknown reason, was not adopted by the Greeks, who called it *Zeta*. Whether, as seems most likely, Zeta was the name of one of the other Semitic sibilants Ẓade (Tzaddi) transferred to this by mistake, or whether the name is a new one, made in imitation of Eta (η) and Theta (θ), is disputed. The pronunciation of the Semitic letter was the voiced *s*, like the ordinary use of *z* in English, as in *zodiac*, *raze*. It is probable that in Greek there was a considerable variety of pronunciation from dialect to dialect. In the earlier Greek of Athens, North-west Greece and Lesbos the pronunciation seems to have been *zd*, in Attic from the 4th century B.C. onwards it seems to have been only a voiced *s*, and this also was probably the pronunciation of the dialect from which Latin borrowed its Greek words. In other dialects, as Elean and Cretan, the symbol was apparently used for sounds resembling the English voiced and unvoiced *th* (ð, þ). In the common dialect (κοινή) which succeeded the older dialects, ζ became a voiced *s*, as it remains in modern Greek. In Vulgar Latin the Greek *Z* seems to have been pronounced as *dy* and later *y*; *di* being found for *z* in words like *baptidiare* for *baptizare*, "baptize," while conversely *z* appears for *di* in forms like *zaconus*, *zabulus*, for *diaconus*, "deacon," *diabulus*, "devil." *Z* also is often written for the consonantal I (J) as in *zunior* for *iunior*, "younger" (see Grandgent, *Introduction to Vulgar Latin*, §§ 272, 339) Besides this, however, there was a more cultured pronunciation of *z* as *dz*, which passed through French into Middle English. Early English had used *s* alone for both the unvoiced and the voiced sibilant; the Latin sound imported through French was new and was not written with *z* but with *g* or *i*. The successive changes can be well seen in the double forms from the same original, *jealous* and *zealous*. Both of these come from a late Latin *zelosus*, derived from the imported Greek ζῆλος. Much the earlier form is *jealous*; its initial sound is the *dz* which in later French is changed to *z* (voiced *s*). It is written *gelows* or *ielous* by Wycliffe and his contemporaries, the form with *i* is the ancestor of the modern form. The later word *zealous* was borrowed after the French *dz* had become *z*. At the end of words this *z* was pronounced *ts* as in the English *assets*, which comes from a late Latin *ad satis* through an early French *asez*, "enough." With *z* also is frequently written *zh*, the voiced form of *sh*, in *azure*, *seizure*. But it appears even more frequently as *s* before *u*, and as *si* or *ti* before other vowels in *measure*, *decision*, *transition*, &c., or in foreign words as *g*, as in *rouge*. For the ȝ representing *g* and *y* in Scottish proper names see under *Y*. (P. Gi.)

ZAANDAM (incorrectly SAARDAM), a town of Holland, in the province of North Holland, on the river Zaan, 6½ m. N.W. of Amsterdam, with which it is connected by railway and steamer. Pop. (1905) 23,773. It is of typically Dutch appearance, with low, brightly coloured houses. It has an important trade in timber, and numerous windmills in the vicinity provide power for oil, cement and paper works, timber-sawing and corn-grinding. At Zaandam is preserved the wooden hut which Peter the Great occupied for a week in 1697 while studying shipbuilding and paper-making.

ZABERN (French, *Saverne*), a town of Germany, in the imperial province of Alsace-Lorraine, district of Lower Alsace, situated on the Rhine-Marne canal at the foot of a pass over the Vosges, and 27 m. N.W. of Strassburg by the railway to Deutsch Avricourt. Pop. (1900) 8499. Its principal building, the former episcopal residence, rebuilt by Cardinal de Rohan in 1779, is now used as barracks. There are also a 15th century church and an antiquarian museum. In the vicinity are the ruined castles of Hoch-barr, Grossgeroldseck, Ochsenstein and Greifenstein. Hence a beautiful road, immortalized by Goethe in *Dichtung und Wahrheit*, leads across the Vosges to Pfalzburg.

Zabern (*Tres Tabernae*) was an important place in the times of the Romans, and, after being destroyed by the Alamanni, was rebuilt by the emperor Julian. During the Peasants' War the town was occupied, in 1525, by the insurgents, who were driven out in their turn by Duke Anton of Lorraine. It suffered much from the ravages of the Thirty Years' War, but the episcopal castle, then destroyed, was subsequently rebuilt, and in 1852 was converted by Louis Napoleon into a place of residence for widows of knights of the Legion of Honour.

See Fischer, *Geschichte der Stadt Zabern* (Zabern, 1824).

ZABRZE, a town of Germany, in the extreme S.E. of Prussian Silesia, on the railway between Gleiwitz and Königshütte. Pop. (1905) 55,634. Like other towns in this populous region, it is an important manufacturing centre, having coal-mines, iron, wire, glass, chemical and oil works, breweries, &c.

ZACATECAS, a state of Mexico, bounded N by Durango and Coahuila, E. by San Luis Potosí, S. by Aguascalientes and Jalisco, and W. by Jalisco and Durango. Area, 24,757 sq. m. Pop. (1900) 462,190. It belongs wholly to the great central plateau of Mexico, with an average elevation of about 7700 ft. The state is somewhat mountainous, being traversed in the W. by lateral ranges of the Sierra Madre Occidental, and by numerous isolated ranges in other parts—Mazapil, Norillos, Guadalupe and others. There are no large rivers, only the small head-streams of the Aguanaval in the N., and of the Guazamota, Bolanos and Juchipila in the W., the last three being tributaries of the Rio Grande de Santiago. As the rainfall is light this lack of streams suitable for irrigation is a drawback to agriculture. The climate is dry and generally healthy, being warm in the valleys and temperate in the mountains. The agricultural products are cereals, sugar and maguey, the first being dependent on the rainfall, often failing altogether, the second on irrigation in the lower valleys, and the latter doing best in a dry climate on a calcareous soil with water not far beneath the surface. There is also a considerable production of peaches, apricots and grapes, the last being made into wine. A few cattle are raised, and considerable attention is given to the rearing of sheep, goats and swine. A natural product is *guayule*, a shrub from which rubber is extracted. The chief industry of Zacatecas, however, is mining for silver, gold, mercury, copper, iron, zinc, lead, bismuth, antimony and salt. Its mineral wealth was discovered soon after the conquest, and some of its mines are among the most famous of Mexico, dating from 1546. One of the most productive of its silver mines, the Alvarado, has records which show a production of nearly $800,000,000 in silver between 1548 and 1867. The state is traversed by the Mexican Central and the Mexican National railways. Its manufactures are limited chiefly to the reduction of mineral ores, the extraction of rubber from *guayule*, the making of sugar, rum, mescal, pulque, woollen and cotton fabrics, and some minor industries of the capital. The capital is Zacatecas, and the other principal towns are Sombrerete (pop. 10,000), an important silver-mining town 70 m. N.W. of the capital (elevation 8430 ft.); Ciudad Garcia (about 9500); Guadalupe (9000); Pinos (8000), a mining town; San Juan de Mezquital (7000); and Fresnillo (6300), an important silver- and copper-mining centre.

ZACATECAS, a city of Mexico, capital of the state of Zacatecas, 442 m. by the Mexican Central railway N.W. of Mexico city. Pop. (1900) 39,912. It is built in a deep, narrow ravine, 8050 ft. above sea-level, with narrow, crooked streets climbing the steep hillsides, and white, flat-roofed houses of four and five storeys overtopping each other. Its streets are well paved, and are lighted with electricity. The city is well drained and has a fine aqueduct for its water supply. The cathedral is an elaborately carved red-stone structure with unfinished towers and richly decorated interior. Several domed churches occupy prominent sites. The National College and the Colegio de Nuesta Señora de Guadalupe with its fine library may be noticed. Overlooking the city from an elevation of 500 ft. is the Bufa Hill, which is crowned by a chapel and is a popular pilgrimage resort. The Guadalupe chapel near the city has elaborate decorations, including frescoes, onyx steps, silver rails and paintings, and a curious tiled dome. The industries comprise carriage building, weaving and the manufacture of coarse pottery. The town is an important commercial centre.

Zacatecas was founded in 1546 and was built over a rich vein of silver discovered by Juan de Tolosa in the same year. This and other mines in the vicinity attracted a large population, and it soon became one of the chief mining centres of Mexico. It was made a city in 1585 by Philip II.

ZACH, FRANZ XAVER, Baron von (1754–1832), German astronomer, was born at Pesth on the 4th of June 1754. He served for some time in the Austrian army, and afterwards lived in London from 1783 to 1786 as tutor in the house of the Saxon minister, Count Brühl. In 1786 he was appointed by Ernest II. of Saxe-Coburg-Gotha director of the new observatory on the Seeberg at Gotha, which was finished in 1791. From 1806 Zach accompanied the duke's widow on her travels in the south of Europe. He died in Paris on the 2nd of September 1832

Zach published *Tables of the Sun* (Gotha, 1792; new and improved edition, *ibid.*, 1804), and numerous papers on geographical subjects, particularly on the geographical positions of many towns and places, which he determined on his travels with a sextant. His principal importance was, however, as editor of three scientific journals of great value: *Allgemeine Geographische Ephemeriden* (4 vols., Gotha, 1798–99), *Monatliche Correspondenz zur Beförderung der Erd- und Himmels-Kunde* (28 vols., Gotha, 1800–13, from 1807 edited by B. von Lindenau), and *Correspondance astronomique, géographique, hydrographique, et statistique* (Genoa, 1818–26, 14 vols., and one number of the 15th suppressed at the instigation of the Jesuits).

ZACHARIAE VON LINGENTHAL, KARL SALOMO (1769–1843), German jurist, was born on the 14th of September 1769 at Meissen in Saxony, the son of a lawyer, and received his early education at the famous public school of St Afra in that town. He afterwards studied philosophy, history, mathematics and law at the university of Leipzig. In 1792 he went to Wittenberg University as tutor to one of the counts of Lippe, and continued his legal studies. In 1794 he became *privatdozent*, lecturing on canon law, in 1798 extraordinary professor, and 1802 ordinary professor of *feudal law*. From that time to his death in 1843, with the exception of a short period in which public affairs occupied him, he poured out a succession of works covering the whole field of jurisprudence, and was a copious contributor to periodicals. In 1807 he received a call to Heidelberg, then beginning its period of splendour as a school of law. There, resisting many calls to Göttingen, Berlin and other universities, he remained until his death. In 1820 he took his seat, as representative of his university, in the upper house of the newly constituted parliament of Baden. Though he himself prepared many reforms—notably in the harsh criminal code—he was, by instinct and conviction, conservative and totally opposed to the violent democratic spirit which dominated the second chamber, and brought it into conflict with the grand-duke and the German federal government. After the remodelling of the constitution in a "reactionary" sense, he was returned, in 1825, by the district of Heidelberg to the second chamber, of which he became the first vice-president, and in which he proved himself more "loyal" than the government itself. With the growth of parliamentary Liberalism, however, he grew disgusted with politics, from which he retired altogether in 1829. He now devoted himself wholly to juridical work and to the last days of his life toiled with the ardour of a young student. His fame extended beyond Germany. The German universities then enjoyed, in regard to legal questions of international importance, a jurisdiction dating from the middle ages; and Zachariae was often consulted as to questions arising in Germany, France and England. Elaborate "opinions," some of them forming veritable treatises—*e.g.* on Sir Augustus d'Este's claim to the dukedom of Sussex, Baron de Bode's claim as an English subject to a share in the French indemnity, the dispute as to the debts due to the elector of Hesse-Cassel, confiscated by Napoleon, and the constitutional position of the Mecklenburg landowners—were composed by Zachariae. Large fees which he received for these opinions and the great popularity of his lectures made him rich, and he was able to buy several estates; from one of which, Lingenthal, he took his title when, in 1842, he was ennobled by the grand-duke. He died on the 27th of March 1843. He had married in 1811, but his wife died four years later, leaving him a son, Karl Eduard.

Zachariae's true history is in his writings, which are extremely numerous and multifarious. They deal with almost every branch of jurisprudence; they are philosophical, historical and practical, and relate to Roman, Canon, German, French and English law. The first book of much consequence which he published was *Die Einheit des Staats und der Kirche mit Rücksicht auf die Deutsche Reichsverfassung* (1797), a work on the relations of church and state, with special reference to the constitution of the empire, which displayed the writer's power of analysis and his skill in making a complicated set of facts appear to be deductions from a few principles. In 1805 appeared *Versuch einer allgemeinen Hermeneutik des Rechts;* and in 1806 *Die Wissenschaft der Gesetzgebung*, an attempt to find a new theoretical basis for society in place of the opportunist politics which had led to the cataclysm of the French Revolution. This basis he seemed to discover in something resembling Bentham's utilitarianism. Zachariae's last work of importance was *Vierzig Bücher vom Staate* (1839–42), to which his admirers point as his enduring monument. It has been compared to Montesquieu's *L'Esprit des lois*, and covers no small part of the field of Buckle's first volume of the *History of Civilization*. But though it contains proof of vast erudition and many original ideas as to the future of the state and of law, it lacks logical sequence, and is, consequently, full of contradictions. Its fundamental theory is, that the state had its origin, not in a contract (Rousseau-Kant), but in the consciousness of a legal duty. What Machiavelli was to the Italians and Montesquieu to the French, Zachariae aspired to become to the Germans; but he lacked their patriotic inspiration, and so failed to exercise any permanent influence on the constitutional law of his country. Among other important works of Zachariae are his *Staatsrecht*, and his treatise on the *Code Napoléon*, of which several French editions were published, and which was translated into Italian. Zachariae edited with Karl Joseph Mittermaier the *Kritische Zeitschrift für Rechtswissenschaft und Gesetzgebung des Auslandes*, and the introduction which he wrote illustrates his wide reading and his constant desire for new light upon old problems. Though Zachariae's works have been superseded, they were in their day epoch-making, and they have been superseded by books which, without them, could not have been written.

For an account of Zachariae and his works, see Robert von Mohl, *Geschichte u. Literatur der Staatswissenschaften* (1855–58), and Charles Brocher, *K. S. Zachariae, sa vie et ses œuvres* (1870); cf. also his biography in *Allgem. Deutsche Biographie* (vol. 44) by Wilhelm Fischer, and Holtzendorff, *Rechts-Lexicon, Zachariae von Lingenthal*.

His son, **Karl Eduard Zachariae** (1812–1894), also an eminent jurist, was born on the 24th of December 1812, and studied philosophy, history, mathematics and languages, as well as jurisprudence, at Leipzig, Berlin and Heidelberg. Having made Roman and Byzantine law his special study, he visited Paris in 1832 to examine Byzantine MSS., went in 1834 to St Petersburg and Copenhagen for the same purpose, and in 1835 worked in the libraries of Brussels, London, Oxford, Dublin, Edinburgh and Cambridge. After a few months as a practising lawyer and *privatdozent* at Heidelberg, he went in 1837, in search of materials, to Italy and the East, visiting Athens, Constantinople and the monasteries of Mount Athos. Having a taste for a country life, and none for teaching, he gave up his position as extraordinary professor at Heidelberg, and in 1845 bought an estate in the Prussian province of Saxony. Here he lived, engaged in scientific agriculture and interested in Prussian politics, until his death on the 3rd of June 1894.

He produced an enormous mass of works of great importance for students of Byzantine law. The task to which he devoted his life was, to discover and classify the sources of Byzantine law hidden away in the libraries of the East and West; to re-edit, in the light of modern criticism, those sources which had already been published; to write the history of Byzantine law on the basis of this hitherto undiscovered material; and finally, to apply the results to the scientific elucidation of the Justinian law. His *Jus Graeco-Romanum*, of which the first part was published in 1856, the last in 1891, is the best and most complete collection of the sources of Byzantine law and of the *Novels* from the time of Justin II. to 1453. On the general history of the subject he wrote two epoch-making works, the *Historiae Graeco-Romani juris delineatio, cum appendice ineditorum* (Heidelberg, 1839), and *Innere Geschichte des grieschisch-römischen Rechts. I. Personalrecht; II. Erbrecht; III. Die Geschichte des Sachenrechts und Obligationsrecht* (Leipzig, 1856), the third edition of which appeared under the title *Geschichte des griechisch-römischen Rechts* (1892). In this last work, which covered ground hitherto unexplored, Byzantine is treated as a development of Justinian law, and incidentally many obscure points in the economic and agrarian conditions of the Eastern empire are elucidated. For a list of Zachariae's other works, see *Allgem. Deutsche Biogr.*, art. by Wilhelm Fischer.

ZACHARIAS, ST, pope from 741 to 752, was a Greek by birth, and appears to have been on intimate terms with Gregory III., whom he succeeded (November 741). Contemporary history dwells chiefly on his great personal influence with the Lombard king Luitprand, and with his successor Rachis; it was largely through his tact in dealing with these princes in a variety of emergencies that the exarchate of Ravenna was rescued from becoming part of the Lombard kingdom. A correspondence, of considerable extent and of great interest, between Zacharias and St Boniface, the apostle of Germany, is still extant, and shows how great was the influence of this pope on events then passing in France and Germany: he encouraged the deposition of Childeric, and it was with his sanction that Boniface crowned Pippin as king of the Franks at Soissons in 752. Zacharias is stated to have remonstrated with the emperor Constantine Copronymus on the part he had taken in the iconoclastic controversy. He died on the 14th of March 752, and was succeeded by Stephen II.

The letters and decrees of Zacharias are published in Migne, *Patrolog. lat.* lxxxix. p. 917-960.

ZAGAZIG (Zaḳāzīk), a town of Lower Egypt, capital of the province of Sharkia. Pop. (1907) 34,999, including 2617 Copts and 1355 Greeks. It is built on a branch of the Fresh Water or Ismailia canal, and on the Al-Mo'izz canal (the ancient Tanitic channel of the Nile), and is 47 m. by rail N.N.E. of Cairo. Situated on the Delta in the midst of a fertile district, Zagazig is a great centre of the cotton and grain trade of Egypt. It has large cotton factories and the offices of numerous European merchants. About a mile south of the town are the ruins of Bubastis (*q.v.*).

ZÄHRINGEN, the name of an old and influential German family, taken from the castle and village of that name near Freiburg-im-Breisgau. The earliest known member of the family was probably one Bezelin, a count in the Breisgau, who was living early in the 11th century. Bezelin's son Bertold I. (d. 1078) was count of Zähringen and was related to the Hohenstaufen family. He received a promise of the duchy of Swabia, which, however, was not fulfilled, but in 1061 he was made duke of Carinthia. Although this dignity was a titular one only Bertold lost it when he joined a rising against the emperor Henry IV. in 1073. His son Bertold II. (d. 1111), who like his father fought against Henry IV., inherited the land of the counts of Rheinfelden in 1090 and took the title of duke of Zähringen; he was succeeded in turn by his sons, Bertold III. (d. 1122) and Conrad (d. 1152). In 1127 Conrad inherited some land in Burgundy and about this date he was appointed by the German king, Lothair the Saxon, rector of the kingdom of Burgundy or Arles. This office was held by the Zähringens until 1218 and hence they are sometimes called dukes of Burgundy. Bertold IV. (d. 1186), who followed his father Conrad, spent much of his time in Italy in the train of the emperor Frederick I.; his son and successor, Bertold V., showed his prowess by reducing the Burgundian nobles to order. This latter duke was the founder of the town of Bern, and when he died in February 1218 the main line of the Zähringen family became extinct. By extensive acquisitions of land the Zähringens had become very powerful in the districts now known as Switzerland and Baden, and when their territories were divided in 1218 part of them passed to the counts of Kyburg and thence to the house of Habsburg. The family now ruling in Baden is descended from Hermann, margrave of Verona (d. 1074), a son of duke Bertold I., and the grand-duke is thus the present representative of the Zähringens.

See E. J. Leichtlen, *Die Zähringer* (Freiburg, 1831); and E. Heyck, *Geschichte der Herzoge von Zähringen* (Freiburg, 1891), and *Urkunden, Siegel und Wappen der Herzoge von Zähringen* (Freiburg, 1892).

ZÄHRINGEN, a village of Germany, in the grand duchy of Baden, situated under the western slope of the Black Forest, 2 m. from Freiburg-im-Breisgau, and on the railway from Heidelberg to Basel. Pop. (1900) 1200. Above the village on a spur of the mountains, 1500 ft. above the sea, lie the ruins of the castle of Zähringen, formerly the stronghold of the ducal line of that name (see above).

See Schöpflin, *Historia Zaringo-Badensis* (Karlsruhe, 1763-66, 7 vols.).

ZAILA, or Zeila; a town on the African coast of the Gulf of Aden, 124 m. S.W. of Aden and 200 m. N.N.E. of Harrar. Zaila is the most western of the ports of the British Somaliland protectorate, being 170 m. N.W. of Berbera by the coast caravan track. The town is surrounded on three sides by the sea; landward the country is unbroken desert for some fifty miles. The principal buildings, which date from the days of Egyptian occupation (1875-1884) are of white (coral) stone; the Somali dwellings are made of grass. Zaila has a good sheltered anchorage much frequented by Arab sailing craft, but heavy draught steamers are obliged to anchor a mile and a half from the shore. Small coasting boats lie off the pier and there is no difficulty in loading or discharging cargo. The water supply of the town is drawn from the wells of Takosha, about three miles distant; every morning camels, in charge of old Somali women and bearing goatskins filled with water, come into the town in picturesque procession. The population varies from 3000 to 7000, the natives, who come in the cool season to barter their goods, retiring to the highlands in hot weather. The chief traders are Indians, the smaller dealers Arabs, Greeks and Jews. The imports, which reach Zaila chiefly via Aden, are mainly cotton goods, rice, jowaree, dates and silk; the exports —of which 90 per cent. are from Abyssinia—are principally coffee, skins, ivory, cattle, ghee and mother-of-pearl.

Zaila owed its importance to its proximity to Harrar, the great entrepôt for the trade of southern Abyssinia. The trade of the port received, however, a severe check on the opening (1901-2) of the railway to Harrar from the French port of Jibuti, which is 35 m. N.W. of Zaila. A steamer from Aden to Zaila takes fifteen hours to accomplish the journey; caravans proceeding from Zaila to Harrar occupy from ten days to three weeks on the road.

For history and trade statistics, see Somaliland, British.

ZAIMUKHT, the name of a small Pathan tribe on the Kohat border of the North-West Frontier Province of India. The Zaimukhts inhabit the hills to the south of the Orakzais between the Miranzai and Kurram valleys. Their country may be described as a triangle, with the range of hills known as the Samana as its base, and the village of Thal in the Kurram valley as its apex. This includes a tract on its western side occupied by an Orakzai clan. The total area is about 400 sq. m., of which the Orakzais occupy a fourth. The Zaimukhts are a fine-looking powerful race, with a fighting strength of some 3000 men.

ZAIRE, a name by which the river Congo was formerly known. Zaire is a Portuguese variant of a Bantu word (*nzari*) meaning river. In the 16th and 17th centuries the powerful native kingdom of Congo possessed both banks of the lower river, and the name of the country was in time given to the river also. Until, however, the last quarter of the 19th century "Zaire" was frequently used to designate the stream. It is so called by Camoens in the *Lusiads*. Since H. M. Stanley's discoveries "Congo" has become the general name for the river from its mouth to Stanley Falls, despite an effort on the part of Stanley to have the stream re-named Livingstone. (See Congo, river.)

ZAISAN, or Zaisansk, a town of Russian Central Asia, in the province of Semipalatinsk, near the Chinese frontier, at an altitude of 2200 ft. and near the S.E. corner of Lake Zaisan. Pop. (1897) 4471. Lake Zaisan, situated in an open valley between the Altai range on the north-east and the Tarbagatai on the south, lies at an altitude of 1355 ft. It has a length of 65 m., a width of 14 to 30 m., an area of 707 sq. m., and a maximum depth of 50 ft. Its water is fresh, as it receives the Black Irtysh and the Kendyrlyk from the east, and several small streams from the west, all of which leave the lake at its north-west extremity by the White Irtysh. The fisheries, which yield abundantly, are in the hands of the Siberian Cossacks. The lake is generally frozen from the beginning of November to the end of April.

ZALEUCUS, of Locri Epizephyrii in Magna Graecia, Greek lawgiver, is supposed to have flourished about 660 B.C. The statement that he was a pupil of Pythagoras is an anachronism. Little is known of him, and Timaeus even doubted his existence, but it is now generally agreed that this is an error. He is said to have been the author of the first written code of laws amongst the Greeks. According to the common story, the Locrians consulted the Delphic oracle as to a remedy for the disorder and lawlessness that were rife amongst them. Having been ordered to make laws for themselves, they commissioned one Zaleucus, a shepherd and slave (in later tradition, a man of distinguished family) to draw up a code. The laws of Zaleucus, which he declared had been communicated to him in a dream by Athena, the patron goddess of the city, were few and simple, but so severe that, like those of Draco, they became proverbial. They remained essentially unchanged for centuries, and the Locrians subsequently enjoyed a high reputation as upholders of the law. One of the most important provisions was that the punishment for different offences was definitely fixed, instead of being left to the discretion of the judge before whom a case was tried. The penalty for adultery was the loss of the eyes, and in general the application of the *lex talionis* was enjoined as the punishment for personal injuries. Special enactments concerning the rights of property, the alienation of land, settlement in foreign countries, and various sumptuary laws (*e.g.* the drinking of pure wine, except when ordered medicinally, was forbidden) are attributed to him. After the code was firmly established, the Locrians introduced a regulation that, if a citizen interpreted a law differently from the cosmopolis (the chief magistrate), each had to appear before the council of One Thousand with a rope round his neck, and the one against whom the council decided was immediately strangled. Any one who proposed a new law or the alteration of one already existing was subjected to the same test, which continued in force till the 4th century and even later. Zaleucus is often confused with Charondas, and the same story is told of their death. It is said that one of Zaleucus's laws forbade a citizen, under penalty of death, to enter the senate-house bearing a weapon. During the stress of war, Zaleucus violated this law; and, on its being pointed out to him, he committed suicide by throwing himself upon the point of his sword, declaring that the law must be vindicated.

See Bentley, *Dissertation on the Epistles of Phalaris*; F. D. Gerlach, *Zaleukos, Charondas, Pythagoras* (1858); G. Busolt, *Griechische Geschichte*, i.; Schol. on Pindar, *Ol.* x. 17; Strabo vi. p. 259; Diod. Sic. xii. 20, 21; Demosthenes, *In Timocratem*, p. 744; Stobaeus, *Florilegium*, xliv. 20, 21, where the supposed preface of Zaleucus and the collection of laws as a whole is spurious; Suidas, s.v., who makes him a native of Thurii; Cicero, *De Legibus*, ii. 6. See also article Greek Law.

ZALMOXIS, or Zamolxis, a semi-mythical social and religious reformer, regarded as the only true God by the Thracian Getae. According to Herodotus (iv. 94), the Getae, who believed in the immortality of the soul, looked upon death merely as going to Zalmoxis. Every five years they selected by lot one of the tribesmen as a messenger to the god. The man was thrown into the air and caught upon the points of spears. If he did not die, he was considered unfit to undertake the mission and another was chosen. By the euhemeristic Hellespontine Greeks Herodotus was told that Zalmoxis was really a man, formerly a slave of Pythagoras at Samos, who, having obtained his freedom and amassed great wealth, returned to Thrace, and instructed his fellow-tribesmen in the doctrines of Pythagoras and the arts of civilization. He taught them that they would pass at death to a certain place, where they would enjoy all possible blessings for all eternity, and to convince them of this he had a subterranean chamber constructed, to which he withdrew for three years. Herodotus, who declines to commit himself as to the existence of Zalmoxis, expresses the opinion that in any case he must have lived long before the time of Pythagoras. It is probable that Zalmoxis is Sabazius, the Thracian Dionysus or Zeus; Mnaseas of Patrae identified him with Cronus. In Plato (*Charmides*, 158 B) he is mentioned with Abaris as skilled in the arts of incantation. No satisfactory etymology of the name has been suggested.

ZAMAKHSHARĪ [Abū-l Qāsim Maḥmūd ibn 'Umar uz-Zamakhsharī] (1074–1143), Arabian theologian and grammarian, was born at Zamakhshar, a village of Khwarizm, studied at Bokhara and Samarkand, and enjoyed the fellowship of the jurists of Bagdad. For many years he stayed at Mecca, from which circumstance he was known as *Jār-ullāh* ("God's client"). Later he returned to Khwarizm, where he died at the capital Jurjānīyya. In theology he was a pronounced Mo'tazilite (see Mahommedan Religion: section *Sects*). Although he used Persian for some of his works he was a strong supporter of the superiority of the Arabic language and an opponent of the Shu'ūbite movement. Zamakhsharī's fame as a commentator rests upon his commentary on the Koran, called *al-Kashshāf* ("the Revealer"). In spite of its Mo'tazilite theology it was famous among scholars and was the basis of the widely-read commentary of Baidhāwī (*q.v.*). It has been edited by W. Nassau Lees (Calcutta, 1856), and has been printed at Cairo (1890). Various glosses on it have been written by different authors. His chief grammatical work is the *Kitāb ul-mufaṣṣal*, written about 1120 and edited by J. P. Broch (2nd ed., Christiania, 1879). Many commentaries have been written on this work, the fullest being that of Ibn Ya'īsh (d. 1245), edited by G. Jahn (2 vols., Leipzig, 1876–86).

Of his lexicographical works the *Kitāb Muqaddimat ul-Adab* was edited as *Samachscharii Lexicon Arab. Pers.* (ed. J. G. Wetzstein, 2 vols., Leipzig, 1844), and the *Asās ul-balāgha*, a lexicon of choice words and phrases, was printed at Bulāq, 1882. Of his *adab* works the *Nawābigh ul-kalim*, an anthology, was edited by H. A. Schultens (Leiden, 1772), by B. de Meynard in the *Journal asiatique*, ser. 7, vol. vi., pp. 313 ff. (cf. M. de Goeje in *Zeitschr. d. deutsch. morg. Gesellschaft*, vol. xxx. pp. 569 ff.). The *Atwāq udh-Dhahab* was edited by J. von Hammer-Purgstall (Vienna, 1835); by H. L. Fleischer (Leipzig, 1835); by G. Weil (Stuttgart, 1863); and by B. de Meynard (Paris, 1876; cf. de Goeje as above). (G. W. T.)

ZAMBEZI, the fourth in size of the rivers of Africa, and the largest of those flowing eastwards to the Indian Ocean. Its length (taking all curves into consideration) is about 2200 m. The area of its basin, according to Dr Bludau, is 513,500 sq. m., or rather less than half that of the Nile. The main channel is clearly marked from beginning to end. The river takes its rise in 11° 21′ 3″ S., 24° 22′ E. The source lies in British territory in a depression of an undulating country 5000 ft. above the sea, covered with bracken and open forest. The water, like that of all the rivers of the neighbourhood, issues from a black marshy bog, and quickly collects into a well-defined stream. In the first hundred miles of its course the river is known as the Yambeshe—in sound almost identical with its name in its lower course, though intervening sections are known as Liambeshe, Liambai, &c. Eastward of the source the water-parting between the Congo and Zambezi basins is a well-marked belt of high ground, falling abruptly north and south, and running nearly east and west between 11° and 12° S. This distinctly cuts off the basin of the Luapula (the main branch of the upper Congo) from that of the Zambezi. In the neighbourhood of the source, however, the water-parting is not so clear, but the two river systems do not connect.

The Upper River.—The infant Zambezi, after pursuing a south-westerly course for about 150 m., turns more directly south and, soon after the 12° S. is crossed, is joined by a stream (coming from the north-west) whose source is near a marshy lake called Dilolo, 4600 ft. above sea-level in 11° 50′ S., 22° 10′ E. Lake Dilolo was at one time believed to communicate with the Kasai river, one of the great affluents of the Congo flowing north-west, but this is not the case. Dilolo belongs to the Zambezi system only, sending water to that river after heavy rain. The Zambezi as it flows southward receives on either side numerous small tributaries. A few miles above Kakengi (in 12° 24′ S.), the Zambezi, narrow, picturesque and tortuous, suddenly widens from 100 to 350 yds. Below Kakengi are a number of rapids ending (13° 7′ S.) in the Sapuma cataracts. At this point the river flows tumultuously through a rocky fissure.

The first of its large tributaries to enter the Zambezi is the Kabompo, a left-hand affluent. It joins the main stream in 14° 26′ S. A little lower down (in 14° 18′ S.) the Zambezi receives from the west the waters of a much larger stream than the Kabompo, namely, the Lungwebungu. (For details concerning these and the other chief tributaries of the Zambezi, see below.) The savannah forest, which has hitherto characterized the country, now gives place to a more open bush valley, studded with Borassus palms. Dense vegetation is confined to narrow strips of matted forest which skirt the first few hundred yards of the sources of the Zambezi and its tributaries during the first 100 m. or so. The land, from 5000 ft. at the source, falls gradually to 3600 ft. at Kakengi—a distance of 220 m. From this point until the Victoria Falls are reached—500 m.—the level of the Zambezi basin is very uniform, the fall being in this distance 600 ft. only. Twenty miles below the confluence of the Lungwebungu the country becomes flat, and in the rainy seasons is largely covered by floods. Some 50 m. farther down, the Luanginga, which with its tributaries drains a large area to the westward, joins the Zambezi. A few miles higher up on the east the main stream is reinforced by the waters of the Luena. On the same (eastern) side a little below the junction of the Luanginga and the Zambezi stands Lialui, the capital of the Barotse (*q.v.*). The river, which for some distance has had a slight western as well as southern trend, now turns distinctly south-east. From the east the Zambezi continues to receive numerous small streams, but on the west is without tributaries for 150 m., when the great river formerly misnamed the Chobe, but known to the natives as Kwando or Linyante, joins it (in 17° 47′ S.). Before this junction is effected, the Gonye Falls, the work of erosion (16° 40′ S.), offer an interruption to navigation, whilst below the falls are numerous rapids. The western bank of the Zambezi, which in this part of its course is very tortuous, is German territory from the most southern of these rapids—Katima Molilo (17° 28′ S.)—to the confluence of the Kwando, including the right or northern bank of the lower course of the last-named river; this narrow strip of land projecting from the main portion of German South-West Africa expressly to allow Germany access to the Zambezi.

Below the junction of the Kwando and the Zambezi the river bends almost due east. The stream has hitherto flowed, in the main, in a gentle steady current, the depth of water, owing to the breadth of the channel, not being great. But its character is about to change. As it flows eastward towards the border of the great central plateau of Africa it reaches a tremendous chasm in the floor of the earth, and thus the Victoria Falls (*q.v.*), the largest waterfalls in the world, are formed.

The Middle Zambezi.—The Victoria Falls are reached some 60 m. after the Kwando confluence is passed, and below them the river continues to flow due east for about 120 m. It then cuts its way through perpendicular walls of basalt from 60 to 100 ft. apart. This dismal canyon, named by Major St Hill Gibbons "The Devil's Gorge," is 8 m. long. Towering over the rocks which form the banks of the river are precipitous hills, 700 to 800 ft. high. The river flows swiftly through the gorge, the current being continually interrupted by reefs. Beyond the gorge are a succession of rapids, ending with those called Molele, which is 146 m. below the Victoria Falls. In this distance the fall of the river is 800 ft. From the Devil's Gorge the Zambezi takes a decided trend north whilst still pursuing its general easterly course. For the next 700 m. until the Kebrabasa Rapids are reached, the river flows through well-defined and occasionally rocky banks. Besides the rapids already mentioned there are several others in the middle stretch of the river, forming impediments to navigation at low water. One of the most difficult passages is that of a grand gorge a little above the mouth of the Loangwa, in about 30° E., named by Major Gibbons Livingstone's Kariba, in distinction from a second Kariba (= "gorge") a little beyond the Kafukwe confluence. Between the two gorges the river is generally unobstructed, but at the western end of the second Kariba navigation is dangerous at low water. Exclusive of the Shiré (*q.v.*) the Loangwa and the Kafukwe (also called Kafue) just mentioned are the two largest left-hand tributaries of the Zambezi. The Kafukwe joins the main river in 15° 57′ S. in a quiet deep stream about 200 yds. wide. From this point the northward bend of the Zambezi is checked and the stream continues due east. At the confluence of the Loangwa (15° 37′ S.) it enters Portuguese territory, and from this point to the sea both banks of the river belong to that kingdom. At the Kebrabasa Rapids—800 m. below the Victoria Falls—the Zambezi is sharply deflected to the south, the river at this point breaking through the continental escarpment to reach the sea. The Kebrabasa Rapids, which extend about 45 m.—the road taking a détour of 70 m.—are absolutely unnavigable, and with them the middle stretch of the Zambezi as definitely ends as does the upper river at the Victoria Falls.

The Lower River.—The lower Zambezi—400 m. from Kebrabasa Rapids to the sea—presents no obstacles to navigation save the shallowness of the stream in many places in the dry season. This shallowness arises from the different character of the river basin. Instead of, as in the case of the middle Zambezi, flowing mainly through hilly country with well-defined banks, the river traverses a broad valley and spreads out over a large area. Only at one point, the Lupata Gorge, 200 m. from its mouth, is the river confined between high hills. Here it is scarcely 200 yds. wide. Elsewhere it is from 3 to 5 m. wide, flowing gently in many streams. The river-bed is sandy, the banks are low and reed-fringed. At places, however, and especially in the rainy season, the streams unite into one broad swift-flowing river. About 100 m. from the sea the Zambezi receives the drainage of Lake Nyasa through the river Shiré. On approaching the ocean, which it reaches in 18° 50′ S. the Zambezi splits up into a number of branches and forms a wide delta. Each of the four principal mouths—Milambe, Kongone, Luabo and Timbwe—is obstructed by a sand-bar. A more northerly branch, called the Chinde mouth, has a minimum depth at low water of 7 ft. at the entrance, and of 12 ft. farther in, and is the branch used for navigation. Sixty miles farther north is a river called the Qua-Qua or Quilimane, from the town founded by the Portuguese at its mouth. This stream, which is silting up, receives in the rainy season the overflow of the Zambezi.

The region drained by the Zambezi may be represented as a vast broken-edged plateau 3000 or 4000 ft. high, composed in the remote interior of metamorphic beds and fringed with the igneous rocks of the Victoria Falls. At Shupanga, on the lower Zambezi, thin strata of grey and yellow sandstones, with an occasional band of limestone, crop out on the bed of the river in the dry season, and these persist beyond Tete, where they are associated with extensive seams of coal. Coal is also found in the district just below the Victoria Falls. Gold-bearing rocks occur in several places.

Four Thousand Miles of Navigable Water.—As a highway into the interior of the continent the Zambezi, like all other large African rivers, in greater or less degree, suffers on account of the bar at its mouth, the shallowness of its stream, and the rapids and cataracts which interrupt its course. Nevertheless its importance to commerce is great, as the following recapitulation of its navigable stretches will show. (1) From the sea to the Kebrabasa Rapids, 400 m. (2) From Chikoa (above Kebrabasa) to within 140 m. of the Victoria Falls, 700 m. (3) From the rapids above the Victoria Falls to the Katima Molilo Rapids, 100 m. (4) Above the Gonye Falls to the Supuma cataract, 300 m. (5) Above the Supuma cataract, 120 m. Thus for 1620 m. of its course the Zambezi is navigable for steamers with a draught of from 18 to 28 in. Were the obstruction caused by the Kebrabasa Rapids removed, there would be a clear passage from the sea almost to the foot of the cataracts below the Victoria Falls. The difficulty at Kebrabasa might be removed either by the cutting of a side channel or the building of a dam to convert the gorge into a lake, to be connected with the river below by a lock and weir.

Several of the Zambezi affluents are also navigable for many miles. The Lungwebungu, which enters the upper river, is navigable for a long distance, thus supplying communication with the extreme north-west corner of the Zambezi basin. Parts at least of the Luena, Kafukwe, Loangwa and the Kwando tributaries are also capable of being navigated. The possibility of connecting the

Kwando with the navigable waters of the Okavango, at the point where the overflow mentioned below takes place, has likewise been suggested. The Shiré is also navigable for a considerable distance. The sum of such navigable reaches within the Zambezi basin as exceed 100 m. is nearly 4000 m.

Tributaries.—The tributaries of the Zambezi are very numerous. The course of the more important streams is as follows: The Kabompo, which flows in from the east in about 14° 8′ S., rises not far from 11° 34′ S., 25° 17′ E. in the high land which forms the eastern watershed between the Zambezi and Congo systems. In 13½° S. it receives on the right bank a tributary, the Lunga, said to be more important than the upper Kabompo itself, and rising somewhat farther north. The Lungwebungu, which enters the Zambezi from the west in 14° 35′ S., is a strong, deep stream 200 yds. wide in its upper course, flowing in a valley bordered by undulations of white sand covered by thin forest, its floor forming at times an inundated plain 2 to 3 m. wide.

The Kwando, largest of the western affluents of the Zambezi, formerly known as the Chobe and frequently spoken of as the Linyante from the ruined capital of the Makololo, situated on its lower course, rises in about 12° 40′ S., 18° 50′ E., and flows in a generally straight course south-east to 17° 30′ S., at which point it makes a sudden bend to the south before flowing east to the Zambezi. In this eastward stretch the Kwando for some 70 m. flows through a vast reedy swamp or lake studded with alluvial islands. Apart from its head-streams, it receives most of its tributaries from the west, and at its most southern bend is joined by the Magwe'-kwana, which in time of flood receives some of the surplus water of the Okavango (see NGAMI). This surplus water, received after most of the flood water of the Kwando has passed, raises the level of the lake and holds up the waters of the Kwando for some miles above it.

Of the streams which enter the upper Zambezi from the east, the largest, after the Kabompo, is the Luena, which rises in 16° S., 26° E., and flows first north-west, afterwards west-south-west, joining the main river a little north of 15° S. Others are the Njoko joining in 17° 8′ S., the Machili, which enters in about 25° E., the Lumbi, 16° 45′ S., and the Umgwezi, 17° 37′ S. The largest tributary of the middle Zambezi—the Kafukwe—rises in about 11° 35′ S. at an elevation of 4400 ft. in thick forest country. The main head-stream, which flows first south-east, afterwards south-west, is joined in 14° 35′ S. by the Lunga or Luanga, an important right-bank tributary, the united stream then flowing first south, afterwards due east. The lower Kafukwe is a large navigable river until about 40 m. from its mouth, but it then descends from the plateau by a series of falls and cataracts, the drop being over 1000 ft. in 15 m., one very high fall occurring in a stupendous chasm. The next great tributary to the east is the Loangwa (also called Luangwa) which in its upper course runs parallel to the western shores of Lake Nyasa, having its source not far from the north-west corner of the lake. The main stream flows in a generally level valley, bounded by steep plateau escarpments, and is for the most part shallow and rapid, though fairly wide. In 14° 30′ S., however, it passes through narrow gorges with a speed of 8 or 9 m. an hour. In 15° 5′ S. it is joined by the Lunsefwa, which, with its tributary, the Lukosasi, drains a large extent of the western plateau, its basin being separated by the Mchinga mountains from that of the Loangwa. The Loangwa joins the Zambezi a little above the town of Zumbo. For some distance its lower course forms the frontier between Portuguese and British territory. From the south the middle Zambezi receives various rivers which water northern Matabele and Mashona lands—namely, the Shangani, Sanyati, and Hanyani, besides minor streams. The Mazoe, which also rises in Mashonaland, joins the Zambezi below the Kebrabasa Rapids.

Exploration of the River.—The Zambezi region was known to the medieval geographers as the empire of Monomotapa and the course of the river, as well as the position of Lakes Ngami and Nyasa, was filled in with a rude approximation to accuracy in the earlier maps. These were probably constructed from Arab information. The first European to visit the upper Zambezi was David Livingstone in his exploration from Bechuanaland between 1851 and 1853. Two or three years later he descended the Zambezi to its mouth and in the course of this journey discovered the Victoria Falls. During 1858–60, accompanied by Dr (afterwards Sir) John Kirk, Livingstone ascended the river by the Kongone mouth as far as the Falls, besides tracing the course of its tributary the Shiré and discovering Lake Nyasa. For the next thirty-five years practically no additions were made to our knowledge of the river system. In 1889 the entrance of vessels from the sea was much facilitated by the discovery by Mr D. J. Rankin of the Chinde channel north of the main mouths of the river. Major A. St Hill Gibbons and his assistants, during two expeditions, in 1895–96 and 1898–1900, ably continued the work of exploration begun by Livingstone in the upper basin and central course of the river. Of non-British travellers Major Serpa Pinto examined some of the western tributaries of the river and made measurements of the Victoria Falls (1878). Steamers had been used on the lower river—the "Ma-Robert" and the "Pioneer"—by the Livingstone expedition of 1858–61, but the utilization of the Zambezi as a commercial highway was inconsiderable until after the discovery of the Chinde mouth. The first steamer placed on the river above the Kebrabasa Rapids was the "Constance" launched by the Gibbons expedition at Chikoa in September 1898. She steamed to beyond the Guay confluence, and being ultimately sold to a commercial company, was used to carry goods on the middle Zambezi. The first steamer placed on the river above the Victoria Falls was the "Livingstone," launched in August 1902.

See David and Charles Livingstone, *Narrative of an Expedition to the Zambesi and its Tributaries* (1865); A. de Serpa Pinto, *How I Crossed Africa* (1881); D. J. Rankin in *Proc. R. G. S.* (March, 1890); A. Sharpe, *ibid.* (December, 1890); H. S. Bivar, "Curso medio do Zambeze," *B. S. G. Lisboa*, vol. xxiv. (1906); G. W. Lamplugh in *Geo. Jnl.*, vol. xxxi. (1908); F. Coillard, *On the Threshold of Central Africa* (London, 1897), and A. St H. Gibbons, *Africa from South to North through Marotseland* (2 vols., London, 1904), which gives the results of a detailed examination of the upper Zambezi valley (with map). The last-named author has kindly revised the account given above. (F. R. C.)

ZAMBOANGA, the capital of the Moro Province, and of the District (or Comandancia) of Zamboanga, and a port of entry, on the island of Mindanao, Philippine Islands, at the S. extremity of the western peninsula. Pop. (1903) 3281; of the comandancia, 20,692. Zamboanga has one of the most healthful sites in the islands, its climate being decidedly cooler than that of Manila. Since the American occupation the trade has greatly increased and various improvements have been planned or are under way, including a new custom-house, better facilities for docking, pavements, bridges, and public parks. The Provincial Capitol, one of the finest government buildings in the Philippines, was completed in 1908. There is considerable valuable timber in the vicinity, live-stock is extensively raised, and rice, copra, hemp, sugar-cane, tobacco, and sweet potatoes are other important products. Zamboanga was one of the oldest Spanish settlements in the islands, it having been taken and fortified as a base against the Moros, and it still contains an old stone fort. Many of the inhabitants are descendants of slaves who escaped from the Moros and sought Spanish protection. A Spanish patois, called "Zamboangueno," is spoken by most of the native inhabitants.

ZAMINDAR, or ZEMINDAR (from Persian *zamin* = "land"), an Indian landholder. In official usage the term is applied to any person, whether owner of a large estate or cultivating member of a village community, who is recognized as possessing some property in the soil, as opposed to the ryot (*q.v.*), who is regarded as having only a right of occupancy, subject in both cases to payment of the land revenue assessed on his holding. The *zamindari* system obtains throughout northern and central India, and also in the permanently settled estates of Madras.

The raja of Benares had certain special rights as *zamindar*, and in 1910 it was arranged to make part of his "family domain" a new native state with an area of 887 sq. m. (pop. 362,000).

ZAMINDAWAR, a district of Afghanistan, situated on the right bank of the Helmund river to the N.W. of Kandahar, bordering the road which leads from Kandahar to Herat via Farah. Zamindawar is a district of hills, and of wide, well populated, and fertile valleys watered by important affluents of the Helmund. The principal town is Musa Kala, which stands on the banks of a river of the same name, about 60 m. N. of Girishk. The whole of this region is a well-known hot-bed of fanaticism, the headquarters of the Achakzais, the most aggressive of all Durani tribes. It was from Zamindawar that much of the strength of the force which besieged Kandahar under Ayub Khan in 1880 was derived; and it was the Zamindawar contingent of tribesmen who so nearly defeated Sir Donald Stewart's force at Ahmad Khel previously. The control of Zamindawar may be regarded as the key to the position for safeguarding the route between Herat and Kandahar.

ZAMORA, an inland province of north-western Spain, one of the three into which the former province of Leon has since 1833 been divided; bounded on the W. by Portugal and Orense, N. by Leon, E. by Valladolid, and S. by Salamanca. Pop. (1900) 275,545; area, 4097 sq. m. Zamora is traversed from east to west by the river Duero or Douro (*q.v.*), which receives within the province the Valderaduey and the Esla on the right and the Guareña on the left; the Tormes also skirts the south-western boundary for some 25 m. Except in the north-west, where it is entered by two outlying ridges of the Cantabrian Mountains, the Sierra de la Culebra and Sierra de Peña Negra, the surface consists of a level or slightly undulating plateau; its lowest point is 1070 ft. above sea-level. Its plains, especially the valley of the Esla, yield large quantities of grain and pulse; wine and flax are also produced; and on the higher grounds large numbers of merino sheep and goats are reared, chiefly for export to Portugal. The manufactures of Zamora are unimportant. Three lines of railway, from Astorga on the N., Salamanca on the S., and Medina del Campo on the E., traverse the province and meet at the city of Zamora; there is a lack of good roads, and it is largely for this reason that the mines and extensive forests are neglected. The only towns with more than 5000 inhabitants are Zamora (pop., 1900, 16,287) and Toro (8379), which are described in separate articles. The people of the province are very poor, badly educated, and lacking in enterprise. (See also LEON.)

ZAMORA, an episcopal city, and the capital of the Spanish province of Zamora; on the right bank of the river Duero (Douro), and at the junction of railways from Salamanca, Medina del Campo and Astorga. Pop. (1900) 16,283. Zamora occupies a rocky height overlooking the Duero, a little below its confluence with the Valderaduey. The river is crossed by a fine 14th-century bridge of sixteen pointed arches. The citadel of Zamora dates from the 8th century. The small but beautiful cathedral, one of four 12th-century churches in the city, is a Romanesque building, with a square tower, a dome above the crossing, and an elaborately-decorated interior. It was completed about 1175, and contains some interesting medieval tombs, and paintings by Fernando Gallegos (1475–1550). The other principal buildings are the 17th-century town-hall, the palace of the provincial assembly, a hospital with curious Gothic windows, an ecclesiastical seminary, and a school of engineering. The trade is chiefly agricultural, but linen and woollen goods, pottery, hats, leather, and spirits are manufactured in small quantities.

In the early period of the Christian re-conquest Zamora, from its position on the north bank of the Duero, was a place of considerable strategic importance. It was taken from the Moors by Alphonso I. of Leon in 748, but was again held by them for short periods in 813, 939, 963, 984 and 986. It was entirely repaired by Ferdinand I. of Castile and Leon, who in 1061 gave it to his daughter Doña Urraca. After his death in 1065 his son Sancho II. disputed possession with Urraca and laid siege to the city, but without success, although the famous Ruy Diaz de Bivar was among his warriors, and indeed at this time received his title of "The Cid." Zamora became subject to Alphonso VI. in 1073.

ZAMOYSKI, JAN (1541–1605), Polish statesman, was the son of Stanislaw, Castellan of Chelm, and Anna Herburtowna, who belonged to one of the most ancient and illustrious families in Poland. After completing his education at Paris, Strassburg, and at Padua, where as rector of the academy he composed his celebrated work *De senatu romano* (Venice, 1563), he returned home in 1565, one of the most consummate scholars and jurists in Europe. His essentially bold and practical genius sought at once the stormy political arena. He was mainly instrumental, after the death of Sigismund II., in remodelling the Polish constitution and procuring the election of Henry of Valois. After the flight of that prince Zamoyski seems to have aimed at the throne himself, but quickly changed his mind and threw all his abilities into the scale in favour of Stephen Báthory and against the Austrian influence. By his advice, at the beginning of January 1576 a diet was summoned to Jedrzejow to confirm the election of Báthory, and from the time of that monarch's arrival in Poland till his death ten years later Zamoyski was his foremost counsellor. Immediately after the coronation, on the 1st of May 1576, Zamoyski was appointed chancellor, and in 1580 *wielki hetman*, or commander-in-chief, so that he was now the second highest dignitary in the kingdom. He strenuously supported Stephen during his long struggle with Ivan the Terrible, despite the obstruction and parsimony of the diet. He also enabled the king in 1585 to bring the traitorous Samuel Zborowski to the scaffold in the face of a determined resistance from the nobility. On the death of Stephen, the Zborowski recovered their influence and did their utmost to keep Zamoyski in the background. Their violence prevented "the pasha," as they called him, from attending the convention summoned to Warsaw on the death of Báthory; but at the subsequent election diet, which met at Warsaw on the 9th of July 1587, he appeared at the head of 6000 veterans and intrenched himself with his partisans in what was called "the Black Camp" in contradistinction to "the General Camp" of the Zborowski. Zamoyski was at first in favour of a member of the Báthory family, with which he was united by ties of amity and mutual interest; but on becoming convinced of the impossibility of any such candidature, he pronounced for a native Pole, or for whichever foreign prince might be found most profitable to Poland. The Habsburgs, already sure of the Zborowski, bid very high for the support of Zamoyski. But though he was offered the title of prince, with the Golden Fleece and 200,000 ducats, he steadily opposed the Austrian faction, even at the imminent risk of a civil war; and on the 19th of August procured the election of Sigismund of Sweden, whose mother was Catherine Jagiellonica. The opposite party immediately elected the Austrian Archduke Maximilian, who thereupon made an attempt upon Cracow. But Zamoyski traversed all the plans of the Austrian faction by routing the archduke at the battle of Byczyna (January 24, 1588) and taking him prisoner. From the first there was a certain coldness between the new king and the chancellor. Each had his own plan for coping with the difficulties of the situation; but while Zamoyski regarded the Habsburgs with suspicion, Sigismund III. was disposed to act in concert with them as being the natural and strongest possible allies for a Catholic power like Poland. Zamoyski feared their influence upon Poland, which he would have made the head of the Slavonic powers by its own endeavours. Zamoyski was undoubtedly most jealous of his dignity; his patriotism was seldom proof against private pique; and he was not always particular in his choice of means. Thus at the diet of 1589 he prevailed over the king by threatening to leave the country defenceless against the Turks, if the Austrians were not excluded from the succession. In general, however, his Turkish policy was sound, as he consistently adopted the Jagiellonic policy of being friendly with so dangerous a neighbour as the Porte. His views on this head are set out with great force in his pamphlet, *La deffaicte des Tartares et Turcs* (Lyons, 1590). The ill-will between the king and the chancellor reached an acute stage when Sigismund appointed an opponent of Zamoyski vice-chancellor, and made other ministerial changes which limited his authority; though ultimately, with the aid of his partisans and the adoption of such desperate expedients as the summoning of a confederation to annul the royal decrees in 1592, Zamoyski recovered his full authority. In 1595 Zamoyski, in his capacity of commander-in-chief, at the head of 8000 veterans dethroned the anti-Polish hospodar of Moldavia and installed in his stead a Catholic convert, George Mohila. On his return he successfully sustained in his camp at Cecora a siege by the Tatar khan. Five years later (October 20, 1600) he won his greatest victory at Tergoviste, when with a small well-disciplined army he routed

Michael the Brave, hospodar of Walachia and Moldavia. But beyond securing the Polish frontier Zamoyski would never go. He refused to wage war with Turkey even under the most favourable circumstances, nor could he be drawn into the Holy League against the Ottomans in 1600. When pressed by the papal legate and the Austrian envoys to co-operate at the head of all the forces of the league, he first demanded that in case of success Moldavia, Walachia and Bessarabia should fall to Poland, and that she should in the meantime hold Olmutz and Breslau as guarantees. The refusal of the Austrians to accept these reasonable terms justified Zamoyski's suspicion that the league would use Poland as a cat's-paw, and the negotiations came to nothing. Statesman though he was, Zamoyski cannot, however, be called a true patriot. Polish historians, dazzled by his genius and valour, are apt to overlook his quasi-treasonable conduct and blame Sigismund III. for every misadventure; but there can be no doubt that the king took a far broader view of the whole situation when he attempted to reform the Polish constitution in 1605 by strengthening the royal power and deciding all measures in future by a majority of the diet. These reforms Zamoyski strenuously opposed. The last speech he delivered was in favour of the anarchic principle of free election. He died suddenly at Zamosc on the 3rd of June 1605.

See *Vincent Laureo, 1574–78, et ses dépêches inédites* (Ital.) (Warsaw, 1877); Augustin Theiner, *Vetera monumenta Poloniae et Lituaniae* vol. ii. (Rome, 1862); Adam Tytus Dzialynski, *Collectanea vitam resque gestas J. Zamoyscii illustrantia* (Posen, 1881). (R. N. B.)

ZANARDELLI, GIUSEPPE (1826–1903), Italian jurisconsult and statesman, was born at Brescia on the 29th of October 1826. A combatant in the volunteer corps during the war of 1848, he returned to Brescia after the defeat of Novara, and for a time earned a livelihood by teaching law, but was molested by the Austrian police and forbidden to teach in consequence of his refusal to contribute pro-Austrian articles to the press. Elected deputy in 1859, he received various administrative appointments, but only attained a political office in 1876 when the Left, of which he had been a prominent and influential member, came into power. Minister of public works in the first Depretis cabinet of 1876, and minister of the interior in the Cairoli cabinet of 1878, he in the latter capacity drafted the franchise reform, but created dissatisfaction by the indecision of his administrative acts, particularly in regard to the Irredentist agitation, and by his theory of repressing and not in any way preventing crime, which led for a time to a perfect epidemic of murders. Overthrown with Cairoli in December 1878, he returned to power as minister of justice in the Depretis cabinet of 1881, and succeeded in completing the commercial code. Abandoned by Depretis in 1883, he remained in opposition until 1887, when he again joined Depretis as minister of justice, retaining his portfolio throughout the ensuing Crispi ministry until the 31st of January 1891. During this period he promulgated the Criminal Code, and began the reform of the magistracy. After the fall of the Giolitti cabinet in 1893, Zanardelli made a strenuous but unsuccessful attempt to form an administration. Elected president of the chamber in 1894 and 1896, he exercised that office with ability until, in December 1897, he accepted the portfolio of justice in the Rudini cabinet, only to resign in the following spring on account of dissensions with his colleague, Visconti-Venosta, over the measures necessary to prevent a recurrence of the tumults of May 1898. Returning to the presidency of the chamber, he again abandoned his post in order to associate himself with the obstructionist campaign against the Public Safety Bill (1899–1900), and was rewarded by being enabled to form an administration with the support of the Extreme Left upon the fall of the Saracco cabinet in February 1901. He was unable to achieve much during his last term of office, as his health was greatly impaired; his Divorce Bill, although voted in the chamber, had to be withdrawn on account of the strong opposition of the country. He retired from the administration on the 2nd of November 1903, and died on the 21st of December following.

ZANELLA, GIACOMO (1820–1888), Italian poet, was born at Chiampo, near Vicenza, on the 9th of September 1820, and was educated for the priesthood. After his ordination he became professor at the lyceum of his native place, but his patriotic sympathies excited the jealousy of the Austrian authorities, and although protected by his diocesan, he was compelled to resign in 1853. After the liberation of Venetia, the Italian government conferred upon him a professorship at Padua, and he achieved distinction as a poet on the publication of his first volume of poems in 1868. In 1872 grief for the death of his mother occasioned a mental malady, which led to the resignation of his professorship. After his complete and permanent recovery he built himself a villa on the bank of his native river, the Astichello, and lived there in tranquillity until his death on the 17th of May 1888. His last published volume contains a series of sonnets of singular beauty, addressed to the river, resembling Wordsworth's "Sonnets to the Duddon," but more perfect in form; and a blank verse idyll, "Il Pettirosso" ("The Redbreast"), bearing an equally strong, though equally accidental, resemblance to the similar compositions of Coleridge. His ode to Dante, and that on the opening of the Suez Canal, are distinguished by great dignity. Of his other compositions, the most individual are those in which, deeply impressed by the problems of his day, he has sought to reconcile science and religion, especially the fine dialogue between Milton and Galileo, where the former, impressed by Galileo's predictions of the intellectual consequences of scientific progress, resolves "to justify the ways of God to man." Zanella was a broad-minded and patriotic ecclesiastic, and his character is justly held in equal honour with his poetry, which, if hardly to be termed powerful, wears a stamp of peculiar elegance and finish, and asserts a place of its own in modern Italian literature.

ZANESVILLE, a city and the county-seat of Muskingum county, Ohio, U.S.A., on the Muskingum river, at the mouth of the Licking river, about 60 m. E. of Columbus. Pop. (1890) 21,009; (1900) 23,538, of whom 1435 were foreign-born; (1910, census) 28,026. Zanesville is served by the Baltimore & Ohio, the Pennsylvania, the Cleveland, Akron & Columbus, the Ohio River & Western, the Wheeling & Lake Erie, the Zanesville & Western, and the Ohio & Little Kanawha (B. and O. system) railways, by a belt line around the city, and by the Ohio Electric and the South-Eastern Ohio electric interurban lines. By a series of locks and dams the Muskingum river has been made navigable for small vessels to the Ohio and above Zanesville to Dresden, where connexion is made with the Ohio Canal extending north to Cleveland. Within the city limits the Muskingum is crossed by seven bridges (including a notable concrete Y bridge) and the Licking by two. The business districts of the city lie on both sides of the two rivers; the residential districts being chiefly on the hills to the north and west. Among the principal buildings are the Federal building, the county court-house, the Soldiers and Sailors' Monumental Building, containing a large auditorium, the Masonic and Oddfellows' temples, the Market building, containing city offices, a National Guard armoury, the John McIntire public library, the John McIntire Children's Home (1880), the Helen Purcell home for women, the county infirmary, the Bethesda Hospital (1890), and the Good Samaritan hospital (1902; under the Franciscan Sisters). The John McIntire public library (about 20,000 volumes) is a consolidation of the Zanesville Athenaeum (1827) and the Eunice Buckingham library of the former Putnam Female Seminary (1835) here; Andrew Carnegie contributed $50,000 for the erection of the building. John McIntire (1759–1815), one of the early settlers, provided by will for the maintenance of a school for poor children, and such a school was maintained from 1836 to 1856, when it was transferred to the city school system, annual contributions being made from the fund for poor children; later the McIntire Home was founded, and in 1902 donations to the city school system were discontinued and the entire revenues of the estate devoted to the maintenance of the Home, which is a model of its kind. Zanesville is an important centre for the manufacture of art and domestic pottery, plain and ornamental tile, building and paving bricks, and other clay products. In 1905 it ranked sixth among the cities of the country in the amount of pottery produced, and third in the degree of the specialization of that industry. In 1905 the value of all factory products was $7,047,637, of which $1,144,384 (16·2 per cent.) represented pottery, terra-cotta, and fireclay products.

Zanesville was first platted in 1800 by Ebenezer Zane (1747–1811) of Wheeling, Virginia (now West Virginia), his brother Jonathan, and John McIntire, his son-in-law, of Alexandria, Va., who under an act of Congress of 1796 surveyed a road from Wheeling to what is now Maysville, Kentucky, and received for this service three sections of land. Jonathan Zane and McIntire selected the land at the point where the new road crossed the Muskingum river. The settlement was first called Westbourne and later was named Zanesville; a post office was established in 1802. Zanesville became the county-seat upon the creation of Muskingum county in 1804, was the capital of the state from 1810 to 1812, was incorporated as a town in 1814, and was chartered as a city in 1850.

ZANGWILL, ISRAEL (1864–), Jewish man of letters, was born in London on the 14th of February 1864. His early childhood was spent in Plymouth and at Bristol, where he received his first schooling. He was in his ninth year when his parents settled in Spitalfields, and he entered the Jews' Free School, where eventually he became a teacher. Concurrently with his teaching work he took his degree with honours at London University. He had already written a fantastic tale entitled *The Premier and the Painter* in collaboration with Louis Cowen, when he resigned his position as a teacher owing to differences with the school managers and ventured into journalism. He founded and edited *Ariel, The London Puck*, and did much miscellaneous work on the London press. He made his literary reputation with a novel, *The Children of the Ghetto* (1892), which was followed by *Ghetto Tragedies* (1893); *The Master* (1895); *Dreamers of the Ghetto* (1898); *The Mantle of Elijah* (1901); and other tales and novels of great interest dealing with Jewish life. *Children of the Ghetto* was produced in a play in New York with success in 1899, and has since been extensively played both in English and Yiddish. Others of his plays are: *Merely Mary Ann*, played at the Duke of York's theatre, and *The Serio-Comic Governess; Nurse Marjorie;* and *The Melting-Pot*, all produced in New York. Mr Zangwill was the founder of the International Jewish Territorial Organization (see Zionism).

ZANTE (anc. *Zacynthus*), an island of Greece, one of the Ionian group, in the Ionian Sea, in 37° 40′ N. lat. and 21° E. long., is 25 m. long, about 12 broad, and 64 m. round, with an area of 277 sq. m., and a population in 1907 of 42,502. Zante lies 8 m. S. of Cephalonia, forming with it, Leucas and Ithaca a crescent-shaped insular group, which represents the crests of a submerged limestone ridge facing the Gulf of Patras. Zante is of somewhat irregular oval shape, with its main axis disposed in the direction from north-west to south-east, and indented by a deep inlet at its southern extremity. The surface is mainly occupied by an extensive and highly productive central plain, skirted on the west side by a range of bare limestone hills from 1000 to 1200 ft. high, which fall gently landwards, but present bold steep cliffs towards the sea, and which culminate northwards in Mount Skopos, the ancient *Elatos* (1600 ft.), the highest point in the island. On the east side the plain is also limited by a low ridge, which still justifies the epithet of *nemorosa*, or the "wooded," applied by Virgil to Zacynthus. These hills are densely clothed to their summits with an exuberant growth of olives, figs, myrtles, laurels, oranges, aloes, vines and other sub-tropical plants. The central plain is highly cultivated, forming an almost continuous stretch of gardens and vineyards, varied here and there with a few patches of cornfields and pasture lands. Here is grown a peculiar dwarf vine, whose fruit, the "currant" (from "Corinth") of commerce, forms the chief resource and staple export of Zante, as well as of the neighbouring mainland. The vine, which grows to a height of 3 ft., begins to yield in seven years and lasts for over a century. From the grape, which has a pleasant bitter-sweet taste, a wine is also extracted, which is said to excel all others in flavour, fire and strength. Besides this species, there are nearly forty different kinds of vine and ten of the olive, including the *karudolia*, which yields the best edible olive berry. For size, vigorous growth and productiveness the olive tree of Zante is rivalled only by that of Corfu.

The island enjoys a healthy climate; and, although there are no perennial streams, an abundant supply of good water is obtained from the numerous springs, occurring especially in the eastern and central districts. But earthquakes are frequent and at times disastrous. During recent times the most destructive were those of 1811, 1820, 1840 and 1893; and, although the prevailing geological formations are sedimentary, chiefly calcareous, there seems no doubt that these disturbances are of igneous origin. Other indications of volcanic agency are the oil springs occurring on the coast, and even in the bed of the sea near Cape Skinari on the north side, and especially the famous pitch or bituminous wells already mentioned by Herodotus (*Hist.*, bk. iv.). These have been productive throughout the historic period and still yield a considerable supply of pitch. They are situated in a swamp near the coast village of Chieri, and comprise two basins, with alternate layers of water and bitumen, the lower sheet of water apparently communicating with the sea.

Zante, capital of the island, is a considerable seaport on the east side, with a population in 1907 of 13,501. It occupies the site of the ancient city of Zacynthus, said to have been founded by Zacynthus, son of a legendary Arcadian chief, Dardanus, to whom was also attributed the neighbouring citadel of Psophis. But of this, as well as of the temple of Artemis that formerly crowned Mount Skopos, no vestiges can now be discovered.

Traditionally the island formed part of the territory of Ulysses, king of Ithaca. It was peopled in ancient times by settlers variously represented as coming from Achaea or Arcadia. It figures occasionally in history as a base for belligerents in the Ionian Sea. Thus during the Peloponnesian War it served as a naval station for the Athenians, who again in 374 B.C. endeavoured to acquire it for a similar purpose; in 357 it became the headquarters of Dion on his expedition against Syracuse. In 217 it was seized by Philip V. of Macedon. The Romans captured it in 211, but restored it temporarily to Philip; in 191, wishing to keep it out of the hands of ambitious Greek powers, they definitely annexed it. In 86 it was raided by Mithradates' admiral Archelaus during a short foray into Ionian waters. Under the Roman Empire Zante was included in the province of Epirus. In the 11th century it passed to the Norman kings of Sicily; after the Fourth Crusade it belonged at various times to the despots of Epirus, the emperors of Constantinople, and the Orsini, counts of Cephalonia. After remaining from 1357 to 1482 in the hands of the Tocco family it became a Venetian possession. In 1797 it was ceded to France, and after a short occupation by the Russians was brought under British protection; in 1864 it was ceded with the other Ionian islands to the Greek kingdom.

The long Venetian occupation is reflected in the appearance, character, and to some extent even the language and religion of the Zantiots. Nearly all the aristocracy claim Venetian descent; most of the upper classes are bilingual, speaking both Greek and Italian; and a considerable section of the population are Roman Catholics of the Latin rite. Even the bulk of the people, although mainly of Greek stock, form in their social usages a connecting link between the Hellenes, whose language they speak, and the Western nations by whom they were so long ruled.

See B. Schmidt, *Die Insel Zakynthos* (Freiburg, 1899); B. V. Head, *Historia Numorum* (Oxford, 1887), pp. 359–60.

ZANY, a fool or silly person. The word came into English in the 16th century from Ital. *Zane*, mod. *Zanni*, an abbreviation of the name Giovanni (John). This familiar form of the name was given by Italians to a special type of clown or buffoon who acted as an attendant or follower of the regular professional clown on the stage and made clumsy and ludicrous attempts to mimic his performance.

ZANZIBAR, a sultanate and British protectorate of East Africa. The sultanate, formerly of much larger extent (see below, *History*), was reduced in 1890 to the islands of Zanzibar and Pemba, some adjacent islets, the nominal sovereignty of the coast line—for ten miles inland—of the protectorate of British East Africa (*q.v.*), and the possession, also nominal, of five ports on the Benadir coast, leased to Italy. (In 1905 the sultan of Zanzibar sold his sovereign rights to these ports to Italy. See SOMALILAND: § *Italian*.) The islands of Pemba and Zanzibar have a collective area of 1020 sq. m. and an estimated population (1909) of 250,000.

Topography, &c.—The political and commercial, as well as the geographical, centre of the state is the fertile and densely peopled island of Zanzibar, which lies at a mean distance of 20 m. from the mainland, between 5° 40′ and 6° 30′ S. Pemba (*q.v.*) to the north and the more distant Mafia (to the south) form with Zanzibar an independent geological system, resting on a foundation of coralline reefs, and constituting a sort of outer coast-line, which almost everywhere presents a rocky barrier to the Indian Ocean. All three are disposed parallel to the mainland, from which they are separated by shallow waters, mostly under thirty fathoms, strewn with numerous reefs dangerous to navigation, especially in the Mafia channel opposite the Rufiji delta. (For Mafia, see GERMAN EAST AFRICA.) Some 6 m. N. of Zanzibar and forming part of the coral reef is the small, densely wooded island of Tumbatu. Its inhabitants are excellent sailors.

Zanzibar island is 47 m. long and 20 broad at its greatest breadth. It has an area of 640 sq. m. The island, called Unguja in Swahili, is not exclusively of coralline formation, several heights of a reddish ferruginous clay rising in gentle slopes 400 to 450 ft. in the centre and double that in the north. There are several tolerable natural harbours, used only by Arab dhows, the port of Zanzibar sufficing for the general trade. The forests which formerly covered the island have largely disappeared; the eastern half is now mostly covered with low scrub. The western part is noted for the luxuriance and variety of its flora, notwithstanding the absence of timber trees. Among fruit-trees the coco-nut palm is conspicuous. Each tree yields 100 to 120 nuts a year. In places there are extensive groves of these trees, elsewhere the palms grow indiscriminately among other trees, which include the mangrove (in swampy districts), lemons, sweet and sour limes, the bread fruit, papaw, pomegranate, tamarind, the orange and mango trees. The two last-named and plantains and bananas are abundant. The mango trees attain a great size. Many of the fruit-trees and plants have been introduced from India and Malaysia, such as the mangosteen, guava, durian, cinnamon, nutmeg and cloves, all of which thrive well. The soil seems specially suited for the clove, which, although nearly destroyed by a terrible cyclone in 1872, completely recovered from that disaster.

Although the fauna is almost exclusively continental, Zanzibar till recently possessed a distinct variety of monkey (*Colobus kirkii*), which appears to be now extinct. Other varieties of monkeys are fairly numerous. Hippopotami have occasionally swum to the island. Wild boars and servals are common, pythons are found in the swamps. Camels and bullocks are used as draught animals.

Climate.—The great heat and the excessive moisture of the atmosphere render the climate very trying, especially to Europeans. The year is divided into two seasons, according to the direction of the monsoons. The north-east monsoon sets in about the end of November, the south-west monsoon in April. The "hot season" corresponds with the north-east monsoon, when the minimum readings of the thermometer often exceed 80° F. In June to September the minimum readings drop to 72°, the mean annual temperature being about 80°. Rain falls in every month of the year. December, April and May are the rainiest months, August to October the driest. The average annual rainfall (18 years' observations) is 65 in. (In 1859 as much as 170 in. were registered.)

Inhabitants.—On the east side of the island the inhabitants, a Bantu-speaking race of low development, probably represent the aboriginal stock. They are known as Wahadimu and are noted as good fishermen, cattle raisers, and skilled artisans. In the west, and especially in the capital (for which, see below), the population is of an extremely heterogeneous character, including full-blood and half-caste Arabs, Goanese, Parsis, Hindus, Comoro Islanders, Swahili (*q.v.*) of every shade, and representatives of tribes from all parts of East Africa. The Arabs number about 7000; Asiatics (mostly British Indians), 20,000; whites (chiefly British), 250. Besides the port of Zanzibar there are no large towns. Chuaka is a pleasant health resort on the eastern shore facing the Indian Ocean.

Production.—Cloves and copra are the chief products of the island. There are also extensive chilli and rubber plantations. The muhogo (cassava), the tobacco plant and vanilla are cultivated on a smaller scale; experiments in cotton-growing proved unsuccessful. The shambas (plantations) are mostly the property of Arabs. The labourers are chiefly Swahilis, and were formerly slaves. The labour available at harvest time is often inadequate, and year after year a large proportion of the clove crop has remained unpicked. As its prosperity depended much more on its transit trade (Zanzibar being the entrepôt for all the East African ports as far south as the Zambezi) than on agriculture the resources of the island were somewhat neglected; but when in the early years of the 20th century the competition of Mombasa and Dar-es-Salaam was felt, efforts were made to increase the number and productiveness of the crops and also to decrease costs by providing better means of transport. Good roads were made by the government, and an American company built a 3-ft. gauge railway from Zanzibar town to the north of the island, where are the chief plantations. Rice is imported in large quantities from Rangoon and Bombay. Besides rice, cassava, grown on the island, and fish (which is abundant) are the chief foods of the natives. The pigeon pea (*cajanus Indicus*) is commonly grown, and the Wahadimu and Watumbata cultivate the betel-nut creeper.

Revenue and Currency.—Custom duties are the chief source of revenue. Other sources are registration and market fees, hut tax (one dollar per hut) on government ground, post office receipts, &c., and the produce of crown shambas. A sum of £17,000 a year is paid to the government by the British East Africa Protectorate for the right to administer the mainland portion of the sultanate; the Zanzibar government also receives some £10,000 a year interest on the purchase money paid by Germany and Italy for the part of Zanzibar territory acquired by those Powers. In 1900 the revenue was £123,000 and the expenditure £131,000. In 1902 the sultan, on the advice of the British government, appointed a financial adviser, under whose care the finances steadily improved. In 1906 the revenue was £191,000, the expenditure £156,000. In the last-named year there was a public debt of £88,000. The principal items of expenditure come under the heads of administration, public works, civil list and military police.

The coinage system is somewhat complicated. The Maria Theresa dollar (equalling approximately 3s. 9d.) is used as a standard of value in price quotations, but the coin is not in circulation. The Indian rupee is in universal currency and the British sovereign is legal tender at the fixed rate of 15 rupees to £1. The division of the rupee into annas and pice was abolished in 1908 and the rupee divided into 100 cents. In the same year the government issued notes of 5, 10, 20, 50 and 100 rupees. British weights and measures are used in wholesale transactions, with the exception of the *frasila*, which equals 35 ℔ avoir.

Religion, Education and Justice.—Mahommedanism is the dominant religion. Most of the inhabitants are Sunnis of the Shafi school, but the sultan and his relatives are schismatics of the Ibadhi sect. There are several Protestant and Roman Catholic missions with branches on the mainland. These missions maintain schools. The government supports kuttabs in which elementary education is given in Arabic and the vernacular, and more advanced schools in which English, geography and arithmetic are taught. In December 1892 the sultan delegated to the British agent and consul-general his right to try all cases in which a British subject is plaintiff or accuser, and the defendant or accused is a Zanzibar subject. The British court also tries all cases in which other Europeans (and Americans) are concerned, the consular jurisdiction exercised by other Powers having been finally abolished in 1907. Cases between natives are tried by Moslem tribunals. There is a military police force under a British officer.

History.—From the earliest times of which there is any record the African seaboard from the Red Sea to an unknown distance southwards was subject to Arabian influence and dominion. Egyptians, Chinese and Malays also appear to have visited the coast. At a later period the coast towns were founded or conquered by Persian and Arab Mahommedans who, for the most part, fled to East Africa between the 8th and 11th centuries on account of the religious differences of the times the refugees being schismatics. Various small states thus grew up along the coast, Mombasa seeming to be the most important. These states are sometimes spoken of as the Zenj empire, though they were never, probably, united under one ruler. Kilwa (*q.v.*) was regarded as the capital of the "empire." The seaboard itself took the name of *Zanquebar* (corrupted to Zanzibar by the Banyan traders), the Balid ez-Zenj, or "Land of the Zenj" of the Arabs, a term which corresponds to the Hindu-bar, or "land of the Hindu," formerly applied to the west coast of India. By Ibn Batuta, who visited the coast in 1328, and other Arab writers the Zenj people are referred to in a general way as Mahommedan negroes; and they are no doubt still represented by the semi-civilized Mahommedan Bantus now collectively known as the Swahili or "coast people," and in whose veins is a large admixture of Asiatic blood. The Zenj "empire" began to decline soon after the appearance of the Portuguese in East African waters at the close of the 15th century. To them fell in rapid succession the great cities of Kilwa with its 300 mosques (1505), Mombasa the "Magnificent" (1505), and soon after Malindi and Mukdishu the "Immense" (Ibn Batuta). The Portuguese rule was troubled by many revolts, and towards the end of the 16th century the chief cities were ravaged by the Turks, who came by sea, and by the Zimbas, a fierce negro tribe, who came overland from south of the Zambezi. On the ruins of the Portuguese power in the 17th century was built up that of the Imams of Muscat. Over their African dominions the Imams placed *walis* or viceroys, who in time became independent of their overlord. In Mombasa power passed into the hands of the Mazrui family. The island of Zanzibar, conquered by the Portuguese in 1503-8, was occupied by the Arabs in 1730, and in 1832 the town of Zanzibar, then a place of no note, was made the capital of his dominions by the Sayyid Said of Muscat, who reconquered all the towns formerly owning allegiance to the Imams, Mombasa being taken by treachery in 1837. On the death of Said in 1856 his dominions were divided between his two sons, the African section falling to Majid, who was succeeded in 1870 by his younger brother Bargash ibn Said, commonly known as sultan of Zanzibar. Bargash witnessed the dismemberment of his dominions by Great Britain, Germany and Italy (see Africa, § 5), and in March 1888 left to his successor, Sayyid Khalifa, a mere fragment of the territories over which he had once ruled. The Sayyids Majid and Bargash acted largely under the influence of Sir John Kirk (*q.v.*), who from 1866 to 1887 was consular representative of Great Britain at Zanzibar. By Sir John's efforts a treaty for the suppression of the slave trade throughout the sultanate had been concluded in 1873.

In the negotiations between the Powers for the partition of Africa the supremacy of British interests in the island was acknowledged by Germany and France, thus rendering a treaty made in 1862 between France and Great Britain recognizing the "independence" of Zanzibar of no effect. On the 4th of November 1890 the sultanate was proclaimed a British protectorate, in conformity with conventions by which Great Britain on her part ceded Heligoland to Germany and renounced all claims to Madagascar in favour of France.[1] Sultan (Sayyid) Ali, who had succeeded his brother Sayyid Khalifa in February 1890, in August following issued a decree which resulted in the liberation of large numbers of slaves. Sayyid Ali was succeeded in March 1893 by Hamed bin Thwain, on whose death in August 1896 his cousin, Sayyid Khalid, proclaimed himself sultan, and seized the palace. The British government disapproved, and to compel Khalid's submission the palace was bombarded by warships. Khalid fled to the German consulate, whence he was removed to the mainland, and Hamed bin Mahommed, brother of Hamed bin Thwain, was installed sultan by the British representative (27th of August 1896). The government was reconstituted under British auspices in October 1891, when Sir Lloyd Mathews[2] was appointed prime minister, and the sultan made virtually a crown pensioner, with a civil list of 120,000 rupees. In 1897 the legal status of slavery was abolished, compensation being given to slave owners. In July 1902 Hamed bin Mahommed died, and was succeeded by his son Ali bin Hamud, born in 1885. The British government is represented by an agent and consul-general, without whose sanction no important steps can be undertaken. This officer also administered the East Africa Protectorate, but the dual appointment was found to hamper the progress of both protectorates, and in 1904 when Mr Basil S. Cave was given charge of the Zanzibar protectorate another officer was appointed for the mainland. In 1906 the British agent assumed more direct control over the protectorate and again reorganized the administration, Capt. (locally general) A. E. H. Raikes being appointed prime minister. These changes, together with the abolition of foreign consular jurisdiction, led to many reforms in the government and the increased prosperity of the Zanzibari.

Authorities.—J. L. Krapf, *Travels . . . in Eastern Africa* (London, 1860); *Précis of Information concerning . . . Zanzibar* (War Office, London, 1902); W. W. A. Fitzgerald *Travels in . . . the island of Zanzibar* (London, 1898); H. S. Newman, *Banani, the Transition from Slavery to Freedom in Zanzibar* (London, 1898); Sir C. Eliot, *The East Africa Protectorate* (London, 1905); R. N. Lyne, *Zanzibar in Contemporary Times* (London, 1905), a useful historical summary, with bibliography of British Blue Books; *Drumkeys' Year Book for East Africa* (annually since 1908); and the annual reports to the British Foreign Office.

ZANZIBAR, an East African seaport, capital of the island and sultanate of the same name, in 6° 9′ S., 39° 15′ E. The town is situated on the western side of the island, 26 m. N.E. of the mainland port of Bagamoyo, which is visible from Zanzibar in very clear weather. Zanzibar is built on a triangular-shaped peninsula about a mile and a half long which runs from east to west, forming a safe and spacious roadstead or bay with a minimum depth of water exceeding five fathoms. Ocean steamers anchor in the roadstead and are loaded and discharged by lighters. The harbour, frequented by British, German and French steamers, warships and Arab dhows, affords a constant scene of animation. Viewed from the sea, the town presents a pleasant prospect with its mosques, white flat-topped houses, barracks, forts, and round towers. The most prominent buildings are the Sultan's palace and the Government offices (formerly the British consulate), the last-named situated at the Point, the south-west horn of the bay. To the left of the palace—viewed from the sea—is the "stone ship," a series of water tanks (now disused) the front of which is cleverly carved to resemble a ship. The town consists of two quarters—Shangani, the centre of trade and residence of the sultan, and the eastern suburb, formerly separated from the rest of the town by the Malagash lagoon, an inlet of the sea, now drained. For the most part Zanzibar consists of a labyrinth of narrow and dirty streets, in which live the Banyans, Singalese, the negro porters, fishermen and half-castes. There are numerous markets. In Shangani are the houses of the European merchants and the chief Arabs, and the headquarters of various Protestant and Roman Catholic missions. Characteristic of the streets are the carved and massive wooden doors, whose blackness contrasts with the white stone of the houses, and the bright red of the acacias in the garden enclosures. Ndia Kun or Main Road extends from the Sultan's palace to the (new) British Agency at Mnazi Moja, a castellated building situated in beautiful grounds. Along this thoroughfare are the custom house, the post office buildings (an imposing edifice) and several consulates. In a turning off Main Street is the residence of Tippoo Tib (now an hotel). Next to this house is the English Club, and in the same street are the law courts (built 1909-10). The Anglican cathedral (built 1873-79) a semi-Gothic coral building, occupies the site of the old slave market. The Roman Catholic cathedral—in the Renaissance style—is one of the finest buildings in East Africa. On the outskirts of the town at Mnazi Moja is a public park, a golf course and cricket ground. Zanzibar is well supplied with pure water brought from the neighbouring hills.

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[1] By the Zanzibar Order in Council, 1906, the protectorate of Zanzibar was limited to the islands of Zanzibar and Pemba, including the territorial waters thereof and any islets within those waters.

[2] Sir Lloyd Mathews (1850-1901) was a British naval officer. He served in Ashanti 1873-74 and went to Zanzibar in 1875 as lieutenant on a ship engaged in the suppression of the slave trade. In 1877 he was selected to command the military force being raised by Sayyid Bargash and thereafter devoted his services entirely to the Zanzibar government. He was made a K.C.M.G. in 1894.

Submarine cables connect Zanzibar with all parts of the world; whilst lines of steamships from Europe and India make it a regular port of call. It was not, however, until 1910 that direct steamship communication with London was established. The average annual value of the external trade for the five years 1902–6 was: imports, £1,075,580; exports, £1,084,224. In 1907 the imports were valued at £1,232,957, the exports at £1,070,067. The figures for 1908 were: imports, £969,841; exports, £977,628. Many of the imports brought from the neighbouring mainland also figure as exports. Of these the most important are ivory, and rhinoceros horn, gum copal, hides and skins. Cloves, clove stems and copra are the chief exports, the production of the island. The bulk of the articles named, with the exception of copra, are sent to the United Kingdom; India, however, has a larger trade with Zanzibar than any other country. From it are imported food stuffs (rice, grain, flour, ghee, groceries) and piece goods. The copra is sent almost exclusively to Marseilles. The most valuable articles of import are piece goods and rice. The piece goods come chiefly from the United Kingdom, India, America and the Netherlands, the rice entirely from India. Other imports of value are building material, coal, petroleum and sugar.

The motley population of Zanzibar is indicative of the commercial importance of the city. Its geographical position has made it the key of East Africa from Cape Guardafui to Delagoa Bay. "When you play on the flute at Zanzibar" (says an Arab proverb) "all Africa as far as the lakes dances." From the time (1832) when Seyyid Said of Muscat fixed on the town as the capital of his empire, Zanzibar became the centre of the trade between the African continent, India, Arabia and the Persian Gulf, as well as Madagascar and the Mauritius. It also speedily obtained a large trade with Europe and America. The Americans were the first among white merchants to realize the possibilities of the port, and a United States consulate was established as early as 1836. The name Merikani, applied to cotton goods and blankets on the east coast, is a testimony to the enterprise of the American trader. Zanzibar is to a greater degree than any other city the capital of negro Africa; made so, however, not by the negroes but by Arab conquerors and traders. The aspect of the city has changed since the establishment of the British protectorate, the suppression of the slave market and of slavery itself, and the enforcement of sanitation; but Professor Henry Drummond in *Tropical Africa* (1888) aptly sketched the characteristics of Zanzibar in pre-protectorate days when he wrote of it as a "cesspool of wickedness Oriental in its appearance, Mahommedan in its religion, Arabian in its morals . . . a fit capital for the Dark Continent." Nevertheless Zanzibar in those days was the focus of all exploring and missionary work for the interior, the portal through which civilizing influences penetrated into the eastern section of equatorial Africa. The growth of the British and German protectorates on the neighbouring shores led in the early years of the 20th century to considerable trade which had hitherto gone through Zanzibar being diverted to Mombasa and Dar-es-Salaam, but Zanzibar maintains its supremacy as the great distributing centre for the eastern seaboard.

ZAPAROS, a tribe or group of tribes of South American Indians of the river Napo. They occupy some 12,000 sq. m. between the Napo and the Pastaza. Their only industries are hammock plaiting and fishing-net weaving. Polygamy is general. They wear a long skirt of bark fibre.

ZARA (Serbo-Croatian *Zadar*), the capital of Dalmatia, Austria. Pop. (1900), of town and commune, 32,506: including a garrison of 1330. Zara is situated on the Adriatic Sea, 52 m. S.E. of Trieste, and opposite the islands of Ugliano and Pasman, from which it is separated by the narrow Channel of Zara. It is the meeting-place of the provincial diet, and the seat of a Roman Catholic archbishop and an Orthodox bishop. The promontory on which it stands is separated from the mainland by a deep moat, practically making an island of the city. In 1873 the ramparts of Zara were converted into elevated promenades commanding extensive views to seaward and to landward. Of its four old gates one, the Porta Marina, incorporates the relics of a Roman arch, and another, the Porta di Terraferma, was designed in the 16th century by the Veronese artist Sanmichele. The chief interest of Zara lies in its churches, the most remarkable of which is the cathedral of St Anastasia, a fine Romanesque basilica, built between 1202 and 1205. The churches of St Chrysogonus and St Simeon are also in the Romanesque style, and St Mary's retains a fine Romanesque campanile of 1105. The round church of St Donatus, traditionally but erroneously said to have been erected in the 9th century on the site of a temple of Juno, is used for secular purposes. The church treasuries contain some of the finest Dalmatian metal-work; notably the silver ark or reliquary of St Simeon (1380), and the pastoral staff of Bishop Valaresso (1460). Most of the Roman remains were used in the construction of the fortifications. But two squares are embellished with lofty marble columns; a Roman tower stands on the east side of the town; and some remains of a Roman aqueduct may be seen outside the ramparts. Among the other chief buildings are the Loggia del Comune, rebuilt in 1565, and containing a public library; the old palace of the priors, now the governor's residence; and the episcopal palaces. The harbour, to the north-east of the town, is safe and spacious, and it is annually entered by about 2500 small vessels, mainly engaged in the coasting trade. Large quantities of maraschino are distilled in Zara; and the local industries include fishing, glass-blowing, and the preparation of oil, flour and wax.

In the early days of the Roman empire Zara was a flourishing Roman colony under the name of *Jadera*, subsequently changed to *Diadora*. It remained united with the eastern empire down to 998, when it sought Venetian protection. For the next four centuries it was always under Venetian or Hungarian rule, changing hands repeatedly. It was occupied by the Hungarians at the end of the 12th century, but was recaptured by the Venetians in 1202, with the aid of French crusaders on their way to Palestine. In 1409 it was finally purchased from Hungary by Venice for 100,000 ducats. In 1792 it passed into the possession of Austria. From 1809 to 1813 it belonged to France.

About 15 m. S.E. is Zara Vecchia, or Old Zara, an insignificant village on the site of Biograd, the former residence of the Croatian kings, which was destroyed during the wars between Venice and Hungary.

See Angelo Nani, *Zara, e suoi Dintorni* (Zara, 1878), and *Notizie Storiche della Città di Zara*, (Zara, 1883).

ZARCILLO Y ALCARAZ, FRANCISCO (1707–1781), Spanish sculptor, was born in Murcia on the 12th of May 1707. At the age of twenty he completed the statue of St Ines of Montepulciano, which had been begun for the Dominicans at Murcia by his father. On the death of the latter the care of the family fell upon Francisco, who with the help of his brothers and sisters organized a workshop. In 1765 he also founded a small academy, which, however, was speedily dissolved owing to disunion among the members. In the Ermita de Jesús in Murcia may be seen Zarcillo's scenes from the Passion of Our Lord, a vast work in which all the sculptor's qualities and defects are revealed. In the church of St Miguel are an Immaculate Conception and a St Francis. Mention should also be made of the Christ at the Well in the church of Santa Maria dellas Gracias in Murcia, and of the sculptures in San Pedro and in the Capucine monastery in Murcia. Zarcillo worked in wood, which was coloured. The ascription of the stone sculptures on the façade of the St Nicolas Church in Murcia to him rests on conjecture. He died at Murcia in 1781.

See B. Haendcke, *Studien zur Geschichte der spanischen Plastik* (Strassburg, 1900).

ZARHÓN, a mountain in Morocco, 9½ m. N. of Mequinez, on whose hillside is the town Mulai Idris Zarhón, so called after Mulai Idrís I., the founder of the Moorish empire, who was buried there in A.D. 791. The whole town is considered as a sanctuary, pays no taxes, provides no soldiers and is never visited save by Mahommedans. Near the town are the ruins of Volubilis—Kasar Fara'on or Pharaoh's Castle, once the Roman capital, and the first home of Idris.

ZARIA, a province of the British protectorate of Northern Nigeria. It lies approximately between 5° 50′ and 8° 30′ E. and 9° 20′ and 11° 30′ N. It has an area of 22,000 sq. m. and an estimated population of about 250,000. The province, of which a great portion consists of open rolling plains, is watered by the Kaduna affluent of the Niger and its many tributaries, and is generally healthy and suitable for cultivation. The chief towns are Zaria, the capital of the emirate, 87 m. S.W. of Kano, and Zungeru, the headquarters of the British administration for the whole of Northern Nigeria. The British station at Zaria town, with an elevation of 2150 ft., has so far proved the healthiest and most agreeable point of occupation in the protectorate. The climate here for a great portion of the year is bracing, and in the cold season there is frost at night.

The British capital at Zungeru, in the south-western corner of the province, less fortunate than Zaria, has only an elevation of about 450 ft. above the sea. The climate, though better than that of Lokoja, is still relaxing and trying for Europeans. The site of Zungeru, 6° 9′ 40″ E. 9° 48′ 32″ N., was selected in 1901. By the summer of 1902 brick houses for the public departments, a residency, a hospital, barracks and a certain number of houses for the civilian staff had been erected, and the town is now a flourishing settlement, having all the appearance of an English suburban town with shaded avenues and public gardens clustering on either side of the river Dagò, over which several bridges have been thrown.

Zaria is not a great grain-producing province. Its principal crop is cotton, of which the surplus is available for purposes of trade, and among the Mahommedan population there is a growing demand for cloth, agricultural and culinary implements, Birmingham goods, soap, oil, sugar and European provisions. The construction of roads, telegraphs and other public works consequent upon the British occupation of the province makes somewhat heavy calls upon the local labour supply and accentuates to some of the large landowners the inconvenience resulting from the abolition of the slave trade, but the practice of owning domestic slaves is not forbidden, and it is the policy of the administration to render the transition from slave labour to free labour as gradual as possible.

The ancient state of Zaria, also called Zeg-Zeg by the geographers and historians of the middle ages, was one of the original seven Hausa states. It suffered all the fluctuations of Hausa history, and in the 13th and early 14th centuries seems to have been the dominating state of Hausaland. At later periods it underwent many conquests and submitted in turn to Kano, Songhoi and Bornu. At the end of the 18th century it was an independent state living under its own Mahommedan rulers; but, like the rest of northern Hausaland, it was conquered in the opening years of the 19th century by the emissaries of the Fula Dan Fodio. It remained a Fulani emirate paying allegiance to Sokoto up to the period of the British occupation of Nigeria, January 1900. Early in 1900 a British garrison was placed at Wushishi, a town in the south-western corner of the emirate which marks the limit of navigation of the Kaduna river. The emir of Zaria professed friendliness to the British, and at his own request British troops were quartered at his capital, in order to protect him from the threatened attacks of Kontagora. In March 1902 the province was taken under British administrative control. Throughout that year it was found that, notwithstanding his friendly professions, the emir of Zaria was intriguing with Kano and Sokoto, then openly hostile to Great Britain, while at the same time he continued, contrary to his undertaking in return for British protection, to raid for slaves and to perpetrate acts of brutal tyranny and oppression. He was deposed in the autumn of 1902, and after the Sokoto-Kano campaign of 1903, which assured the supremacy of Great Britain in the protectorate, another emir was appointed to Zaria. The new emir, Dan Sidi, took the oath of allegiance to the British crown and accepted his appointment on the conditions required of all the Nigerian native rulers. He afterwards continued to act in loyal co-operation with the British administration.

The province has been organized for administration on the same system as the rest of the protectorate. It has been divided into four administrative districts, each under a British assistant resident. A good cart road suitable for wheeled traffic has been constructed between Zungeru and Zaria, and the Kaduna has been handsomely bridged at a point near Wushishi, which is the meeting-point of main caravan roads, and whence there is at certain seasons of the year uninterrupted water carriage to the mouth of the Niger. The development of trade was further facilitated in the early days of the British occupation by the building of a light railway from Barijuko, a point on the Kaduna river below Wushishi, to Zungeru. This line was superseded by the construction, in 1907–1909, of a 3 ft. 6 in. railway from Baro, a port on the lower Niger, to Zungeru, whence the line was continued to Zaria.

The taxation scheme introduced by the British administration works satisfactorily, and the revenue shows a regular surplus. Courts of justice have been established in the administrative districts. In 1904 Zaria suffered from the misfortune of a famine, but excellent harvests restored prosperity in the following year, and the province shows every sign of contentment under existing rule. The main artery of commerce which runs from Zaria to Wushishi has been rendered not only safe and peaceful, but has been made so much more commodious by the construction of a good road and by the bridging of the river that the north and south trade is steadily increasing. The local movements of trade throughout the province are also greater.

A large portion of the province is occupied by pagan tribes, especially in the south and the south-west. These districts require more direct British supervision than the Fula districts, in which the native administration, under British control, is fairly efficient. The creation of an administrative division at Kachia with a British station and garrison at Kachia town had an excellent effect, and the resident was able to report in 1905 that "the inhabitants of the once dangerous pagan districts now buy cloth, kolas and salt from the traders in exchange for mats, rubber, palm oil and corn, instead of seizing these articles as they formerly did." (F. L. L.)

ZARLINO, GIOSEFFO (1517–1590), Italian musical theorist, surnamed from his birthplace Zarlinus Clodiensis, was born at Chioggia, Venetia, in 1517 (not 1540, as Burney and Hawkins say). Studying in his youth for the Church, he was admitted to the minor orders in 1539 and ordained deacon in 1541 at Venice; but he soon devoted himself entirely to the study of music under the guidance of Adrian Willaert, then choirmaster at St Mark's. Willaert, dying in 1562, was succeeded by Cipriano di Rore, on whose removal to Parma in 1565 Zarlino was elected choirmaster. Though now remembered chiefly for invaluable contributions to the theory of music, it is evident that he must have been famous both as a practical musician and as a composer; for, notwithstanding the limited number of his printed works, consisting of a volume entitled *Modulationes Sex Vocum* (Venice, 1566), and a few motets and madrigals scattered through the collections of Scotto and other contemporary publishers, he both produced and superintended the public performance of some important pieces in the service of the republic. First among these was the music written to celebrate the battle of Lepanto (on the 7th of October 1571). Again, when Henry III. of France passed through Venice on his return from Poland in 1574, Zarlino directed on board the "Bucentaur" the performance of an ode for which he himself had composed the music, to verses supplied by Rocco Benedetti and Cornelio Frangipani. The ode was followed by a solemn service in St Mark's, in which Zarlino's music formed a prominent feature, and the festival concluded with the representation of a dramatic piece entitled *Orfeo* composed by Zarlino. When the church of S. Maria della Salute was founded in 1577 to commemorate the plague, he composed a solemn mass for the occasion. No one of these works is now known to be in existence; the only example we possess of Zarlino's compositions on a grand scale is a MS. mass for four voices, in the library of the Philharmonic Lyceum at Bologna. He died at Venice on the 14th, or according to some the 4th, of February 1590.

Zarlino's first theoretical work was the *Istitutioni Armoniche* (Venice, 1558; reprinted 1562 and 1573). This was followed by the *Dimostrationi Armoniche* (Venice, 1571; reprinted 1573) and by the *Sopplimenti Musicali* (Venice, 1588). Finally, in a complete edition of his works published shortly before his death Zarlino reprinted these three treatises, accompanied by a *Tract on Patience*, a *Discourse on the True date of the Crucifixion of Our Lord*, an essay on *The Origin of the Capuchins*, and the *Resolution of Some Doubts Concerning the Correction of the Julian Calendar* (Venice, 1589).[1]

The *Istitutioni* and *Dimostrationi Armoniche* deal, like most other theoretical works of the period, with the whole science of music as it was understood in the 16th century. The earlier chapters, treating chiefly of the arithmetical foundations of the science, differ but little in their line of argument from the principles laid down by Pietro Aron, Zacconi, and other early writers of the Boeotian school; but in bk. ii. of the *Institutioni* Zarlino boldly attacks the false system of tonality to which the proportions of the Pythagorean tetrachord, if strictly carried out in practice, must inevitably lead. The fact that, so far as can now be ascertained, they never were strictly carried out in the Italian medieval schools, at least after the invention of counterpoint, in no wise diminishes the force of the reformer's argument. The point at issue was, that neither in the polyphonic school, in which Zarlino was educated, nor in the later monodic school, of which his recalcitrant pupil, Vincenzo Galilei, was the most redoubtable champion, could those proportions be tolerated in practice, however attractive they might be to the theorist in their mathematical aspect. So persistently does the human ear rebel against the division of the tetrachord into two greater tones and a leimma or hemitone, as represented by the fractions $\frac{9}{8}$, $\frac{9}{8}$, $\frac{256}{243}$, that, centuries before the possibility of reconciling the demands of the ear with those of exact science was satisfactorily demonstrated, the Aristoxenian school advocated the use of an empirical scale, sounding pleasant to the sense, in preference to an unpleasing tonality founded upon immutable proportions. Didymus, writing in the year 60, made the first step towards establishing this pleasant-sounding scale upon a mathematical basis, by the discovery of the lesser tone; but unhappily he placed it in a false position below the greater tone. Claudius Ptolemy (130) rectified this error, and in the so-called syntonous or intense diatonic scale reduced the proportions of his tetrachord to $\frac{9}{8}$, $\frac{10}{9}$, $\frac{16}{15}$,—*i.e.* the greater tone, lesser tone, and diatonic semitone of modern music.[2] Ptolemy set forth this system as one of eight possible forms of the diatonic scale. But Zarlino uncompromisingly declared that the syntonous or intense diatonic scale was the only form that could reasonably be sung; and in proof of its perfection he exhibited the exact arrangement of its various diatonic intervals, to the fifth inclusive, in every part of the diapason or octave. The proportions are precisely those now universally accepted in the system called "just intonation." But this system is practicable only by the voice and instruments of the violin class. For keyed or fretted instruments a compromise is indispensable. To meet this exigency, Zarlino proposed that for the lute the octave should be divided into twelve equal semitones; and after centuries of discussion this system of "equal temperament" has, within the last thirty-five years, been universally adopted as the best attainable for keyed instruments of every description.[3]

Again, Zarlino was in advance of his age in his classification of the ecclesiastical modes. These scales were not, as is vulgarly supposed, wholly abolished in favour of our modern tonality in the 17th century. Eight of them, it is true, fell into disuse; but the medieval Ionian and Hypo-ionian modes are absolutely identical with the modern natural scale of C; and the Aeolian and Hypoaeolian modes differ from our minor scale, not in constitution, but in treatment only. Medieval composers, however, regarded the Ionian mode as the least perfect of the series and placed it last in order. Zarlino thought differently and made it the first mode, changing all the others to accord with it. His numerical table, therefore, differs from all others made before or since, prophetically assigning the place of honour to the one ancient scale now recognized as the foundation of the modern tonal system.

These innovations were violently opposed by the apostles of the monodic school. Vincenzo Galilei led the attack in a tract entitled *Discorso Intorno alle Opere di Messer Gioseffe Zarlino*, and followed it up in his famous *Dialogo*, defending the Pythagorean system in very unmeasured language. It was in answer to these strictures that Zarlino published his *Sopplementi*.

ZARNCKE, FRIEDRICH KARL THEODOR (1825–1891), German philologist, was born on the 7th of July 1825 at Zahrenstorf, near Brüel, in Mecklenburg, the son of a country pastor. He was educated at the Rostock gymnasium, and studied (1844–1847) at the universities of Rostock, Leipzig and Berlin. In 1848 he was employed in arranging the valuable library of Old German literature of Freiherr Karl Hartwig von Meusebach (1781–1847), and superintending its removal from Baumgartenbrück, near Potsdam, to the Royal Library at Berlin. In 1850 he founded at Leipzig the *Literarisches Centralblatt für Deutschland*. In 1852 he established himself as *Privatdozent* at the university of Leipzig, and published an excellent edition of Sebastian Brant's *Narrenschiff* (1854), a treatise *Zur Nibelungenfrage* (1854), followed by an edition of the *Nibelungenlied* (1856, 12th ed. 1887), and *Beiträge zur Erläuterung und Geschichte des Nibelungenliedes* (1857). In 1858 he was appointed full professor, and commenced a series of noteworthy studies on medieval literature, most of which were published in the reports (*Berichte*) of the Saxon Society of Sciences. Among them were that on the old High German poem *Muspilli* (1866); *Gesang vom heiligen Georg* (1874); the legend of the *Priester Johannes* (1874); *Der Graltempel* (1876), and the *Annolied* (1887). He also wrote a valuable treatise on Christian Reuter (1884), on the portraits of Goethe (1884), and published the history of Leipzig university, *Die urkundlichen Quellen zur Geschichte der Universität Leipzig* (1857) and *Die deutschen Universitäten im Mittelalter* (1857). Two volumes of his *Kleine Schriften* appeared in 1897.

See *Zur Erinnerung an den Heimgang von Dr Friedrich Zarncke* (1891); Franz Vogt in *Zeitschrift für deutsche Philologie*; Eduard Zarncke in *Biographisches Jahrbuch für Altertumswissenschaft* (1895); and E. Sievers in *Allgemeine deutsche Biographie*.

ZEALAND (also SEALAND or SEELAND; Danish *Sjaelland*), the largest island of the kingdom of Denmark. It is bounded N. by the Cattegat, E. by the Sound, separating it from Sweden, and the Baltic Sea, S. by narrow straits separating it from Falster, Möen, and smaller islands, and W. by the Great Belt, separating it from Fünen. Its nearer point to Sweden is 3 m., to Fünen 11. Its greatest extent from N. to S. is 82 m., from E. to W. 68 m., but the outline is very irregular. The area is 2636 sq. m. The surface is for the most part undulating, but on the whole little above sea-level; the highest elevations are in the south-east, where Cretaceous hills (the oldest geological formation on the island) reach heights of upwards of 350 ft. The coast is indented by numerous deep bays and fjords; the Ise Fjord in the north, with its branches the Roskilde Fjord on the east and the Lamme Fjord on the west, penetrates inland for about 25 m. There are no rivers of importance; but several large lakes, the most considerable being Arre and Esrom, occur in the north-east. The soil is fertile and produces grain, especially rye and barley, in great abundance, as well as potatoes and other vegetables, and fruit. The scenery, especially in the neighbourhood of the fjords, is pleasant, lacking the barrenness of some portions of the kingdom.

Zealand is divided into five *amter* (counties). (1) Frederiksborg, in the north, named from the palace of Frederiksborg. In the north-east, where the coast approaches most nearly to Sweden, is Helsingör or Elsinore. (2) Kjöbenhavn, south of Frederiksborg. The capital is that of the kingdom, Copenhagen (Kjöbenhavn). The only other town of importance is the old cathedral city of Roskilde on the fjord of that name. Off the little port of Kjöge in the south the Danes under Nils Juel defeated the Swedes in 1677, and in another engagement in 1710 the famous Danish commander Hvitfeldt sank with his ship. (3) Holbaek, west of Kjöbenhavn. The chief town, Holbaek, lies on an arm of the Ise Fjord. In the west is the port of Kallundborg, with regular communication by steamer with Aarhus in Jutland. It has a singular Romanesque church of the 12th century. The district is diversified with small lakes, as the Tüs Sö. (4) Sorö, occupying the south-western part of the island. The chief town, Sorö, lies among woods on the small Sorö lake. It was formerly the seat of a university, and remains an important educational centre. Its church, of the

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[1] Ambros mentions an edition of the *Istitutioni* dated 1557, and one of the *Dimostrationi* dated 1562. The present writer has never met with either.

[2] We have given the fractions in the order in which they occur in the modern system. Ptolemy, following the invariable Greek method, placed them thus—$\frac{16}{15}$, $\frac{9}{8}$, $\frac{10}{9}$. This, however, made no difference in the actual proportions.

[3] It was first used in France, for the organ, in 1835; in England, for the pianoforte in 1846 and for the organ in 1854. Bach had advocated it in Germany a century earlier; but it was not generally adopted.

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of all the striped members of the
applicable only to the true or
species (*Equus zebra*) inhabits the
Cape Colony, where, owing to the
into its restricted range it has become
threatened with extermination, but
local race in Angola. The second
Equus burchelli, is represented by a
ranging from the plains north of
east Africa.
smaller of the two (about 4 ft. high at the
ears, a tail more scantily clothed with
The general ground colour is white,
the lower part of the face is bright
the abdomen and the inside of
of the surface is covered with stripes, the
transverse bars reaching quite to the hoofs,
being also barred. The outsides of the
and a broad black mark occupying the
surface, but are white at the base. Perhaps
obvious distinction between this species
arrangement of the stripes on the hinder
where there are a number of short transverse
the median longitudinal dorsal stripe, and
the uppermost of the broad stripes which pass
haunch from the flanks towards the root
is often a median longitudinal stripe under

Burchell's zebra, or the bonte-quagga (*Equus*
rather larger and more robust animal, with

-The True or Mountain Zebra (*Equus zebra*).

longer mane, and fuller tail. The general ground-
body is pale yellowish brown, the limbs nearly
pes dark brown or black. In the typical form the
extend on to the limbs or tail; but there is a
n in this respect, and as we proceed north the
ases, till in the north-eastern *E. burchelli granti*
triped to the hoofs. There is a strongly marked
tudinal ventral black stripe, to which the lower
transverse side stripes are usually united, but the

dorsal stripe (also strongly marked) is completely isolated i
its posterior half, and the uppermost of the broad band
stripes runs nearly parallel to it. A much larger proportion o
the ears is white than in the other species. In the middle o
the wide intervals between the broad black stripes of the fore
and haunches fainter stripes are generally seen. It is close

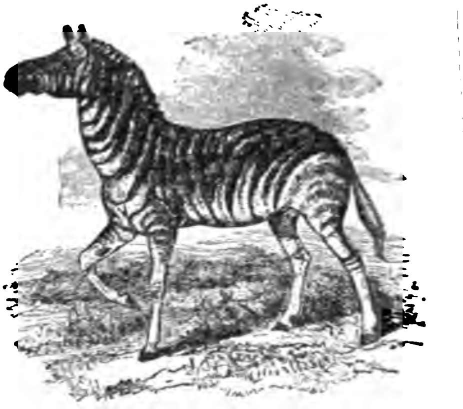

FIG. 2.—Burchell's Zebra (*E. burchelli*).

allied to the quagga, but the typical form, in which the resemblance is closest, is extinct. The Abyssinian and Somali Grévy's zebra (*E. grevyi*) is markedly distinguished by its enormous ears and more numerous and narrower black stripes. The flesh of Burchell's zebra (or quagga, as it is often called) is relished by the natives as food, and its hide is very valuable for leather. Although the many attempts that have been made to break in and train zebras for riding and driving have sometimes been rewarded with partial success, the animal has never been domesticated in the true sense of the word (see HORSE).

(W. H. F.; R. L.*)

ZEBULUN, a tribe of Israel, named after Jacob's sixth "son" by Leah. The narrator of Gen. xxx. 20 offers two etymologies of the name, from the roots *z-b-d*, "give," and *z-b-l*, "exalt (?)."[1] The country of Zebulun lay in the fertile hilly country to the north of the plain of Jezreel, which forms the first step towards the mountains of Asher and Naphtali, and included the goodly upland plain of el-Baṭṭōf. The description of its boundaries is obscure, owing in some measure to its position between Issachar and Naphtali, with one or the other of which it is frequently combined. At one period Zebulun, like Dan and Asher (Judges v. 17), would seem to have reached the sea and bordered on Phoenician territory (Gen. xlix. 13, Deut. xxxiii. 18 seq.). In the latter passage allusion is made to a feast upon a sacred mountain held by Zebulun and Issachar in common, and to the wealth these tribes derived from commerce by sea. Zebulun had a chief part in the war with Sisera (Judges iv. 6, v. 18; see DEBORAH); it is said to have furnished at least one of the "judges," Elon the Zebulonite (Judges xii. 11 seq.); and the prophet Jonah, who foretold the victories of Jeroboam II., came from the border town of Gath-hepher (probably the modern el-Meshhed) (2 Kings xiv. 25). The deportation of the northern tribes under Tiglath Pileser IV. (2 Kings xv. 29) appears to have included Zebulun (Isa. ix. 1). Nazareth lay within the territory of Zebulun but is not mentioned in the Old Testament.

(S. A. C.)

ZECHARIAH, son of Berechiah, son of Iddo (or by contraction, son of Iddo), a prophet of the Old Testament. He appeared in Jerusalem along with Haggai (*q.v.*), in the second year of Darius Hystaspis (520 B.C.), to warn and encourage the

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[1] A connexion with a divine name (cf. Baal-Zebul) is not improbable; see H. W. Hogg, *Ency. Bib.*, art. "Zebulun."

Jews to address themselves at length to the restoration of the Temple.[1] Supported by the prophets, Zerubbabel and Joshua set about the work, and the elders of Judah built and the work went forward (Ezra v. 1 seq., vi. 14). The first eight chapters of the book of Zechariah exactly fit into this historical setting. They are divided by precise chronological headings into three sections—(*a*) chap. i. 1–6, in the eighth month of the second year of Darius; (*b*) chap. i. 7–vi. 15, on the twenty-fourth day of the eleventh month of the same year; (*c*) chap. vii.–viii., on the fourth day of the ninth month of the fourth year of Darius. The first section is a preface containing exhortation in general terms. The main section is the second, containing a series of night visions, the significant features of which are pointed out by an angel who stands by the prophet and answers his questions.

i. 7–17. The divine chariots and horses that make the round of the world by Yahweh's orders return to the heavenly palace and report that there is still no movement among the nations, no sign of the Messianic crisis. Seventy years have passed, and Zion and the cities of Judah still mourn. Sad news! but Yahweh gives a comfortable assurance of His gracious return to Jerusalem and the rebuilding of His temple.

i. 18–21 (Heb. ii. 1–4). Four horns, representing the hostile world-power that oppresses Israel and Jerusalem, are cast down by four smiths.

ii. 1–13 (Heb. ii. 5–17). The new Jerusalem is laid out with the measuring line. It is to have no walls, that its population may not be limited, and it needs none, for Yahweh is its protection. The catastrophe of "the land of the north" is near to come; then the exiles of Zion shall stream back from all quarters, the converted heathen shall join them, Yahweh Himself will dwell in the midst of them, and even now He stirs Himself from His holy habitation.

iii. 1–10. The high priest Joshua is accused before Yahweh by Satan, but is acquitted and given rule in Yahweh's house and courts, with the right of access to Yahweh in priestly intercession. The restoration of the temple and its service is a pledge of still higher things. The promised "branch" (or "shoot," *ṣemaḥ*), the Messiah, will come; the national kingdom is restored in its old splendour; and a time of general felicity dawns, when every man shall sit happy under his vine and under his fig tree. As by rights the Messianic kingdom should follow immediately on the exile, it is probable that the prophet designs to hint in a guarded way that Zerubbabel, who in all other places is mentioned along with Joshua, is on the point of ascending the throne of his ancestor David. The jewel with seven facets is already there, the inscription only has still to be engraved on it (iii. 9). The charges brought against the high priest consist simply in the obstacles that have hitherto impeded the restoration of the temple and its service; and in like manner the guilt of the land (iii. 9) is simply the still continuing domination of foreigners.

iv. 1–14. Beside a lighted golden candlestick of seven branches stand two olive trees—Zerubbabel and Joshua, the two anointed ones—specially watched over by Him whose seven eyes run through the whole earth. This explanation of the vision is separated from the description by an animated dialogue, not quite clear in its expression, in which it is said that the mountain of obstacles shall disappear before Zerubbabel, and that, having begun the building of the temple, he shall also bring it to an end in spite of those who now mock at the day of small beginnings.

v. 1–4. A written roll flies over the Holy Land; this is a concrete representation of the curse which in future will fall of itself on all crime, so that, *e.g.*, no man who has suffered theft will have occasion himself to pronounce a curse against the thief (cf. Judges xvii. 2).

v. 5–11. Guilt, personified as a woman, is cast into an ephah-measure with a heavy lid and carried from Judah to Chaldaea, where it is to have its home for the future.

vi. 1–8. The divine teams, four in number, again traverse the world toward the four winds, to execute Yahweh's commands. That which goes northward is charged to wreak His anger on the north country. The series of visions has now reached its close, returning to its starting-point in i. 7 sqq.

An appendix follows (vi. 9–15) Jews from Babylon have brought gold and silver to Jerusalem; of these the prophet must make a crown designed for the "branch" who is to build Yahweh's house and sit king on the throne, but retain a good understanding with the high priest. Zerubbabel is certainly meant here, and, if the received text names Joshua instead of him (vi. 11) this is only a correction, made for reasons easy to understand, which breaks the context and destroys the sense and the reference of "then both" in verse 13.

The third section (chaps. vii.–viii.), dated from the fourth year of Darius, contains an inquiry whether the fast days that arose in the captivity are still to be observed, with a comforting and encouraging reply of the prophet.

Thus throughout the first eight chapters the scene is Jerusalem in the early part of the reign of Darius.[2] Zerubbabel and Joshua, the prince and the priest, are the leaders of the community. The great concern of the time and the chief practical theme of these chapters is the building of the temple; but its restoration is only the earnest of greater things to follow, viz., the glorious restoration of David's kingdom. The horizon of these prophecies is everywhere limited by the narrow conditions of the time, and their aim is clearly seen. The visions hardly veil the thought, and the mode of expression is usually simple, except in the Messianic passages, where the tortuousness and obscurity are perhaps intentional. Noteworthy is the affinity between some notions evidently not first framed by the prophet himself and the prologue to Job—the heavenly hosts that wander through the earth and bring back their report to Yahweh's throne, the figure of Satan, the idea that suffering and calamity are evidences of guilt and of accusations presented before God.

Passing from chaps. i.–viii. to chaps. ix. seq., we at once feel ourselves transported into a different world.

(1) Yahweh's word is accomplished on Syria-Phoenicia and Philistia; and then the Messianic kingdom begins in Zion, and the Israelites detained among the heathen, Judah and Ephraim combined, receive a part in it. The might of the sons of Javan is broken in battle against this kingdom (ch. ix.). After an intermezzo of three verses (x. 1–3: "Ask rain of Yahweh, not of the diviners") a second and quite analogous Messianic prophecy follows. The foreign tyrants fall; the lordship of Assyria and Egypt has an end; the autonomy and martial power of the nation are restored. The scattered exiles return as citizens of the new theocracy, all obstacles in their way parting asunder as when the waves of the Red Sea gave passage to Israel at the founding of the old theocracy (x. 3–12). Again there is an interlude of three verses (xi. 1–3): fire seizes the cedars of Lebanon and the oaks of Bashan.[3]

(2) The difficult passage about the shepherds follows. The shepherds (rulers) of the nation make their flock an article of trade and treat the sheep as sheep for the shambles. Therefore the inhabited world shall fall a sacrifice to the tyranny of its kings, while Israel is delivered to a shepherd who feeds the sheep for those who make a trade of the flock (כנעניי הצאן, xi. 7, 11 = "they that sell them," ver. 5) and enters on his office with two staves, "Favour" and "Union." He destroys "the three shepherds" in one month, but is soon weary of his flock and the flock of him. He breaks the staff "Favour," *i.e.* the covenant of peace with the nations, and asks the traders for his hire. Receiving thirty pieces of silver, he casts it into the temple treasury and breaks the staff "Union," *i.e.* the brotherhood between Judah and Israel. He is succeeded by a foolish shepherd, who neglects his flock and lets it go to ruin. At length Yahweh intervenes; the foolish shepherd falls by the sword; two-thirds of the people perish with him in the Messianic crisis, but the remnant of one-third forms the seed of the new theocracy (xi. 4–17 taken with xiii. 7–9, according to the necessary transposition proposed by Ewald). All this must be an allegory of past events, the time present to the author and his hopes for the future beginning only at xi. 17, xiii. 7–9.

(3) Chap. xii. presents a third variation on the Messianic promise. All heathendom is gathered together against Jerusalem and perishes there. Yahweh first gives victory to the countryfolk of Judah and then they rescue the capital. After this triumph the noblest houses of Jerusalem hold, each by itself, a great lamentation over a martyr "whom they have pierced" (or "whom men have

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[1] The alleged foundation of the second temple in 536 (Ezra iii. 8–13; cf. iv. 1–5, 24) is open to doubt, because (*a*) the statements of the compiler of Ezra are not contemporary evidence, (*b*) the contemporary Haggai and Zechariah seem to imply that this work first began in 520 (Hag. ii. 18; Zech. viii. 9; cf. Ezra v. 2). If, on the ground of Ezra v. 16, we accept the truth of an original foundation in 536 (so Driver, *Minor Prophets*, p. 148), that event was admittedly formal only and without success, so that the real beginning was made in 520. Wellhausen (*Isr. und Jüd. Gesch.*, 3rd ed., p. 160) rejects the earlier foundation: on the other hand, he insists, with the majority of scholars and against Kosters, on the actual return of exiles in 537 to form the nucleus of the post-exilic community (*loc. cit.*, p. 157 *n.*).

[2] The historical occasion of the emergence of Haggai and Zechariah was supplied by the series of revolts following the succession of Darius in 522 (cf. Driver, *op. cit.*, p. 150). His reconquest of Babylon in 520 may, in particular, have seemed the prelude to the Messianic age (Wellhausen, *Gesch.*, p. 161 *n.*).

[3] "The cedars of Lebanon, the oaks of Bashan, the forest of Jordan represent the national might of the heathen kingdoms" (Wellh., *Die Kl. Proph.*, 3rd ed., p. 192).

pierced "). It is taken for granted that the readers will know who the martyr is, and the exegesis of the Church applies the passage to our Lord. Chap. xiii. 1–6 is a continuation of chap. xii.; the dawn of the day of salvation is accompanied by a general purging away of idolatry and the enthusiasm of false prophets.

(4) Yet a fourth variation of the picture of the incoming of the Messianic deliverance is given in chap. xiv. The heathen gather against Jerusalem and take the city, but do not utterly destroy the inhabitants. The Yahweh, at a time known only to Himself, shall appear with all His saints on Mount Olivet and destroy the heathen in battle, while the men of Jerusalem take refuge in their terror in the great cleft, that opens where Yahweh sets His foot. Now the new era begins, and even the heathen do homage to Yahweh by bringing due tribute to the annual feast of tabernacles. All in Jerusalem is holy down to the bells on the horses and the cooking-pots.

There is a striking contrast between chaps. i.–viii. and chaps. ix.–xiv. The former prophecy is closely linked to the situation and wants of the community of Jerusalem in the second year of Darius I., and relates to the restoration of the temple and, perhaps, the elevation of Zerubbabel to the throne of David. In chaps. ix.–xiv., however, " there is nothing about the restoration of the temple, or about Joshua and Zerubbabel; but we read of the evil rulers, foreign and native alike, who maltreat their subjects, and enrich themselves at their expense.[1] There are corresponding differences in style and speech, and it is particularly to be noted that, while the superscriptions in the first part name the author and give the date of each oracle with precision, those in the second part (ix. i., xii. 1) are without name or date. That both parts do not belong to the same author is now generally admitted, as is also the fact that chaps. ix.–xiv. are of much later date.[2] The predictions of these chapters have no affinity either with the prophecy of Amos, Hosea and Isaiah, or with that of Jeremiah. The kind of eschatology which we find in Zech. ix.–xiv. was first introduced by Ezekiel, who in particular is the author of the conception that the time of deliverance is to be preceded by a joint attack of all nations on Jerusalem, in which they come to final overthrow (Ezek. xxxviii. seq.; Isa. lxvi. 18–24; Joel). The importance attached to the temple service, even in Messianic times (Zech. xiv.), implies an author who lived in the ideas of the religious commonwealth of post-exile times. A future king is hoped for; but in the present there is no Davidic king, only a Davidic family standing on the same level with other noble families in Jerusalem (xii. 7, 12). The " bastard " (mixed race) of Ashdod reminds us of Neh. xiii. 23 sqq.; and the words of ix. 12 (" to-day, also, do I declare that I will render double unto thee ") have no sense unless they refer back to the deliverance from Babylonian exile. But the decisive argument is that in ix. 13 the sons of Javan, *i.e.* the Greeks, appear as the representatives of the heathen world-power. This part of the prophecy, therefore, is later than Alexander, who overthrew the Persian empire in 333. Egypt and Assyria (x. 10, 11) must be taken to represent the Ptolemaic and Seleucid kingdoms, which together made up for the Jews the empire of the sons of Javan.[3]

The whole prophecy, however, is not a unity. By reference to the analysis given above, it will be seen that there are four sections in Zech. ix.–xiv., viz. (1) ix., x. (xi. 1–3); (2) xi. 4–17, xiii. 7–9; (3) xii., xiii. 1–6; (4) xiv., which are more or less independent of each other. Of these (3) and (4) are of marked eschatological character, and show little contact with definite historical events (except xii. 7, which suggests the Maccabean age). On the other hand (1) implies a period when the Jews were governed by the Seleucids, since it is against these that the anger of Yahweh is first directed (ix. 1, 2).[4] This section, therefore, belongs to the first third of the 2nd century B.C., when the Jews were first held in the power of the Seleucids.[5] The same date may be assigned to (2), where the traffickers in the sheep may be regarded as the Seleucid rulers, and the shepherds as the Jewish high priests and ethnarchs; the prelude to the Maccabean revolt largely consisted of the rapid and violent changes here figured. In particular, the evil shepherd of xi. 15 f. may be Menelaus; whilst the disinterested speaker may be Hyrcanus ben Tobias (cf. xi. 13 and II. Macc. iii. 11).

Recent criticism (for further details see G. A. Smith, *The Book of the Twelve Prophets*, ii. pp. 450 f., and Driver, *Minor Prophets*, pp. 232–234) shows some difference of opinion as to the question of unity, and also of actual date within the Greek period. Whilst G. A. Smith (following Stade) and Marti find no adequate ground for the further division of Zech. ix.–xiv., Driver (following Nowack) accepts the fourfold division indicated above (" Four anonymous Prophecies, perhaps the work of four distinct Prophets," *op. cit.*, p. 235). In regard to date, G. A. Smith (here also following Stade) accepts the earlier part of the Greek period (306–278). With this Driver provisionally agrees, whilst Nowack thinks no more can be said than that (1) belongs to the Greek and (2)–(4) to the post-exilic period in general. On the other hand, Marti assigns the whole to 160 B.C. (Maccabean period; a little later than Wellhausen) and sees a number of references to historical personages of that age. The chief arguments to be urged against this late date are the character of the Hebrew style (Driver, *op. cit.*, p. 233) and the alleged close of the prophetic canon by 200; but perhaps neither of these can be regarded as very convincing.

Recent Literature.—Nowack, *Die Kleinen Propheten* (1897; ed. 2, 1903); Wellhausen, *Die Kleinen Propheten*,^{3} (1898); G. A. Smith, *The Book of the Twelve Prophets* (in *The Expositor's Bible*), vol. ii. (pp. 253–328, 447–490) (1898); Marti, *Dodekapropheton*, ii. (1904); Driver, *Minor Prophets*, ii. (in *The Century Bible*, 1906; the most useful for the general reader). The article in Hastings's *Dictionary of the Bible* (vol. iv., pp. 967–970) (1902), by Nowack, is a reproduction from his work cited above; the article in the *Ency. Bibl.* by Wellhausen is a revision of his article in the 9th edition of the *Ency. Brit.*, and the present independent revision is in some points indebted to it. (J. We.; H. W. R.*)

ZEDEKIAH (Hebrew for " righteousness of Yah[weh] "), son of Josiah, and the last king of Judah (2 Kings xxiv. 17 sqq.; 2 Chron. xxxvi. 10 seq.). Previously known as Mattaniah (" gift of Yah[weh] "), he was appointed king by Nebuchadrezzar after the capture of Jerusalem (597 B.C.) and his name changed to Zedekiah. He held his position under an oath of allegiance, but after three years (cf. Jehoiakim, 2 Kings xxiv. 1) began an intrigue with Moab, Edom, Ammon, Tyre and Sidon, which the prophet Jeremiah vigorously denounced (Jer. xxvii. seq.; cf. also Ezek. xvii. 11–21). It is possible that he was summoned to Babylon to explain his conduct (Jer. li. 59; the Septuagint reads " *from* Zedekiah "; see also xxix. 3). Nevertheless, relations were maintained with Egypt and steps were taken to revolt. The Babylonian army began to lay siege to Jerusalem in the ninth year of his reign, and a vain attempt was made by Pharaoh Hophra to cause a diversion. The headings to the prophecies in Ezek. xxix. sqq. suggest that fuller details of the events were once preserved, and the narratives in Jer. xxxii.–xxxiv., xxxvii. give some account of the internal position in Jerusalem at the time. After six months a breach was made in the city, Zedekiah's flight was cut off in the Jordan Valley and he was taken to Nebuchadrezzar at Riblah. His sons were killed, and he was blinded and carried to Babylon in chains (cf. Ezek. xii. 10–14). Vengeance was taken upon Jerusalem, and, on the seventh day of the fifth month, 586 B.C., Nebuzaradan sacked the temple, destroyed the walls and houses, and deported the citizens, only the poorest peasantry of the land being left behind. See Jews (History), § 17 seq. (S. A. C.)

ZEEHAN, a town of Montagu county, Tasmania, 225 m. direct N.W. of Hobart, on the Little Henty river. Pop. (1901) 5014. It is an important railway centre, and from it radiate lines to Strahan, its port on the Macquarie Harbour, to Dundas, to Williamsford, and to Burnie, where connexion is made to

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[1] Driver, *op. cit.*, p. 229, who also refers to the differences of Messianic outlook, and the substitution of an atmosphere of war for one of peace.

[2] Earlier critics made the second part the older. Chaps. ix.–xi. were ascribed to a contemporary of Amos and Hosea, about the middle of the 8th century B.C., because Ephraim is mentioned as well as Judah, and Assyria along with Egypt (x. 10), while the neighbours of Israel appear in ix. 1 sq. in the same way as in Amos i.–ii. That chaps. xii.–xiv. also were pre-exilic was held to appear especially in the attack on idolatry and lying prophecy (xiii. 1–6); but, as this prophecy speaks only of Judah and Jerusalem, it was dated after the fall of Samaria, and assigned to the last days of the Judaean kingdom on the strength of xii. 11, where an allusion is seen by some to the mourning for King Josiah, slain in battle at Megiddo.

[3] What follows is summarized from Wellhausen, *Die Kleinen Propheten*, pp. 190, 192, 195–197.

[4] Hadrach, *i.e* the Assyrian Hatarika, apparently denotes a district S. of Hamath (between Palmyra and the Mediterranean).

[5] Wellhausen, *Sketch of the History of Israel and Judah*, pp. 137, 139.

Launceston and Hobart. The town is lighted by electricity and has an academy of music and a state-aided school of mines. It is the principal centre of the silver-lead mining district, and has large smelting works.

ZEELAND (or Zealand), a province of Holland, bounded S.E. and S. by Belgium, W. by the North Sea, N. by South Holland, and E. by North Brabant. It has an area of 690 sq. m. and a population (1905) of 227,292. Zeeland consists of the delta islands formed about the estuaries of the Maas and Scheldt with its two arms, the Honte or Western Scheldt, and the Ooster Scheldt, together with a strip of mainland called Zeeland-Flanders. The names of the islands are Schouwen and Duiveland, St Filipsland, Tolen, North Beveland, South Beveland and Walcheren. The history of these islands is in every case one of varying loss and gain in the struggle with the sea. They were built up by the gradual accumulation of mud deposits in a shallow bay, separated by dunes from the North Sea. As late as the 12th and 13th centuries each of these islands consisted of several smaller islands, many of whose names are still preserved in the fertile *polders* which have taken their place. Lying for the most part below sea-level, the islands are protected by a continuous line of artificial dikes, which hide them from view on the seaward side, whence only an occasional church steeple is seen. The islands of Schouwen and Duiveland are united owing to the damming of the Dykwater; St Filipsland, or Philipsland, and South Beveland are connected with the mainland of North Brabant by naturally formed mud banks.

The soil of Zeeland consists of a fertile sea clay which especially favours the production of wheat; rye, barley (for malting), beans and peas, and flax are also cultivated. Cattle and swine are reared, and dairy produce is largely exported; but the sheep of the province are small and their wool indifferent. The industries (linen, yarn-spinning, distilling, brewing, salt-refining, shipbuilding) are comparatively unimportant. The inhabitants, who retain many quaint and archaic peculiarities of manner and dress, speak the variety of Dutch known as Low Frankish.

The chief towns on the island of Schouwen are the ports of Zierikzee and Brouwershaven. On the well-wooded fringe of the dunes on the west side of the island are the two villages of Renesse and Haamstede, the seats in former days of the two powerful lordships of the same name. St Maartensdyk on the adjoining island of Tolen was formerly the seat of a lordship which belonged successively to the families of Van Borssele, Burren and Orange-Nassau. There is a monument of the Van Borsseles in the Reformed church. The castle built here in the first half of the 14th century was demolished in 1819. The island of South Beveland frequently suffered from inundations and experienced a particularly disastrous one in 1530. In the same century the flourishing walled town of Reimenswaal and the island of Borsele or Borssele disappeared beneath the waves; but the last-named was gradually recovered during the 17th century. This island gave its name to the powerful lordship of the same name. Goes is the chief town on South Beveland. Oyster-breeding is practised on the north coast of the island, especially at Wemeldinge and Ierseke or Yerseke. Ierseke was once a town of importance and the seat of a lordship, while at Wemeldinge there was formerly an establishment of the Templars. In 1866 South Beveland and Walcheren were joined by a heavy railway dam, a canal being cut through the middle of the former island to restore the connexion between the East and West Scheldt. South Beveland is sometimes called the "granary" and Walcheren the "garden" of Zeeland. The principal towns in Walcheren are Middelburg, the chief town of the province, Flushing and Veere; all three connected by a canal (1867–72) which divides the island in two. The fishing village of Arnemuiden flourished as a harbour in the 16th century, but decayed owing to the silting up of the sand. Domburg is pleasantly situated at the foot of the dunes on the west side of the island, and in modern times has become a popular but primitive watering-place. It is a very old town, having received civic rights in the 13th century, and from time to time Roman remains and other antiquities have been dug out of the sands. Between Domburg and the village of Westkapelle there stretches the famous Westkapelle sea-dike. The mainland of Zeeland-Flanders was formerly also composed of numerous islands which were gradually united by the accumulation of mud and sand, and in this way many once flourishing commercial towns, such as Sluis and Aardenburg, were reduced in importance. The famous castle of Sluis, built in 1385, was partly blown up by the French in 1794, and totally demolished in 1818. Yzendyke represents a Hanse town which flourished in the 13th century and was gradually engulfed by the sea. Similarly the original port of Breskens was destroyed by inundations in the 15th and 16th centuries. The modern town rose into importance in the 19th century on account of its good harbour. The old towns of Axel and Hulst were formerly important fortresses, and as such were frequently besieged in the 16th, 17th and 18th centuries. Ter Neuzen was strongly fortified in 1833–39, and has a flourishing transit trade, as the port of Ghent, by the canal constructed in 1825–27.

ZEERUST, a town of the Transvaal, 149 m. by rail, via Krugersdorp, N.N.W. of Pretoria and 33 m. N.E. of Mafeking. Pop. (1904) 1945. It was founded in 1868 and is the chief town of the Marico district, one of the most fertile regions of South Africa. In the neighbourhood are lead, zinc and silver mines, and some 20 m. S. are the Malmani goldfields. The Marico Valley was occupied early in the 19th century by Matabele, who had come from Zululand. They were driven out by Boer trekkers in 1837. To Boer cultivation the valley of the Marico river owes its fertility. Wheat and oats are largely cultivated and almost all sub-tropical fruits flourish. Following the relief of Mafeking, 17th of May 1900, Zeerust was occupied by the British under General R. S. S. Baden-Powell. Railway connexion with Pretoria was established in 1907.

ZEISSBERG, HEINRICH, Ritter von (1839–1899), Austrian historian, was born in Vienna on the 8th of July 1839, and in 1865 became professor of history at the university of Lemberg. In 1871 he removed to Innsbruck; in 1873 he was appointed professor at the university of Vienna, and here he was historical tutor to the crown prince Rudolph. In 1891 he was made director of the Vienna institute for historical research, and in 1896 director of the imperial court library at Vienna. He resigned his professorial chair in 1897 and died on the 27th of May 1899.

Zeissberg's writings deal mainly with the history of Austria and of Poland, and among them the following may be mentioned:—*Die polnische Geschichtsschreibung des Mittelalters* (Leipzig, 1873); *Arno, erster Erzbischof von Salzburg* (Vienna, 1863); *Die Kriege Kaiser Heinrichs II. mit Herzog Boleslaw I. von Polen* (Vienna, 1868); *Rudolf von Habsburg und der österreichische Staatsgedanke* (Vienna, 1882); *Über das Rechtsverfahren Rudolfs von Habsburg gegen Ottokar von Böhmen* (Vienna, 1887); and *Der österreichische Erbfolgestreit nach dem Tode des Königs Ladislaus Posthumus*, 1457–58 (Vienna, 1879). Dealing with more recent times he wrote:—*Zur deutschen Kaiserpolitik Oesterreichs: ein Beitrag zur Geschichte des Revolutionsjahres 1705* (Vienna, 1899); *Zwei Jahre belgischer Geschichte 1791–92* (Vienna, 1891); *Belgien unter der Generalstatthalterschaft Erzherzog Karls 1793–94* (Vienna, 1893–94); *Erzherzog Karl von Oesterreich. Lebensbild* (Vienna, 1895); and *Franz Josef I.* (Vienna, 1888). He edited three volumes of the *Quellen zur Geschichte der Deutschen Kaiserpolitik Oesterreichs während der französischen Revolutionskriege 1790–1801* (Vienna, 1882–1885, 1890).

ZEITUN (="olive"), the name of several places in Turkey and Egypt, but principally an Armenian town in the Aleppo vilayet, altitude about 4000 ft., situated in the heart of Mt. Taurus, about 20 m. N.N.W. of Marash. The inhabitants, about 10,000, all Christians, are of a singularly fine physical type, though too much inbred, and are interesting from their character and historical position as a remnant of the kingdom of Lesser Armenia. The importance of Zeitun dates from the capture of Leo VI. by the Egyptians in 1375, and it probably became then a refuge for the more active and irreconcilable Armenians; but nothing certain is known of the place till 300 years later. It long maintained practical independence as a nest of freebooters, and it was only in 1878 that the Turks, after a long conflict, were enabled to station troops in a fort above the town. In 1890 there was a serious revolt, from the worst consequences of which the town was saved by the intercession of the British consul at Aleppo warned in time by the devoted energy of T. Christie, American missionary at Marash; and in 1895, after the Armenian massacres had commenced elsewhere, the people again rose, seized the fort, and, after holding out for more than three months against a large Turkish force, secured honourable terms of peace on the mediation of the consuls of the Powers at Aleppo. The inhabitants seem to be abandoning their robber customs and devoting themselves to oil and silk culture. In consequence transit trade through the passes of eastern Taurus (see MARASH), long almost annihilated by fear of the Zeitunli marauders, revived considerably. The governor must be a Christian, and certain other privileges are secured to the Zeitunlis during their good behaviour.

(D. G. H.)

ZEITZ, a town of Germany, in the extreme south of the Prussian province of Saxony, pleasantly situated on a hill on the Weisse (White) Elster, 28 m. by rail S.S.W. of Leipzig on the line to Gera, and with branches to Altenburg and Weissenfels. Pop. (1885) 19,797; (1900) 27,391. The river is here crossed by two iron bridges, and one stone and one timber bridge, and the upper and lower towns are connected by a funicular railway. The Gothic abbey church dates from the 15th century, but its Romanesque crypt from the 12th. The old Franciscan monastery, now occupied by a seminary, contains a library of 20,000 volumes. Just outside the town rises the Moritzburg, built in 1564 by the dukes of Saxe-Zeitz, on the site of the bishop's palace; it is now a reformatory and poorhouse. Zeitz has manufactures of cloth, cottons and other textiles, machinery, wax-cloth, musical instruments, vinegar, cigars, &c.; and wood-carving, dyeing and calico-printing are carried on. In the neighbourhood there are considerable deposits of lignite, and mineral-oil works.

Zeitz is an ancient place of Slavonic origin. From 968 till 1028 it was the seat of a bishopric, afterwards removed to Naumburg, 15½ m. to the N.W., and styled Naumburg-Zeitz. In 1564 the last Roman Catholic bishop died, and his dominions were thenceforward administered by princes of Saxony. From 1653 till 1718 Zeitz was the capital of the dukes of Saxe-Zeitz or Sachsen-Zeitz. It thereafter remained in the possession of the electors of Saxony until 1815, when it passed to Prussia.

See Rothe, *Aus der Geschichte der Stadt Zeitz* (Zeitz, 1876); and Lange, *Chronik des Bisthums Naumburg* (Naumburg, 1891).

ZELLER, EDUARD (1814–1908), German philosopher, was born at Kleinbottwar in Württemberg on the 22nd of January 1814, and educated at the university of Tübingen and under the influence of Hegel. In 1840 he was *Privatdozent* of theology at Tübingen, in 1847 professor of theology at Bern, in 1849 professor of theology at Marburg, migrating soon afterwards to the faculty of philosophy as the result of disputes with the Clerical party. He became professor of philosophy at Heidelberg in 1862, removed to Berlin in 1872, and retired in 1895. His great work is his *Philosophie der Griechen* (1844–52). This book he continued to amplify and improve in the light of further research; the last edition appeared in 1902. It has been translated into most of the European languages and became the recognized text-book of Greek philosophy. He wrote also on theology, and published three volumes of philosophical essays. He was also one of the founders of the *Theologische Jahrbücher*, a periodical which acquired great importance as the exponent of the historical method of David Strauss and Christian Baur. Like most of his contemporaries he began with Hegelianism, but subsequently he developed a system on his own lines. He saw the necessity of going back to Kant in the sense of demanding a critical reconsideration of the epistemological problems which Kant had made but a partially successful attempt to solve. None the less his merits as an original thinker are far outshone by his splendid services to the history of philosophy. It is true that his view of Greek thought is somewhat warped by Hegelian formalism. He is not alive enough to the very intimate relation which thought holds to national life and to the idiosyncrasy of the thinker. He lays too much stress upon the "concept," and explains too much by the Hegelian antithesis of subjective and objective. Nevertheless his history of Greek philosophy remains a noble monument of solid learning informed with natural sagacity. He received the highest recognition, not only from philosophers and learned societies all over the world, but also from the emperor and the German people. In 1894 the Emperor William II. made him a "Wirklicher Geheimrat" with the title of "Excellenz," and his bust, with that of Helmholtz, was set up at the Brandenburg Gate near the statues erected to the Emperor and Empress Frederick. He died on the 19th of March 1908.

The *Philosophie der Griechen* has been translated into English by S. F. Alleyne (2 vols., 1881) in sections: S. F. Alleyne, *Hist. of Gk. Phil. to the time of Socrates* (1881); O. J. Reichel, *Socrates and the Socratic Schools* (1868; 2nd ed. 1877); S. F. Alleyne and A. Goodwin, *Plato and the Older Academy* (1876); Costelloe and Muirhead, *Aristotle and the Earlier Peripatetics* (1897); O. J. Reichel, *Stoics, Epicureans and Sceptics* (1870 and 1880); S. F. Alleyne, *Hist. of Eclecticism in Gk. Phil.* (1883). The *Philosophie* appeared in an abbreviated form as *Grundriss d. Gesch. d. Griech. Philos.* (1883; 5th ed. 1898); Eng. trans. by Alleyne and Evelyn Abbott (1866), under the title, *Outlines of the Hist. of Gk. Philos.* Among his other works are:—*Platonische Studien* (1839); *Die Apostelgeschichte krit. untersucht* (1854; Eng. trans. J. Dare, 1875–76); *Entwickelung d. Monotheismus bei d. Griech.* (1862); *Gesch. d. christlich. Kirche* (1898); *Gesch. d. deutsch. Philos. seit Leibniz* (1873, ed. 1875); *Staat und Kirche* (1873); *Strauss in seinen Leben und Schriften* (1874; Eng. trans. 1874); *Über Bedeütung und Aufgabe d. Erkenntniss-Theorie* (1862); *Über teleolog. und mechan. Naturerklarung* (1876); *Vorträge und Abhandlungen* (1865–84); *Religion und Philosophie bei den Römern* (1866, ed. 1871); *Philosoph. Aufsätze* (1887).

ZEMARCHUS (fl. 568), Byzantine general and traveller. The Turks, by their conquest of Sogdiana in the middle of the 6th century, gained control of the silk trade which then passed through Central Asia into Persia. But the Persian king, Chosroes Nushirvan, dreading the intrusion of Turkish influence, refused to allow the old commerce to continue, and the Turks after many rebuffs consented to a suggestion made by their mercantile subjects of the Soghd, and in 568 sent an embassy to Constantinople to form an alliance with the Byzantines and "transfer the sale of silk to them." The offer was accepted by Justin II., and in August 568, Zemarchus the Cilician, "General of the cities of the East," left Byzantium for Sogdiana. The embassy was under the guidance of Maniakh, "chief of the people of Sogdiana," who had first, according to Menander Protector, suggested to Dizabul (*Dizaboulos*, the *Bu Min khan* of the Turks, the *Mokan* of the Chinese), the great khan of the Turks, this "Roman" alliance, and had himself come to Byzantium to negotiate the same. On reaching the Sogdian territories the travellers were offered iron for sale, and solemnly exorcised; Zemarchus was made to "pass through the fire" (*i.e.* between two fires), and strange ceremonies were performed over the baggage of the expedition, a bell being rung and a drum beaten over it, while flaming incense-leaves were carried round it, and incantations muttered in "Scythian." After these precautions the envoys proceeded to the camp of Dizabul (or rather of Dizabul's successor, Bu Min khan having just died) "in a hollow encompassed by the Golden Mountain," apparently in some locality of the Altai. They found the khan surrounded by astonishing barbaric pomp—gilded thrones, golden peacocks, gold and silver plate and silver animals, hangings and clothing of figured silk. They accompanied him some way on his march against Persia, passing through Talas or Turkestan in the Syr Daria valley, where Hsüan Tsang, on his way from China to India sixty years later, met with another of Dizabul's successors. Zemarchus was present at a banquet in Talas where the Turkish kagan and the Persian envoy exchanged abuse; but the Byzantine does not seem to have witnessed actual fighting. Near the river Oĕkh (Syr Daria?) he was sent back to Constantinople with a Turkish embassy and with envoys from various tribes subject to the Turks. Halting by the "vast, wide lagoon" (of the Aral Sea?), Zemarchus sent off an express messenger, one George, to announce his return to the emperor. George hurried on by the shortest route, "desert and waterless," apparently the steppes north of the Black Sea: while his superior, moving more slowly, marched twelve days by the sandy shores of "the lagoon"; crossed the Emba, Ural, Volga, and Kuban (where 4000 Persians vainly lay in ambush to stop him); and passing round the western end of the Caucasus, arrived safely at Trebizond and Constantinople. For several years this Turkish alliance subsisted, while close intercourse was maintained between Central Asia and Byzantium; when another Roman envoy, one Valentinos (Οὐαλεντῖνος), goes on his embassy in 575 he takes back with him 106 Turks who had been visiting Byzantine lands; but from 579 this friendship rapidly began to cool. It is curious that all this travel between the Bosporus and Transoxiana seems not to have done anything to correct, at least in literature, the widespread misapprehension of the Caspian as a gulf of the Arctic Ocean.

See Menander Protector, Περὶ Πρεσβειῶν Ῥωμαίων πρὸς Ἔθνη (*De Legationibus Romanorum ad Gentes*), pp. 295–302, 380–85, 397–404, Bonn edition (xix), 1828 (= pp. 806–11, 883–87, 899–907, in Migne, *Patrolog. Graec.*, vol. cxiii., Paris, 1864); H. Yule, *Cathay*, clx.–clxvi. (London, Hakluyt Society, 1866); L. Cahun, *Introduction à l'histoire de l'Asie*, pp. 108–18 (Paris, 1896); C. R. Beazley, *Dawn of Modern Geography*, i. 186–89 (London, 1897). (C. R. B.)

ZENÁGA (Sanhájà, Senajeh), a Berber tribe of southern Morocco who gave their name to Senegal, once their tribal home. They formed one of the tribes which, uniting under the leadership of Yusef bin Tashfin, crossed the Sahara and gave a dynasty to Morocco and Spain, namely, that of the Almoravides (*q.v.*). The Zeirid dynasty which supplanted the Fatimites in the Maghrib and founded the city of Algiers was also of Zenága origin. The Zenága dialect of Berber is spoken in southern Morocco and on the banks of the lower Senegal, largely by the negro population.

ZENANA (Persian *zanana*), the apartments of an Eastern house in which the women of the family are secluded (see Harem). This is a Mahommedan custom, which has been introduced into India and has spread amongst the Hindus. The zenana missions are missions to Indian women in their own homes.

ZENATA, or Zanátà, a Berber tribe of Morocco in the district of the central Atlas. Their tribal home seems to have been south of Oran in Algeria, and they seem to have early claimed an Arab origin, though it was alleged by the Arabs that they were descendants of Goliath, *i.e.* Philistines or Phoenicians (Ibn Khaldun, vol. iii. p. 184 and vol. iv. p. 597). They were formerly a large and powerful confederation, and took a prominent part in the history of the Berber race. The Beni-Marin and Wattasi dynasties which reigned in Morocco from 1213 to 1548 were of Zenata origin.

ZEND-AVESTA, the original document of the religion of Zoroaster (*q.v.*), still used by the Parsees as their bible and prayer-book. The name "Zend-Avesta" has been current in Europe since the time of Anquetil Duperron (*c.* 1771), but the Parsees themselves call it simply *Avesta*, *Zend* (*i.e.* "interpretation") being specially employed to denote the translation and exposition of a great part of the Avesta which exists in Pahlavi. Text and translation are often spoken of together in Pahlavi books as *Avistāk va Zand* ("Avesta and Zend"), whence—through a misunderstanding—our word Zend-Avesta. The origin and meaning of the word "Avesta" (or in its older form, *Avistāk*) are alike obscure; it cannot be traced further back than the Sasanian period. The language of the Avesta is still frequently called Zend; but, as already implied, this is a mistake. We possess no other document written in it, and on this account modern Parsee scholars, as well as the older Pahlavi books, speak of the language and writing indifferently as Avesta. As the original home of the language can only be very doubtfully conjectured, we shall do well to follow the usage sanctioned by old custom and apply the word to both. Although the Avesta is a work of but moderate compass (comparable, say, to the *Iliad* and *Odyssey* taken together), there nevertheless exists no single MS. which gives it in entirety. This circumstance alone is enough to reveal the true nature of the book: it is a composite whole, a collection of writings, as the Old Testament is. It consists, as we shall afterwards see, of the last remains of the extensive sacred literature in which the Zoroastrian faith was formerly set forth.

Contents.—As we now have it, the Avesta consists of five parts—the Yasna, the Vispered, the Vendidad, the Yashts, and the Khordah Avesta.

1. The *Yasna*, the principal liturgical book of the Parsees, in 72 chapters (*hāiti*, *hā*), contains the texts that are read by the priests at the solemn yasna (Izeshne) ceremony, or the general sacrifice in honour of *all* the deities. The arrangement of the chapters is purely liturgical, although their matter in part has nothing to do with the liturgical action. The kernel of the whole book, around which the remaining portions are grouped, consists of the Gāthās or "hymns" of Zoroaster (*q.v.*), the oldest and most sacred portion of the entire canon. The Yasna accordingly falls into three sections of about equal length:—(*a*) The introduction (chaps. 1–27) is, for the most part, made up of long-winded, monotonous, reiterated invocations. Yet even this section includes some interesting texts, *e.g.* the *Haoma* (*Hom*) Yasht (9, 11) and the ancient confession of faith (12), which is of value as a document for the history of civilization. (*b*) The Gāthās (chaps. 28–54) contain the discourses, exhortations and revelations of the prophet, written in a metrical style and an archaic language, different in many respects from that ordinarily used in the Avesta. As to the authenticity of these hymns, see Zoroaster. The Gāthās proper, arranged according to the metres in which they are written, fall into five subdivisions (28–34, 43–46, 47–50, 51, 53). Between chap. 37 and chap. 43 is inserted the so-called Seven-Chapter Yasna (*haptanghāiti*), a number of small prose pieces not far behind the Gāthās in antiquity. (*c*) The so-called Later Yasna (*Aparō Yasnō*) (chaps. 54–72) has contents of considerable variety, but consists mainly of invocations. Special mention ought to be made of the *Sraosha* (*Srōsh*) Yasht (57), the prayer to fire (62), and the great liturgy for the sacrifice to divinities of the water (63–69).

2. The *Vispered*, a minor liturgical work in 24 chapters (*karde*), is alike in form and substance completely dependent on the Yasna, to which it is a liturgical appendix. Its separate chapters are interpolated in the Yasna in order to produce a modified—or expanded—Yasna ceremony. The name Vispered, meaning "all the chiefs" (*vispē ratavō*), has reference to the spiritual heads of the religion of Ormuzd, invocations to whom form the contents of the first chapter of the book.

3. The *Vendidad*, the priestly code of the Parsees, contains in 22 chapters (*fargard*) a kind of dualistic account of the creation (chap. 1), the legend of Yima and the golden age (chap. 2), and in the bulk of the remaining chapters the precepts of religion with regard to the cultivation of the earth, the care of useful animals, the protection of the sacred elements, such as earth, fire and water, the keeping of a man's body from defilement, together with the requisite measures of precaution, elaborate ceremonies of purification, atonements, ecclesiastical expiations and so forth. These prescriptions are marked by a conscientious classification based on considerations of material, size and number; but they lose themselves in an exaggerated casuistry. Still the whole of Zoroastrian legislation is subordinate to one great point of view: the war—preached without intermission—against Satan and his noxious creatures, from which the whole book derives its name; for "Vendidād" is a modern corruption for *vī-daēvō-dātem*—"the anti-demonic Law." Fargard 18 treats of the true and false priest, of the value of the house-cock, of the four paramours of the she-devil, and of unlawful lust. Fargard 19 is a fragment of the Zoroaster legend: Ahriman tempts Zoroaster; Zoroaster applies to Ormuzd for the revelation of the law, Ahriman and the devils despair, and flee down into hell. The three concluding chapters are devoted to sacerdotal medicine.

The Yasna, Vispered and Vendidad together constitute the Avesta in the stricter sense of the word, and the reading of them appertains to the priest alone. For liturgical purposes the separate chapters of the Vendidad are sometimes inserted among those of the Yasna and Vispered. The reading of the Vendidad in this case may, when viewed according to the original intention, be taken as corresponding in some sense to the sermon, while that of the Yasna and Vispered may be said to answer to the hymns and prayers of Christian worship.

4. The *Yashts*, *i.e.* "songs of praise," in so far as they have not been received already into the Yasna, form a collection by themselves. They contain invocations of *separate* Izads, or angels, number 21 in all, and are of widely divergent extent and antiquity. The great Yashts—some nine or ten—are impressed with a higher stamp: they are cast almost throughout in a poetical mould, and represent the religious poetry of the ancient Iranians. So far they

may be compared to the Indian Rig-Veda. Several of them may have been cemented together from a number of lesser poems or songs. They are a rich source of mythology and legendary history. Side by side with full, vividly coloured descriptions of the Zoroastrian deities, they frequently interweave, as episodes, stories from the old heroic fables. The most important of all, the 19th Yasht, gives a consecutive account of the Iranian heroic saga in great broad lines, together with a prophetic presentment of the end of this world.

5. The *Khordah Avesta*, *i.e.* the Little Avesta, comprises a collection of shorter prayers designed for all believers—the laity included—and adapted for the various occurrences of ordinary life. In part, these brief petitions serve as convenient substitutes for the more lengthy Yashts—especially the so-called *Nyāishes*.

Over and above the five books just enumerated, there are a considerable number of fragments from other books, *e.g.* the *Nīrangistān*, as well as quotations, glosses and glossaries.

The Larger Avesta and the Twenty-one Nasks.—In its present form, however, the Avesta is only a fragmentary remnant of the old priestly literature of Zoroastrianism, a fact confessed by the learned tradition of the Parsees themselves, according to which the number of Yashts was originally thirty. The truth is that we possess but a trifling portion of a very much larger Avesta, if we are to believe native tradition, carrying us back to the Sassanian period, which tells of a larger Avesta in twenty-one books called *nasks* or *nosks*, as to the names of which we have several more or less detailed accounts, particularly in the Pahlavi Dīnkard (9th century A.D.) and in the Rivayats. From the same sources we learn that this *larger* Avesta was only a part of a yet more extensive *original* Avesta, which is said to have existed before Alexander. We are told that of a number of nasks only a small portion was found to be extant "after Alexander." For example, of the seventh nask, which "before Alexander" had as many as fifty chapters, there then remained only thirteen; and similar allegations are made with regard to the eighth, ninth, tenth and other nasks. The Rivayats state that, when after the calamity of Alexander they sought for the books again, they found a portion of each nask, but found no nask in completeness except the Vendidad. But even of the remains of the Avesta, as these lay before the author of the 9th century, only a small residue has survived to our time. Of all the nasks one only, the nineteenth, has come down on us intact—the Vendidad. All else, considered as wholes, have vanished in the course of the centuries.

It would be rash summarily to dismiss this old tradition of the twenty-one nasks as pure invention. The number twenty-one points, indeed, to an artificial arrangement of the material; for twenty-one is a sacred number, and the most sacred prayer of the Parsees, the so-called Ahunō Vairyō (Honovar) contains twenty-one words; and it is also true that in the enumeration of the nasks we miss the names of the books we know, like the Yasna and the Yashts. But we must assume that these were included in such or such a nask, as the Yashts in the seventeenth or *Bakān* Yasht; or, it may be that other books, especially the Yasna, are a compilation extracted for liturgical purposes from various nasks. Further, the statements of the Dīnkard leave on us a very distinct impression that the author actually had before him the text of the nasks, or at all events of a large part of them: for he expressly states that the eleventh nask was entirely lost, so that he is unable to give the slightest account of its contents. And, besides, in other directions there are numerous indications that such books once really existed. In the Khordah Avesta, as we now have it, we find two Srōsh Yashts; with regard to the first, it is expressly stated in old MSS. that it was taken from the *Hādōkht* nask (the twentieth, according to the Dīnkard). From the same nask also a considerable fragment (*Yts.* 21 and 22 in Westergaard) has been taken. So, also, the *Nīrangistān* is a portion of the seventeenth (or *Hūspāram*) nask. Lastly, the numerous other fragments, the quotations in the Pahlavi translation, the many references in the *Bundahish* to passages of this Avesta not now known to us, all presuppose the existence in the Sassanian period of a much more extensive Avesta literature than the mere prayer-book now in our hands. The existence of a larger Avesta, even as late as the 9th century A.D., is far from being a mere myth. But, even granting that a certain obscurity still hangs undispelled over the problem of the old Avesta, with its twenty-one nasks, we may well believe the Parsees themselves, when they affirm that their sacred literature has passed through successive stages of decay, the last of which is represented by the present Avesta. In fact we can clearly trace th[illegible]rocess of decay in certain portions of the Avesta duri[illegible]uries. The great Yashts are not of very frequent occurrence in the manuscripts: some of them, indeed, are already met with but seldom, and MSS. containing all the Yashts are of extreme rarity. Of the fifteenth, seventeenth and nineteenth Yashts the few useful copies that we possess are derived from a single MS. of the year 1591 A.D.

Origin and History.—While all that Herodotus (i. 132) has to say is that the Magi sang "the theogony" at their sacrifices, Pausanias is able to add (v. 27. 3) that they read from a book. Hermippus, in the 3rd century B.C., affirmed that Zoroaster, the founder of the doctrine of the Magi, was the author of twenty books, each containing 100,000 verses. According to the Arab historian, Ṭabari, these were written on 12,000 cowhides, a statement confirmed by Masudi, who writes: "Zartusht gave to the Persians the book called Avesta. It consisted of twenty-one parts, each containing 200 leaves. This book, in the writing which Zartusht invented and which the Magi called the writing of religion, was written on 12,000 cowhides, bound together by golden bands. Its language was the Old Persian, which now no one understands." These assertions sufficiently establish the existence and great bulk of the sacred writings. Parsee tradition adds a number of interesting statements as to their history. According to the *Arda-Viraf-Nāma* the religion revealed through Zoroaster has subsisted in its purity for 300 years, when Iskander Rumi (Alexander the Great) invaded and devastated Iran, and burned the Avesta which, written on cowhides with golden ink, was preserved in the archives at Persepolis. According to the Dinkard, there were two copies, of which one was burned, while the second came into the hands of the Greeks. One of the Rivāyato relates further: "After the villainy of Alexander, an assemblage of several high-priests brought together the Avesta from various places, and made a collection which included the sacred Yasna, Vispered, Vendidad and other scraps of the Avesta." As to this re-collection and redaction of the Avesta the Dīnkard gives various details. One of the Arsacid kings, Vologeses (I. or III.?), ordered the scattered remnants of the Avesta to be carefully preserved and recorded. The first of the Sassanian kings, Ardashīr Bābagān (226–240), caused his high-priest, Tanvasar, to bring together the dispersed portions of the holy book, and to compile from these a new Avesta, which, as far as possible, should be a faithful reproduction of the original. King Shāpūr I. (241–272) enlarged this re-edited Avesta by collecting and incorporating with it the non-religious tractates on medicine, astronomy, geography and philosophy. Under Shāpūr II. (309–380) the nasks were brought into complete order, and the new redaction of the Avesta reached its definitive conclusion.

Historical criticism may regard this tradition, in many of its features, as mere fiction, or as a perversion of facts made for the purpose of transferring the blame for the loss of a sacred literature to other persons than those actually responsible for it. We may, if we choose, absolve Alexander from the charge of vandalism of which he is accused, but the fact nevertheless remains, that he ordered the palace at Persepolis to be burned (Diod., xvii. 72; Curt., v. 7). Even the statement as to the one or two complete copies of the Avesta may be given up as the invention of a later day. Nevertheless the essential elements of the tradition remain unshaken, viz. that the original Avesta, or old sacred literature, divided on account of its great bulk and heterogeneous contents into many portions and a variety of separate works, had an actual existence in numerous copies and also in the memories of priests, that, although gradually diminishing in bulk, it remained extant during the period of foreign domination and ecclesiastical decay after the time of Alexander, and that it served as a basis for the redaction subsequently made. The kernel of this native tradition—the fact of a late collection of older fragments—appears indisputable. The character of the book is entirely that of a compilation.

In its outward form the Avesta, as we now have it, belongs to the Sassanian period—the last survival of the compilers' work already alluded to. But this Sassanian origin of the Avesta must not be misunderstood: from the remnants and heterogeneous fragments at their disposal, the diasceuast or diasceuasts composed a new canon—erected a new edifice from the materials of the old. In point of detail, it is now impossible to draw a sharp distinction between that which they found surviving ready to their hand and that which they themselves added, or to define how far they reproduced the traditional fragments with verbal fidelity or indulged in revision and remoulding. It may reasonably be supposed, not only that they constructed the external framework of many chapters, and also made some additions of their own—a necessary process in order to weld their motley collection of fragments into a new and coherent book—but also that they fabricated anew many formulae and imitative passages on the model of the materials at their disposal. In this consisted the "completion" of Tanvasar, expressly mentioned in the account of the Dînkard. All those texts in which the grammar is handled, now with laxness and want of skill, and again with absolute barbarism, may probably be placed to the account of the Sassanian redactors. All the grammatically correct texts, together with those portions of the Avesta which have intrinsic worth, especially the metrical passages, are indubitably authentic and taken *ad verbum* from the original Avesta. To this class, above all, belong the Gâthâs and the nucleus of the greater Yashts. Opinions differ greatly as to the precise age of the original texts brought together by subsequent redactors: according to some, they are pre-Achaemenian; according to Darmesteter's former opinion, they were written in Media under the Achaemenian dynasty; according to some, their source must be sought in the east, according to others, in the west of Iran. But to search for a precise time or an exact locality is to deal with the question too narrowly; it is more correct to say that the Avesta was worked at from the time of Zoroaster down to the Sassanian period. Its oldest portions, the Gâthâs, proceed from the prophet himself. This conclusion is inevitable for every one to whom Zoroaster is an historical personality, and who does not shun the labour of an unprejudiced research into the meaning of those difficult texts (cf. ZOROASTER). The rest of the Avesta, in spite of the opposite opinion of orthodox Parsees, does not even claim to come from Zoroaster. As the Gâthâs now constitute the kernel of the most sacred prayer-book, viz. the Yasna, so they ultimately proved to be the first nucleus of a religious literature in general. The language in which Zoroaster taught, especially a later development of it, remained as the standard with his followers, and became the sacred language of the priesthood of that faith which he had founded; as such it became, so to speak, absolved from the ordinary conditions of time and space. Taught and acquired as an ecclesiastical language, it was enabled to live an artificial life long after it had become extinct as a vernacular—in this respect comparable to the Latin of the middle ages or the Hebrew of the rabbinical schools. The priests, who were the composers and repositories of these texts, succeeded in giving them a perfectly general form. They refrained from practically every allusion to ephemeral or local circumstances. Thus we search vainly in the Avesta itself for any precise data to determine the period of its composition or the place where it arose. The original country of the religion, and the seat of the Avesta language, ought perhaps to be sought rather in the east of Iran (Seistân and the neighbouring districts). But neither the spiritual literature nor the sacred tongue remained limited to the east. The geography of the Avesta points both to the east and the west, particularly the north-west of Iran, but with a decided tendency to gravitate towards the east. The vivid description of the basin of the Hilment (*Yasht* 19, 65–69) is peculiarly instructive. The language of the Avesta travelled with the Zoroastrian religion and with the main body of the priesthood, in all probability, that is to say, from east to west; within the limits of Iran it became international.

As has been already stated, the Avesta now in our hands is but a small portion of the book as restored and edited under the Sassanians. The larger part perished under the Mahommedan rule and under the more barbarous tyranny of the Tatars, when through conversion and extermination the Zoroastrians became a mere remnant that concealed its religion and neglected the necessary copying of manuscripts. A most meagre proportion only of the real religious and ritual writings, the sacerdotal law and the liturgy, has been preserved to our time. The great bulk—over three-fourths of the Sassanian contents—especially the more secular literature collected, has fallen a prey to oblivion. The understanding of the older Avesta texts began to die away at an early period. The need for a translation and interpretation became evident; and under the Later Sassanians the majority of the books, if not the whole of them, were rendered into the current Pahlavi. A thorough use of this translation will not be possible until we have it in good critical editions, and acquaintance with its language ceases to be the monopoly of a few privileged individuals. For the interpretation of the older texts it is of great value where they are concerned with the fixed, formal statutes of the church. But when they pass beyond this narrow sphere, as particularly in the Gâthâs, the Pahlavi translator becomes a defective and unreliable interpreter. The Parsee priest, Neryosangh, subsequently translated a portion of the Pahlavi version into Sanskrit.

The MSS. of the Avesta are, comparatively speaking, of recent date. The oldest is the Pahlavi Vispered in Copenhagen, dated 1258. Next come the four MSS. of the Herbad Mihirâpân Kai Khusro at Cambay (1323 and 1324), two Vendidads with Pahlavi in London and Copenhagen, and two Yasnas with Pahlavi in Copenhagen and formerly in Bombay (now Oxford). Generally speaking, the MSS. fall off in quality and carefulness in proportion to their lateness; though an honourable exception must be made in favour of those proceeding from Kirman and Yazd in Persia, mostly dating from the 17th and 18th centuries.

The first European scholar to direct attention to the Avesta was Hyde of Oxford, in his *Historia Religionis Veterum Persarum eorumque Magorum* (1700), which, however, failed to awake any lasting interest in the sacred writings of the Parsees. The merit of achieving this belongs to the enthusiastic orientalist Anquetil Duperron, the fruit of whose prolonged stay in India (1755–1761) and his acquaintance with the Parsee priests was a translation (certainly very defective) of the Zend-Avesta. The foundation of a scientific exegesis was laid by Burnouf. The interpretation of the Avesta is one of the most difficult problems of oriental philology. To this very day no kind of agreement has been reached by conflicting schools, even upon some of the most important points. The value of the Pahlavi interpretation was overrated by Spiegel, Darmesteter, but wholly denied by Roth. The truth lies between these two extremes. Opinion is divided also as to the significance of the Avesta in the literature of the world. The exaggerated enthusiasm of Anquetil Duperron has been followed, especially since Spiegel's translation, by an excessive reaction. Upon the whole, the Avesta is a monotonous book. The Yasna and many Yashts in great part consist of formulae of prayer which are as poor in contents as they are rich in verbiage. The book of laws (*Vendidad*) is characterized by an arid didactic tone; only here and there the legislator clothes his dicta in the guise of graceful dialogues and tales, or of poetic descriptions and similitudes; and then the book of laws is transformed into a didactic poem. Nor can we deny to the Yashts, in their depiction of the Zoroastrian angels and their presentment of the old sagas, a certain poetic feeling, at times, and a pleasant diction. The Gâthâs are quite unique in their kind. As a whole, the Avesta, for profundity of thought and beauty, stands on a lower level than the Old Testament. But as a religious book—the most important document of the Zoroastrian faith, and the sole literary monument of ancient Iran—the Avesta occupies a prominent position in the literature of the world. At the present day its significance is decidedly underrated. The future will doubtless be more just with regard to the importance of the book for the history of religion in general and even of Christianity.

EDITIONS.—*Zend-Avesta*, ed. by N. L. Westergaard (Copenhagen 1852–54), complete; F. Spiegel, *Avesta* (Vienna, 1853–58), only Vendidad, Vispered and Yasna, but with the Pahlavi translation, K. Geldner (Stuttgart, 1886–96). *Translations.*—Anquetil Duperron, *Zend-Avesta, Ouvrage de Zoroastre* (Paris, 1771); Fr. Spiegel, 3 vols. (Leipzig, 1852–63), both completely antiquated. *Avesta traduit* par C. de Harlez, ed. 2 (Paris, 1881); *The Zend-Avesta, Part I. Vendidad, Part II. Sîrôzahs, Yashts and Nyâyish*, tr. by J. Darmesteter, *Part III. Yasna, Visparad, &c.*, by L. H. Mills (Oxford, 1880–87), in the *Sacred Books of the East; Le Zend-Avesta, traduction nouvelle* par J. Darmesteter, 3 vols. (Paris, 1892–93) (*Annales du Musée Guimet*)—a most important work.

LITERATURE.—Anquetil Duperron (see above); Haug, *Essays on the Sacred Language, &c., of the Parsis*, especially in the new edition by E. W. West (London, 1878); De Harlez, *Introduction à l'étude de l'Avesta* (Paris, 1881); Max Duncker, *Geschichte des Altertums*, vol. iv.; Eduard Meyer, *Geschichte des Altertums*, vol. i. (Stuttgart, 1884); J. Darmesteter, in the *Introduction* to his translation (see above); K. Geldner, *Avesta-Litteratur* in the *Grundriss der iranischen Philologie*, by Geiger and Kuhn (Strassburg, 1896), vol. 2, 1 f.; E. W. West, *Contents of the Nasks*, S. B. E. 37 (Oxford, 1892).

(K. G.)

ZENGG (Hungarian, *Zeng*; Croatian, *Senj*; Italian, *Segna*), a royal free town of Hungary, in the county of Lika-Krbava, Croatia-Slavonia, 34 m. S.E. of Fiume, on the Adriatic Sea. Pop. (1900) 3182. Zengg lies at the entrance to a long cleft among the Velebit Mountains, down which the *bora*, or N.N.E. wind, sweeps with such violence as often to render the harbour unsafe, although the Austrian Lloyd steamers call regularly. Apart from the cathedral of its Roman Catholic bishop, a *gymnasium*, and some ancient fortifications, the town contains little of interest. It carries on a small trade in tobacco, fish and salt. The island of Veglia faces the town and the port of San Giorgio lies 5 m. S.

The captaincy of Zengg was established, in the 15th century, by King Matthias Corvinus of Hungary, as a check upon the Turks; and subsequently, until 1617, the town became famous as the stronghold of the Uskoks.

ZENITH (from the Arabic), the point directly overhead; its direction is defined by that of the plumb-line.

ZENJÁN, or ZANJAN, a town of Persia, capital of the Khamseh province, about 205 m. N.W. of Teheran, on the high road thence to Tabriz, at an elevation of 5180 ft. It has a population of about 25,000 and post and telegraph offices, and was one of the original strongholds of the Bábí sectarians, who held it against a large Persian force from May 1850 to the end of the year, when most of them were massacred. It has extensive gardens, well watered by the Zanjaneh river, which flows south of it. The well-stocked bazaar supplies the neighbouring districts.

ZENO, East Roman emperor from 474 to 491, was an Isaurian of noble birth, and originally bore the name of Trascalissaeus, which he exchanged for that of Zeno on his marriage with Ariadne, daughter of Leo I., in 468. Of his early life nothing is known; after his marriage (which was designed by Leo to secure the Isaurian support against his ambitious minister Aspar) he became patrician and commander of the imperial guard and of the armies in the East. While on a campaign in Thrace he narrowly escaped assassination; on his return to the capital he avenged himself by compassing the murder of Aspar, who had instigated the attempt. In 474 Leo I. died after appointing as his successor Leo the son of Zeno and Ariadne; Zeno, however, with the help of his mother-in-law Verina, succeeded in getting himself crowned also, and on the death of his son before the end of the year became sole emperor. In the following year, in consequence of a revolt fomented by Verina in favour of her brother Basiliscus, and the antipathy to his Isaurian soldiers and administrators, he was compelled to take refuge in Isauria, where, after sustaining a defeat, he was compelled to shut himself up in a fortress. The growing misgovernment and unpopularity of Basiliscus ultimately enabled Zeno to re-enter Constantinople unopposed (476); his rival was banished to Phrygia, where he soon afterwards died. The remainder of Zeno's reign was disturbed by numerous other less formidable revolts. Since 472 the aggressions of the two Ostrogoth leaders Theodoric had been a constant source of danger. Though Zeno at times contrived to play them off against each other, they in turn were able to profit by his dynastic rivalries, and it was only by offering them pay and high command that he kept them from attacking Constantinople itself. In 487 he induced Theodoric, son of Theodemir, to invade Italy and establish his new kingdom. Zeno is described as a lax and indolent ruler, but he seems to have husbanded the resources of the empire so as to leave it appreciably stronger at his death. In ecclesiastical history the name of Zeno is associated with the *Henoticon* or instrument of union, promulgated by him and signed by all the Eastern bishops, with the design of terminating the Monophysite controversy.

See J. B. Bury, *The Later Roman Empire* (London, 1889), i. pp. 250–274; E. W. Brooks in the *English Historical Review* (1893), pp. 209–238; W. Barth, *Der Kaiser Zeno* (Basel, 1894).

ZENO OF ELEA, son of Teleutagoras, is supposed to have been born towards the beginning of the 5th century B.C. The il and the friend of Parmenides, he sought to recommend ster's doctrine of the existence of the One by controverting the popular belief in the existence of the Many. In virtue of this method of indirect argumentation he is regarded as the inventor of "dialectic," that is to say, disputation having for its end not victory but the discovery or the transmission of truth. He is said to have been concerned in a plot against a tyrant, and on its detection to have borne with exemplary constancy the tortures to which he was subjected; but authorities differ both as to the name and the residence of the tyrant and as to the circumstances and the issue of the enterprise.

In Plato's *Parmenides*, Socrates, "then very young," meets Parmenides, "an old man some sixty-five years of age," and Zeno, "a man of about forty, tall and personable," and engages them in philosophical discussion. But it may be doubted whether such a meeting was chronologically possible. Plato's account of Zeno's teaching (*Parmenides*, 128 seq.) is, however, presumably as accurate as it is precise. In reply to those who thought that Parmenides's theory of the existence of the One involved inconsistencies and absurdities, Zeno tried to show that the assumption of the existence of the Many, that is to say, a plurality of things in time and space, carried with it inconsistencies and absurdities grosser and more numerous. In early youth he collected his arguments in a book, which, according to Plato, was put into circulation without his knowledge.

Of the paradoxes used by Zeno to discredit the belief in plurality and motion, eight survive in the writings of Aristotle and Simplicius. They are commonly stated as follows.[1] (1) If the Existent is Many, it must be at once infinitely small and infinitely great—infinitely small, because the parts of which it consists must be indivisible and therefore without magnitude; infinitely great, because, that any part having magnitude may be separate from any other part, the intervention of a third part having magnitude is necessary, and that this third part may be separate from the other two the intervention of other parts having magnitude is necessary, and so on *ad infinitum*. (2) In like manner the Many must be numerically both finite and infinite—numerically finite, because there are as many things as there are, neither more nor less; numerically infinite, because, that any two things may be separate, the intervention of a third thing is necessary, and so on *ad infinitum*. (3) If all that is is in space, space itself must be in space, and so on *ad infinitum*. (4) If a bushel of corn turned out upon the floor makes a noise, each grain and each part of each grain must make a noise likewise; but, in fact, it is not so. (5) Before a body in motion can reach a given point, it must first traverse the half of the distance; before it can traverse the half of the distance, it must first traverse the quarter; and so on *ad infinitum*. Hence, that a body may pass from one point to another, it must traverse an infinite number of divisions. But an infinite distance (which Zeno fails to distinguish from a finite distance infinitely divided) cannot be traversed in a finite time. Consequently, the goal can never be reached. (6) If the tortoise has the start of Achilles, Achilles can never come up with the tortoise; for, while Achilles traverses the distance from his starting-point to the starting-point of the tortoise, the tortoise advances a certain distance, and while Achilles traverses this distance, the tortoise makes a further advance, and so on *ad infinitum*. Consequently, Achilles may run *ad infinitum* without overtaking the tortoise. [This paradox is virtually identical with (5), the only difference being that, whereas in (5) there is one body, in (6) there are two bodies, moving towards a limit. The "infinity" of the premise is an infinity of subdivisions of a distance which is finite; the "infinity" of the conclusion is an infinity of distance. Thus Zeno again confounds a finite distance infinitely divided with an infinite distance. If the tortoise has a start of 1000 ft. Achilles, on the supposition that his speed is ten times that of the tortoise, must traverse an infinite number of spaces—1000 ft., 100 ft., 10 ft., &c.—and the tortoise must traverse an infinite number of spaces—100 ft., 10 ft., 1 ft., &c.—before they reach the point, distant from their starting-points $1111\frac{1}{9}$ ft. and $111\frac{1}{9}$ ft. respectively, at which the tortoise is overtaken. In a word, $1000+100+10$ &c., in (6) and $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}$ &c., in (5) are convergent series, and $1111\frac{1}{9}$ and 1 are the limits to which they respectively approximate.] (7) So long as anything is in one and the same space, it is at rest. Hence an arrow is at rest at every moment of its flight, and therefore also during the whole of its flight. (8) Two bodies moving with equal speed traverse equal spaces in equal time. But, when two bodies move with equal speed in opposite directions, the one passes the other in half the time in which it passes it when at rest. These propositions appeared to Zeno to be irreconcilable. In short, the ordinary belief in plurality and motion seemed to him to involve fatal inconsistencies, whence he inferred that Parmenides was justified in distinguishing the mutable movable Many from the immutable immovable One, which alone is really existent. In other words, Zeno re-affirmed the dogma, "The Ent is, the Non-ent is not."

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[1] See Zeller, *Die Philosophie d. Griechen*, i. 591 seq.; *Grundriss*, 54.

If tradition has not misrepresented these paradoxes of time, space and motion, there is in Zeno's reasoning an element of fallacy. It is indeed difficult to understand how so acute a thinker should confound that which is infinitely divisible with that which is infinitely great, as in (1), (2), (5), and (6); that he should identify space and magnitude, as in (3); that he should neglect the imperfection of the organs of sense, as in (4); that he should deny the reality of motion, as in (7); and that he should ignore the relativity of speed, as in (8): and of late years it has been thought that the conventional statements of the paradoxes, and in particular of those which are more definitely mathematical, namely (5), (6), (7), (8), do less than justice to Zeno's acumen. Thus, several French writers—notably, Tannery and Noël—regard them as dilemmas advanced, with some measure of success, in refutation of specific doctrines attributed to the Pythagoreans. "One of the most notable victims of posterity's lack of judgment," says Bertrand Russell, "is the Eleatic Zeno. Having invented four arguments all immeasurably subtle and profound, the grossness of subsequent philosophers pronounced him to be a mere ingenious juggler, and his arguments to be one and all sophisms. After two thousand years of continual refutation, these sophisms were reinstated, and made the foundation of a mathematical renaissance, by a German professor, who probably never dreamed of any connexion between himself and Zeno. Weierstrass, by strictly banishing all infinitesimals, has at last shown that we live in an unchanging world, and that the arrow at every moment of its flight is truly at rest." "The interpretation of Zeno's last four paradoxes given by Messrs. Noël and Russell," says G. H. Hardy, "may be briefly stated as follows: The notion of time, which seems at first sight to enter into (5) and (6), should be eliminated. The former should be regarded as asserting that the whole is, not temporally, but logically, subsequent to the part, and that therefore there is an infinite regress in the notion of a whole which is infinitely divisible—a view which at any rate demands a serious refutation. The kernel of the latter lies in the perfectly valid proof which it affords that the tortoise passes through as many positions as Achilles—a view which embodies an accepted doctrine of modern mathematics. The paradox of the arrow (7), says Mr Russell, is a plain statement of a very elementary fact: the arrow is at rest at very moment of its flight: Zeno's only mistake was in inferring (if he did infer) that it was therefore at the same point at one moment as at another. Finally, the last paradox may be interpreted as a valid refutation of the doctrine that space and time are not infinitely divisible. How far this interpretation of Zeno is historically justifiable, may be doubtful. But one may well believe that there was in his mind at any rate a foreshadowing of some of the ideas by which modern mathematicians have finally laid to rest the traditional difficulties connected with infinity and continuity."

Great as was the importance of these paradoxes of plurality and motion in stimulating speculation about space and time, their direct influence upon Greek thought was less considerable than that of another paradox—strangely neglected by historians of philosophy—the paradox of predication. We learn from Plato (*Parmenides*, 127 D) that "the first hypothesis of the first argument" of Zeno's book above mentioned ran as follows: "If existences are many, they must be both like and unlike [unlike, inasmuch as they are not one and the same, and like, inasmuch as they agree in not being one and the same, Proclus, *On the Parmenides*, ii. 143]. But this is impossible; for unlike things cannot be like, nor like things unlike. Therefore existences are not many." That is to say, not perceiving that the same thing may be at once like and unlike in different relations, Zeno regarded the attribution to the same thing of likeness and unlikeness as a violation of what was afterwards known as the principle of contradiction; and, finding that plurality entailed these attributions, he inferred its unreality. Now, when without qualification he affirmed that the unlike thing cannot be like, nor the like thing unlike, he was on the high road to the doctrine maintained three-quarters of a century later by the Cynics, that no predication which is not identical is legitimate. He was not indeed aware how deeply he had committed himself; otherwise he would have observed that his argument, if valid against the Many of the vulgar, was valid also against the One of Parmenides, with its plurality of attributes, as well as that, in the absence of a theory of predication, it was useless to speculate about knowledge and being. But others were not slow to draw the obvious conclusions; and it may be conjectured that Gorgias's sceptical development of the Zenonian logic contributed, not less than Protagoras's sceptical development of the Ionian physics, to the diversion of the intellectual energies of Greece from the pursuit of truth to the pursuit of culture.

For three-quarters of a century, then, philosophy was at a standstill; and, when in the second decade of the 4th century the pursuit of truth was resumed, it was plain that Zeno's paradox of predication must be disposed of before the problems which had occupied the earlier thinkers—the problem of knowledge and the problem of being—could be so much as attempted. Accordingly, in the seventh book of the *Republic*, where Plato propounds his scheme of Academic education, he directs the attention of studious youth primarily, if not exclusively, to the concurrence of inconsistent attributes; and in the *Phaedo*, 102 B–103 A, taking as an instance the tallness and the shortness simultaneously discoverable in Simmias, he offers his own theory of the immanent idea as the solution of the paradox. Simmias, he says, has in him the ideas of tall and short. Again, when it presently appeared that the theory of the immanent idea was inconsistent with itself, and moreover inapplicable to explain predication except where the subject was a sensible thing, so that reconstruction became necessary, the Zenonian difficulty continued to demand and to receive Plato's best attention. Thus, in the *Parmenides*, with the paradox of likeness and unlikeness for his text, he inquires how far the current theories of being (his own included) are capable of providing, not only for knowledge, but also for predication, and in the concluding sentence he suggests that, as likeness and unlikeness, greatness and smallness, &c., are relations, the initial paradox is no longer paradoxical; while in the *Sophist*, Zeno's doctrine having been shown to be fatal to reason, thought, speech and utterance, the mutual *κοινωνία* of *εἰδῶν* which are not *αὐτὰ καθ' αὑτά* is elaborately demonstrated. It would seem then that, not to Antisthenes only, but to Plato also, Zeno's paradox of predication was a substantial difficulty; and we shall be disposed to give Zeno credit accordingly for his perception of its importance.

In all probability Zeno did not observe that in his controversial defence of Eleaticism he was interpreting Parmenides's teaching anew. But so it was. For, while Parmenides had recognized, together with the One, which is, and is the object of knowledge, a Many, which is not, and therefore is not known, but nevertheless becomes, and is the object of opinion, Zeno plainly affirmed that plurality, becoming and opinion are one and all inconceivable. In a word, the fundamental dogma, "The Ent is, the Non-ent is not," which with Parmenides had been an assertion of the necessity of distinguishing between the Ent, which is, and the Non-ent, which is not, but becomes, was with Zeno a declaration of the Non-ent's absolute nullity. Thus, just as Empedocles developed Parmenides's theory of the Many to the neglect of his theory of the One, so Zeno developed the theory of the One to the neglect of the theory of the Many. With the severance of its two members Eleaticism proper, the Eleaticism of Parmenides, ceased to exist.

The first effect of Zeno's teaching was to complete the discomfiture of philosophy. For the paradox of predication, which he had used to disprove the existence of plurality, was virtually a denial of all speech and all thought, and thus led to a more comprehensive scepticism than that which sprang from the contemporary theories of sensation. Nevertheless, he left an enduring mark upon Greek speculation, inasmuch as he not only recognized the need of a logic, and grappled, however unsuccessfully, with one of the most obvious of logical problems, but also by the invention of dialectic provided a new and powerful instrument against the time when the One and the Many should be reunited in the philosophy of Plato.

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Russell, *Principles of Mathematics* (Cambridge, 1903), pp. 346–354. For histories of philosophy and other works upon Eleaticism see PARMENIDES. (H. JA.)

ZENO OF SIDON, Epicurean philosopher of the first century B.C., and contemporary of Cicero. In the *De Natura Deorum* (i. 34), Cicero states that he was contemptuous of other philosophers and even called Socrates "the Attic Buffoon." Diogenes Laërtius and Cicero both speak of him with respect and describe him as an accurate and polished thinker. He held that happiness includes not merely present enjoyment and prosperity, but also a reasonable expectation of their continuance. His views were made the subject of a special treatise by Posidonius.

ZENO OF TARSUS, Stoic philosopher and pupil of Chrysippus, belonged to the period of the Middle Stoa. He appears to have accepted all the Stoic doctrines except that he denied the final conflagration of the universe (see STOICS).

ZENOBIA (Gr. *Ζηνοβία*), queen of Palmyra, one of the heroines of antiquity. Her native name was Septimia Bathzabbai, a name also borne by one of her generals, Septimius Zabbai.[1] This remarkable woman, famed for her beauty, her masculine energy and unusual powers of mind, was well fitted to be the consort of Odainatti (see ODAENATHUS) in his proud position as Dux Orientis; during his lifetime she actively seconded his policy, and after his death in A.D. 266–7 she not only succeeded to his position but determined to surpass it and make Palmyra mistress of the Roman Empire in the East. Wahab-allath or Athenodōrus (as the name was Graecized), her son by Odainath, being still a boy, she took the reins of government into her own hands. Under her general-in-chief Zabdā, the Palmyrenes occupied Egypt in A.D. 270, not without a struggle, under the pretext of restoring it to Rome; and Wahab-allath governed Egypt in the reign of Claudius as joint ruler with the title of *βασιλεύς* (king), while Zenobia herself was styled *βασίλισσα* (queen). In Asia Minor Palmyrene garrisons were established as far west as Ancyra in Galatia and Chalcedon opposite Byzantium, and Zenobia still professed to be acting in the interests of the Roman rule. In his coins struck at Alexandria in A.D. 270 Wahab-allath is named along with Aurelian, but the title of Augustus is given only to the latter; a Greek inscription from Byblos, however, mentions Aurelian (or his predecessor Claudius) and Zenobia together as *Σεβαστός* and *Σεβαστή* (*i.e.* Augustus and Augusta, *C.I.G.* 4503 b). When Aurelian became emperor in 270 he quickly realized that the policy of the Palmyrene queen was endangering the unity of the empire. It was not long before all disguises were thrown off; in Egypt Wahab-allath began to issue coins without the head of Aurelian and bearing the imperial title, and Zenobia's coins bear the same. The assumption marked the rejection of all allegiance to Rome. Aurelian instantly took measures; Egypt was recovered for the Empire by Probus (close of 270), and the emperor himself prepared a great expedition into Asia Minor and Syria. Towards the end of 271 he marched through Asia Minor and, overthrowing the Palmyrene garrisons in Chalcedon, Ancyra and Tyana, he reached Antioch, where the main Palmyrene army under Zabdā and Zabbai, with Zenobia herself, attempted to oppose his way. The attempt, however, proved unsuccessful, and after suffering considerable losses the Palmyrenes retired in the direction of Emesa (now Höms), whence the road lay open to their native city. The queen refused to yield to Aurelian's demand for surrender, and drew up her army at Emesa for the battle which was to decide her fate. In the end she was defeated, and there was nothing for it but to fall back upon Palmyra across the desert. Thither Aurelian followed her in spite of the difficulties of transport, and laid siege to the well-fortified and provisioned city. At the critical moment the queen's courage seems to have failed her; she and her son fled from the city to seek help from the Persian king;[2] they were captured on the bank of the Euphrates, and the Palmyrenes, losing heart at this disaster, capitulated (A.D. 272). Aurelian seized the wealth of the city but spared the inhabitants; to Zenobia he granted life; while her officers and advisers, among whom was the celebrated scholar Longinus, were put to death. Zenobia figured in the conqueror's splendid triumph at Rome, and by the most probable account accepted her fall with dignity and closed her days at Tibur, where she lived with her sons the life of a Roman matron. A few months after the fall of Zenobia, Palmyra revolted again; Aurelian unexpectedly returned, destroyed the city, and this time showed no mercy to the population (spring, 273).

Among the traditions relating to Zenobia may be mentioned that of her discussions with the Archbishop Paul of Samosata on matters of religion. It is probable that she treated the Jews in Palmyra with favour; she is referred to in the Talmud, as protecting Jewish rabbis (Talm. Jer. *Ter.* viii. 46 b).

The well-known account of Zenobia by Gibbon (*Decline and Fall*, i. pp. 302–312 Bury's edition) is based upon the imperial biographers (*Historia Augusta*) and cannot be regarded as strictly historical in detail. An obscure and distorted tradition of Zenobia as an Arab queen survived in the Arabian story of Zabbā, daughter of 'Amr b. Zarib, whose name is associated with Tadmor and with a town on the right bank of the Euphrates, which is no doubt the Zenobia of which Procopius speaks as founded by the famous queen. See C. de Perceval, *Essai sur l'hist. des Arabes*, ii. 28 f., 197 f.; Tabari, i. 757 f. See further PALMYRA. (G. A. C.*)

ZENOBIUS, a Greek sophist, who taught rhetoric at Rome during the reign of Hadrian (A.D. 117–138). He was the author of a collection of proverbs in three books, still extant in an abridged form, compiled, according to Suidas, from Didymus of Alexandria and "The Tarrhaean" (Lucillus of Tarrha in Crete). Zenobius is also said to have been the author of a Greek translation of Sallust and of a birthday poem (*γενεθλιακόν*) on Hadrian.

Editions by T. Gaisford (1836) and E. L. Leutsch-F. W. Schneidewin (1839), and in B. E. Miller, *Mélanges de littérature grecque* (1868); see also W. Christ, *Griechische Litteraturgeschichte* (1898).

ZENODOCHIUM (Gr. *ξενοδοχεῖον*, *ξένος*, stranger, guest, *δέχεσθαι*, to receive), the name given by the Greeks to a building erected for the reception of strangers.

ZENODOTUS, Greek grammarian and critic, pupil of Philetas (*q.v.*) of Cos, was a native of Ephesus. He lived during the reigns of the first two Ptolemies, and was at the height of his reputation about 280 B.C. He was the first superintendent of the library at Alexandria and the first critical editor (*διορθωτής*) of Homer. His colleagues in the librarianship were Alexander of Aetolia and Lycophron of Chalcis, to whom were allotted the tragic and comic writers respectively, Homer and other epic poets being assigned to Zenodotus. Although he has been reproached with arbitrariness and an insufficient knowledge of Greek, in his recension he undoubtedly laid a sound foundation for future criticism. Having collated the different MSS. in the library, he expunged or obelised doubtful verses, transposed or altered lines, and introduced new readings. He divided the Homeric poems into books (with capitals for the *Iliad*, and small letters for the *Odyssey*), and possibly was the author of the calculation of the days of the *Iliad* in the Tabula Iliaca. He does not appear to have written any regular commentary on Homer, but his Homeric *γλῶσσαι* (lists of unusual words) probably formed the source of the explanations of Homer attributed by the grammarians to Zenodotus. He also lectured upon Hesiod, Anacreon and Pindar, if he did not publish editions of them. He is further called an epic poet by Suidas, and three epigrams in the Greek Anthology are assigned to him.

There appear to have been at least two other grammarians of the same name: (1) Zenodotus of Alexandria, surnamed

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[1] See the Palmyrene inscriptions given in Vogüé, *Syrie centrale*, Nos. 28, 29 = Cooke, *North-Semitic Inscriptions*, Nos. 130, 131. Zabbai, an abbreviation of some such form as Zabd-ilā = *dowry of God*, was a common Palmyrene name; it occurs in the Old Testament. Ezr. x. 28; Neh. iii. 20.

[2] Whether Shāpūr or his son Hormuzdi is not certain; Shāpūr's death is variously placed in 269 and 272.

ὁ ἐν ἄστει; (2) Zenodotus of Mallus, the disciple of Crates, who like his master attacked Aristarchus.

See F. A. Wolf, *Prolegomena ad Homerum*, section 43 (1859 edition); H. Düntzer, *De Zenodoti studiis Homericis* (1848); A. Römer, *Über die Homerrecension des Zenodotus* (Munich, 1885); F. Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit*, i. p. 330, ii. p. 14; J. E. Sandys, *Hist. of Class. Schol.* (1906), ed. 2, vol. i. pp. 119–121.

ZENTA, a market town of Hungary, in the county of Bács-Bodrog, 133 m. S.E. of Budapest by rail. Pop. (1900) 28,582. It is situated on the right bank of the river Theiss, and is historically known for the decisive victory won in its vicinity by Prince Eugene of Savoy over the Turks on the 11th of September 1697.

ZEOLITES, a family of minerals consisting of hydrated silicates of alumina with alkalis or alkaline earths or both. The water they contain is readily lost, and before the blowpipe it is expelled with intumescence; hence the name zeolite, from the Greek ζεῖν (to boil) and λίθος (a stone), given by A. Cronstedt in 1758. In some other characters, as well as in their origin and mode of occurrence, they have points in common. Several species have been distinguished, of which the following are the more important. Apophyllite (*q.v.*) and pectolite (see PYROXENE) are also sometimes included.

Heulandite Group.	Heulandite . . .	$H_4CaAl_2(SiO_3)_6+3H_2O$.
	Brewsterite . . .	$H_4(Sr, Ba, Ca)Al_2(SiO_3)_6+3H_2O$.
	Epistilbite . . .	$H_4CaAl_2(SiO_3)_6+3H_2O$.
Stilbite Group.	Wellsite . . .	$(Ba, Ca, K_2)Al_2Si_3O_{10}+3H_2O$.
	Phillipsite . . .	$(K_2, Ca)Al_2(SiO_3)_4+4H_2O$.
	Harmotome . . .	$H_2(K_2, Ba)Al_2(SiO_3)_5+5H_2O$.
	Stilbite . . .	$CaAl_2(SiO_3)_6+6H_2O$.
	Gismondite . . .	$CaAl_2(SiO_3)_4+4H_2O$.
	Laumontite . . .	$H_4CaAl_2Si_4O_{14}+2H_2O$.
Chabazite Group.	Chabazite . . .	$(Ca, Na_2)Al_2(SiO_4)_2+4H_2O$, &c.
	Gmelinite . . .	$(Na_2, Ca)Al_2(SiO_3)_4+6H_2O$.
	Levynite . . .	$CaAl_2Si_3O_{10}+5H_2O$.
	Analcite . . .	$NaAl(SiO_3)_2+H_2O$.
Natrolite Group.	Natrolite. . .	$Na_2Al_2Si_3O_{10}+2H_2O$.
	Mesolite . . .	$(Ca, Na_2)Al_2Si_3O_{10}+2H_2O$.
	Scolecite . . .	$CaAl_2Si_3O_{10}+3H_2O$.
	Edingtonite . . .	$BaAl_2Si_3O_{10}+3H_2O$.
	Thomsonite . . .	$(Na_2, Ca)Al_2(SiO_4)_2+2\frac{1}{2}H_2O$.

Some of the chemical formulae given above are only approximate, since in some species the composition varies between certain limits and can be best expressed by the isomorphous mixing of different molecules (see, for example, CHABAZITE). They are all readily decomposed by hydrochloric acid, usually with the separation of gelatinous silica. By the action of various reagents several substitution products have been prepared artificially: thus, crystallized products, in which the alkalis or alkaline earths are replaced by ammonium or silver, &c., have been obtained.

The zeolites are often beautifully crystallized, and belong to several crystal-systems. The crystals usually show evidences of twinning, and when examined in polarized light they frequently exhibit optical anomalies and a complex structure. The hardness (H.=3½–5½) and specific gravity (2·0–2·4) are comparatively low, and so are the indices of refraction and the double refraction.

The water of zeolites presents many points of interest. Laumontite loses water on exposure to air, and the crystals soon crumble to powder unless they are kept in a moist atmosphere. All the zeolites lose a portion of their "water of crystallization" in dry air (over sulphuric acid), and a considerable portion at a temperature of 100° C., increasing in amount to 200° or 300°; the actual amount lost depending not only on the temperature, but also on the tension of aqueous vapour in the surrounding atmosphere. In some species the remaining water is expelled only at a red heat, and is therefore to be regarded as "water of constitution." With the progressive loss of water there is a progressive change in the optical characters of the crystals. When a partially dehydrated and opaque crystal is exposed to moist air the water is reabsorbed, the crystal becoming again transparent and regaining its original optical characters. Not only may water be reabsorbed, but such substances as ammonia, hydrogen sulphide and alcohol may be absorbed in definite amounts and with an evolution of heat. The water of zeolites may therefore be partly driven off and reabsorbed or replaced by other substances without destroying the crystalline structure of the material, and it would thus seem to differ from the water of crystallization of most other hydrated salts.

Zeolites are minerals of secondary origin and in most cases have resulted by the decomposition of the felspars of basic igneous rocks: in fact their chemical composition is somewhat analogous to that of the felspars with the addition of water. Nepheline and sodalite are often altered to zeolites. They usually occur as crystals lining the amygdaloidal and other cavities of basalt, melaphyre, &c. Usually two or more species are associated together, and often with agate, calcite and some other minerals. Less frequently they occur in cavities in granite and gneiss, and in metalliferous veins (*e.g.* harmotome); while only exceptionally are they primary constituents (*e.g.* analcite) of igneous rocks. Several species have been observed in the Roman masonry at the hot springs of Bourbonne-les-Bains in France: and phillipsite has been dredged from the floor of the deep sea.

See ANALCITE, CHABAZITE, HARMOTOME, HEULANDITE, NATROLITE, PHILLIPSITE, SCOLECITE, STILBITE. (L. J. S.)

ZEPHANIAH, the ninth of the minor prophets in the Bible. The name (*Yah*[*weh*] "hides" or "treasures"; there is a similar Phoenician compound of Baal) is borne by various individuals, in Jer. xxix. 25 (cf. lii. 24); Zech. vi. 10, 14; 1 Chron. vi. 36, and among the Jews of Elephantine in Egypt (5th century B.C.). The prophet's ancestry is traced through Cushi (cf. Jer. xxxvi. 14) to his great-grandfather Hezekiah, who may, in spite of 2 Kings xx. 18, xxi. 1, be the well-known king of Judah (*c.* 720–690). This would agree fairly with the title (i. 1) which makes the prophet a contemporary of King Josiah (*c.* 637), and this in turn appears to agree (*a*) with the internal conditions (i. 4–6, cf. 2 Kings xxiii. 4, 5, 12) which, it is held, are evidently earlier than Josiah's reforms (620); (*b*) with the denunciation of the royal household, but not of the (young) king himself (i. 8, iii. 3); (*c*) with the apparent allusion in ch. i. to the invasion of the Scythians (perhaps *c.* 626), and (*d*) with the anticipated downfall of Assyria and Nineveh (ii. 13, 607 B.C.). Zephaniah's prophecies are characterized by the denunciation of Judah and Jerusalem and the promise of a peaceful future, and these are interwoven with the idea of a world-wide judgment resulting in the sovereignty of a universally recognized Yahweh. The theme in its main outlines is a popular one in biblical prophecy, but when these 53 verses are carefully examined and compared with prophetical thought elsewhere, several difficult problems arise, an adequate solution of which cannot as yet be offered.

After the title (i. 1) and the announcement of the entire destruction of every living thing (2–3), the fate of Judah and Jerusalem is heralded (4–6). The *name* of Baal (so LXX.; *remnant* implies a date after Josiah's reforms) and of the idolatrous priests will be cut off, together with them that worship the "host of heaven" (condemned later than 620 in Jer. xix. 13, cf. xliv. 15–19) and swear by the Ammonite god *Milcom* (or perhaps by their Moloch; for the persistence of his grim cult, see MOLOCH). Silence is enjoined at the presence of Yahweh (*v.* 7, cf. Zech. ii. 13) and there follows a fine description of "the Day of Yahweh" (*vv.* 7–18).[1] The inveterate popular belief in the manifestation of the warring deity on behalf of his people (*e.g.* Isa. xxxiv. 8, lxiii. 4; Jer. xlvi. 10; Obad. 15; Ezek. xxx. 3) is treated (*a*) ethically, as a day of judgment upon sin and pride (Amos v. 18; Isa. ii. 12–21) and (*b*) apocalyptically, is bound up with ideas of a universal doom. Punishment will fall upon an oppressive court, upon those who wear foreign apparel, and who "leap over the threshold" (*v.* 9, cf. 1 Sam. v. 5, a Philistine custom)—a protest against heathen intercourse, for which cf. Isa. ii. 6, and COSTUME, *Oriental*. The blow falls upon the north side of Jerusalem (*v.* 10 seq., the merchant quarter (?), cf. Zech. xiv. 21); the city will be ransacked and the indifferent or apathetic, who thought that Yahweh could do neither good nor evil (so, of the idols, Isa. xli. 23; Jer. x. 5) will be ruined. With *v.* 13 contrast the promises Isa. lxv. 21. "That day is a day of wrath" (*v.* 15)[2] with celestial signs (cf. Amos v. 18, 20, viii. 9; Isa. xiii. 10; Joel ii. 2, iii. 15), war and distress, when wealth shall not avail (*v.* 18, cf. Isa. xiii. 17, of the Medes against Babylon, and more generally Ezek. vii. 19). Thus Yahweh's jealousy fired by the dishonour shown towards him *in Judah* will make an end of *all them that dwell in the earth* (*v.* 18, cf. *v.* 2 seq., and see Isa. x. 23, where a remnant is promised).

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[1] For "day" (*i.e.* of battle) cf. the Arab usage, W. R. Smith, *Proph. of Israel*, p. 398. The victorious and divine kings of Egypt in the XIXth and XXth Dynasties are likened to Baal in his "hour" (J. H. Breasted, *Hist. Doc. Eg.*, iii. §§ 312, 326, iv. § 106).

[2] The Vulgate *Dies irae dies illa*, whence the striking hymn by Thomas of Celano (*c.* 1250).

Chap. ii. opens probably "Get you shame, and be ye ashamed, O nation unabashed, before ye become as chaff that passeth away" (the last two clauses of *v.* 2 are doublets). With this very general call to repentance (cf. Amos v. 6, 15; Jer. iv. 14, &c.) is joined a particular appeal to "the humble ones of the earth" (*v.* 3, cf. iii. 12; Isa. xi. 4; Ps. lxxvi. 9) to seek righteousness and humility, *peradventure* (but LXX. *so that*) they may be hid in the day of Yahweh's wrath (cf. Isa. xxvi. 20). "For" the cities of the Philistines shall be destroyed (*v.* 4, cf. on i. 9 above), and an oracle of woe is uttered against their land (*v.* 5 seq.). With a sudden transition the "remnant of the house of Judah" is promised the maritime coast (*v.* 7, read *by the sea* for *thereupon*), and this is enhanced by the tidings of the return of the captivity. This thought is developed further. Yahweh has "heard" (cf. Isa. xvi. 6, 13 seq.; Jer. xlviii. 29 sqq.; Ezek. xxxv., 12) "the reproach of Moab and the revilings of the Ammonites," and the Lord of Hosts, the God of Israel, swears by his life that both shall be destroyed for their hostility towards his people, and the remnant of his nation shall possess their territory (*vv.* 8–10). After turning aside to Yahweh's supremacy (*v.* 11, iii. 9 seq.) the chapter continues with a short and vague doom "also" upon Cush (Ethiopia) "slain by my sword" (cf. Isa. lxvi. 16), and a more detailed prophecy upon Assyria and Nineveh. The exulting and boastful city (cf. Babylon, Isa. xlvii. 8, 10, with xlv. 5 seq.) shall be a haunt of wild animals (cf. Babylon, Isa. xiii. 20 sqq., and more especially Edom *ibid.* xxxiv. 11–13) and is pictured as shortly to be made desolate (*v.* 15, with the last words cf. Jerusalem, Jer. xix. 8, Edom, xlix. 17).

In chap. iii. there are again changing situations. The defiant, polluted and oppressive city is condemned for failing to regard the warnings. Her secular and religious leaders are denounced, and stress is laid, not upon foreign cults, but upon the rampant treachery and profanation (cf. Mal. ii. 11; Isa. lvi. 10–12, and especially Ezek. xxii. 25–28). Yahweh in the midst of her is "righteous" (cf. Neh. ix. 33, and especially the "Deutero-Isaiah," xl. sqq.),[1] but although the nations round about have been cut off and destroyed, Jerusalem, instead of taking warning in order to escape destruction, has been persistently corrupt (*vv.* 1–7; *v.* 2, cf. Jer. ii. 30 and often). "Therefore, wait ye for me, saith Yahweh, for the day when I arise *as a witness*" (so read in *v.* 8, cf. Mic. i. 2; Mal. iii. 5). But there is another sudden transition—in that day Yahweh shall assemble all nations and kingdoms to pour out upon them his anger (*v.* 8). This judgment upon the world will be followed by a universal conversion (*v.* 9, cf. ii. 11) and "from beyond the rivers of Cush" (cf. ii. 12) tribute will be brought to Yahweh (cf. Isa. xlv. 14, and especially xviii. 1, 7; some reference to a return of dispersed Jews may be suspected in the now corrupt text). "In that day" (*i.e.* after the judgment, implied by *v.* 7 seq.) there will be a purified Judah (cf. often in Isaiah, i. 24 sqq., iv. 2–6) and, with the removal of the proud, there will be left an afflicted, poor and trusting people (*v.* 12). "The remnant of Israel," also, shall dwell in peace and piety (*v.* 13; cf. the corrupt people who are to be "refined," Jer. ix. 3–9). Next, a noteworthy jubilant note is struck when "the daughter of Zion" is bidden to exult (*v.* 14, cf. Zech. ii. 10, ix. 9), for the "judgments" are removed, the "enemy" is cleared away. Yahweh, the mighty deliverer, is in her midst as "king of Israel" (Isa. xxiv. 23, xliv. 6), he will take joy in her (cf. Isa. lxii. 5, lxv. 19), and she shall no more see evil. In conclusion (*vv.* 18–20), he will gather them that are in exile away from the sacred festivals, who were a cause of "reproach" (cf. Ezek. xxxvi. 15; Isa. liv. 4; Neh. i. 3); he will "deal with" all oppressors and restore the outcast and the lame (cf. Mic. iv. 6 seq.; Ezek. xxxiv. 16). She shall become a praise and a name (cf. Jer. xxxiii. 9) when Yahweh brings back the captivity "before your eyes" (*i.e.* in your generation).

It is a natural assumption that prophecies have a practical end and refer to existing or impending conditions.[2] But although one single leading motive runs through the book of Zephaniah there are abrupt transitions which do not concern mere subjective considerations of logical or smooth thought, but material and organic changes representing different groups of ideas. The instruments of Yahweh's anger (ch. i.) are not so real or prominent on the political horizon as, for example, in Isaiah, Jeremiah or Habakkuk. The true date of the Scythian inroad and its results for Judah and Philistia are less important when it is observed that the doom upon Philistia, the vengeance upon Moab and Ammon and the promises for Judah (ch. ii.) belong to a large group of prophecies against certain historic enemies (Edom included) who are denounced for their contempt, hostility and intrusion. These prophecies are in large measure associated traditionally with the fall of Jerusalem, and to such a calamity, and not to the inroad of the Scythians, the references to the "remnant" and the "captivity" can only refer.[3] The anticipation of future events is of course conceivable in itself, but the promises (in ch. ii.) *presuppose* events other and later than those with which the Scythians were connected. On the other hand, it is entirely intelligible that a prophecy relating to Scythians should have been re-shaped to apply to later conditions, and on this view it is explicable why the indefinite political convulsions should be adjusted to the exile and why the gloom should be relieved by the promise of a territory extending from the Mediterranean to the Syrian desert (ii. 7, 9). After a period of punishment (cf. Lamentations) Yahweh's jealousy *against* the semi-heathen Judah has become a jealousy *for* his people, and we appear to move in the thought of Haggai and Zechariah, where the remnant are comforted by Yahweh's return and the dispersed exiles are to be brought back (cf. Zech. i. 14–17, viii. 2–17). But in ch. iii. other circles of thought are manifest. Israel's enemies have been destroyed, her own God Yahweh has proved *his* loyalty and has fulfilled *his* promises, but the city remains polluted (*vv.* 1–7, cf. Isa. lviii. seq.; Malachi). Once more doom is threatened, and once more we pass over into a later stage where Yahweh has vindicated *his* supremacy and Zion is glorified. Instead of the realities of history we have the apocalyptical feature of the gathering of the nations (*v.* 8); the thought may be illustrated from Zech. xii. 1.–xiii. 6, where Jerusalem is attacked, purged and delivered, and from Zech. xiv. where the city is actually captured and half the people are removed into captivity (cf. Zeph. iii. 11 purging, 15 removal of the enemy, 18–20 return of the captivity). The goal is the vindication of Israel and of Israel's God, and the establishment of universal monotheism (ii. 11, iii. 9 seq.). The foe which threatened Judah has become the chastiser of Ethiopia and Assyria (ii.) and the prelude to the golden age (iii., cf. Ezek. xxxviii. seq.). No longer does Yahweh contend for recognition with Baal and the "host of heaven" (i. 4–6); the convulsions of history are Yahweh's work for the instruction and amendment of Israel (iii. 6 seq.); the heathen gods prove helpless (ii. 11), but in what manner the conviction of Yahweh's greatness is brought home is not stated.[4]

If Jer. iv. 5–vi. 30 originally referred to the Scythians, it has been revised to refer to the Chaldeans; also in Ezek. xxxviii. seq. the northern foe has been associated with the great world-judgment. The replacing of the sequel of Amos (*q.v.*) by one which presupposes a later historical background, the addendum to the prophecy against Moab (Isa. xvi. 13 seq.), the pessimistic glosses in Isa. xlviii., the variations in the Hebrew and Greek text of Jeremiah, and the general treatment of prophecies of judgment and promise, exemplify certain *literary* processes which illustrate the present form of Zephaniah. In Isaiah and Zechariah, notably, older and later *groups* of prophecies are preserved, whereas here the new preludes and new sequels suggest that the original nucleus has passed through the hands of writers in touch with those vicissitudes of thought which can be studied more completely elsewhere. It is not to be supposed that the elimination of all later passages and traces of revision will give us Zephaniah's prophecies in their original extent. In fact the internal religious and social conditions in i. 4–6 or iii. 1–4 do not compel a date before Josiah's reforms. The doom of Cush is still in the future in Ezek. xxx. 4; and if the impending fall of Nineveh (ii. 13) implies an early date, yet it is found in writings which have later additions (Nahum), or which are essentially later (Jonah, cf. Tobit xiv. 4 [LXX], 8, 10, 15); cf. also the use of Assyria for Babylon (Ezra vi. 22) or Syria (Zech. x. 10). Historical references in prophecies are not always decisive (Ezek. xxxii., for example, looks upon Edom and Sidon as dead), and while the continued revision of the book allows the presumption that the tradition ascribing its inception to the time of Josiah may be authentic, it is doubtful how much of the original nucleus can be safely recognized. These are problems which concern not only the criticism of biblical prophetical writings as a whole, but also the historical vicissitudes of the period over which they extend (see JEWS; PALESTINE: *History*).

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[1] The idea of "righteousness" (*ṣ-d-ḳ*), or loyalty, appears to have implied the mutual bonds uniting the community and its deity, see *Journ. Theol. Stud.*, 1908, p. 632 *n.* 1; *Expositor*, Aug. 1910, p. 120.

[2] Material familiar to contemporary thought is naturally used (see especially H. Gressmann, *Ursprung d. israel-jüd. Eschatologie*; J. M. P. Smith. *Biblical World*, 1910, pp. 223 sqq.).

[3] The "humble" (ii. 3) can scarcely be identified with the "remnant" and, as in iii. 12, are viewed as a small pious community such as we find in the Psalms (see Nowack's *Comm.*).

[4] See further W. R. Smith, art. "Zephaniah," *Ency. Brit.*, 9th ed., who points out that "in the scheme of Isaiah it is made clear that the fall of the power that shatters the nations cannot fail to be recognized as Yahweh's work."

According to late tradition Zephaniah, like Habakkuk, was of the tribe of Simeon (cf. Micah of Mareshah and Obadiah of Beth-haccerem, see Cheyne, *Ency. Bib.*, col. 3455). The apocryphal prophecy of Zeph. (Clement of Alex., *Strom.*, v. 11, 77; see Schürer, *Gesch. Volk. Isr.*, iii. 271 seq.) merely illustrates the tendency to utilize older traditions. See further on textual, metrical and literary details, W. R. Smith (note 4, previous page), reprinted in *Ency. Bib.*, with additions by S. R. Driver, J. A. Selbie in Hastings's *Dict. Bib.*, J. Lippl in *Bibl. Studien* (1910), and the commentaries on (all or portions of) the Minor Prophets by A. B. Davidson (*Camb. Bible*, 1896); G. A. Smith (1898); W. Nowack (1903); K. Marti (1904; especially valuable); Driver (*Cent. Bib.*, 1906); Von Hoonacker (1908). (S. A. C.)

ZEPHYRINUS, ST, bishop of Rome from about 198 to 217, succeeded Victor I. He is described as a man of little intelligence or strength of character, and the somewhat important controversies on doctrine and discipline that marked his pontificate are more appropriately associated with the names of Hippolytus and of Calixtus, his principal adviser and afterwards his successor.

ZEPHYRUS, in Greek mythology, the west wind (whence the English "zephyr," a light breeze), brother of Boreas, the north wind, and son of the Titan Astraeus and Eos, the dawn. He was the husband of Chloris, the goddess of flowers, by whom he had a son, Carpus, the god of fruit (Ovid, *Fasti*, v. 197); by the harpy Podargē he was also the father of Xanthus and Balius, the horses of Achilles. Being spurned by Hyacinthus (*q.v.*), he caused his death by accident at the hands of Apollo. He was identified by the Romans with Favonius, and Chloris with Flora.

ZERBST, a town of Germany, in the duchy of Anhalt, situated on the Nuthe, 11 m. N.W. of Dessau and 27 m. S.E. of Magdeburg by the railway Dessau-Leipzig. Pop. (1900) 17,095. It is still surrounded in part by old walls and bastions, while other portions of the whilom fortifications have been converted into pleasant promenades. It contains five churches, one of which (St Nicholas), built in 1446–88, is a good example of the late Gothic style as developed in Saxony, with its spacious proportions, groined vaulting, and bare simple pillars. The town hall dates from about 1480, but it was disfigured by additions in the beginning of the 17th century. It contains the municipal museum, among the chief treasures of which is a Luther Bible illustrated by Lucas Cranach the younger. The palace (1681–1750) has been used as a depository of archives since 1872. There are several quaint old houses, with high gables, in the market-place, in the middle of which stand a Roland column, of about 1445, and a bronze figure known as the *Butterjungfer* (butter-girl), of uncertain origin and meaning, but now regarded as the palladium of the town. The old Franciscan monastery, with fine cloisters, founded in 1250, contains the gymnasium; a Cistercian nunnery of 1214 has been converted into barracks; and the Augustinian monastery of 1390 has been a hospital since 1525. Gold and silver articles, silk, plush, cloth, leather, soap, starch, chemicals and carriages are among the chief manufactures. Iron-founding is carried on; and several breweries are engaged in the preparation of Zerbster bitter beer, which enjoys considerable repute.

Zerbst is an ancient town, mentioned in 949. In 1307 it came into the possession of the Anhalt family, and from 1603 till 1793 was the capital of the collateral branch of Anhalt-Zerbst. In 1793 it passed to Anhalt-Dessau.

ZERMATT, a mountain village at the head of the Visp valley and at the foot of the Matterhorn, in the canton of the Valais, Switzerland. It is 22¼ m. by rail from Visp in the Rhône valley, and there is also a railway from Zermatt past the Riffel inns to the very top of the Gornergrat (10,289 ft.). The village is 5315 ft. above the sea, and in 1900 had 741 permanent inhabitants (all Romanists save 9, and all but 12 German-speaking), resident in 73 houses. Formerly Zermatt was called "Praborgne," and this name is mentioned in the Swiss census of 1888. Its originally Romance population seems to have been Teutonised in the course of the 15th century, the name "Matt", (now written "Zermatt," *i.e.* the village on the meadows) first occurring at the very end of that century. Zermatt was long known to botanists and geologists only, and has an interesting though very local history. De Saussure in 1789 was one of the first tourists to visit it. But it was not till the arrival of M. Alexandre Seiler in 1854 that its fame as one of the chief tourist resorts in the Alps was laid, for tourists abound only where there are good inns. When M. Seiler died in 1891 he was proprietor of most of the great hotels in and around Zermatt. The Matterhorn, which frowns over the village from which it takes its name, was not conquered till 1865, Mr E. Whymper and two guides then alone surviving the terrible accident in which their four comrades perished. The easy glacier pass of the St Théodule (10,899 ft.) leads S. in six hours from the village to the Val Tournanche, a tributary glen of the valley of Aosta.

ZERO, the figure 0 in the Arabic notation for numbers, nought, cipher. The Arabic name for the figure was *sifr*, which meant literally an empty thing. The old Latin writers on arithmetic translated or transliterated the Arabic word as *zephyrum*; this in Ital. became *zefiro*, contracted to *zero*, borrowed by F. *zéro*, whence it came late into English. The Spanish form *cifra*, more closely resembling the original Arabic, gave O. Fr. *cifre*, mod. *chiffre*, also used in the sense of monogram, and English "cipher" which is thus a doublet. In physics, the term is applied to a point with which phenomena are quantitatively compared, especially to a point of a graduated instrument between a positive and negative or ascending and descending scale, as in the scales of temperature.

ZEULENRODA, a town of Germany, in the principality of Reuss-the-Elder, situated on a high plateau in a well-wooded and hilly country, 35 m. N. from Hof by the railway to Werdau. Pop. (1900) 9419. The town contains a handsome town hall, several churches and schools, and carries on an active industry in cotton and woollen stocking manufacture. Zeulenroda is mentioned as a village as early as 1399, and it obtained municipal rights in 1438. Since 1500 it has belonged to the Greiz branch of the Reuss line of princes.

ZEUS, the Greek counterpart of the Roman god, Jupiter (*q.v.*). In the recorded periods of Hellenic history, Zeus was accepted as the chief god of the pantheon of the Greeks; and the religious progress of the people from lower to higher ideas can be well illustrated by the study of his ritual and personality. His name is formed from a root *div*, meaning "bright," which appears in other Aryan languages as a formative part of divine names, such as the Sanskrit *Dyâus*, "sky"; Latin *Diovis*, *Jovis*, *Diespiter*, *divus*; Old English *Tiw*; Norse *Tyr*. The conclusion that has been frequently drawn from these facts, that all the Indo-Germanic stocks before their dispersal worshipped a personal High God, the Sky-Father, has been now seen to be hazardous.[1] Nevertheless, it remains probable that Zeus had already been conceived as a personal and pre-eminent god by the ancestors of the leading Hellenic tribes before they entered the peninsula which became their historic home. In the first place, his pre-eminence is obviously pre-Homeric; for Homer was no preacher or innovator in religion, but gives us some at least of the primary facts of the contemporary religious beliefs prevailing about 1000 B.C.: and he attests for us the supremacy of Zeus as a belief which was unquestioned by the average Hellene of the time; and appreciating how slow was the process of religious change in the earlier period, we shall believe that the god had won this position long before the Homeric age. In the next place, we cannot trace the origin of his worship back to any special stock or particular locality; we cannot find a single community that did not possess his worship or that preserved any legend that suggests a late date for its introduction. Doubtless, it has very ancient and close associations with Thessaly; for most of the leading tribes must have entered Hellas by this route, and remembered the mountain Olympus that dominates this region as the earliest home of his cult, and took with them to their most distant settlements the cult-title *'Ολύμπιος*. Also, some of the prehistoric stocks in Thessaly, like the Achaean Aeacidae, may have regarded him as specially their ancestor. But to maintain therefore that he originated in Thessaly as the special deity of a single tribe, who were able to impose him upon the whole of Hellas, is against the analogies offered by the study of the special cults of Greek polytheism. But if we assume that he was the aboriginal Hellenic High God, we must be quite ready to admit that the separate communities were always liable to cherish other divinities with a more ardent and closer devotion, whether divinities that they brought with them or divinities that they found powerfully established in the conquered lands, Athena or Hera, for instance, in Attica or Argolis, or Poseidon in the Minyan settlements. This in fact is a frequent fate of a "High God" in polytheistic systems; he is vaguely praised and reverenced, but lower divine powers are nearer to the people's love or fear.

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[1] See, however, Schrader, *Prehistoric Antiquities of the Aryan Peoples* (trans. Jevons), 416–419.

The Cretan legend of his birth and origin, which gave rise to the Cretan cult of Zeus *Κρηταγενής*,[1] "Zeus born in Crete," may appear evidence against the theory just set forth. But it is not likely that any birth-legend belongs to the earliest stratum of the Zeus-religion. The Aryan Hellenes found in many of the conquered lands the predominant cult of a mother-goddess, to whom they gradually had to affiliate their own High God: and in Crete they found her cult associated with the figure of a male divinity who was believed to be born and to die at certain periods; probably he was an early form of Dionysus, but owing to his prominence in the island the Hellenic settlers may have called him Zeus; and this would explain the markedly Dionysiac character of the later Zeus-religion in Crete.

We can now consider the question how the god was imagined in the popular belief of the earliest and later periods. Homer is our earliest literary witness; and the portrait that he presents of Zeus is too well known to need minute description. To appreciate it, we must distinguish the lower mythologic aspect of him, in which he appears as an amorous and capricious deity lacking often in dignity and real power, and the higher religious aspect, in which he is conceived as the All-Father, the Father of Gods and men in a spiritual or moral sense, as a God omnipotent in heaven and earth, the sea and the realms below, as a God of righteousness and justice and mercy, who regards the sanctity of the oath and hears the voice of the suppliant and sinner, and in whom the pious and the lowly trust. In fact the later Greek religion did not advance much above the high-water mark of the Homeric, although the poets and philosophers deepened certain of its nobler traits. But Homer we now know to be a relatively late witness in this matter. How much of his sketch is really primitive, and what can we learn or guess concerning the millennium that preceded him? His God is pronouncedly individual and personal, and probably Zeus had reached this stage of character at the dawn of Hellenic history. Yet traces of a pre-deistic and animistic period survived here and there; for instance, in Arcadia we find the thunder itself called Zeus (*Ζεὺς Κεραυνός*) in a Mantinean inscription,[2] and the stone near Gythium in Laconia on which Orestes sat and was cured of his madness, evidently a thunder-stone, was named itself *Ζεὺς Καππώτας*, which must be interpreted as "Zeus that fell from heaven";[3] we here observe that the personal God does not yet seem to have emerged from the divine thing or divine phenomenon. Yet the Arcadians, like the other Greeks, had probably long before Homer risen above this stage of thought; for Greek religion was so strongly conservative that it preserved side by side the deposits of different ages of thought sundered perhaps by thousands of years.

Again the Homeric Zeus is fully anthropomorphic; but in many domains of Greek religion we discover the traces of theriomorphism, when the deity was regarded as often incarnate in the form of an animal or the animal might itself be worshipped in its own right. We seem to find it latent in the Arcadian worship of Zeus *Λυκαῖος* and the legend of King Lycaon. The latter offers a cannibal-meal to the disguised God, who turns him into a wolf for his sins; and the later Arcadian ritual in honour of this God betrays a hint of lycanthropy; some one who partook of the sacrifice or who swam across a certain lake was supposed to be transformed into a wolf for a certain time.[4] Robertson Smith[5] was the first to propose that we have here the traces of an ancient totemistic sacrifice of a wolf-clan, who offered the "theanthropic" animal "the man-wolf" to the wolf-God. The totemistic theory in its application to Greek religion cannot be here discussed; but we may note that there is no hint in the story that the wolf was offered to Zeus and that the name *Λυκαῖος* could not originally have designated the "wolf"-God: for from the stem *λυκο-* we should get the adjective *λυκειος*, not *λυκαιος*; the latter is better derived from a word such as *λυκη* = "light," and may allude to the God of the clear sky; in fact the wolf, which was a necessary animal in the ritual and legend of Apollo *Λύκειος*, may have strayed casually into association with Zeus *Λυκαῖος*, attracted by a false etymology. Another ritual, fascinating for the glimpse it affords of very old-world thought, is that of the Diipolia, the yearly sacrifice to Zeus Polieus on the Acropolis at Athens.[6] In this an ox was slaughtered with ceremonies unique in Greece; the priest who slew him fled and remained in exile for a period, and the axe that was used was tried, condemned and flung into the sea; the hide of the slain ox was stuffed with hay, and this effigy of the ox was yoked to the plough and feigned to be alive. Again Robertson Smith saw here the "theanthropic" animal, the Ox-God-man, eaten sacramentally by an ox-tribe, and so sacred that his death is a murder that must be atoned for in other ways and by a feigned resurrection. We recognize indeed the sacramental meal and the sanctity of the ox; but the animal may have acquired this sanctity temporarily through contact with the altar; we need not suppose an ox-clan—the priest was merely *βούτης* "the herdsman"—nor assume the permanent sanctity of the ox, nor the belief that the deity was permanently incarnate in the ox: the main parts of the ceremony can be explained as cattle-magic intended to appease the rest of the oxen or to prevent them suffering sympathetically through the death of one. We may indeed with Mr Andrew Lang explain the many myths of the bestial transformations of Zeus on the theory that the God was the tribal ancestor and assumed the shape of the animal-totem in order to engender the tribal patriarch;[7] but on the actual cults of Zeus theriomorphism has left less trace than on those of many other Hellenic deities. The animal offered to him may become temporarily sacred; and its skin would have magic properties: this explains his use of the *aegis*, the goatskin, as a battle-charm; but of a Goat-Zeus, a Ram-Zeus, or a Wolf-Zeus, there is no real trace.

The peculiar characteristic of his earliest ritual was the human sacrifice; besides the legend of King Lycaon, we find it in the story of the house of Athamas and in the worship of Zeus *Λαφύστιος* of Thessaly,[8] and other examples are recorded. The cruel rite had ceased in the Arcadian worship before Pliny wrote, but seems to have continued in Cyprus till the reign of Hadrian. It was found in the worship of many other divinities of Hellas in early times, and no single explanation can be given that would apply to them all. A hypothesis favoured by Dr Frazer, that the victim is usually a divine man, a priest-king incarnating the God, may be well applied to the Athamantid sacrifice and to that of King Lycaon; for he derives his name from the divinity himself, and according to one version[1] he offers his own child; and the Lycaonid legend presents one almost unique feature, which is only found elsewhere in legendary Dionysiac sacrifice, the human flesh is eaten, and the sacrifice is a cannibalistic-sacrament, of which the old Mexican religion offers conspicuous example. Yet it is in this religion of Zeus that we see most clearly the achievement of progressive morality; Zeus himself punishes and abolishes the savage practice; the story related by Plutarch,[2] how a kid was substituted miraculously for Helen when she was led to the altar to be offered, is a remarkably close parallel to the biblical legend of Abraham's sacrifice of Isaac.

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[1] *Corp. Inscr. Graec.* 2554.

[2] *Bull. Corr. Hell.*, 1878, p. 515.

[3] Pausan. iii. 22. 1.

[4] Pliny, *Nat. Hist.* viii. 82; Pausan. viii. 2, § 3 and § 6.

[5] Article on "Sacrifice" in *Ency. Brit.*, 9th ed.

[6] Cf. Porphyry, ii. 29, 30 (from Theophrastus) and Pausan. i. 24. 4.

[7] *Myth, Ritual and Religion*, ii. 176.

[8] Herod. vii. 197.

We can now consider the special attributes of the anthropomorphic God. His character and power as a deity of the sky, who ruled the phenomena of the air, so clearly expressed in Homer, explains the greater part of his cult and cult-titles. More personal than Ouranos and Helios—with whom he has only slight associations—he was worshipped and invoked as the deity of the bright day (*Ἀμάριος, Λευκαῖος, Λυκαῖος*), who sends the rain, the wind and dew (*Ὄμβριος, Νάϊος, Ὑέτιος, Οὔριος, Εὐάνεμος, Ἰκμαῖος*), and such a primitive adjective as *διιπετής*, applied to things "that fall from heaven," attests the primeval significance of the name of Zeus. But the thunder was his most striking manifestation, and no doubt he was primevally a thunder-God, *Κεραύνιος, Κεραυνοβόλος, Ἀστραπαῖος*. These cult-titles had originally the force of magic invocation, and much of his ritual was weather-magic: the priest of Zeus *Λυκαῖος*, in time of drought, was wont to ascend Mount Lycaeum and dip an oak-bough in a sacred fountain, and by this sympathetic means produce mist.[3] A god of this character would naturally be worshipped on the mountain-tops, and that these were very frequently consecrated to him is shown by the large number of appellatives derived from the names of mountains.[4] But probably in his earliest Hellenic period the power of Zeus in the natural world was not limited to the sky. A deity who sent the fertilizing rains would come to be regarded as a god of vegetation, who descended into the earth and whose power worked in the life that wells forth from the earth in plant and tree. Also the close special association of the European Thunder-God and the oak-tree has recently been exposed.[5] Homer calls the God of the lower world *Ζεὺς Καταχθόνιος*,[6] and the title of Zeus *Χθόνιος* which was known to Hesiod, occurred in the worship of Corinth;[7] and there is reason to believe that Eubouleus of Eleusis and Trophonius of Lebadeia are faded forms of the nether Zeus; in the Phrygian religion of Zeus, which no doubt contains primitive Aryan elements, we find the Thunder-God associated also with the nether powers.[8]

A glimpse into a very old stratum of Hellenic religion is afforded us by the records of Dodona. A Dodonean liturgy has been preserved which, though framed in the form of an invocation and a dogma, has the force of a spell-prayer—"Zeus was and is and will be, oh great Zeus: earth gives forth fruits, therefore call on Mother Earth."[9] Zeus the Sky-God is seen here allied to the Earth-Goddess, of whom his feminine counterpart, Dione, may have been the personal form. And it is at Dodona that his association with the oak is of the closest. His prophet-priests the Selloi "with unwashed feet, couching on the ground,"[10] lived about the sacred oak, which may be regarded[11] as the primeval shrine of the Aryan God, and interpreted its oracular voice, which spoke in the rustling of its leaves or the cooing of its doves. Achilles hails the Dodonean God as *Πελασγικέ*, either in the sense of "Thessalian" or "primitive";[12] and Zeus, we may believe, long remained at Dodona such as he was when the Hellenic tribes first brought him down from the Balkans, a high God supreme in heaven and in earth.

We may also believe that in the earliest stages of worship he had already acquired a moral and a social character. The Homeric view of him as the All-Father is a high spiritual concept, but one of which many savage religions of our own time are capable. The family, the tribe, the city, the simpler and more complex organisms of the Hellenic polity, were specially under his care and direction. In spite of the popular stories of his amours and infidelities, he is the patron-God of the monogamic marriage, and his union with Hera remained the divine type of human wedlock. "Reverence Zeus, the Father-God": "all fathers are sacred to Zeus, the Father-God, and all brothers to Zeus the God of the family": these phrases of Aristophanes and Epictetus[13] express the ideas that engendered his titles *Πατρῷος, Γαμήλιος, Τελεῖος, Ὁμόγνιος*. In the *Eumenides* of Aeschylus[14] the Erinyes are reproached in that by aiding Clytemnestra, who slew her husband, "they are dishonouring and bringing to naught the pledges of Zeus and Hera, the marriage-goddess"; and these were the divinities to whom sacrifice was offered before the wedding,[15] and it may be that some kind of mimetic representation of the "Holy Marriage," the *Ἱερὸς γάμος*, of Zeus and Hera formed a part of the Attic nuptial ceremonies.[16] The "Holy Marriage" was celebrated in many parts of Greece, and certain details of the ritual suggest that it was of great antiquity: here and there it may have had the significance of vegetation-magic,[17] like the marriage of the Lord and Lady of May; but generally it seems to have been only regarded as a divine counterpart to the human ceremony. Society may have at one time been matrilinear in the communities that become the historic Hellenes; but of this there is no trace in the worship of Zeus and Hera.[18]

In fact, the whole of the family morality in Hellas centred in Zeus, whose altar in the courtyard was the bond of the kinsmen; and sins against the family, such as unnatural vice and the exposure of children, are sometimes spoken of as offences against the High God.[19]

He was also the tutelary deity of the larger organization of the phratria; and the altar of Zeus *Φράτριος* was the meeting-point of the *phrateres*, when they were assembled to consider the legitimacy of the new applicants for admission into their circle.[20]

His religion also came to assist the development of certain legal ideas, for instance, the rights of private or family property in land; he guarded the allotments as *Ζεὺς Κλάριος*,[21] and the Greek commandment "thou shalt not remove thy neighbour's landmark" was maintained by Zeus *Ὅριος*, the god of boundaries, a more personal power than the Latin Jupiter Terminus.[22]

His highest political functions were summed up in the title *Πολιεύς*, a cult-name of legendary antiquity in Athens, and frequent in the Hellenic world.[23]

His consort in his political life was not Hera, but his daughter Athena Polias. He sat in her judgment court *ἐπὶ Παλλαδίῳ* where cases of involuntary homicide were tried.[24] With her he shared the chapel in the Council-Hall of Athens dedicated to them under the titles of *Βουλαῖος* and *Βουλαία*, "the inspirers of counsel," by which they were worshipped in many parts of

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[1] Clemens, *Protrept.* p. 31 P.

[2] *Parallela*, 35.

[3] Pausan. viii. 38, 3.

[4] Farnell, *Cults of the Greek States*, i. 154; ref. 66–89.

[5] See Chadwick in *Anthropological Journ.*, 1900, on "The Oak and the Thunder-God."

[6] *Il.* ix. 457.

[7] *Works and Days*, 456; Pausan. ii. 2, 8.

[8] *Journ. Hellen. Stud.* iii. 124; v. 257.

[9] Pausan. x. 12, 10.

[10] Hom. *Il.* xvi. 233.

[11] Chadwick, *op. cit.*

[12] *Il.* xvi. 233.

[13] Arist. *Nub.* 1468; Epict. *Diatrib.* iii. ch. 11.

[14] 213–214.

[15] Schol. Aristoph. *Thesm.* 973.

[16] Photius, s.v. *Ἱερὸς γάμος*.

[17] See Frazer's *Golden Bough*, 2nd ed. i. 226–227.

[18] The attempts to discover the traces of matrilinear society in Greek religion may be regarded as mainly unsuccessful: *vide* A. B. Cook, *Class. Rev.* 1906 (October, November), "Who was the wife of Zeus?"

[19] Dio. Chrys. *Or.* 7 (Dind. i. 139).

[20] Demosth. *Contra Macartatum*, 1078, I.

[21] Pausan. viii. 53, 9.

[22] Plato's *Laws*, 842 E.

[23] Vide Farnell, *op. cit.* i. 159; ref. 107–109.

[24] *Corp. Inscr. Attic.* iii. 71 and 273.

Greece.[1] The political assembly and the law-court were consecrated to *Ζεὺς Ἀγοραῖος*,[2] and being the eternal source of justice he might be invoked as *Δικαιόσυνος* "The Just."[3] As the god who brought the people under one government he might be worshipped as *Πάνδημος*;[4] as the deity of the whole of Hellas, *Ἑλλάνιος*,[5] a title that belonged originally to Aegina and to the prehistoric tribe of the Aeacidae, and had once the narrower application to the "Thessalian Hellenes," but acquired the Pan-Hellenic sense, in fact expanded into the form *Πανελλήνιος*, perhaps about the time of the Persian wars, when thanksgiving for the victory took the form of dedications and sacrifice to "Zeus the Liberator"—*Ἐλευθέριος*.[6] Finally, in the formulae adopted for the public oath, where many deities were invoked, the name of Zeus was the masterword.

There is reason for thinking that this political character of Zeus belongs to the earliest period of his religion, and it remained as long as that religion lasted. Yet in one respect Apollo was more dominant in the political life; for Apollo possessed the more powerful oracle of Delphi. Zeus spoke directly to his people at Dodona only,[7] and with authority only in ancient times; for owing to historical circumstances and the disadvantage of its position, Dodona paled before Delphi.

It remains to consider briefly certain moral aspects of his cult. The morality attaching to the oath, so deeply rooted in the conscience of primitive peoples, was expressed in the cult of Zeus *Ὅρκιος*, the God who punished perjury.[8] The whole history of Greek legal and moral conceptions attaching to the guilt of homicide can be studied in relation to the cult-appellatives of Zeus. The Greek consciousness of the sin of murder, only dimly awakened in the Homeric period, and only sensitive at first when a kinsman or a suppliant was slain, gradually expands till the sanctity of all human life becomes recognized by the higher morality of the people: and the names of *Ζεὺς Μειλίχιος*, the dread deity of the ghost-world whom the sinner must make "placable," of *Ζεὺς Ἱκέσιος* and *Προστροπαῖος*, to whom the conscience-striken outcast may turn for mercy and pardon, play a guiding-part in this momentous evolution.[9]

Even this summary reveals the deep indebtedness of early Greek civilization to this cult, which engendered ideas of importance for the higher religious thought of the race, and which might have developed into a monotheistic religion, had a prophet-philosopher arisen powerful enough to combat the polytheistic proclivities of Hellas. Yet the figure of Zeus had almost faded from the religious world of Hellas some time before the end of paganism; and Lucian makes him complain that even the Egyptian Anubis is more popular than he, and that men think they have done the outworn God sufficient honour if they sacrifice to him once in five years at Olympia. The history of religions supplies us with many examples of the High God losing his hold on the people's consciousness and love. In the case of this cult the cause may well have been a certain coldness, a lack of enthusiasm and mystic ardour, in the service. These stimulants were offered rather by Demeter and Dionysus, later by Cybele, Isis and Mithras.

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ZEUXIS, a Greek painter, who flourished about 420–390 B.C., and described himself as a native of Heraclea, meaning probably the town on the Black Sea. He was, according to one account, a pupil of Damophilus of Himera in Sicily, the other statement being that he was a pupil of Neseus of Thasos. Afterwards he appears to have resided in Ephesus. His known works are—

1. Zeus surrounded by Deities.
2. Eros crowned with Roses.
3. Marsyas bound.
4. Pan.
5. Centaur family.
6. Boreas or Triton.
7. Infant Heracles strangling the serpents in presence of his parents, Alcmena and Amphitryon.
8. Alcmena, possibly another name for 7.
9. Helena at Croton.
10. Penelope.
11. Menelaus.
12. Athlete.
13. An old Woman.
14. Boy with grapes.
15. Grapes.
16. Monochromes.
17. Plastic works in clay.

In ancient records we are told that Zeuxis, following the initiative of Apollodorus, had introduced into the art of painting a method of representing his figures in light and shadow, as opposed to the older method of outline, with large flat masses of colour for draperies, and other details, such as had been practised by Polygnotus and others of the great fresco painters. The new method led to smaller compositions, and often to pictures consisting of only a single figure, on which it was more easy for the painter to demonstrate the combined effect of the various means by which he obtained perfect roundness of form. The effect would appear strongly realistic, as compared with the older method, and to this was probably due the origin of such stories as the contest in which Zeuxis painted a bunch of grapes so like reality that birds flew towards it, while Parrhasius painted a curtain which even Zeuxis mistook for real. It is perhaps a variation of this story when we are told (Pliny) that Zeuxis also painted a boy holding grapes towards which birds flew, the artist remarking that if the boy had been as well painted as the grapes the birds would have kept at a distance. But, if the method of Zeuxis led him to real roundness of form, to natural colouring, and to pictures consisting of single figures or nearly so, it was likely to lead him also to search for striking attitudes or motives, which by the obviousness of their meaning should emulate the plain intelligibility of the larger compositions of older times. Lucian, in his *Zeuxis*, speaks of him as carrying this search to a novel and strange degree, as illustrated in the group of a female Centaur with her young. When the picture was exhibited, the spectators admired its novelty and overlooked the skill of the painter, to the vexation of Zeuxis. The pictures of Heracles strangling the serpents to the astonishment of his father and mother (7), Penelope (10), and Menelaus Weeping (11) are quoted as instances in which strong motives naturally presented themselves to him. But, in spite of the tendency towards realism inherent in the new method of Zeuxis, he is said to have retained the ideality which had characterized his predecessors. Of all his known works it would be expected that this quality would have appeared best in his famous picture of Helena, for this reason, that we cannot conceive any striking or effective incident for him in her career. In addition to this, however, Quintilian states (*Inst. Orat.* xii. 10, 4) that in respect of robustness of types Zeuxis had followed Homer, while there is the fact that he had inscribed two verses of the *Iliad* (iii 156 seq.) under his figure of Helena. As models for the picture he was allowed the presence of five of the most beautiful maidens of Croton at his own request, in order that he might be able to "transfer the truth of life to a mute image." Cicero (*De Invent.* ii. 1, 1) assumed that Zeuxis had found distributed among these five the various elements that went to make up a figure of ideal beauty. It should not, however, be understood that the painter had made up his figure by the process of combining the good points of various models, but rather that he found among those models the points that answered to the ideal Helena in his own mind, and that he merely required the models to guide and correct himself by during the process of transferring his ideal to form and colour. This picture also is said to have been exhibited publicly, with the result that Zeuxis made much profit out of it. By this and other means, we are told, he became so rich as rather to give away his pictures than to sell them. He presented his Alcmena to the Agrigentines, his Pan to King Archelaus of Macedonia, whose palace he is also said to have decorated with paintings. According to Pliny (*N.H.* xxxv. 62), he made an ostentatious display of his wealth at Olympia in having his name woven in letters of gold on his dress. Under his picture of an athlete (12) he wrote that "It is easier to revile than to rival" (*μωμήσεταί τις μᾶλλον ἢ μιμήσεται*). A contemporary, Isocrates (*De Permut.* 2), remarks that no one would say that Zeuxis and Parrhasius had the same profession as those persons who paint *pinakia*, or tablets of terra-cotta. We possess many examples of the vase-painting of the period *circa* 400 B.C., and it is noticeable on them that there is great freedom and facility in drawing the human form, besides great carelessness. In the absence of fresco paintings of that date we have only these vases to fall back upon. Yet, with their limited resources of colour and perspective, they in a measure show the influence of Zeuxis, while, as would be expected, they retain perhaps more of the simplicity of older times.

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[1] Antiphon vi. p. 789; Pausan. i. 3, 5: cf. *Corp. Inscr. Attic.* iii. 683.
[2] Farnell, *op. cit.* vol. i. p. 162.
[3] *Amer. Journ. Archaeol.*, 1905, p. 302.
[4] *C. I. A.* 3, 7. Head, *Hist. Num.* p. 569.
[5] Herod. ix. 7, 4; Pind. *Nem.* v. 15 (Schol.).
[6] Simonides, *Frag.* 140 (Bergk), Strab. 412.
[7] There was a minor oracle of Zeus at Olympia. See ORACLE.
[8] Pausan. v. 24, 9.
[9] Farnell, *op. cit.* vol. i. pp. 64–69.

ZHELESNOVODSK, a health resort of Russian Caucasia, in the province of Terek, lying at an altitude of 1885 ft. on the S. slope of the Zhelesnaya Gora (2805 ft.), 11 m. by rail N.N.W. from Pyatigorsk. It possesses chalybeate springs of temperature 56½–96° Fahr.; the buildings over the springs were erected in 1893. The season lasts from early in June to the middle of September.

ZHITOMIR, or Jitomir, a town of western Russia, capital of the government of Volhynia, on the Teterev river, 83 m. W.S.W. of Kiev. Pop. (1900) 80,787, more than one-third Jews. It is the see of an archbishop of the Orthodox Greek Church and of a Roman Catholic bishop. Two printing offices in Zhitomir issue nearly one-half of all the Hebrew books printed in Russia. The Jewish merchants carry on a considerable export trade in agricultural produce, and in timber and wooden wares from the forests to the north. Kid gloves, tobacco, dyes and spirits are manufactured.

Zhitomir is a very old city, tradition tracing its foundation as far back as the times of the Scandinavian adventurers, Askold and Dir (9th century). The annals, however, mention it chiefly in connexion with the invasions of the Tatars, who plundered it in the 13th, 14th and 17th centuries (1606), or in connexion with destructive conflagrations. It fell under Lithuanian rule in 1320, and during the 15th century was one of the chief cities of the kingdom. Later it became part of Poland, and when the Cossacks rose under their chieftain, Bogdan Chmielnicki (1648), they sacked the town. It was annexed to Russia along with the rest of the Ukraine in 1778.

ZHOB, a valley and river in the N.E. of Baluchistan. The Zhob is a large valley running from the hills near Ziarat first eastward and then northward parallel to the Indus frontier, till it meets the Gomal river at Khajuri Kach. It thus becomes a strategic line of great importance, as being the shortest route between the North-West Frontier Province and Quetta, and dominates all the Pathan tribes of Baluchistan by cutting between them and Afghanistan. Up to the year 1884 it was practically unknown to Europeans, but the Zhob Valley Expedition of that year opened it up, and in 1889 the Zhob Valley and Gomal Pass were taken under the control of the British Government. The Zhob Valley was the scene of punitive British expeditions in 1884 and 1890. In 1890 Zhob was formed into a district or political agency, with its headquarters at Fort Sandeman: pop. (1901) 3552. As reconstituted in 1903, the district has an area of 9626 sq. m.; pop. (1901) 69,718, mostly Pathans of the Kakar tribe.

See Sir T. H. Holdich's *Indian Borderland* (1901); Bruce's *Forward Policy* (1900); McFall's *With the Zhob Field Force* (1895); and *Zhob District Gazetteer* (Bombay, 1907).

ZIARAT ("a Mahommedan shrine"), the summer residence of the chief commissioner of Baluchistan, and sanatorium for the European troops at Quetta: 8850 ft. above the sea and 33 m. by cart-road from the railway. There is a good water-supply, and the hills around are well-wooded and picturesque.

ZICHY (of Zich and Vásonykeö), the name of a noble Magyar family, conspicuous in Hungarian history from the latter part of the 13th century onwards. Its first authentic ancestor bore the name of Zayk, and this was the surname of the family until it came into possession of Zich in the 15th century. It first came into great prominence in the 16th century, being given countly rank in 1679 in the person of the imperial general Stefan Zichy (d. 1693). His descendants divided, first into two branches: those of Zichy-Palota and Zichy-Karlburg. The Palota line, divided again into three: that of Nagy-Láng, that of Adony and Szent-Miklós, and that of Palota, which died out in the male line in 1874. The line of Zichy-Karlburg (since 1811 Zichy-Ferraris) split into four branches: that of Vedröd, that of Vézsony, and those of Daruvár and Csicsó, now extinct.

Count Károly Zichy (1753–1826) was Austrian war minister in 1809 and minister of the interior in 1813–1814; his son, Count Ferdinánd (1783–1862) was the Austrian field-marshal condemned to ten years' imprisonment for surrendering Venice to the insurgents in 1848 (he was pardoned in 1851). Count Ödön [Edmund] Zichy (1809–1848), administrator of the county of Veszprém, was hanged on the 30th of September 1848 by order of a Hungarian court-martial, presided over by Görgei, for acting as Jellachich's emissary to the imperial general Roth. Count Ferenc Zichy (1811–1900) was secretary of state for commerce in the Széchényi ministry of 1848, but retired on the outbreak of the revolution, joined the imperial side, and acted as imperial commissary; from 1874 to 1880 he was Austrian ambassador at Constantinople. Count Ödön Zichy (1811–1894) was remarkable for his great activity in promoting art and industry in Austria-Hungary; he founded the Oriental Museum in Vienna. His son, Count Eugen Zichy (b. 1837), inherited his father's notable collections, and followed him in his economic activities; he three times visited the Caucasus and Central Asia to investigate the original seat of the Magyars, publishing as the result *Voyages au Caucase* (2 vols., Budapest, 1897) and *Dritte asiatische Forschungsreise* (6 vols., in Magyar and German; Budapest and Leipzig, 1900–1905). Count Ferdinánd Zichy (b. 1829), vice-president of the Hungarian stadtholdership under the Mailáth régime, was condemned in 1863 under the press laws to the loss of his titles and to imprisonment. In 1867 he was elected to the Hungarian parliament, at first joining the party of Deák, and subsequently becoming one of the founders and leaders of the Catholic People's Party (see Hungary, *History*). His second son, Count Aladár Zichy (b. 1864), also a member of the Catholic People's Party, was made minister of the royal household in the Wekerle cabinet of 1906. Count János Zichy (b. 1868), also from 1896 to 1906 a member of the Catholic People's Party in the Lower House, and after 1906 attached to Andrássy's Constitutional Party, was of importance as the confidant of the heir to the throne, the Archduke Francis Ferdinand. Count Géza Zichy (b. 1849), nephew of the Count Ferenc mentioned above, studied under Liszt and became a professional pianist; in 1891 he became intendant of the Hungarian national opera-house, a member of the Hungarian Upper House and head of the Conservatoire at Budapest. Count Mihály Zichy (b. 1829), one of the most conspicuous Hungarian painters, was appointed court painter at St Petersburg in 1847 and accompanied the Russian emperors on their various journeys. The National Gallery at Budapest possesses some of his paintings, notably that of "Queen Elizabeth before the coffin of Francis Deák"; but he is best known for his illustrations of the works of the great Magyar writers (Petöfy, Arany, &c.).

ZIEM, FÉLIX FRANÇOIS GEORGE PHILIBERT (1821–   ), French painter, was born at Beaune (Côte d'Or) in 1821. Having studied at the art school of Dijon, where he carried off the *grand prix* for architecture, he went to Rome in 1839 and there continued his studies. The years from 1845 to 1848 were spent in travel in the south of France, Italy and the East, where he found the glowing sunlight and the rich colour peculiarly suited to his temperament. His reputation is, however, not based so much on his orientalist canvases as on his pictures of Venice, which are generally characterized by the intensity of the sunny glow on the red sails and golden-yellow buildings under a deep blue sky. Many of his Venetian pictures are purely imaginative, and their appeal is entirely due to their qualities of colour, his architectural drawing being frequently faulty and careless. After "Sunrise at Stamboul," which Théodore Gautier called "the finest picture of modern times," he received the Legion of Honour in 1857, and was made an officer in 1878. The majority of his paintings have gone to American private collections, but two of his finest pictures, "The Doge's Palace in Venice" (1852), and a marine-painting, are at the Luxembourg Museum, and a "View of Quai St Jean, Marseilles" at the Marseilles Gallery, whilst many others are to be found in the leading private collections of modern pictures in France, England and Germany. In collaboration with Luc de Vos he illustrated *The Death of Paganini*.

See *Félix Ziem*, by L. Roger-Milès (*Librairie de l'art*, Paris).

ZIERIKSEE, a town in the province of Zeeland, Holland, on the south side of the island of Schouwen. Pop. 6800. It is a very old town, and formerly flourished exceedingly on account of its trade and fishing, and important salt-making industry, and now is the chief market centre and port in the island. Among the principal buildings are the town-hall (15th century); the Great Church, which was rebuilt after a fire in 1832, but retains the lofty tower (1454) belonging to the earlier building; the Little Church, the prison and the exchange. The chief public square occupies the site of a residence of the counts of Zeeland dating from 1048.

ZIETEN, HANS JOACHIM VON (1699–1786), Prussian general-field-marshal, began his military career as a volunteer in an infantry regiment. He retired after ten years' service, but soon afterwards became a lieutenant of dragoons. Being involved in some trade transactions of his squadron-commander, he was cashiered, but by some means managed to obtain reinstatement, and was posted to a hussar corps, then a new arm. At that time light cavalry work was well known only to the Austrians, and in 1735 Rittmeister von Zieten made the Rhine campaign under the Austrian general Baronay. In 1741, when just promoted lieutenant-colonel, Zieten met his old teacher in battle and defeated him at the action of Rothschloss. The chivalrous Austrian sent him a complimentary letter a few days later, and Winterfeld (who was in command at Rothschloss) reported upon his conduct so favourably that Zieten was at once marked out by Frederick the Great for high command. Within the year he was colonel of the newly formed Hussar regiment, and henceforward his promotion was rapid. In the "Moravian Foray" of the following year Zieten and his hussars penetrated almost to Vienna, and in the retreat to Silesia he was constantly employed with the rearguard. Still more distinguished was his part in the Second Silesian War. In the short peace, the hussars, like the rest of the Prussian cavalry, had undergone a complete reformation; to iron discipline they had added the dash and skirmishing qualities of the best irregulars, and the hussars were considered the best of their arm in Europe. Zieten fought the brilliant action of Moldau Tein almost on the day he received his commission as major-general. In the next campaign he led the famous *Zietenritt* round the enemy's lines with the object of delivering the king's order to a distant detachment. At Hohenfriedberg-Striegau and at Katholisch-Hennersdorf the hussars covered themselves with glory. Hennersdorf and Kesselsdorf ended the second war, but the Prussian army did not rest on its laurels, and their training during the ten years' peace was careful and unceasing. When the Seven Years' War broke out in 1756 Zieten had just been made lieutenant-general. At Reichenberg and at Prag he held important commands, and at the disastrous ba June 1757) his left wing of cavalry was the only victorious corps of troops. At Leuthen, the most brilliant battle of the 18th century, Zieten's cavalry began the fighting and completed the rout of the Austrians. He continued, during the whole of the war, to be one of Frederick's most trusted generals. Almost the only error in his career of battles was his misdirection of the frontal attack at Torgau, but he redeemed the mistake by his desperate assault on the Siptitz heights, which eventually decided the day. At the peace, General Zieten went into retirement, the hero alike of the army and the people. He died in 1786. Six years later Frederick's successor erected a column to his memory on the Wilhelmsplatz in Berlin.

See the Lives by his daughter, Frau von Blumenthal (Berlin. 1800), by Hahn (5th ed., Berlin, 1878), by Lippe-Weissenfeld (2nd ed., Berlin, 1878), and by Winter (Leipzig, 1886).

ZIMBABWE, a Bantu name, probably derived from the two words *simba* ("houses") and *mabgi* ("stones"), given to certain ruins in South-East Africa. Its use is not confined to Southern Rhodesia and should not properly be restricted to any one particular site. For, as the medieval Portuguese stated, it is merely a generic term for the capital of any considerable chief, and it has been applied even by them to several distinct places. From about 1550 onwards the Zimbabwe generally referred to by Portuguese writers was at a spot a little north of the Afur district, not far from the Zambezi. There is some reason, however, to suppose that before this the capital of the Monomotapa was situated much farther south, and it may plausibly be identified with the most extensive ruins as yet known, viz. those near Victoria (Mashonaland) to which popular usage has now attached *par excellence* the name of Zimbabwe.

These ruins were discovered by Adam Renders in 1868 and explored by Karl Mauch in 1871. They became well known to English readers from J. T. Bent's account of the *Ruined Cities of Mashonaland*, but the popularity of that work disseminated a romance concerning their age and origin which was only dispelled when scientific investigations undertaken in 1905 showed it to be wholly without historical warrant. Even before this it had been clear to archaeologists and ethnologists that there was no evidence to support the popular theory that Zimbabwe had been built in very ancient days by some Oriental people. Swan's measurements, which had misled Bent into accepting a chronology based on a supposed orientation of the "temple," had been shown to be inexact. There was no authentic instance of any inscription having been found there or elsewhere in Rhodesia. Numerous objects had been discovered in the course of excavations, but not one of them could be recognized as more than a few centuries old, while those that were not demonstrably foreign imports were of African type.

The explorations conducted in 1905 added positive evidence. For it was proved that the medieval objects were found in such positions as to be necessarily contemporaneous with the foundation of the buildings, and that there was no superposition of periods of any date whatsoever. Finally from a comparative study of several ruins it was established that the plan and construction of Zimbabwe are by no means unique, and that this site only differs from others in Rhodesia in respect of the great dimensions and the massiveness of its individual buildings. It may confidently be dated to a period not earlier than the 14th or 15th century A.D., and attributed to the same Bantu people the remains of whose stone-fenced *kraals* are found at so many places between the Limpopo and the Zambezi.

There are three distinct though connected groups of ruins at Zimbabwe, which are commonly known as the "Elliptical Temple," the "Acropolis" and the "Valley Ruins." The most famous is the first, which is doubly misnamed, since it is not a temple and its contour is too unsymmetrical to be described properly as elliptical. It is an irregular enclosure over 800 ft. in circumference, with a maximum length of 292 ft. and a maximum breadth of 220 ft., surrounded by a dry-built wall of extraordinary massiveness. This wall is in places over 30 ft. high and 14 ft. wide, but is very erratic in outline and variable in thickness. The most carefully executed part is on the south and south-east, where the wall is decorated by a row of granite monoliths beneath which runs a double line of chevron ornament. The interior has been much destroyed by the ravages of gold-seekers and amateur excavators. Enough, however, remains to show that the scheme was a combination of such a stone *kraal* as that at Nanatali with the plan of a fort like those found about Inyanga. The only unique feature is the occurrence of a large and a small conical tower at the southern end, which Bent and others considered to be representatives of the human phallus. Their form, however, is not sufficiently characteristic to warrant this identification, though it may be noted that the nearest approximation to phallic worship is found amongst the most typical of African peoples, viz. the Ewe-speaking natives of the West Coast. The floor of the enclosure is constituted as in the other Zimbabwe buildings by a thick bed of cement which extends even outside the main wall. This cement mass is heightened at many places so as to make platforms and supports for huts. Groups of these dwellings are enclosed by subsidiary stone walls so as to form distinct units within the larger precinct.

The "Acropolis" is in some ways more remarkable than the great *kraal* which has just been described. It is a hill rising 200 to 300 ft. above the valley, fortified with the minutest care and with extraordinary ingenuity. The principles of construction, the use of stone and cement are the same as in the "elliptical" *kraal*; there is no definite plan, the shape and arrangement of the enclosures being determined solely by the natural features of the ground. Between this and the "elliptical" *kraal* are the "Valley Ruins," consisting of smaller buildings which may have been the dwellings of those traders who bartered the gold brought in from distant mines. Zimbabwe was probably the distributing centre for the gold traffic carried on in the middle ages between subjects of the Monomotapa and the Mahommedans of the coast.

Compare also the articles RHODESIA· *Archaeology*, and MONOMOTAPA.

See D. Randall-MacIver, *Mediaeval Rhodesia* (London, 1906); *Journal of Anthrop. Inst.*, vol. xxxv.; *Geog. Journal* (1906); Mauch's report in *Ausland* (1872) is now only of bibliographical interest, while Bent's *Ruined Cities of Mashonaland* (1892) and R. N. Hall's *Great Zimbabwe* (1905) are chiefly valuable for their illustrations.[1] (D. R.-M.)

ZIMMERMANN, JOHANN GEORG, RITTER VON (1728–1795), Swiss philosophical writer and physician, was born at Brugg, in the canton of Aargau, on the 8th of December 1728. He studied at Göttingen, where he took the degree of doctor of medicine; and he established his reputation by the dissertation, *De irritabilitate* (1751). After travelling in Holland and France, he practised as a physician in his native place, and here he wrote *Über die Einsamkeit* (1756, emended and enlarged, 1784–85) and *Vom Nationalstolz* (1758). These books made a great impression in Germany, and were translated into almost every European language. They are now only of historical interest. In Zimmermann's character there was a strange combination of sentimentalism, melancholy and enthusiasm; and it was by the free and eccentric expression of these qualities that he excited the interest of his contemporaries. Another book by him, written at Brugg, *Von der Erfahrung in der Arzneiwissenschaft* (1764), also attracted much attention. In 1768 he settled at Hanover as private physician of George III. with the title of Hofrat. Catherine II. invited him to the court of St Petersburg, but this invitation he declined. He attended Frederick the Great during that monarch's last illness, and afterwards issued various books about him, of which the chief were *Über Friederich den Grossen und meine Unterredung mit ihm kurz vor seinem Tode* (1788) and *Fragmente über Friedrich den Grossen* (1790). These writings display extraordinary personal vanity, and convey a wholly false impression of Frederick's character. Zimmermann died at Hanover on the 7th of October 1795.

See A. Rengger, *Zimmermann's Briefe an einige seiner Freunde in der Schweiz* (1830); E. Bodemann, *Johann Georg Zimmermann, sein Leben und bisher ungedruckte Briefe an ihn* (Hann., 1878); and R. Ischer, *Johann Georg Zimmermann's Leben und Werke* (Berne, 1893).

ZINC, a metallic chemical element; its symbol is Zn, and atomic weight 65·37 (O=16). Zinc as a component of brass (χαλκός, ὀρεί-χαλκος) had currency in metallurgy long before it became known as an individual metal. Aristotle refers to brass as the "metal of the Mosynoeci,"[2] which is produced as a bright and light-coloured χαλκός, not by addition of tin, but by fusing up with an earth. Pliny explicitly speaks of a mineral *καδμεία* or *cadmia* as serving for the conversion of copper into *aurichalcum*, and says further that the deposit (of zinc oxide) formed in the brass furnaces could be used instead of the mineral. The same process was used for centuries after Pliny, but its rationale was not understood. Stahl, as late as 1702, quoted the formation of brass as a case of the union of a metal with an earth into a metallic compound; but he subsequently adopted the view propounded by Kunckel in 1677, that "cadmia" is a metallic calx, and that it dyes the copper yellow by giving its metal up to it.

The word zinc (in the form *zinken*) was first used by Paracelsus, who regarded it as a bastard or semi-metal; but the word was subsequently used for both the metal and its ores. Moreover, zinc and bismuth were confused, and the word *spiauter* (the modern spelter) was indiscriminately given to both these metals. In 1597 Libavius described a "peculiar kind of tin" which was prepared in India, and of which a friend had given him a quantity. From his account it is quite clear that that metal was zinc, but he did not recognize it as the metal of calamine. It is not known to whom the discovery of isolated zinc is due; but we do know that the art of zinc-smelting was practised in England from about 1730. The first continental zinc-works were erected at Liége in 1807.

Occurrence.—Zinc does not occur free in nature, but in combination it is widely diffused. The chief ore is zinc blende, or sphalerite (see BLENDE), which generally contains, in addition to zinc sulphide, small amounts of the sulphides of iron, silver and cadmium. It may also be accompanied by pyrites, galena, arsenides and antimonides, quartz, calcite, dolomite, &c. It is widely distributed, and is particularly abundant in Germany (the Harz, Silesia), Austro-Hungary, Belgium, the United States and in England (Cumberland, Derbyshire, Cornwall, North Wales). Second in importance is the carbonate, calamine (*q.v.*) or zinc spar, which at one time was the principal ore; it almost invariably contains the carbonates of cadmium, iron, manganese, magnesium and calcium, and may be contaminated with clay, oxides of iron, galena and calcite; "white calamine" owes its colour to much clay; "red calamine" to admixed iron and manganese oxides. Calamine chiefly occurs in Spain, Silesia and in the United States. Of less importance is the silicate, $Zn_2SiO_4 \cdot H_2O$, named electric calamine or hemimorphite; this occurs in quantity in Altenburg near Aix-la-Chapelle, Sardinia, Spain and the United States (New Jersey, Pennsylvania, Missouri, Wisconsin). Other zinc minerals are willemite (*q.v.*), Zn_2SiO_4, hydrozincite or zinc bloom, $ZnCO_3 \cdot 2Zn(OH)_2$, zincite (*q.v.*) or red zinc ore, ZnO, and franklinite, $3(Fe,Zn)O \cdot (Fe,Mn)_2O_3$.

Production.—Until about 1833 the supply of zinc was almost entirely obtained from Germany, but in this year Russia began to contribute about 2000 tons annually to the 6000 to 7000 derived from Germany. Belgium entered in 1837 with an output of about 2000 tons; England in 1855 with 3000; and the United States in 1873 with 6000 tons. The productions of Germany, Belgium and the United States have enormously and fairly regularly increased; the rise has been most rapid in the United

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[1] [In 1909 Hall published another volume, *Prehistoric Rhodesia*, in which he maintained, in emphatic opposition to Dr MacIver's conclusions, that the ruins were of ancient date and not the unaided work of Bantu negroes. See the review by Sir Harry Johnston in the *Geog. Jnl.*, Nov. 1909. ED.]

[2] From the name of this tribe the German word *Messing*, brass, is undoubtedly derived (see K. B. Hoffmann, *Zeit. f. Berg. und Hüttenwesen*, vol. 41).

States. England, France, Spain and Austria have been fairly constant producers. Germany produced 155,799 tons in 1900, and 198,208 in 1905. Belgium, 120,000 in 1900 and 143,165 in 1905, the United States, 111,000 in 1900 and 183,014 in 1905. The world's supply was 445,438 tons in 1900, and 654,367 in 1905.

METALLURGY

The principles underlying the extraction of zinc may be summarized as (1) the ore is first converted into zinc oxide, (2) the oxide is distilled with carbon and the distillate of metallic zinc condensed Oxide of zinc, like most heavy metallic oxides, is easily reduced to the metallic state by heating it to redness with charcoal, pure red zinc ore may be treated directly, and the same might be done with pure calamine of any kind, because the carbon dioxide of the zinc carbonate goes off below redness and the silica of zinc silicate only retards, but does not prevent, the reducing action of the charcoal Zinc blende, however, being zinc sulphide, is not directly reducible by charcoal, but it is easy to convert it into oxide by roasting the sulphur goes off as sulphur dioxide whilst the zinc remains in the (infusible) form of oxide, ZnO. In practice, however, we never have to deal with pure zinc minerals, but with complex mixtures, which must first of all be subjected to mechanical operations, to remove at least part of the gangue, and if possible also of the heavy metallic impurities (see ORE-DRESSING).

As ores of zinc are usually shipped before smelting from widely separated places—Sweden, Spain, Algiers, Italy, Greece, Australia and the Rocky Mountains region of North America—it is important that they be separated from their mixtures at the mines. The difficulty in separating zinc blende from iron pyrites is well known, and probably the most elaborate ore-dressing works ever built have been designed with this end in view The Wetherill system of magnetic concentration has been remarkably successful in separating the minerals contained in the well-known deposit in Sussex county, N.J. Here very clean non-magnetic concentrate of willemite, which is an anhydrous zinc silicate and a very high-grade zinc ore, is separated from an intimate mixture of willemite, zincite and franklinites, with calcite and some manganese silicates. The magnetic concentrates contain enough zinc to be well adapted to the manufacture of zinc oxide. Magnetic concentration is also applied in the removal of an excess of iron from partially roasted blende. Neither mechanical nor magnetic concentration can effect much in the way of separation when, as in many complex ores, carbonates of iron, calcium and magnesium replace the isomorphous zinc carbonate, when some iron sulphide containing less sulphur than pyrites replaces zinc sulphide, and when gold and silver are contained in the zinc ore itself. Hence only in exceptional circumstances is it possible to utilize a large class of widely distributed ores, carrying from 10 to 35 per cent. of zinc, in which the zinc alone, estimated at 2d. a pound, is worth from about £2 to £7 per ton of ore. The ores of the Joplin district, in the Ozark uplift in the Mississippi Valley, are remarkable in that they are specially adapted to mechanical concentration. The material as mined will probably not average over 10 per cent. of zinc, but the dressed zinc ore as sold ranges from 45 to 62 per cent. of zinc. This region now furnishes the bulk of the ore required by the smelters of Illinois, Missouri and Kansas.

The ore, even if it is not blende, must be roasted or calcined in order to remove all volatile components as completely as possible, because these, if allowed to remain, would carry away a large proportion of the zinc vapour during the distillation. If the zinc is present as blende, this operation offers considerable difficulties, because in the roasting process the zinc sulphide passes in the first instance into sulphate, which demands a high temperature for its conversion into oxide. Another point to be considered in this connexion is that the masses of sulphur dioxide evolved, being destructive of vegetable life, are an intolerable nuisance to the neighbourhood in which the operations take place. For the desulphurization of zinc blende where it is not intended to collect and save the sulphur there are many mechanical kilns, generally classified as straight-line, horse-shoe, turret and shaft kilns; all of these may be made to do good work on moderately clean ores which do not melt at the temperature of desulphurization. But the problem of saving the sulphur is yearly becoming more important. In roasting a ton of rich blende containing 60 per cent. of zinc enough sulphur is liberated to produce one ton of strong sulphuric acid, and unless this is collected not only are poisonous gases discharged, but the waste is considerable. When sulphuric or sulphurous acid is to be collected, it is important to keep the fuel gas from admixture with the sulphur gases, and kilns for this purpose require some modification. If hot air is introduced into the kiln, the additional heat developed by the oxidation of the zinc and the sulphur is sufficient to keep up a part of the reaction, but for the complete expulsion of the sulphur an externally-fired muffle through which the ore is passed is found to be essential.

Distillation of the Oxide with Charcoal.—The distillation process in former times, especially in England, used to be carried out "per descensum." The bottom of a crucible is perforated by a pipe which projects into the crucible to about two-thirds of its height. The mixture of ore and charcoal is put into the crucible around the pipe, the crucible closed by a luted-on lid, and placed in a furnace constructed so as to permit of the lower end of the pipe projecting into the ash-pit. The zinc vapour produced descends through the pipe and condenses into liquid zinc, which is collected in a ladle held under the outlet end of the pipe. For manufacturing purposes a furnace similar to that used for the making of glass was employed to heat a circular row of crucibles standing on a shelf along the wall of the furnace. This system, however, has long been abandoned.

The modern processes may be primarily divided into two groups according to the nature of the vessel in which the operation is effected These distilling vessels are called retorts if they are supported only at the ends, and the furnace using them is termed a Belgian furnace. If they are supported at intervals along a flat side, they are called muffles, and the furnace is known as a Silesian furnace Various combinations and modifications of these two types of furnace have given rise to distinctive names, and as each system has its advantages and disadvantages local conditions determine which is the better

In the *Belgian process* the reduction and distillation are carried out in cylindrical or elliptical retorts of fire-clay, from 3 ft. 3 in. to 4 ft 9 in long and 6 to 10 in. internal diameter. Some forty-six or more retorts, arranged in parallel horizontal rows, are heated in one furnace. The furnaces are square and open in front, to allow the outlet ends of the retorts to project, they are grouped together by fours, and their several chimneys are within the same enclosure Each retort is provided with two adapters, namely, a conical pipe of fire-clay, about 15 in. long, which fits into the retort end, and a conical tube of sheet iron, which fits over the end of the fire-clay pipe, and which at its outlet end is only about an inch wide. To start a new furnace, the front side is closed provisionally by a brick wall, a fire lighted inside, and the temperature raised very gradually to a white heat. After four days' heating the provisional front wall is removed piecemeal, and the retorts, after having been heated to redness, are inserted in corresponding sets. The charge of the retorts consists of a mixture of 1100 lb of roasted calamine and 550 lb of dry powdered coal per furnace. A newly started furnace, however, is used for a time with smaller charges. Supposing the last of these preliminary distillations to have been completed, the residues left in the retorts are removed, and the retorts, as they lie in the hot furnace, are charged by means of semi-cylindrical shovels, and their adapters put on. The charging operation being completed, the temperature is raised, and as a consequence an evolution of carbon monoxide soon begins, and becomes visible by the gas bursting out into the characteristic blue flame. After a time the flame becomes dazzling white, showing that zinc vapour is beginning to escape. The iron adapters are now slipped on, and left on for two hours, when, as a matter of experience, a considerable amount of zinc has gone out of the retort, the greater part into the fire-clay adapter, the rest into the iron cone. The former contains a mixture of semi-solid and molten metal, which is raked out into iron ladles and cast into plates of 66 to 77 lb weight, to be sold as "spelter." The contents of the iron recipient consist of a powdery mixture of oxide and metal, which is added to the next charge, except what is put aside to be sold as "zinc dust" This dust may amount to 10 per cent of the total production. As soon as the adapters have been cleared of their contents, they are replaced, and again left to themselves for two hours, to be once more emptied and replaced, &c. The complete exhaustion of the charge of a furnace takes about eleven hours.

In the *Silesian process* the distillation is conducted in specially constructed muffles of a prismatic shape arched above, which are arranged in two parallel rows within a low-vaulted furnace, similar to the pots in a glass furnace. As a rule every furnace accommodates ten muffles. Through an orifice in the outlet pipe (which is closed during the distillation by a loose plug) a hot iron rod can be introduced from time to time to clear away any solid zinc that may threaten to obstruct it. As soon as the outlet pipe has become sufficiently hot the zinc flows through it and collects in conveniently placed receptacles About six or eight hours after starting the distillation is in full swing, and in twenty-four hours it is completed. A fresh charge is then put in at once, the muffles being cleared only after three successive distillations. The distillate consists of a conglomerate of drops ("drop zinc"). It is fused up in iron basins lined with clay, and cast out into the customary form of cakes.

The chief improvements in the plant of these processes are concerned with the manufacture of the retorts or muffles, and especially with the introduction of gas-firing. Even a machine of simple type, like the ordinary drain-pipe machine, in which the retorts are made by forcing the plastic clay mixture through a die, may result in greater economy and uniformity than is possible when retorts are made by hand. When hydraulic pressure to the amount of 2000 to 3000 lb per square inch is applied, the saving is unquestioned, since less time is required to dry the pressed retort, its life in the furnaces is longer, its absorption of zinc is less, and the loss of zinc by passage through its walls in the form of vapour is reduced.

Three modes of gas-firing are to be noticed, each of which is adapted to special local conditions. (*a*) The gas is made from the fuel in a detached fireplace and conducted while hot into the combustion chamber of the furnace, and the air for complete combustion is heated by the products of combustion on their way to the chimney (*b*) Both the producer gas and the air are heated before they enter the combustion chamber, as in the Siemens system of regenerative firing. (*c*) Natural gas is piped to the furnace, where it meets air heated by the chimney gases. The primary advantages of gas-firing are that less fuel is required, that there is better control of the heat in the furnace, and that larger and more accessible furnaces can be built. In Silesia the introduction of gas-firing has led to the use of furnaces containing eighty muffles. In the United States, Belgian furnaces of type (*a*) are built to contain 864 retorts; of type (*b*), to contain 300 to 400 retorts; and of type (*c*), preferably about 600 retorts. The use of gas-fired furnaces greatly simplifies manual labour. On a direct-fired furnace at least one man, the brigadier, must be an expert in all the operations involved; but with a gas furnace a division of labour is possible. One man who understands the use of gaseous fuel can regulate the heat of a thousand or more retorts. The men who charge and empty the retorts, those who draw and cast the metal, and those who keep the furnace in repair, need not know anything about the making or using of gas, and the men who make the gas need not know anything about a zinc furnace. Again, in direct-fired furnaces there are commonly seven or eight rows of retorts, one above another, so that to serve the upper rows the workman must stand upon a table, where he is exposed to the full heat of the furnace and requires a helper to wait upon him. With gas-firing the retorts can be arranged in four horizontal rows, all within reach of a man on the furnace-room floor. Furthermore, with the large furnaces which gas-firing makes possible mechanical appliances may be substituted for manual labour in many operations, such as removing and replacing broken retorts, mixing and conveying the charge, drawing and casting the metal, charging and emptying the retorts, and removing the residues and products.

Refining.—The specific effects of different impurities on the physical properties of zinc have only been imperfectly studied. Fortunately, however, the small amounts of any of them that are likely to be found in commercial zinc are not for most purposes very deleterious. It is generally recognized that the purest ores produce the purest metal. Grades of commercial zinc are usually based on selected ores, and brands, when they mean anything, usually mean that the metal is made from certain ores. Chemical control of the metal purchased is not nearly as common as it should be, and the refining of zinc is at best an imperfect operation. To obtain the metal chemically pure a specially prepared pure oxide or salt of zinc is distilled. A redistilled zinc, from an ordinarily pure commercial zinc, is often called chemically pure, but redistillation is seldom practised except for the recovery of zinc from galvanizer's dross and from the skimmings and bottoms of the melting furnaces of zinc rolling mills. The only other method of refining is by oxidizing and settling. A bath, even of very impure zinc, is allowed to stand at about the temperature of the melting-point of the metal for forty-eight or more hours, whereupon the more easily oxidizable impurities can be largely removed in the dross at the top, the heavier metals such as lead and iron settling towards the bottom. This method is rarely practised except by the rollers of zinc. A certain amount of refined zinc can be dipped from the furnace; a further amount, nearly free from iron, can be liquated out of the ingots cast from the bottom of the bath in a subsequent slow remelting, and it is sometimes possible to eliminate a zinciferous lead which collects in the sump of the furnace. Owing to the fact that at temperatures between its melting and boiling point zinc has a strong affinity for iron, it is often contaminated by the scraper while being drawn from the condenser, as is shown by the fact that the scraper wears away rapidly. As each retort in a furnace is in all essentials a separate crucible, and as the metal from only a few of them goes into a single ingot, there can be no uniformity either in the ingots made from the same furnace during a day's run or in those made from several furnaces treating the same ore. Some brassfounders break from a single ingot the quantity of zinc required to produce the amount of brass they wish to compound in one crucible, but when perfect uniformity is desired the importance of remelting the zinc on a large scale cannot be too strongly emphasized.

Electrolytic Separation of Zinc.—The deposition of pure zinc is beset with many difficulties. Zinc being more electro-positive even than nickel, all the heavy metals must be removed before its deposition is attempted. Moreover, unless the conditions are closely watched, it is liable to be thrown down in a spongy form. M. Kiliani found that the sponge was produced chiefly when a weak solution, or a low current-density, was used, and that hydrogen was usually evolved simultaneously; sound deposits resulted from the use of a current-density of 200 amperes, or more, per sq ft., and strong solutions. The cause of the spongy deposit is variously explained, some (Siemens and Halske) ascribing it to the existence of a compound of zinc and hydrogen, and others, among whom are G. Nahnsen, F. Mylius and A. Fromm, F. Foerster and W. Borchers, trace it to the presence of oxide, produced, for example, either by the use of a solution containing a trace of basic salt of zinc (to prevent which the bath should be kept just—almost imperceptibly—acid), or by the presence of a more electro-negative metal, which, being co-deposited, sets up local action at the expense of the zinc. Many processes have been patented, the ore being acted upon by acid, and the resulting solution treated, by either chemical or electrolytic means, for the successive removal of the other heavy metals. The pure solution of zinc is then electrolysed. E. A. Ashcroft patented a process of dealing with complex ores of the well-known Broken Hill type, containing sulphides of silver, lead and zinc, but the system was abandoned after a long trial on a practical scale. A full account of the process (*Trans. Inst. Min. and Met.*, 1898, vol. vi. p. 282) has been published by the inventor, describing the practical trial at the Cockle Creek Works. The ore was crushed roasted, and leached with sulphuric acid (with or without ferric sulphate); the solution was purified and then electrolysed for zinc with lead anodes and with a current-density of 5 amperes per sq. ft. at 2·75 volts when diaphragms were used, or 2·5 volts when they were dispensed with, or with 10 amperes per sq. ft. at 3 or 2·5 volts respectively, the electrolyte containing 1·2 lb of zinc in the form of sulphate, and ½ to ¾ oz. of sulphuric acid, per gallon. The current efficiency was about 83 per cent. Canvas diaphragms were used to prevent the acid formed by electrolysis at the anode from mixing with the cathode liquor, and so hindering deposition. C. Hoepfner has patented several processes, in one of which (No. 13,336 of 1894) a rapidly rotating cathode is used in a chloride solution, a porous partition separating the tank into anode and cathode compartments, and the chlorine generated by electrolysis at the anode being recovered. Hoepfner's processes have been employed both in England and in Germany. Nahnsen's process, with an electrolyte containing alkali-metal sulphate and zinc sulphate, has been used in Germany, and a process invented by Dieffenbach has also been tried in that country. Siemens and Halske have proposed the addition of oxidizing agents such as free halogens, to prevent the formation of zinc hydride, to which they attribute the formation of zinc-sponge. Borchers and others deposit zinc from the fused chloride. In Borchers' process the chloride is heated partly by external firing, partly by the heat generated owing to the use of a current-density of 90 to 100 amperes per sq. ft.

PROPERTIES

Zinc is a bluish-white metal, showing a high lustre when freshly fractured. It fuses at 415° C. and under ordinary atmospheric pressure boils at 1040° C. Its vapour density shows that it is monatomic. The molten metal on cooling deposits crystals belonging to the hexagonal system, and freezes into a compact crystalline solid, which may be brittle or ductile according to circumstances. If zinc be cast into a mould at a red heat, the ingot produced is laminar and brittle; if cast at just the fusing-point, it is granular and sufficiently ductile to be rolled into sheet at the ordinary temperature. According to some authorities, pure zinc always yields ductile ingots. Commercial "spelter" always breaks under the hammer; but at 100° to 150° C. it is susceptible of being rolled out into even a very thin sheet. Such a sheet, if once produced, remains flexible when cold. At about 200° C., the metal becomes so brittle that it can be pounded in a mortar. The specific gravity of zinc cannot be expected to be perfectly constant; according to Karsten, that of pure ingot is 6·915, and rises to 7·191 after rolling. The coefficient of linear expansion is 0·002,905 for 100° from 0° upwards (Fizeau). The specific heat is 0·09555 (Regnault). Compact zinc is bluish white; it does not tarnish much in the air. It is fairly soft, and clogs the file. If zinc be heated to near its boiling-point, it catches fire and burns with a brilliant light into its powdery white oxide, which forms a reek in the air (*lana philosophica*, "philosopher's wool"). Boiling water attacks it appreciably, but slightly, with evolution of hydrogen and formation of the hydroxide, $Zn(OH)_2$. A rod of perfectly pure zinc, when immersed in dilute sulphuric acid, is so very slowly attacked that there is no visible evolution of gas; but, if a piece of platinum, copper or other more electro-positive metal be brought into contact with the zinc, it dissolves readily, with evolution of hydrogen and formation of the sulphate. The ordinary impure metal dissolves at once, the more readily the less pure it is. Cold dilute nitric acid dissolves zinc as nitrate, with evolution of nitrous oxide. At higher temperatures, or with stronger acid, nitric oxide, NO, is produced besides or instead of nitrous. Zinc is also soluble in soda and potash solutions, but not in ammonia.

Applications.—Zinc is largely used for "galvanizing" iron, sheets of clean iron being immersed in a bath of the molten metal and then removed, so that a coat of zinc remains on the iron, which is thereby protected from atmospheric corrosion. It is also a constituent of many valuable alloys; brass, Muntz-metal, pinchbeck, tombac, are examples. In technological chemistry it finds application as a reducing agent, *e.g.* in the production of aniline from nitrobenzene, but the use of iron is generally preferable in view of the cheapness of this metal.

Compounds

Zinc forms only one oxide, ZnO, from which is derived a well-characterized series of salts. It is chemically related to cadmium and mercury, the resemblance to cadmium being especially well marked; one distinction is that zinc is less basigenic. Zinc is capable of isomorphously replacing many of the bivalent metals—magnesium, manganese, iron, nickel, cobalt and cadmium.

Zinc oxide, ZnO, is maufactured for paint by two processes—directly from the ore mixed with coal by volatilization on a grate, as in the Wetherill oxide process, and by oxidizing the vapour given off by a boiling bath of zinc metal. The oxide made by the latter method has generally a better colour, a finer texture, and a greater covering power. It is also manufactured by the latter process from the metallic zinc liquated out of galvanizer's dross. It is an infusible solid, which is intensely yellow at a red heat, but on cooling becomes white. This at least is true of the oxide produced from the metal by combustion; that produced from the carbonate, if once made yellow at a red heat, retains a yellow shade permanently. By heating the nitrate it is obtained as hemimorphous pyramids belonging to the hexagonal system; and by heating the chloride in a current of steam as hexagonal prisms. It is insoluble in water; it dissolves readily in all aqueous acids, with formation of salts. It also dissolves in aqueous caustic alkalis, including ammonia, forming "zincates" [*e.g.* $Zn(OK)_2$]. Zinc oxide is used in the arts as a white pigment (zinc white); it has not by any means the covering power of white lead, but offers the advantages of being non-poisonous and of not becoming discoloured in sulphuretted hydrogen. It is used also in medicine.

Zinc hydroxide, $Zn\,(OH)_2$, is prepared as a gelatinous precipitate by adding a solution of any zinc salt to caustic potash. The alkali must be free from carbonate and an excess of it must be avoided, otherwise the hydrate redissolves. It is a white powder, and is insoluble in water. To acids and to alkalis it behaves like the oxide, but dissolves more readily.

Zinc chloride, $ZnCl_2$, is produced by heating the metal in dry chlorine gas, when it distils over as a white translucent mass, fusing at 250° and boiling at about 400°. Its vapour-density at 900° C. corresponds to $ZnCl_2$. It is extremely hygroscopic and is used in synthetical organic chemistry as a condensing agent. It dissolves in a fraction of its weight of even cold water, forming a syrupy solution. A solution of zinc chloride is easily produced from the metal and hydrochloric acid; it cannot be evaporated to dryness without considerable decomposition of the hydrated salt into oxychloride and hydrochloric acid, but it may be crystallized as $ZnCl_2{\cdot}H_2O$. A concentrated solution of zinc chloride converts starch, cellulose and a great many other organic bodies into soluble compounds; hence the application of the fused salt as a caustic in surgery and the impossibility of filtering a strong $ZnCl_2$ solution through paper (see CELLULOSE). At a boiling heat, zinc chloride dissolves in any proportion of water, and highly concentrated solutions, of course, boil at high temperatures; hence they afford a convenient medium for the maintenance of high temperatures.

Zinc chloride solution readily dissolves the oxide with the formation of oxychlorides, some of which are used as pigments, cements and for filling teeth in dentistry. A solution of the oxide in the chloride has the property of dissolving silk, and hence is employed for removing this fibre from wool.

Zinc bromide, $ZnBr_2$, and *Zinc iodide*, ZnI_2, are deliquescent solids formed by the direct union of their elements. With ammonia and alkaline bromides and iodides double salts are formed.

Zinc sulphide, ZnS, occurs in nature as blende (*q.v.*), and is artificially obtained as a white precipitate by passing sulphuretted hydrogen into a neutral solution of a zinc salt. It dissolves in mineral acids, but is insoluble in acetic acid.

Zinc sulphate, $ZnSO_4+7H_2O$, or white vitriol, is prepared by dissolving the metal in dilute sulphuric acid. If care be taken to keep the zinc in excess, the solution will be free from all foreign metals except iron and perhaps manganese. Both are easily removed by passing chlorine through the cold solution, to produce ferric and manganic salt, and then digesting the liquid with a washed precipitate of basic carbonate, produced from a small portion of the solution by means of sodium carbonate. The iron and manganese are precipitated as hydroxides, and are filtered off. The filtrate is acidified with a little sulphuric acid and evaporated to crystallization. The salt crystallizes out on cooling with 7 molecules of water, forming colourless orthorhombic prisms, usually small and needle-shaped. They are permanent in the air. According to Poggiale, 100 parts of water dissolve respectively of ($7H_2O$) salt, 115·2 parts at 0°, and 653·6 parts at 100°. At 100° C the crystals lose 6 of their molecules of water; the remaining molecule goes off at 250°, a temperature which lies close to that at which the salt begins to decompose. The anhydrous salt, when exposed to a red heat, breaks up into oxide, sulphur dioxide and oxygen. An impure form of the salt is prepared by roasting blende at a low temperature. In the arts it is employed in the preparation of varnishes, and as a mordant for the production of colours on calico. A green pigment known as *Rinmann's green* is prepared by mixing 100 parts of zinc vitriol with 2·5 parts of cobalt nitrate and heating the mixture [illegible] duce a compound of the two oxides. Zinc sulphate, like magnesium sulphate, unites with the sulphates of the potassium metals and of ammonium into crystalline double salts, $ZnSO_4{\cdot}R_2SO_4+6H_2O$, isomorphous with one another and the magnesium salts.

Zinc carbonate, $ZnCO_3$, occurs in nature as the mineral calamine (*q.v.*), but has never been prepared artificially, *basic carbonates*, $ZnCO_3.xZn(OH)_2$, where x is variable, being obtained by precipitating a solution of the sulphate or chloride with sodium carbonate. To obtain a product free of Cl or SO_4, there must be an excess of alkali and the zinc salt must be poured into the hot solution of the carbonate. The precipitate, even after exhaustive washing with hot water, still contains a trace of alkali; but from the oxide, prepared from it by ignition, the alkali can be washed away. The basic carbonate is used as a pigment.

Of zinc phosphates we notice the minerals hopeite, $Zn_3(PO_4)_2{\cdot}4H_2O$, and tarbuttite, $Zn_3(PO_4)_2{\cdot}Zn(OH)_2$, both found in Rhodesia.

Analysis.—From neutral solutions of its salts zinc is precipitated by sulphuretted hydrogen as sulphide, ZnS—a white precipitate, soluble, but by no means readily, in dilute mineral acids, but insoluble in acetic acid. In the case of acetate the precipitation is quite complete; from a sulphate or chloride solution the greater part of the metal goes into the precipitate; in the presence of a sufficiency of free HCl the metal remains dissolved; sulphide of ammonium precipitates the metal completely, even in the presence of ammonium salts and free ammonia. The precipitate, when heated, passes into oxide, which is yellow in the heat and white after cooling; and, if it be moistened with cobalt nitrate solution and re-heated, it exhibits a green colour after cooling.

Zinc may be quantitatively estimated by precipitating as basic carbonate, which is dried and ignited to zinc oxide. It may also be precipitated as zinc ammonium phosphate, NH_4ZnPO_4, which is weighed on a filter tared at 100°. Volumetric methods have also been devised.

Pharmacology and Therapeutics of Zinc Compounds

Zinc chloride is a powerful caustic, and is prepared with plaster of Paris in the form of sticks for destroying warts, &c. Its use for this purpose at the present day is, however, very rare, the knife or galvanocautery being preferred in most cases. The salt is a corrosive irritant poison when taken internally. The treatment is to wash out the stomach or give such an emetic as apomorphine, and, when the stomach has been emptied, to administer demulcents such as white of egg or mucilage. Numerous other salts of zinc, used in medicine, are of value as containing this metal. Certain others are referred to in relation with the important radicle contained in the salt. Those treated here are the sulphate, oxide, carbonate, oleate and acetate. All these salts are mild astringents when applied externally, as they coagulate the albumen of the tissues and of any discharge which may be present. In virtue of this property they are also mild haemostatics, tending to coagulate the albumens of the blood and thereby to arrest haemorrhage. *Lotio Rubra*, the familiar "Red Lotion," a solution of zinc sulphate, is widely used in many catarrhal inflammations, as of the ear, urethra, conjunctiva, &c. There are also innumerable ointments.

These salts have been extensively employed internally, and indeed they are still largely employed in the treatment of the more severe and difficult cases of nervous disease. The sulphate is an excellent emetic in cases of poisoning, acting rapidly and without much nausea or depression. For these reasons it may also be given with advantage to children suffering from acute bronchitis or acute laryngitis.

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ZINCITE, a mineral consisting of zinc oxide (ZnO), crystallizing in the hemimorphic-hemihedral class of the rhombohedral system. Distinct crystals are of rare occurrence; they have the form of a hexagonal pyramid terminated at one end only by a basal plane. There is a perfect cleavage parallel to the basal plane, and usually the mineral is found as platy foliated masses. The blood-red colour and the orange-yellow streak are characteristic features. The hardness is 4½, and the specific gravity is 5·6. Some manganese is usually present replacing zinc. It is found in the zinc mines at Sterling Hill and Franklin Furnace in Sussex county, New Jersey, where it is associated with franklinite and willemite in crystalline limestone, and is mined as an ore of zinc. Artificial crystals of a white or yellowish colour are not infrequently formed by sublimation in zinc furnaces.

ZINDER, a town on the northern margin of the central Sudan. Zinder is a great emporium of the trade across the Sahara between the Hausa states of the south and the Tuareg countries and Tripoli in the north. Its ruler was formerly subordinate to Bornu, but with the decline of that kingdom shook off the yoke of the sultan, and on the conquest of that country by Rabah (*q.v.*) seems to have maintained his independence. The country of which Zinder is the capital is known as Damerghu. It is semi-fertile, and supports considerable numbers of horses and sheep, besides troops of camels. By the Anglo-French agreement of June 1898 it was included in the French sphere, having already been the object of French political action. The explorer Cazemajou was assassinated there in 1897, but the town was occupied in July 1899, after a slight resistance, by Lieutenant Pallier of the reconstructed Voulet-Chanoine mission (see SENEGAL, country). A French post (named Fort Cazemajou) was built outside the town on a mound of huge granite blocks. Zinder was the first point in the Sudan reached by F. Foureau after his great journey across the Sahara *via* Air in 1899. Subsequently Commandant Gadel, from his headquarters at Zinder, mapped and pacified the surrounding region, and sent out columns of *meharistes* (camel-corps) which occupied the oasis of Air and Bilma in 1906. Zinder is a large and fine town surrounded with high earthen walls, very thick at the base and pierced with seven gates. Its houses, in part built of clay, in part of straw, are interspersed with trees. There is an important colony of Tuareg merchants, who occupy the suburb of Zengu, and who deal in a variety of wares, from cotton, silks, spices, ostrich feathers, &c, to French scent bottles. Salt is a great article of merchandise. A busy market is held outside one of the gates. Administratively Damerghu is dependent on the French colony of Upper Senegal and Niger

See Cazemajou, in *Bul. Com. de l'Afrique Française* (1900), F Foureau, in *La Géographie* (December 1900), *D'Alger au Congo par le Tchad* (Paris, 1902); Joalland, in *La Géographie*, vol iii (1901); E. Arnaud and M. Cortier, *Nos Confins Sahariens* (Paris, 1908), C Jean, *Les Touarag du Sud-Est* (Paris, 1909)

ZINGERLE, IGNAZ VICENZ (1825–1892), Austrian poet and scholar, was born, the son of the Roman Catholic theologian and orientalist, Pius Zingerle (1801–1881), at Meran on the 6th of June 1825. He began his studies at Trient, and entered for a while the Benedictine monastery at Marienberg. Abandoning the clerical profession, he returned to Innsbruck, where, in 1848, he became teacher in the gymnasium, and in 1859 professor of German language and literature at the university He died at Innsbruck on the 17th of September 1892.

Zingerle is known as an author by his *Zeitgedichte* (Innsbruck, 1848); *Von den Alpen* (1850); *Die Müllerin*, a village tale (1853); *Der Bauer von Longvall* (1874); and *Erzählungen aus dem Burggrafenamte* (1884). His ethnographical writings and literary studies, dealing especially with the Tirol, have, however, rendered him more famous. Among them may be mentioned his editions of *König Laurin* (1850), of the legend, *Von den heyligen drei Künigen* (1855); *Sagen aus Tirol* (1850, 2nd ed. 1891); *Tirol. Natur, Geschichte und Sage im Spiegel deutscher Dichtung* (1851), *Die Personen- und Taufnamen Tirols* (1855); *Sitten, Bräuche und Meinungen des Tiroler-Volkes* (2nd ed. 1871); *Das deutsche Kinderspiel im Mittelalter* (2nd ed. 1873); *Schildereien aus Tirol* (1877, new series, 1888). With E. Inama-Sternegg, he edited *Tirolische Weistümer* (5 vols., 1875–1891).

ZINNIA, in botany, a genus of the natural order Compositae, containing about a dozen species of half-hardy annual or perennial herbs or undershrubs, natives of the southern United States and Mexico. The numerous single and double garden forms are mostly derived from *Zinnia elegans*, and grow about 2 ft. high, producing flowers of various colours, the double ones being about the size of asters, and very handsome. The colours include white, yellow, orange, scarlet, crimson and purple. Zinnias do best in a rich deep loamy soil, in a sunny position. They should be sown on a gentle hotbed at the end of March or in April and planted out early in June

ZINZENDORF, NICOLAUS LUDWIG, COUNT OF ZINZENDORF AND POTTENDORF (1700–1760), German religious and social reformer, was born on the 26th of May 1700 at Dresden. His ancestors belonged to Lower Austria, but had taken the Protestant side in the Reformation struggle, and settled near Nuremberg. Both his parents belonged to the Pietist circle and the lad had Philipp Jakob Spener for his godfather. His father died six weeks after he was born. His mother married again when he was four years old, and he was educated under the charge of his pious and gifted grandmother,[1] Catherine von Gersdorf, who did much to shape his character. His school days were spent at Halle amidst Pietist surroundings, and in 1716 he went to the university of Wittenberg, to study law and fit himself for a diplomatic career. Three years later he was sent to travel in Holland, in France, and in various parts of Germany, where he made the personal acquaintance of men distinguished for practical goodness and belonging to a variety of churches. On his return he visited the branches of his family settled at Oberbirg and at Castell. During a lengthened visit at Castell he fell in love with his cousin Theodora, but the widowed countess, her mother, objected to the marriage, and the lady afterwards became the wife of Count Henry of Reuss. Zinzendorf seems to have considered this disappointment to be a call to betake himself to some special work for God. He had previously, in deference to his family, who wished him to become a diplomatist, rejected the invitation of August Francke to take Baron von Canstein's place in the Halle orphanage; and he now resolved to settle down as a Christian landowner, spending his life on behalf of his tenantry He bought Berthelsdorf from his grandmother, and selected John Andrew Rothe for pastor and John George Heiz for factor; he married Erdmute Dorothea, sister of Count Henry of Reuss, and began living on his estate. His intention was to carry out into practice the Pietist ideas of Spener He did not mean to found a new church or religious organization distinct from the Lutheranism of the land, but to create a Christian association the members of which by preaching, by tract and book distribution and by practical benevolence might awaken the somewhat torpid religion of the Lutheran Church. The "band of four brothers" (Rothe, pastor at Berthelsdorf, Melchior Schäffer, pastor at Görlitz; Francis von Wattewille, a friend from boyhood; and himself) set themselves by sermons, books, journeys and correspondence to create a revival of religion, and by frequent meetings for prayer to preserve in their own hearts the warmth of personal trust in Christ. From the printing-house at Ebersdorf large quantities of books and tracts, catechisms, collections of hymns and cheap Bibles were issued; and a translation of Johann Arndt's *True Christianity* was published for circulation in France. A dislike of the high and dry Lutheran orthodoxy of the period gave Zinzendorf some sympathy with that side of the growing rationalism which was attacking dogma, while at the same time he felt its lack of earnestness, and of a true and deep understanding of religion and of Christianity, and endeavoured to counteract these defects by pointing men to the historical Christ, the revelation of the Father. He seems also to have doubted the wisdom of Spener's plan of not separating from the Lutheran Church, and began to think that true Christianity could be best promoted by free associations of Christians, which in course of time might grow into churches with no state connexion. These thoughts took a practical turn from his connexion with the Bohemian or Moravian Brethren. Zinzendorf offered an asylum to a number of persecuted wanderers from Moravia (see MORAVIAN BRETHREN), and built for them the village of Herrnhut on a corner of his estate of Berthelsdorf The refugees who came to this asylum (between 1722 and 1732—the first detachment under Christian David) from various regions where persecution raged, belonged to more than one Protestant organization. Persecution had made them cling pertinaciously to small peculiarities of creed, organization and worship, and they could scarcely be persuaded to live in peace with each other. Zinzendorf devoted himself to them He, with his wife and children, lived in Herrnhut and brought Rothe with him. He had hard work to bring order out of the confusion. He had to satisfy the authorities that his religious community could be brought under the conditions of the peace of Augsburg; he had to quiet the suspicions of the Lutheran clergy; and, hardest of all, he had to rule in some fashion men made fanatical by persecution, who, in spite of his unwearied labours for them, on more than one occasion, it is said, combined in his own house to denounce him as the Beast of the Apocalypse, with Rothe as the False Prophet. Patience had at last its perfect work, and gradually Zinzendorf was able to organize his refugees into something like a *militia Christi*, based not on monastic but on family life. He was able to establish a common order of worship in 1727, and soon afterwards a common organization, which has been described in the article Moravian Brethren. Zinzendorf took the deepest interest in the wonderful missionary enterprises of the Brethren, and saw with delight the spread of this Protestant family order in Germany, Denmark, Russia and England. He travelled widely in its interests, visiting America in 1741–42 and spending a long time in London in 1750. Missionary colonies had by this time been settled in the West Indies (1732), in Greenland (1733), amongst the North American Indians (1735), and before Zinzendorf's death the Brethren had sent from Herrnhut missionary colonies to Livonia and the northern shores of the Baltic, to the slaves of North Carolina, to Surinam, to the Negro slaves in several parts of South America, to Travancore in the East Indies, to the Copts in Egypt and to the west coast of South Africa. The community in Herrnhut, from which almost all these colonies had been sent out, had no money of its own, and its expenses had been almost exclusively furnished by Zinzendorf. His frequent journeyings from home made it almost impossible for him to look after his private affairs, he was compelled from time to time to raise money by loans, and about 1750 was almost reduced to bankruptcy This led to the establishment of a financial board among the Brethren, on a plan furnished by a lawyer, John Frederick Köber, which worked well. In 1752 Zinzendorf lost his only son, Christian Renatus, whom he had hoped to make his successor, and four years later he lost his wife Erdmute, who had been his counsellor and confidante in all his work. Zinzendorf remained a widower for one year, and then (June 1757) contracted a second marriage with Anna Nitschmann, on the ground that a man in his official position ought to be married. Three years later, overcome with his labours, he fell ill and died (on the 9th of May 1760), leaving John de Wattewille, who had married his eldest daughter Benigna, to take his place at the head of the community

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[1] A volume of *Spiritual Songs*, written by Zinzendorf's grandmother Catherine, was published in 1729 by Paul Anton.

Zinzendorf had a naturally alert and active mind, and an enthusiastic temperament that made his life one of ceaseless planning and executing. Like Luther, he was often carried away by strong and vehement feelings, and he was easily upset both by sorrow and joy He was an eager seeker after truth, and could not understand men who at all costs kept to the opinions they had once formed, yet he had an exceptional talent for talking on religious subjects even with those who differed from him. Few men have been more solicitous for the happiness and comfort of others, even in little things. His activity and varied gifts sometimes landed him in oddities and contradictions that not infrequently looked like equivocation and dissimulation, and the courtly training of his youth made him susceptible about his authority even when no one disputed it. He was a natural orator, and though his dress was simple his personal appearance gave an impression of distinction and force His projects were often misunderstood, and in 1736 he was even banished from Saxony, but in 1749 the government rescinded the decree and begged him to establish within its jurisdiction more settlements like that at Herrnhut.

He wrote a large number of hymns, of which the best known are "Jesus, Thy blood and righteousness," and "Jesus, still lead on." A selection of his *Sermons* was published by G. Clemens in 10 vols., his *Diary* (1716–1719) by G. Reichel and J. Th. Müller (Herrnhut, 1907), and his *Hymns*, &c., by H. Bauer and G. Burkhardt (Leipzig, 1900).

See A. G. Spangenberg, *Leben des Grafen von Zinzendorf* (Barby, 1772–1775); L. von Schrautenbach, *Der Graf v. Zinzendorf* (Gnadau, 1871; written in 1782, and interesting because it gives Zinzendorf's relations to such Pietist rationalists as J. K. Dippel); F. Bovet, *Le Comte de Zinzendorf* (Paris, 1860; Eng. tr. *A Pioneer of Social Christianity*, by T A. Seed, London, 1896); B. Becker, *Zinzendorf im Verhältniss z. Philosophie u. Kirchenthum seiner Zeit* (Leipzig, 1886), H. Römer, *Zinzendorf's Leben und Werken* (Gnaudau, 1900), and other literature mentioned under Moravian Brethren and in the article "Zinzendorf" by J. Th Müller in Hauck-Herzog's *Realencyk. fur prot. Theologie u. Kirche.*

ZION, or Sion (Heb. ציון, perhaps from ציה "to be dry," צוה "to set up," or צון "to protect"; Arabic analogies favour the meaning "hump," "summit of a ridge," and so "citadel"), the name of the Jebusite stronghold at Jerusalem captured by David (2 Sam. v.). Zion (which is synonymous with the Ophel) is properly the southern part of the eastern hill[1] on the top of which was built the temple, so that the name came to be given to the whole hill (2 Kings xix. 31, Isaiah xxiv 23 and throughout 1 Maccabees), to all Jerusalem (Isaiah i. 27, cf. iv 3), and even to the nation or its spiritual nucleus. Thus the people of Jerusalem are spoken of as "the daughter of Zion" (Isaiah i 8), the name being often personified and idealized, especially in Isaiah ii., and in the Psalter, *e g* Ps. lxxxvii. 5, "Every one calls Zion his mother"

See G. A. Smith, *Jerusalem* (London, 1908)

ZIONISM. One of the most interesting results of the anti-Semitic agitation (see Anti-Semitism) has been a strong revival of the national spirit among the Jews in a political form. To this movement the name Zionism has been given. In the same way that anti-Semitism differs from the Jew-hatred of the early and middle ages, Zionism differs from previous manifestations of the Jewish national spirit. It was originally advocated as an expedient without Messianic impulses, and its methods and proposals have remained almost harshly modern None the less it is the lineal heir of the attachment to Zion which led the Babylonian exiles under Zerubbabel to rebuild the Temple, and which flamed up in the heroic struggle of the Maccabees against Antiochus Epiphanes. Without this national spirit it could, indeed, never have assumed its present formidable proportions. The idea that it is a set-back of Jewish history, in the sense that it is an unnatural galvanization of hopes long since abandoned for a spiritual and cosmopolitan conception of the mission of Israel, is a controversial fiction The consciousness of a spiritual mission exists side by side with the national idea. The great bulk of the Jewish people have throughout their history remained faithful to the dream of a restoration of their national life in Judea Its manifestations have suffered temporary modifications under the influence of changing political conditions, and the intensity with which it has been held by individual Jews has varied according to their social circumstances, but in the main the idea has been passionately clung to.

The contention of some modern rabbis that the national idea is Messianic, and hence that its realization should be left to the Divine initiative (*e.g.* Chief Rabbi Adler, *Jewish Chronicle*, 25th November 1898), is based on a false analogy between the politics of the Jews and those of other oppressed nationalities. As all Hebrew politics were theocratic, the national hope was necessarily Messianic It was not on that account less practical or less disposed to express itself in an active political form. The Messianic dreams of the Prophets, which form the framework of the Jewish liturgy to this day, were essentially politico-national They contemplated the redemption of Israel, the gathering of the people in Palestine, the restoration of the Jewish state, the rebuilding of the Temple, and the re-establishment of the Davidic throne in Jerusalem with a prince of the House of David. How little the dispersed Jews regarded this essentially political programme as a mere religious ideal is shown by their attitude towards the pseudo-Messiahs who endeavoured to fulfil it Bar Cochba (A.D. 117–138) lived at a period when a Jewish national uprising might well have been exclusively political, for the dissolution of the kingdom was scarcely half a century old, and Palestine still had a large Jewish population. None the less Bar Cochba based his right to lead the Jewish revolt on Messianic claims, and throughout the Roman Empire the Jews responded with enthusiasm to his call. Three centuries later Moses of Crete attempted to repeat Bar Cochba's experiment, with the same results. In the 8th century, when the Jews of the West were sufficiently remote from the days of their political independence to have developed an exclusively spiritual conception of their national identity, the Messianic claims of a Syrian Jew named Serene shook the whole of Jewry, and even among the Jews of Spain there was no hestitation as to whether they had a right to force the hands of Providence. It was the same with another pseudo-Messiah named Abu-Isa Obadia, who unfurled the national banner in Persia some thirty years later

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[1] Christians of the 4th century removed the name to the S.W hill, and this tradition has persisted until modern times, when archaeological and topographical evidence has re-identified Sion with the E. hill.

During the middle ages, though the racial character of the Jews was being transformed by their Ghetto seclusion, the national yearning suffered no relaxation. If it expressed itself exclusively in literature, it was not on that account undergoing a process of idealization (Cf. Abrahams's *Jewish Life in the Middle Ages*, pp 24–25.) The truth is that it could not have expressed itself differently. There could have been no abandonment of national hopes in a practical sense, unless the prospect of entering the national life of the peoples among whom they dwelt had presented itself as an alternative. Of this there was not the remotest sign The absence of militant Zionism during this period is to be accounted for partly by the want of conspicuous pseudo-Messiahs, and partly by the terror of persecution Unlike the modern Greeks, the medieval Jews could expect no sympathy from their neighbours in an agitation for the recovery of their country One may imagine what the Crusaders would have thought of an international Jewish conspiracy to recapture Jerusalem In the 15th century the aversion from political action, even had it been possible, must have been strengthened by the fact that the Grand Signor was the only friend the Jews had in the world. The nationalist spirit of the medieval Jews is sufficiently reflected in their liturgy, and especially in the works of the poet, Jehuda Halevi It is impossible to read his beautiful *Zionide* without feeling that had he lived another twenty years he would have gladly played towards the pseudo-Messiah David Alroy (*circa* 1160) the part that Akiba played towards Bar Cochba.

The strength of the nationalist feeling was practically tested in the 16th century, when a Jewish impostor, David Reubeni (*circa* 1530), and his disciple, Solomon Molcho (1501–1532), came forward as would-be liberators of their people Throughout Spain, Italy and Turkey they were received with enthusiasm by the bulk of their brethren. In the following century the influence of the Christian Millenarians gave a fresh impulse to the national idea. Owing to the frenzy of persecution and the apocalyptic teachings of the Chiliasts, it now appeared in a more mystical form, but a practical bias was not wanting Menasseh ben Israel (1604–1657) co-operated with English Millenarians to procure the resettlement of the Jews in England as a preliminary to their national return to Palestine, and he regarded his marriage with a scion of the Davidic family of Abarbanel as justifying the hope that the new Messiah might be found among his offspring. The increasing dispersion of the Marranos or crypto-Jews of Spain and Portugal through the Inquisition, and the persecution of the Jews in Poland, deepened the Jewish sense of homelessness the while the Millenarians encouraged their Zionist dreams. The Hebraic and Judeophil tendencies of the Puritan revolution in England still further stirred the prevailing unrest, and some Jewish rabbis are said to have visited England in order to ascertain by genealogical investigations whether a Davidic descent could be ascribed to Oliver Cromwell. It only wanted a leader to produce a national movement on a formidable scale. In 1666 this leader presented himself at Smyrna, in the person of a Jew named Sabbatai Zevi (1626–1676), who proclaimed himself the Messiah The news spread like wildfire, and despite the opposition of some of the leading rabbis, the Jews everywhere prepared for the journey to Palestine Not alone was this the case with the poor Jews of Lithuania and Germany, but also with well-to-do communities like those of Venice, Leghorn and Avignon, and with the great Jewish merchants and bankers of Hamburg, Amsterdam and London. Throughout Europe the nationalist excitement was intense. Even the downfall and apostasy of Sabbatai were powerless to stop it. Among the wealthier Jews it partially subsided, but the great bulk of the people refused for a whole century to be disillusionized. A Messianic frenzy seized upon them. Encouraged on the one hand by Christian Millenarians like Pierre Jurien, Oliger Pauli, and Johannes Speeth, pandered to by Sabbataic impostors like Cardoso, Bonafoux, Mordecai of Eisenstadt, Jacob Querido, Judah Chassid, Nehemiah Chayon and Jacob Franks, and maddened by fresh oppressions, they became fanaticized to the verge of demoralization.

The reaction arrived in 1778 in the shape of the Mendelssohnian movement. The growth of religious toleration, the attempted emancipation of the English Jews in 1753, and the sane Judeophilism of men like Lessing and Dohm, showed that at length the dawn of the only possible alternative to nationalism was at hand. Moses Mendelssohn (1729–1786) sought to prepare his brethren for their new life as citizens of the lands in which they dwelt, by emphasizing the spiritual side of Judaism and the necessity of Occidental culture. His efforts were successful The narrow nationalist spirit everywhere yielded before the hope or the progress of local political emancipation In 1806 the Jewish Sanhedrin convened by Napoleon virtually repudiated the nationalist tradition. The new Judaism, however, had not entirely destroyed it. It had only reconstructed it on a wider and more sober foundation. Mendelssohnian culture, by promoting the study of Jewish history, gave a fresh impulse to the racial consciousness of the Jews. The older nationalism had been founded on traditions so remote as to be almost mythical, the new race consciousness was fed by a glorious martyr history, which ran side by side with the histories of the newly adopted nationalities of the Jews, and was not unworthy of the companionship From this race consciousness came a fresh interest in the Holy Land. It was an ideal rather than a politico-nationalist interest—a desire to preserve and cherish the great monument of the departed national glories. It took the practical form of projects for improving the circumstances of the local Jews by means of schools, and for reviving something of the old social condition of Judea by the establishment of agricultural colonies. In this work Sir Moses Montefiore, the Rothschild family, and the Alliance Israélite Universelle were conspicuous. More or less passively, however, the older nationalism still lived on—especially in lands where Jews were persecuted—and it became strengthened by the revived race consciousness and the new interest in the Holy Land. Christian Millenarians also helped to keep it alive. Lord Ashley, afterwards Lord Shaftesbury, Colonel Gawler, Mr Walter Cresson, the United States consul at Jerusalem, Mr James Finn, the British consul, Mr Laurence Oliphant and many others organized and supported schemes for the benefit of the Jews of the Holy Land on avowedly Restoration grounds. Another vivifying element was the reopening of the Eastern Question and the championship of oppressed nationalities in the East by the Western Powers. In England political writers were found to urge the re-establishment of a Jewish state under British protection as a means of assuring the overland route to India (Hollingsworth, *Jews in Palestine*, 1852). Lord Palmerston was not unaffected by this idea (Finn, *Stirring Times*, vol i. pp 106–112), and both Lord Beaconsfield and Lord Salisbury supported Mr Laurence Oliphant in his negotiations with the Porte for a concession which was to pave the way to an autonomous Jewish state in the Holy Land. In 1854 a London Jew attempted to float a company "for the purpose of enabling the descendants of Israel to obtain and cultivate the Land of Promise" (*Hebrew Observer*, 12th April) In 1876 the publication of George Eliot's *Daniel Deronda* gave to the Jewish nationalist spirit the strongest stimulus it had experienced since the appearance of Sabbatai Zevi.

It was not, however, until the spread of anti-Semitic doctrines through Europe made men doubt whether the Mendelssohnian denationalization of Judaism possessed the elements of permanency that the Jewish nationalist spirit reasserted itself in a practical form. As long as the anti-Semites were merely polemical, the nationalists were mute, but when in Russia their agitation took the form of massacres and spoliation, followed by legislation of medieval harshness, the nationalist remedy offered itself. In 1882 several pamphlets were published by Jews in Russia, advocating the restoration of the Jewish state. They found a powerful echo in the United States, where a young Jewish poetess, Miss Emma Lazarus, passionately championed the Zionist cause in verse not unworthy of Jehuda Halevi. But the movement did not limit itself to literature. A society, "Chovevi Zion," was formed with the object of so extending and methodizing the establishment of agricultural colonies in Palestine as to make the eventual acquisition of the country by the Jews possible. From the beginning it was a great success, and branches, or "tents" as they were called, were established all over the world. At the same time two other great schemes for rescuing the Jewish people from oppression were brought before the public. Neither was Zionist, but both served to encourage the Zionist cause. One was due to the initiative of Mr Cazalet, a financier who was interested in the Euphrates Valley Railway project. With the assistance of Mr Laurence Oliphant he proposed that the concession from the Porte should include a band of territory two miles wide on each side of the railway, on which Jewish refugees from Russia should be settled. Unfortunately the scheme failed. The other was Baron de Hirsch's colossal colonization association (see Hirsch, Maurice de). This was neither political nor Zionist, but it was supported by a good many members of the "Chovevi Zion," among them Colonel Goldsmid, on the ground that it might result in the training of a large class of Jewish yeomen who would be invaluable in the ultimate settlement of Palestine. (Interview in *Daily Graphic*, 10th March 1892.)

None of these projects, however, proved sufficiently inspiring to attract the great mass of Jewish nationalists. The Chovevi Zion was too timid and prosaic; the Hirsch scheme did not directly appeal to their strongest sympathies. In 1897 a striking change manifested itself. A new Zionist leader arose in the person of a Viennese journalist and playwright, Dr Theodore Herzl (1860–1904). The electoral successes of the anti-Semites in Vienna and Lower Austria in 1895 had impressed him with the belief that the Jews were unassimilable in Europe, and that the time was not far distant when they would be once more submitted to civil and political disabilities. The Hirsch scheme did not, in his view, provide a remedy, as it only transplanted the Jews from one uncongenial environment to another. He came to the conclusion that the only solution of the problem was the segregation of the Jews under autonomous political conditions. His first scheme was not essentially Zionist. He merely called for a new exodus, and was ready to accept any grant of land in any part of the world that would secure to the Jews some form of self-government. The idea was not new. In 1566 Don Joseph Nasi had proposed an autonomous settlement of Jews at Tiberias, and had obtained a grant of the city from the Sultan for the purpose. In 1652 the Dutch West India Company in Curaçao, in 1654 Oliver Cromwell in Surinam, and in 1659 the French West India Company at Cayenne had attempted similar experiments. Marshal de Saxe in 1749 had projected the establishment of a Jewish kingdom in South America, of which he should be sovereign; and in 1825 Major M. M. Noah purchased Grand Island, in the river Niagara, with a view to founding upon it a Jewish state. All these projects were failures. Dr Herzl was not slow to perceive that without an impulse of real enthusiasm his scheme would share the fate of these predecessors. He accordingly resolved to identify it with the nationalist idea. His plan was set forth in a pamphlet, entitled *The Jewish State*, which was published in German, French and English in the spring of 1896. It explained in detail how the new exodus was to be organized and how the state was to be managed. It was to be a tribute-paying state under the suzerainty of the Sultan. It was to be settled by a chartered company and governed by an aristocratic republic, tolerant of all religious differences. The Holy Places were to be exterritorialized. The pamphlet produced a profound sensation. Dr Herzl was joined by a number of distinguished Jewish literary men, among whom were Dr Max Nordau and Mr Israel Zangwill, and promises of support and sympathy reached him from all parts of the world. The *haute finance* and the higher rabbinate, however, stood aloof.

The most encouraging feature in Dr Herzl's scheme was that the Sultan of Turkey appeared favourable to it. The motive of his sympathy has not hitherto been made known. The Armenian massacres had inflamed the whole of Europe against him, and for a time the Ottoman Empire was in very serious peril. Dr Herzl's scheme provided him, as he imagined, with a means of securing powerful friends. Through a secret emissary, the Chevalier de Newlinsky, whom he sent to London in May 1896, he offered to present the Jews a charter in Palestine provided they used their influence in the press and otherwise to solve the Armenian question on lines which he laid down. The English Jews declined these proposals, and refused to treat in any way with the persecutor of the Armenians. When, in the following July, Dr Herzl himself came to London, the Maccabaean Society, though ignorant of the negotiations with the Sultan, declined to support the scheme. None the less, it secured a large amount of popular support throughout Europe, and in 1910 Zionism had a following of over 300,000 Jews, divided into a thousand electoral districts. The English membership is about 15,000.

Between 1897 and 1910 the Zionist organization held nine international Congresses. At the first, which met at Basel, a political programme was adopted on the following terms:—

> "Zionism aims at establishing for the Jewish people a publicly and legally assured home in Palestine. For the attainment of this purpose the Congress considers the following means serviceable: (1) The promotion of the settlement of Jewish agriculturists, artisans and tradesmen in Palestine. (2) The federation of all Jews into local or general groups, according to the laws of the various countries. (3) The strengthening of the Jewish feeling and consciousness. (4) Preparatory steps for the attainment of those governmental grants which are necessary to the achievement of the Zionist purpose."

Subsequent congresses founded various institutions for the promotion of this programme, notably a People's Bank known as the Colonial Trust, which is the financial instrument of political Zionism, a National Fund for the purchase of land in Palestine and a Palestine Commission with subsidiary societies for the study and improvement of the social and economic condition of the Jews in the Holy Land. For the purposes of these bodies about £400,000 was collected in small sums and invested. Very little practical work of any abiding value, however, was accomplished, and on the political side the career of Zionism had up to the end of 1910 proved a failure.

In May 1901 and August 1902 Dr Herzl had audiences of the Sultan Abdul Hamid, and was received with great distinction, but the negotiations led to nothing. Despairing of obtaining an immediate charter for Palestine, he turned to the British government with a view to securing a grant of territory on an autonomous basis in the vicinity of the Holy Land, which would provisionally afford a refuge and a political training-ground for persecuted Jews. His overtures met with a sympathetic reception, especially from Mr Chamberlain, then Colonial Secretary, and Earl Percy, who was Under-Secretary for Foreign Affairs (October 1902). At first a site for the proposed settlement was suggested in the Sinai peninsula, but owing to the waterless character of the country the project had to be abandoned. Then Mr Chamberlain, who in the interval had paid a visit to Africa, suggested the salubrious and uninhabited highlands of the East Africa Protectorate, and in 1903 the British government formally offered Dr Herzl the Nasin Gishiu plateau, 6000 sq. m. in area. No such opportunity for creating a Jewish self-governing community had presented itself since the Dispersion, and for a moment it seemed as if Zionism were really entering the field of practical politics. Unhappily it only led to bitter controversies, which nearly wrecked the whole movement. The British offer was submitted to the Sixth Congress, which assembled at Basel in August 1903. It was received with consternation and an explosion of wrath by the ultra-nationalist elements, who interpreted it as an abandonment of the Palestine idea. By his personal influence Dr Herzl succeeded in obtaining the appointment of a commission to examine the proposed territory, but its composition was largely nationalist, and in the following year the Congress gladly availed itself of certain critical passages in the report to reject the whole scheme.

Meanwhile Zionism had suffered an irreparable blow by the death of Dr Herzl (1904). He was succeeded by Mr David Wolffsohn, a banker of Cologne, but there was in truth nobody who in ability and personal dignity and magnetism could take his place. The movement was further shaken by the dissensions which followed the rejection of the East African project. Mr Israel Zangwill led an influential minority which combined with certain non-Zionist elements to found a rival organization under the name of the ITO (Jewish Territorial Organization) with a view to taking over the East African offer or to establish an autonomous place of refuge elsewhere. Thus freed from all moderating elements the Zionists hardened into an exclusively Palestinian body, and under the auspices of Mr Wolffsohn fresh negotiations were opened with the Porte. These, however, were rendered finally hopeless by the Turkish revolution, which postulated a united Ottoman nationality, and resolutely set its face against any extension of the racial and religious autonomies under which the integrity of the Empire had already severely suffered.

During 1905–1910 the Jewish national idea, for all practical purposes, was in a state of suspended animation. The recovery of the Holy Land appeared more distant than ever, while even the establishment of an independent or autonomous Jewish state elsewhere, for which the ITO was labouring, had encountered unexpected difficulties. On the rejection of the British offer by the Zionists Mr Zangwill approached the Colonial Office, but he was too late, as the reserve on the Nasin Gishiu plateau had already been officially withdrawn. The ITO then turned its attention to Cyrenaica, and an expedition to examine the country was sent out (1908), but it was not found suitable. A project for combining all the Jewish organizations in an effort to secure an adequate foothold in Mesopotamia in connexion with the scheme for the irrigation of that region was subsequently proposed by Mr Zangwill, but up to January 1911 it had not been found practicable. The ITO, however, did valuable work by organizing an Emigration Regulation Department for deflecting the stream of Jewish emigration from the overcrowded Jewry of New York to the Southern states of the American Union, where there is greater scope for employment under wholesome conditions. For this purpose a fund was formed, to which Mr Jacob Schiff contributed £100,000 and Messrs Rothschild £20,000.

Although the Zionist organization was numerically strong—indeed, the strongest popular movement Jewish history had ever known—its experience from 1897 to 1910 rendered it very doubtful whether its nationalist aspirations could, humanly speaking, ever be fulfilled. From Turkey, either absolutist or democratic, it appeared hopeless to expect any willing relaxation of the Ottoman hold on Palestine, while in the event of a dissolution of the Empire it was questionable whether Christendom—and especially the Roman and Greek Churches—would permit the Holy Land to pass to the Jews, even though the Holy Places were exterritorialized. Should these obstacles be overcome, still more formidable difficulties would await the Jewish state. The chief of these is the religious question. The state would have to be orthodox or secular. If it were orthodox it would desire to revive the whole Levitical polity, and in these circumstances it would either pass away through internal chaos or would so offend the modern political spirit that it would be soon extinguished from outside. If it were secular it would not be a Jewish state. The great bulk of its supporters would refuse to live in it, and it would ultimately be abandoned to an outlander population consisting of Hebrew Christians and Christian Millenarians.

Modern Zionism is vitiated by its erroneous premises. It is based on the idea that anti-Semitism is unconquerable, and thus the whole movement is artificial. Under the influence of religious toleration and the naturalization laws, nationalities are daily losing more of their racial character. The coming nationality will be essentially a matter of education and economics, and this will not exclude the Jews as such. With the passing away of anti-Semitism, Jewish nationalism will disappear. If the Jewish people disappear with it, it will only be because either their religious mission in the world has been accomplished or they have proved themselves unworthy of it.

LITERATURE.—A Zionist bibliography has been published by the Federation of American Zionists. Besides the works already cited in the body of this article, see on the early nationalist movement Graetz, *Geschichte der Juden*, under the heads of the various pseudo-Messiahs and their adherents. Jewish agricultural colonies will be found discussed very fully in *The Jewish Encyclopedia*, vol. i. pp. 240–262. For early Zionist projects see *Publications of the American Jewish Historical Society*, No. 8, pp. 75–118; Laurence Oliphant, *Land of Gilead*; Mrs Oliphant, *Life of Laurence Oliphant*, pp. 168 et seq. The Zionist movement since 1895 is fully recorded in its official organ, *Die Welt* (Vienna). For proceedings of the Congresses see the *Official Protocols* published for each year by the society "Erez Israel" of Vienna; also Herzl, *Der Baseler Congress* (Vienna, 1897). On the movement generally, see Herzl's *Zionistische Schriften*, edited by Dr Leon Kellner; *Ten Years of Zionism* (Cologne, 1907); Nordau, *Zionism, its History and its Aims* (London, 1905); J. de Haas, *Zionism, Jewish Needs and Jewish Ideals*; also articles by I. Zangwill in *Cosmopolis* (October 1897), *Contemporary Review* (October 1899) and *Fortnightly Review* (April 1910); Dr Gaster in *Asiatic Quarterly Review*, (October 1897); H. Bentwitch in *Nineteenth Century* (October 1897), and *Fortnightly Review* (December 1898); Reich in *Nineteenth Century* (August 1897); Lucien Wolf in *Jewish Quarterly Review* (October 1904: "The Zionist Peril"). On the ITO see pamphlets and leaflets published by the Jewish Territorial Organization; also the *Report of the Commission on Cyrenaica* (London, 1909). (L. W.)

ZIRCON, a mineral composed of zirconium silicate, sometimes used as a gem-stone. It is believed that the name comes from the Arabic *zargun*, and is essentially the same as "jargoon," the name given to certain varieties of zircon. The mineral crystallizes in the tetragonal system, generally in combinations of square prisms and square pyramids, as in figs. 1 and 2. Zircon is isomorphous with cassiterite and rutile, and like them may occur in geniculated twins. There is no distinct cleavage, and the mineral breaks with a conchoidal fracture. The hardness is about 7·5. It is notable that the specific gravity has a very wide range, extending from a little below 4 to rather more than 4·7, and being thus greater than that of any other gem-stone. Rarely colourless, zircon is usually brown or red, sometimes orange, yellow or green, and occasionally parti-coloured or zoned. Whilst common zircon is opaque, the gem-varieties are transparent. The dichroism of coloured zircons is always feeble; the double refraction usually strong and of positive sign; and the optical properties of some zircons suggest a biaxial mineral. It was pointed out long ago by Sir A. H. Church that many transparent zircons afford a spectrum

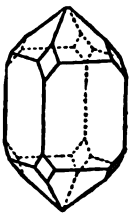


FIG. 1.

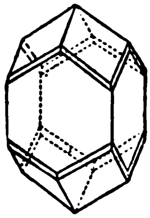


FIG. 2.

marked by certain absorption-bands, a property perhaps due to the presence of uranium.

The effect of heat on zircon is remarkable. Most coloured zircons, exposed to a high temperature, either change or lose their colour, but this loss is attended by a gain in brilliancy. The "Matura diamonds" of Ceylon are zircons which have been thus artificially decolorized. Certain zircons when heated in a Bunsen-flame glow with an orange incandescence, whilst others may emit an orange glow when ground on a copper-wheel fed with diamond-dust. Even exposure to sunlight will sometimes modify the colour and lustre of a zircon. Some zircons suffer contraction when heated, so that the specific gravity becomes raised; but the behaviour of zircons in this respect shows such anomalies that S. Stevanović has been led to suggest the existence of three classes of zircon. One group has a specific gravity of 4·0 and another of 4·7, both remaining unchanged in density when heated. L. J. Spencer, who has studied some remarkable crystals from Ceylon, calls the former α-zircon, and the latter β-zircon. A third class has specific gravity between 4·0 and 4·7, and increases in density on heating. These stones consist, according to Spencer, of an intergrowth of α-zircon or β-zircon, with a third unstable modification which he distinguishes as γ-zircon.

Whilst zircon is usually regarded as a zirconium silicate ($ZrSiO_4$) it is sometimes placed with the oxides as consisting of $ZrO_2 \cdot SiO_2$. A small proportion of ferric oxide seems to be always present, and to this the colour of zircon, according to G. Spezia, may be ascribed. Traces of so many elements have been recorded in certain zircons that it was at one time proposed to call the species polycrasilite from the Greek πολύς (many) and κρᾶσις (mixture). Zircon is used as a source of zirconia in various preparations, for incandescent gas-mantles, &c. It was in this mineral that zirconia was originally discovered by M. H. Klaproth in 1789.

Zircon fit for use as a gem-stone is often known as "noble" or "precious zircon." The red and orange stones are termed hyacinth (*q.v.*) and jacinth, whilst those of other colours, as also the colourless transparent zircons, are called jargoon (*q.v.*). The *lyncurium* of the ancients, described as an amber-coloured stone used for signets, is supposed by some authorities to have been zircon and by others amber. The gem varieties of zircon are found in detrital deposits, especially in Ceylon and in New South Wales, where they accompany sapphire, &c. They occur also in the Anakie sapphire district, near Emerald, in Queensland. A. K. Coomáraswámy has pointed out that most of the stones in the gem-gravels of Ceylon, known locally as *toramalli*, are zircons rather than tourmalines.

Zircon is an accessory constituent of many rocks, especially granite, where it appears to have crystallized at an early stage of consolidation. In microscopic sections, viewed by transmitted light, the zircon by virtue of its high refractive power appears to stand out in relief. It forms an important constituent of the zircon-syenite of Norway. Zircon occurs also in many basic eruptive rocks, notably the basalts of the Rhine and Central France. Being but little subject to alteration, it is common in secondary deposits, as in auriferous and other sands, occurring usually in small characteristic crystals, with rounded angles. Fine crystals of zircon are found in the Ilmen Mountains in Russia, and in Renfrew co., Ontario, where it occurs in crystalline limestone. Many localities in the United States yield zircon, especially in New York state and in North Carolina: it has been largely worked in Henderson co., N.C. Zircon occurs also in Tasmania. Certain varieties of zircon have received distinctive names, such as the azorite, which occurs in sanidine-trachyte in the Azores. Several other minerals seem to be altered zircon, generally hydrated, such as malacon, cyrtolite and oerstedite, the last being a Norwegian mineral containing titanium and magnesium. Auerbachite is a Russian mineral closely related to zircon. (F. W. R.*)

ZIRCONIUM [symbol Zr, atomic weight 90·6 (O=16)], a metallic chemical element. Klaproth in 1789 analysed the mineral zircon or hyacinth and found it to contain a new earth, which he called "zirconia." The metal was obtained by Berzelius as an iron-grey powder by heating potassium zircono-fluoride with metallic potassium. The amorphous metal also results when the chloride is heated with sodium; the oxide reduced with magnesium; or when fused potassium zircono-fluoride is electrolysed (Wedekind, *Zeit. Elektrochem.*, 1904, 10, p. 331). Troost produced crystallized zirconium by fusing the double fluoride with aluminium in a graphite crucible at the temperature of melting iron, and extracting the aluminium from the melt with hydrochloric acid. It is more conveniently prepared by heating the oxide with carbon in the electric furnace. The crystals look like antimony, and are brittle, and so hard as to scratch glass and rubies; their specific gravity is 4·25. The powdery metal burns readily in air; the crystalline metal requires to be heated in an oxyhydrogen flame before it catches fire. Mineral acids generally attack the crystallized metal very little even in the heat; aqua regia, however, dissolves it readily, and so does hydrofluoric acid. In its chemical affinities zirconium resembles titanium, cerium and thorium; it occurs in company with these elements, and is tetravalent in its more important salts.

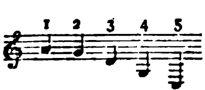
Zirconium oxide or *zirconia*, ZrO_2, has become important since its application to the manufacture of mantles for incandescent gas-lighting. For its extraction from zircon the mineral is heated and quenched in water to render it brittle, and then reduced to a fine powder, which is fused with three to four parts of acid potassium fluoride in a platinum crucible. When the mass is quietly fusing, the crucible is heated for two hours in a wind-furnace. The porcelain-like melt is powdered, boiled with water, and acidified with hydrofluoric acid, and the residual potassium fluosilicate is filtered off. The filtrate on cooling deposits crystals of potassium zirconofluoride, K_2ZrF_6, which are purified by crystallization from hot water. The double fluoride is decomposed with hot concentrated sulphuric acid; the mixed sulphate is dissolved in water; and the zirconia is precipitated with ammonia in the cold. The precipitate, being difficult to wash, is (after a preliminary washing) re-dissolved in hydrochloric acid and re-precipitated with ammonia. Zirconium hydroxide, $Zr(OH)_4$, as thus obtained, is quite appreciably soluble in water and easily in mineral acids, with formation of zirconium salts, *e.g.* $ZrCl_4$. But, if the hydroxide is precipitated in the heat, it demands concentrated acids for its solution. The hydroxide readily loses its water at a dull red heat and passes into anhydride with vivid incandescence. Zirconia can be obtained crystalline, in a form isomorphous with cassiterite and rutile, by fusing the amorphous modification with borax, and dissolving out with sulphuric acid. The anhydrous oxide is with difficulty soluble even in hydrofluoric acid; but a mixture of two parts of concentrated sulphuric acid and one of water dissolves it on continued heating as the sulphate, $Zr(SO_4)_2$. Zirconia, when heated to whiteness, remains unfused, and radiates a fine white light, which suggested its utilization for making incandescent gas mantles; and, in the form of disks, as a substitute for the lime-cylinders ordinarily employed in "limelight." Zirconia, like stannic and titanic oxides, unites not only with acids but also with basic oxides. For instance, if it be fused with sodium carbonate, sodium zirconate, Na_2ZrO_3, is formed. If the carbonate be in excess, the salt Na_4ZrO_4 results, which when treated with water gives $Na_2Zr_8O_{17} \cdot 12H_2O$, which crystallizes in hexagonal plates. When heated in a loosely covered crucible with magnesium the nitride Zr_3N_4 is formed (Wedekind, *Zeit. anorg. Chem.*, 1905, 45, p. 385).

Zirconium hydride, ZrH_2, is supposed to be formed when zirconia is heated with magnesium in an atmosphere of hydrogen. *Zirconium fluoride*, ZrF_4, is obtained as glittering monoclinic tables (with $3H_2O$) by heating zirconia with acid ammonium fluoride. It forms double salts, named zircono-fluorides, which are isomorphous with the stanni- and titani-fluorides. *Zirconium chloride*, $ZrCl_4$, is prepared as a white sublimate by igniting a mixture of zirconia and charcoal in a current of chlorine. It has the exact vapour-density corresponding to the formula. It dissolves in water with evolution of heat; on evaporation a basic salt, $ZrOCl_2 \cdot 8H_2O$, separates out in star-shaped acicular aggregates. *Zirconium bromide*, $ZrBr_4$, is formed similarly to the chloride. Water gives the oxybromide $ZrOBr_2$. *Zirconium iodide*, ZrI_4, was obtained as a yellow, micro-crystalline solid by acting with hydriodic acid on heated zirconium (Wedekind, *Ber.*, 1904, 37, p. 1135). It fumes in air; with water it gives $ZrOI_2 \cdot 8H_2O$; and with alcohol ethyl iodide and zirconium hydroxide are formed. The iodide combines with liquid ammonia to form $ZrI_4 \cdot 8NH_3$; and with ether to give $ZrI_4 \cdot 4(C_2H_5)_2O$. Zirconium combines with sulphur to form a sulphide, and with carbon to form several carbides. The sulphate, $Zr(SO_4)_2$, is a white mass obtained by dissolving the oxide or hydroxide in sulphuric acid, evaporating and heating the mass to nearly a red heat. Since it forms a series of double sulphates, Ruer (*Zeit. anorg. Chem.*, 1904, 42, p. 87) regards it as a dibasic acid, $ZrOSO_4 \cdot SO_4H_2$, and that the crystalline sulphate is $ZrOSO_4 \cdot SO_4H_2 \cdot 3H_2O$ (not $Zr(SO_4)_2 \cdot 4H_2O$). Zirconium also forms double sulphates of the type $Zr_2O_3(SO_4M)_2 \cdot nH_2O$, where M=K, Rb, Cs, and n=8 for K, 15 for Rb, 11 for Cs (Rosenheim and Frank, *Ber.*, 1905, 38, p. 812). The atomic weight was determined by Marignac to be 90·03; Bailey (*Proc. Roy. Soc.*, 1890, 46, p. 74) deduced the value 89·95.

ZIRKEL, FERDINAND (1838-), German geologist and petrographer, was born at Bonn on the 20th of May 1838. He was educated in his native town, and graduated Ph.D. at the university in 1861. In early years he was engaged in teaching geology and mineralogy in Vienna. He became professor of geology in 1863 in the university of Lemberg, in 1868 at Kiel, and in 1870 professor of mineralogy and geology in the university of Leipzig.

His numerous papers and essays include *Geologische Skizze von der Westküste Schottlands* (1871); *Die Struktur der Variolite* (1875); *Microscopical Petrography* (in Report of U.S. Geol. Exploration of 40th Par., vol. vi., 1876); *Limurit aus der Vallée de Lesponne* (1879); *Über den Zirkon* (1880). His separate works include *Lehrbuch der Petrographie* (1866; 2nd ed. 1893, 1894); *Die mikroskopische Beschaffenheit der Mineralien und Gesteine* (1873).

ZITHER (Ger. *Zither*, *Schlagzither*, *Streichzither;* Ital. *cithara*), a name applied in modern Germany to the ancient cithara (*q.v.*), to the cittern (*q.v.*), and to an instrument which is a kind of psaltery, consisting of a shallow sound-chest with ribs having the outline of a flattened jug (termed in German *Flaschenform*, bottle-shape). In the centre of the sound-board is a rose sound-hole, and the finger-board with frets lies along the straight side of the zither in front of the performer. The number of the strings varies, but 36, 38 and 42 are the most usual. Over the finger-board are four or five strings known as *violin*, on which the melody is played. These five melody strings are stopped with the thumb and fingers of the left hand and plucked with the thumb of the right hand, which usually has a thumb ring with plectrum. Nos. 1 and 2 are steel strings; No. 3 of brass, and 4 and 5 of spun wire; the bass is played with the fingers of the right hand, and in order to facilitate the fingering the strings are tuned in fourths and fifths. Most of the other strings from the 6th are of gut. All the strings lie horizontally across the sound-board, being fastened in the usual manner to hitch and wrest pins. The zither is placed on the table in front of the performer, who holds his right arm so that the wrist rests on the side of the zither parallel with the hitch pins, the thumb being over the finger-board.



No. 1 is only used for passages in double notes and for chords.

The foregoing remarks apply to the *discant* and *concert* zither; the *elegiac* or *bass zither* is of similar construction but larger, and is a transposing instrument, having the same notation as the former, the real sounds being a fourth lower. These zithers are the favourite instruments of the peasants in the Swiss and Bavarian highlands, and are sometimes seen in the concert halls of north and western Germany. The *Streichzither*, or bowed zither, has a body of heart- or pear-shape similar to that of the cittern, but without the long neck of the latter. The finger-board covers the whole of the sound-board with the exception of a few inches at the tapering end, which is finished off with a raised nut or bridge, the bow being applied in the centre of this gap. The bowed zither has little feet and is placed on a table when being played. There are four strings corresponding to those of the violin or viola, but the tone is nasal and glassy.

The spelling of the word with a " Z " had already become usual in the early 17th century, for, although the instrument described above did not then exist, *Cither* was the name by which the cittern was known in Germany, and Michael Praetorius, writing in 1618, spells it with both " C " and " Z."

ZITTAU, a town of Germany, in the kingdom of Saxony, on the left bank of the Mandau, near its confluence with the Neisse, close to the Bohemian and Silesian frontier, 25 m. by rail S.E. of Bautzen, 48 E.S.E. of Dresden and at the junction of lines to Reichenberg (in Bohemia), Eibau and Hermsdorf. Pop. (1905) 34,706. The town hall dates from 1844, and contains a beautiful hall with rich stained glass windows. Among the six Evangelical churches, the following are noticeable: that of St John, rebuilt in 1834-37, with twin spires, and the church of St Peter and St Paul, with its elegant tower, which formerly belonged to an old Franciscan monastery. The latter was restored in 1882 and part of it fitted up as an historical museum. Another wing of this building contains the municipal library of 40,000 volumes and valuable manuscripts. Zittau is well equipped with schools, including a gymnasium and a commercial school, which are both accommodated in the Johanneum, and several technical institutions. There are also a theatre, well-equipped public baths and a richly endowed hospital. Zittau is one of the chief manufacturing towns of Saxony. The leading branch of industry is linen and damask weaving; but woollen stuffs, trimmings, &c., are also produced in the factories of the town, and in the surrounding weaving villages, sixty-six of which, with 113,455 (1900) inhabitants, are included in the municipal jurisdiction. The corporation owns valuable forests on the mountains of Upper Lusatia and other estates, the annual income of which is about £15,000. There are various steam-mills, iron-foundries, brick-fields and potteries near the town, and extensive deposits of lignite.

Zittau is of Wendish origin (Chytawa is its Wendish name), and was made a town by Ottocar II. of Bohemia. It was one of the six towns of the Lusatian League (1346), at which period it belonged to Bohemia. It suffered severely in the Hussite wars and in the Thirty Years' War, and was bombarded and burnt by the Austrians in 1757 during the Seven Years' War, The musical composer Marschner (1795-1861) was born at Zittau.

See Carpzov, *Analecta fastorum Zittaviensium* (Leipzig, 1716); *Moschkau, Zittau und seine Umgebung* (5th ed., Zittau, 1893); and Lamprecht, *Wegweiser durch Zittau und das Zittauer Gebirge* (Zittau, 1901).

ZITTEL, KARL ALFRED VON (1839-1904), German palaeontologist, was born at Bahlingen in Baden on the 25th of September 1839. He was educated at Heidelberg, Paris and Vienna. For a short period he served on the Geological Survey of Austria, and as assistant in the mineralogical museum at Vienna. In 1863 he became teacher of geology and mineralogy in the polytechnic at Carlsruhe, and three years later he succeeded Oppel as professor of palaeontology in the university of Munich, with the charge of the state collection of fossils. In 1880 he was appointed to the geological professorship, and eventually to the directorship of the natural history museum of Munich. His earlier work comprised a monograph on the Cretaceous bivalve mollusca of Gosau (1863-66); and an essay on the Tithonian stage (1870), regarded as equivalent to the Purbeck and Wealden formations. In 1873-74 he accompanied the Rohlfs expedition to the Libyan desert, the primary results of which were published in *Über den geologischen Bau der libyschen Wüste* (1880), and further details in the *Palaeontographica* (1883). Dr Zittel was distinguished for his palaeontological researches. From 1869 until the close of his life he was chief editor of the *Palaeontographica* (founded in 1846 by W. Dunker and H. von Meyer). In 1876 he commenced the publication of his great work, *Handbuch der Palaeontologie*, which was completed in 1893 in five volumes, the fifth volume on palaeobotany being prepared by W. P. Schimper and A. Schenk. To make his work as trustworthy as possible Dr Zittel made special studies of each great group, commencing with the fossil sponges, on which he published a monograph (1877-79). In 1895 he issued a summary of his larger work entitled *Grundzüge der Palaeontologie* (ed. 2, part 1, *Invertebrata*, revised by Dr Zittel in 1903; the American edition of 1900 by C. R. Eastman is so revised, sometimes in opposition to Zittel's views, as to be practically an independent work). He was author of *Aus der Urzeit* (1873, ed. 2, 1875); and *Die Sahara* (1883). In 1899 he published *Geschichte der Geologie und Palaeontologie bis Ende des* 19 *Jahrhunderts*, a monumental history of the progress of geological science (Eng. trans., Mrs Maria M. Ogilvie-Gordon, 1901). Dr Zittel was from 1899 president of the Royal Bavarian Academy of Sciences, and in 1894 he was awarded the Wollaston medal by the Geological Society of London. He died on the 5th of January 1904.

Obituary with portrait and bibliography, by Dr F. L. Kitchin, *Geol. Mag.* (February 1904).

ŽIŽKA, JOHN (*c.* 1376–1424), Bohemian general and Hussite leader, was born at Trocnov in Bohemia, of a family which belonged to the gentry. He took part in the civil wars in Bohemia in the reign of Wenceslaus IV., during which he lost one eye in a skirmish. He was from his youth connected with the court, and held the office of chamberlain to Queen Sophia. Žižka's name first became prominent when the Hussite movement began. When in 1419 a Hussite procession was stoned at Prague from the town hall, Žižka headed those who threw the town councillors from its windows. When a temporary armistice was concluded between the partisans of King Sigismund and the citizens of Prague, Žižka marched to Plzeň (Pilsen) with his followers, but soon left that city, and, after defeating at Sudomer the partisans of Sigismund, arrived at Tabor, the newly founded stronghold of the advanced Hussites. Žižka took a large part in the organization of the new military community and became one of the four captains of the people (*hejtmane*) who were at its head. Meanwhile Sigismund, king of the Germans and king of Hungary, invaded Bohemia, claiming the crown as the heir of his brother Wenceslaus. Menaced by Sigismund, the citizens of Prague entreated the Taborites for assistance. Led by Žižka and their other captains, the Taborites set out to take part in the defence of the capital. At Prague Žižka and his men took up a strong position on the hill then known as the Vitkov, on the spot where Žižkov, a suburb of Prague, now stands. At the end of June (1420) the siege of the city began, and on the 14th of July the armies of Sigismund made a general attack. A strong German force assaulted the position on the Vitkov which secured the Hussite communications with the open country. Mainly through the heroism of Žižka, the attack was repulsed, and the forces of Sigismund abandoned the siege. Shortly afterwards (August 22, 1420) the Taborites left Prague and returned to Tabor. Žižka was now engaged in constant warfare with the partisans of Sigismund, particularly with the powerful Romanist, Ulrich of Rosenberg. By this struggle, in which Žižka was invariably successful, the Hussites obtained possession of the greatest part of Bohemia, which Sigismund now left for a time. It was proposed to elect a Polish prince to the throne; but meanwhile the estates of Bohemia and Moravia, who met at Časlav on the 1st of June 1421, decided to appoint a provisional government, consisting of twenty members chosen from all the political and religious parties of the country, Žižka, who took part in the deliberations at Časlav, being elected as one of the two representatives of Tabor. He summarily suppressed some disturbances on the part of a fanatical sect called the Adamites. He continued his campaigns against the Romanists and adherents of Sigismund; and having captured a small castle near Litoměřice (Leitmeritz) he retained possession of it—the only reward for his great services that he ever received or claimed. According to the Hussite custom he gave the biblical name of "Chalice" to this new possession, and henceforth adopted the signature of "Žižka of the Chalice." Later, in 1421, he was severely wounded while besieging the castle of Rábi, and lost the use of his remaining eye. Though now totally blind, he continued to command the armies of Tabor. At the end of 1421 Sigismund, again attempting to subdue Bohemia, obtained possession of the important town of Kutna Hora (Kuttenberg). Žižka, who was at the head of the united armies of Tabor and Prague, at first retreated to Kolin; but after having received reinforcements he attacked and defeated Sigismund's army at the village of Nebovid between Kolin and Kutna Hora (January 6, 1422). Sigismund lost 12,000 men and only escaped himself by rapid flight. Sigismund's forces made a last stand at Nĕmecky Brod (Deutschbrod) on the 10th of January, but the city was stormed by the Bohemians, and, contrary to Žižka's orders, its defenders were put to the sword. Early in 1423 internal dissensions among the Hussites led to civil war. Žižka, as leader of the Taborites, defeated the men of Prague and the Utraquist nobles at Hōric on the 27th of April; but shortly afterwards the news that a new crusade against Bohemia was [illegible] induced the Hussites to conclude an armistice at Konopist on the 24th of June 1423. As soon, however, as the so-called crusaders had dispersed without even attempting to enter Bohemia, the internal dissensions broke out afresh. During his temporary rule over Bohemia Prince Sigismund Korybutovič of Poland had appointed as governor of the city of Králové Hradec (Königgrätz) Borek, lord of Miletinek, who belonged to the moderate Hussite, the so-called Utraquist, party. After the departure of the Polish prince the city of Králové Hradec, in which the democratic party now obtained the upper hand, refused to recognize Borek as its ruler, and called Žižka to its aid. He acceded to the demand and defeated the Utraquists under Borek at the farm of Strachov, near the city of Králové Hradec (August 4, 1423). Žižka now attempted to invade Hungary, which was under the rule of his old enemy King Sigismund. Though this Hungarian campaign was unsuccessful owing to the great superiority of the Hungarians, it ranks among the greatest military exploits of Žižka, on account of the skill he displayed in retreat. In 1424, civil war having again broken out in Bohemia, Žižka decisively defeated the Praguers and Utraquist nobles at Skalic on the 6th of January, and at Malesov on the 7th of June. In September he marched on Prague, but on the 14th of that month peace was concluded between the Hussite parties through the influence of John of Rokycan, afterwards Utraquist archbishop of Prague. It was agreed that the now reunited Hussites should attack Moravia, part of which country was still held by Sigismund's partisans, and that Žižka should be the leader in this campaign. But he died of the plague at Pribyslav (October 11, 1424) before reaching the Moravian frontier.

See Count Lützow, *Bohemia: an Historical Sketch* (London, 1896); Louis Léger, *Jean Žižka* in "*Nouvelles études Slaves*," *deuxième série* (Paris, 1886), the best account of Žižka's career for those unacquainted with the Bohemian language; Tomek, *Jan Žižka*, and *Dějepis Mesta Prahy;* Palacky, *History of Bohemia.* Žižka is the hero of a novel by George Sand, of a German epic by Meissner, and of a Bohemian tragedy by Alois Jirasek. (L.)

ZLATOUST, a town of Russia, in the government of Ufa, close to the river Ufa, in a picturesque valley of the middle Urals, 1925 ft. above sea level, 199 m. by rail E.N.E. of the town of Ufa. Pop. 20,973. The town has a first-class meteorological and magnetical observatory, a cathedral and a museum; it is the seat of the mining administration for the Zlatoust district, and has a brisk trade in agricultural produce and manufactured wares.

ZNAIM (Czech *Znojmo*), a town of Austria, in Moravia, 50 m. S.W. of Brünn by rail. Pop. (1900) 16,261, mostly German. It is picturesquely situated on the left bank of the Thaya. The site of the former fortifications is occupied by a promenade. The Räuberturm is a relic of the old castle of the margraves of Moravia; the round castle-chapel, known as the heathen temple (Heiden-Tempel), in the Romanesque style of the 12th century, was at one time considered the most ancient building in Moravia. The Gothic church of St Nicholas was built about 1348 by the emperor Charles IV.; the town house, with a Gothic tower, 250 ft. high, dates from about 1446. The ancient and once powerful Premonstratensian abbey of Bruck, east of the town, is now occupied as barracks.

The present town of Znaim was founded in 1226 by Ottacar I. of Bohemia on the site of Znojmo, the ancient capital of the tributary margraves of Moravia, which had been destroyed in 1145. Znaim is best known to history for the armistice concluded here in 1809 after the battle of Wagram between Napoléon I. and the archduke Charles. In 1866 the Prussians occupied the town from July 13th till September 3rd. The novelist Karl Postl (1793–1864), who wrote under the pseudonym of Charles Sealsfield, was born at Poppitz, 2¾ m. S.W.

ZOBEIR RAHAMA (1830–), Egyptian pasha and Sudanese governor, came of the Gemaab section of the Jaalin, and was a member of a family which claims descent from the Koreish tribe through Abbas, uncle of Mahomet. He became prominent as the most energetic and intelligent of the Arab ivory and slave traders who about 1860 established themselves on the White Nile and in the Bahr-el-Ghazal. Nominally a subject of Egypt, he raised an army of several thousand well-armed blacks and became a dangerous rival to the Egyptian authorities. At the height of his power Zobeir was visited (1871) by Georg Schweinfurth, who found him "surrounded with a court which was little less than princely in its details" (*Heart of Africa*, vol. ii., chap. xv.). In 1869 an expedition sent from Khartum into the Bahr-el-Ghazal was attacked by Zobeir and completely defeated, its commander being slain. Zobeir represented that he was blameless in this matter, received a "pardon," and was himself appointed governor of the Bahr-el-Ghazal, where he was practically independent. In 1873 he attacked the sultan of Darfur, and the khedive Ismail gave him the rank of bey and sent troops to co-operate. After he had conquered Darfur (1874), Zobeir was made a pasha, but he claimed the more substantial reward of being made governor-general of the new province, and went to Cairo in the spring of 1876 to press his title. He was now in the power of the Egyptian authorities, who prevented his return, though he was allowed to go to Constantinople at the outbreak of the Russo-Turkish War. In 1878, however, his son Suleiman, having got possession of the Bahr-el-Ghazal, and acting on instructions from his father, defied the authority of General Gordon, the new governor-general of the Sudan. Gordon sent Romolo Gessi against Suleiman, who was subdued after an arduous campaign and executed. During the campaign Zobeir offered, if he were allowed to return to the Sudan, to restore order and to pay a revenue of £25,000 a year to the khedive. Gordon declined this help, and subsequently, for his instigation of the revolt, Zobeir was condemned to death, but the trial was a farce, the sentence was remitted, and he remained at Cairo, now in high favour with the khedival court. In March 1884, Gordon, who had been sent to Khartum to effect, if possible, the relief of the Egyptian garrisons in the Sudan, astonished Europe by requesting that Zobeir, whose son he had overthrown and whose trade he had ruined, should be sent to Khartum as his successor.[1] Zobeir, described by Sir Reginald Wingate, who knew him well, as "a quiet, far-seeing, thoughtful man of iron will—a born ruler of men" (*Mahdiism and the Egyptian Sudan*, book v.), might have been able to stem the mahdist movement. But to reinstate the notorious slave-dealer was regarded in London as too perilous an expedient, even in the extreme circumstances then existing, although Colonel Stewart (Gordon's companion in Khartum), Sir Evelyn Baring and Nubar Pasha in Cairo, and Queen Victoria and Mr Gladstone, all favoured such a course. In March 1885 Zobeir was arrested in Cairo by order of the British government for treasonable correspondence with the mahdi and other enemies of Egypt, and was interned at Gibraltar. In August 1887 he was allowed to return to Cairo, and after the reconquest of the Sudan was permitted (1899) to settle in his native country. He established himself on his estates at Geili, some 30 m. N. of Khartum.

See GORDON, CHARLES GEORGE, and the authorities there cited.

ZODIAC (ὁ ζωδιακὸς κύκλος, from ζῴδιον, "a little animal"), in astronomy and astrology, an imaginary zone of the heavens within which lie the paths of the sun, moon and principal planets. It is bounded by two circles equidistant from the ecliptic, about eighteen degrees apart; and it is divided into twelve signs, and marked by twelve constellations. These twelve constellations, with the symbols of the signs which correspond to them, are as follows:—

Aries, the Ram	♈	Libra, the Balance	♎
Taurus, the Bull	♉	Scorpio, the Scorpion	♏
Gemini, the Twins	♊	Sagittarius, the Archer	♐
Cancer, the Crab	♋	Capricornus, the Goat	♑
Leo, the Lion	♌	Aquarius, the Water-carrier	♒
Virgo, the Virgin	♍	Pisces, the Fishes	♓

The signs—the Greek δωδεκατημόρια—are geometrical divisions thirty degrees in extent, counted from the spring equinox in the direction of the sun's progress through them. The whole series accordingly shifts westward through the effect of precession by about one degree in seventy-two years. At the moment of crossing the equator towards the north the sun is said to be at the first point of Aries; some thirty days later it enters Taurus, and so on through Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius and Pisces. The constellations bearing the same names coincided approximately in position, when Hipparchus observed them at Rhodes, with the divisions they designate. The discrepancy now, however, amounts to the entire breadth of a sign, the sun's path in Aries lying among the stars of Pisces, in Taurus among those of Aries, &c.

Assyria and Babylonia.—The twelvefold division of the zodiac was evidently suggested by the occurrence of twelve full moons in successive parts of it in the course of each year. This approximate relation was first systematically developed by the early inhabitants of Mesopotamia, and formed the starting-point for all their divisions of time. As the year separated, as it were of itself, into twelve months, so the day was divided into twelve "double hours," and the great cosmical period of 43,200 years into twelve "sars." Each sar, month and hour was represented at once visibly and symbolically by a twelfth part of the "furrow" drawn by the solar Bull across the heavens. The idea of tracing the sun's path among the stars was, when it occurred to Chaldaean astronomers, an original and, relatively to their means, a recondite one. We owe to its realization by them the constitution and nomenclature of the twelve signs of the zodiac. Assyrian cylinders and inscriptions indicate for the familiar series of our text-books an antiquity of some four thousand years. Ages before Assur-bani-pal reigned at Nineveh the eighth month (Marchesvan) was known as "the month of the star of the Scorpion," the tenth (Tebet) belonged to the "star of the Goat," the twelfth (Adar) to the "star of the Fish of Ea."[2] The motive underlying the choice of symbols is in a few cases obvious, but in most remains conjectural. The attributes of the deities appointed to preside over the months and signs were to some extent influential. Two of them, indeed, took direct possession of their respective portions of the sky. The zodiacal Virgo is held to represent the Assyrian Venus, Ishtar, the ruling divinity of the sixth month, and Sagittarius the archer-god Nergal, to whom the ninth month was dedicated. But no uniform system of selection was pursued, or rather perhaps the results of several systems, adopted at various epochs, and under the influence of varying currents of ideas, became amalgamated in the final series.

Aries.

This, there is reason to believe, was the upshot of a prehistoric reform. So far as positive records go, Aries was always the first sign. But the arrangement is, on the face of it, a comparatively modern one. None of the brighter stars of the constellation could be said even roughly to mark the equinox much before 1800 B.C.; during a long stretch of previous time the leading position belonged to the stars of Taurus.[3] Numerous indications accordingly point to a corresponding primitive zodiac. Setting aside as doubtful evidence derived from interpretations of cuneiform inscriptions, we meet, in connexion with Mithraic and Mylittic legends, reminiscences of a zodiac and religious calendar in which the Bull led the way.[4] Virgil's

> Candidus auratis aperit cum cornibus annum
> Taurus

perpetuates the tradition. And the Pleiades continued, within historical memory, to be the first asterism of the *lunar* zodiac.

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[1] Gordon and Zobeir met in Cairo on the 25th and 26th of January (see *Egypt No.* 12 of 1884) and Gordon from that time onward asked for Zobeir's help. It was not, however, until the 10th of March that his wish was made public, in a telegram from Khartum published in *The Times*.

[2] Lenormant, *Origines de l'Histoire*, i. 236.

[3] The possibility should not, however, be overlooked that the "stars of the months" were determined by their heliacal risings (see Bosanquet and Sayce on Babylonian astronomy, in *Monthly Notices Roy. Astr. Soc.* xl. 117). This would give a further extension backwards of over 1000 years, during which the equinox might have occurred in the month of the Ram.

[4] J. B. F. Lajard, *Recherches sur le Culte de Mithra*, p. 605.

In the Chaldaean signs fragments of several distinct strata of thought appear to be embedded. From one point of view they shadow out the great epic of the destinies of the human race, again, the universal solar myth claims a share in them, hoary traditions were brought into *ex post facto* connexion with them, or they served to commemorate simple meteorological and astronomical facts.

The first Babylonian month Nisan, dedicated to Anu and Bel, was that of "sacrifice", and its association with the Ram as the chief primitive object of sacrifice is thus intelligible.[1] According to an alternative explanation, the heavenly Ram, placed as leader in front of the flock of the stars, merely embodied a spontaneous figure of the popular imagination. An antique persuasion, that the grand cycle of creation opened under the first sign, has been transmitted to modern cognizance by Dante (*Inf.* i. 38). ***Taurus.*** The human race, on the other hand, was supposed to have come into being under Taurus. The solar interpretation of the sign goes back to the far-off time when the year began with Taurus, and the sun was conceived of as a bull entering upon the great furrow of heaven as he ploughed his way among the stars. ***Gemini.*** In the third month and sign the building of the first city and the fratricidal brothers—the Romulus and Remus of Roman legend—were brought to mind. The appropriate symbol was at first indifferently a pile of bricks or two male children, always on early monuments placed feet to feet. ***Cancer.*** The retrograde movement of a crab typified, by an easy association of ideas, the retreat of the sun from his farthest northern excursion, and Cancer was constituted the sign of the summer solstice. ***Leo.*** The Lion, as the symbol of fire, represented the culmination of the solar heat. ***Virgo.*** In the sixth month, the descent of Ishtar to Hades in search of her lost husband Tammuz was celebrated, and the sign of the Virgin had thus a purely mythological signification.

The history of the seventh sign is somewhat complicated. The earlier Greek writers—Eudoxus, Eratosthenes, Hipparchus—knew of only eleven zodiacal symbols, but made one do double duty, extending the Scorpion across the seventh and eighth divisions. ***Libra and Scorpio.*** The Balance, obviously indicating the equality of day and night, is first mentioned as the sign of the autumnal equinox by Geminus and Varro, and obtained, through Sosigenes of Alexandria, official recognition in the Julian calendar. Nevertheless, Virgil (*Georg.* i. 32) regarded the space it presided over as so much waste land, provisionally occupied by the "Claws" of the Scorpion, but readily available for the apotheosis of Augustus. Libra was not of Greek invention. Ptolemy, who himself chiefly used the "Claws" (Χηλαί), speaks of it as a distinctively Chaldaean sign;[2] and it occurs as an extra-zodiacal asterism in the Chinese sphere. An ancient Chinese law, moreover, prescribed the regularization of weights and measures at the *spring* equinox.[3] No representation of the seventh sign has yet been discovered on any Euphratean monument; but it is noticeable that the eighth is frequently doubled,[4] and it is difficult to avoid seeing in the pair of zodiacal scorpions carved on Assyrian cylinders the prototype of the Greek scorpion and claws. Both Libra and the sign it eventually superseded thus owned a Chaldaean birthplace. The struggle of rival systems of nomenclature, from which our zodiacal series resulted, is plainly visible in their alternations; and the claims of the competing signs were long sought to be conciliated by representing the Balance as held between the claws of the Scorpion.

The definitive decline of the sun's power after the autumnal equinox was typified by placing a Scorpion as the symbol of darkness in the eighth sign. ***Sagittarius.*** Sagittarius, figured later as a Centaur, stood for the Babylonian Mars. ***Capricornus.*** Capricornus the sign of the winter solstice, is plausibly connected with the caprine nurse of the young solar god in Oriental legends, of which that of Zeus and Amalthia is a variant.[5] The fish-tailed Goat of the zodiac presents a close analogy with the Mexican calendar sign Cipactli, a kind of marine monster resembling a narwhal.[6] ***Aquarius.*** Aquarius is a still more exclusively meteorological sign than Leo. The eleventh month was known in Euphratean regions as that of "want and rain." The deluge was traditionally associated with it. It was represented in zodiacal symbolism by the god Ramman, crowned with a tiara and pouring water from a vase, or more generally by the vase and water without the god. ***Pisces.*** The resumption of agricultural labours after the deluge was commemorated in the twelfth month, and a mystical association of the fishes, which were its sign, with the life after death is evident in a monument of Assyrian origin described by Clermont-Ganneau, showing a corpse guarded by a pair of fish-gods.[7] The doubling of the sign of Pisces still recalls, according to Sayce,[8] the arrangement of the Babylonian calendar, in which a year of 360 days was supplemented once in six years by a thirteenth month, a second Adar. To the double month corresponded the double sign of the "Fishes of Hea."[9]

Cyclical Meaning of the Succession of Signs.—The cyclical meaning of the succession of zodiacal signs, though now obscured by interpolations and substitutions, was probably once clear and entire. It is curiously reflected in the adventures of the Babylonian Hercules, the solar hero Gilgamesh (see GILGAMESH, EPIC OF). They were recorded in the comparatively late surviving version of the 7th century B.C., on twelve tablets, with an obvious design of correlation with the twelve divisions of the sun's annual course. Gilgamesh's conquest of the divine bull was placed under Taurus; his slaying of the tyrant Khumbaba (the prototype of Geryon) in the fifth month typified the victory of light over darkness, represented in plastic art by the group of a lion killing a bull, which is the form ordinarily given to the sign Leo on Ninevite cylinders.[10] The wooing of Ishtar by the hero of the epic falls under Virgo, and his encounter with two scorpion men, guardians of the rising and the setting sun, under Scorpio. The eleventh tablet narrates the deluge; the twelfth associates the apotheosis of Eabani with the zodiacal emblems of the resurrection.

In the formation of the constellations of the zodiac little regard was paid to stellar configurations. The Chaldaeans chose three stars in each sign to be the "councillor gods" of the planets.[11] These were called by the Greeks "decans," because ten degrees of the ecliptic and ten days of the year were presided over by each. The college of the decans was conceived as moving, by their annual risings and settings, in an "eternal circuit" between the infernal and supernal regions. Modern asterisms first appear in the *Phaenomena* of Eudoxus about 370 B.C. But Eudoxus, there is reason to believe, consulted, not the heavens, but a celestial globe of an anterior epoch, on which the stars and the signs were forced into unnatural agreement. The representation thus handed down (in the verses of Aratus) has been thought to tally best with the state of the sky about 2000 B.C.;[12] and the mention of a pole-star, for which Eudoxus was rebuked by Hipparchus, seems, as W. T. Lynn pointed out,[13] to refer to the time when α Draconis stood near the pole. The data afforded by Eudoxus, however, are far too vague to serve as the basis of any chronological conclusion.

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[1] Sayce, *Transactions of the Society of Biblical Archaeology*, iii. 162.

[2] In citing a Chaldaean observation of Mercury dating from 235 B.C. (*Almagest*, ii. 170, ed. Halma).

[3] See *Uranographie Chinoise*, by Gustav Schlegel, who, however, claims an extravagant antiquity for the Chinese constellational system.

[4] Lenormant, *Origines*, i. 267.

[5] Lenormant, *Origines*, i. 267.

[6] Humboldt, *Vues des Cordillères* (1810), p. 157.

[7] *Rev. Archéol.* (1879), p. 344.

[8] *Trans. Soc. Bibl Archaeol.*, iii. 166.

[9] The god Ea or Hea, the Oannes of Berossus, equivalent to the fish-god Dagon, came to the rescue of the protagonist in the Chaldaean drama of the deluge.

[10] Lenormant, *Origines*, i. 240.

[11] Diod. Sic., *Hist.*, ii. 30, where, however, by an obvious mistake the number of "councillor gods" is stated at only thirty.

[12] R. Brown, *Babylonian Record*, No. 3, p. 34.

[13] *Babylonian Record*, No. 5, p. 79.

Egyptian Zodiacal Signs.—The Egyptians adopted from the Greeks, with considerable modifications of its attendant symbolism, the twelve-fold division of the zodiac. Aries became the Fleece; two Sprouting Plants, typifying equality or resemblance, stood for Gemini; Cancer was re-named Scarabaeus; Leo was converted, from the axe-like configuration of its chief stars, into the Knife: Libra into the Mountain of the Sun, a reminiscence, apparently, of the Euphratean association of the seventh month with a "holy mound," designating the biblical tower of Babel. A Serpent was the Egyptian equivalent of Scorpio; the Arrow only of Sagittarius was retained; Capricornus became "Life," or a Mirror as an image of life; Aquarius survived as Water; Taurus, Virgo and Pisces remained unchanged.[1] The motive of some of the substitutions was to avoid the confusion which must have ensued from the duplication of previously existing native asterisms; thus, the Egyptian and Greek Lions were composed of totally different stars. Abstractions in other cases replaced concrete objects, with the general result of effacing the distinctive character of the Greek zodiac as a "circle of living things."

Spread of Greek System.—Early Zoroastrian writings, though impregnated with star-worship, show no traces of an attempt to organize the heavenly array. In the *Bundahish*, however (9th century), the twelve "Akhtārs," designated by the same names as our signs, lead the army of Ormăzd, while the seven "Awakhtārs" or planets (including a meteor and a comet) fight for Ahriman. The knowledge of the solar zodiac thus turned to account for dualistic purposes was undoubtedly derived from the Greeks. By them, too, it was introduced into Hindustan. Āryabhaṭa, about the beginning of the Christian era, reckoned by the same signs as Hipparchus. They were transmitted from India by Buddhist missionaries to China, but remained in abeyance until the Jesuit reform of Chinese astronomy in the 17th century.

Chinese Zodiacal Signs.—The native Chinese zodiacal system was of unexampled complexity. Besides divisions into twenty-eight and twenty-four parts, it included two distinct duodenary series. The *tse* or "stations" were referred by E. C. Biot to the date 1111 B.C. Measured from the winter solstice of that epoch, they corresponded, in conformity with the Chinese method of observation by intervals of what we now call right ascension, to equal portions of the celestial equator.[2] Projected upon the ecliptic, these were considerably unequal, and the *tse* accordingly differed essentially from the Chaldaean and Greek signs. Their use was chiefly astrological, and their highly figurative names—"Great Splendour," "Immense Void," "Fire of the Phoenix," &c.—had reference to no particular stars. They became virtually merged in the European series, stamped with official recognition over two centuries ago. The twenty-four *tsieki* or demi-*tse* were probably invented to mark the course of weather changes throughout the year. Their appellations are purely meteorological.

The characteristic Chinese mode of dividing the "yellow road" of the sun was, however, by the twelve "cyclical animals"—Rat, Ox, Tiger, Hare, Dragon or Crocodile, Serpent, Horse, Sheep, Monkey, Hen, Dog, Pig. The opening sign corresponds to our Aquarius, and it is remarkable that the rat is, in the far East, frequently used as an ideograph for "water." But here the agreement ceases. For the Chinese series has the strange peculiarity of proceeding in a retrograde direction or *against* the course of the sun. Thus, the second sign (of the Ox) occupies the position of Capricorn, the third that of Sagittarius, and so on. The explanation of this seeming anomaly is to be found in the primitive destination of the "animals" to the purposes of an "horary zodiac." Their succession, established to mark the hours of day and night, was not unnaturally associated with the diurnal revolution of the sphere from east to west.[3] They are unquestionably of native origin. Tradition ascribes their invention to Tajao, minister of the emperor Hwang-ti, who reigned *c.* 2697 B.C., and it can scarcely be placed later than the 7th century B.C.[4]

The Chinese circle of the "animals" obtained early a wide diffusion. It was adopted by Tatars, Turks and Mongols, in Tibet and Tong-king, Japan and Korea. It is denominated by Humboldt[5] the "zodiac of hunters and shepherds," and he adds that the presence in it of a tiger gives it an exclusively Asiatic character. It appears never to have been designed for astronomical employment. From the first it served to characterize the divisions of time. The nomenclature not only of the hours of the day and of their minutest intervals was supplied by it, but of the months of the year, of the years in the Oriental sixty-year cycle, and of the days in the "little cycle" of twelve days. Nor has it yet fallen into desuetude. Years "of the Rat," "of the Tiger," "of the Pig," still figure in the almanacs of Central Asia, Cochin China and Japan.

Aztec Zodiacal Signs.—A large detachment of the "cyclical animals" even found its way to the New World. Seven of the twenty days constituting the Aztec month bore names evidently borrowed from those of the Chinese horary signs. The Hare (or Rabbit), Monkey, Dog and Serpent reappeared without change; for the Tiger, Crocodile and Hen, unknown in America, the Ocelot, Lizard and Eagle were substituted as analogous.[6] The Aztec calendar dated from the 7th century; but the zodiacal tradition embodied by it was doubtless much more ancient. Of the zodiac in its true sense of a partitioned belt of the sphere there was no aboriginal knowledge on the American continent. Mexican acquaintance with the signs related only to their secondary function as dies (so to speak) with which to stamp recurring intervals of time.

Lunar Zodiac.—The *synodical* revolution of the moon laid down the lines of the solar, its *sidereal* revolution those of the lunar zodiac. The first was a circlet of "full moons"; the second marked the diurnal stages of the lunar progress round the sky, from and back again to any selected star. The moon was the earliest "measurer" both of time and space; but its services can scarcely have been rendered available until stellar "milestones" were established at suitable points along its path. Such were the Hindu *nakshatras*, a word originally signifying stars in general, but appropriated to designate certain small stellar groups marking the divisions of the lunar track. They exhibit in an exaggerated form the irregularities of distribution visible in our zodiacal constellations, and present the further anomaly of being frequently reckoned as twenty-eight in number, while the ecliptical arcs they characterize are invariably twenty-seven. Now, since the moon revolves round the earth in 27⅓ days, hesitation between the two full numbers might easily arise; yet the real explanation of the difficulty appears to be different. The superfluous asterism, named *Abhijit*, included the bright star α Lyrae, under whose influence the gods had vanquished the Asuras. Its invocation with the other *nakshatras*, remoteness from the ecliptic notwithstanding, was thus due (according to Max Müller's plausible conjecture)[7] to its being regarded as of especially good omen. Acquaintance with foreign systems of twenty-eight lunar divisions tended doubtless to fix its position, which remained, nevertheless, always equivocal.[8] Alternately admitted into or rejected from the series, it was finally, some six or seven centuries ago, eliminated by the effects of precession in reversing the order of culmination of its limiting stars.

The notion of a twenty-seven-fold division of the zodiac was deeply rooted in Hindu tradition. The number and the name were in early times almost synonymous. Thus a *nakshatra-mālā* denoted a necklace of twenty-seven pearls;[1] and the fundamental equality of the parts was figured in an ancient legend, by the compulsion laid upon King Soma (the Moon) to share his time impartially between all his wives, the twenty-seven daughters of Prajâpati. Everything points to a native origin for the system of *nakshatras*. Some were named after exclusively Vedic deities; they formed the basis of the sacrificial calendar of the Brahmins; the old Indian names of the months were derived from them; their existence was pre-supposed in the entire structure of Hindu ritual and science.[2] They do not, however, obtain full recognition in Sanskrit literature until the Brâhmana period (7th or 8th century B.C.). The *Rig-Veda* contains only one allusion to them, where it is said that "Soma is placed in the lap of the *nakshatras*"; and this is in a part including later interpolations.

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[1] Brugsch, *Z. D. M. G.*, ix. 513.

[2] Biot, *Journ. des Savans*, 1839, p. 729, and 1840, p. 151; Gaubil, *Hist. de l'Astr. Chinoise*, p. 9.

[3] Humboldt, *Vues des Cordillères*, p. 168.

[4] G. Schlegel, *Ur. Chin.*, pp. 37, 561.

[5] *Op. cit.*, p. 219.

[6] *Ibid.*, p. 152; Prescott, *Conquest of Mexico*, iii. 321 (ed. 1860).

[7] *Rig-Veda Samhita*, vol. iv. (1862), Preface, p. lxii.

[8] Whitney, *Journ. Am. Orient. Soc.*, viii. 394.

Positive proof of the high antiquity of the Hindu lunar zodiac is nevertheless afforded by the undoubted fact that the primitive series opened with Krittikâ (the Pleiades) as the sign of the vernal equinox. The arrangement would have been correct about 2300 B.C.; it would scarcely have been possible after 1800 B.C.[3] We find nowhere else a well-authenticated zodiacal sequence corresponding to so early a date. The reform by which Krittikâ, now relegated to the third place, was superseded as the head of the series by "Açvini"[4] was accomplished under Greek influence somewhere near the beginning of the Christian era. For purposes of ritual, however, the Pleiades, with Agni or "Fire" as their presiding deity, continued to be the first sign. Hindu astronomy received its first definite organization in the 6th century, with results embodied in the *Sûrya-Siddhânta*. Here the "signs" and the "constellations" of the lunar zodiac form two essentially distinct systems. The ecliptic is divided into twenty-seven equal parts, called *bhogas* or arcs, of 800′ each. But the *nakshatras* are twenty-eight, and are represented by as many "junction stars" (*yogatâra*), carefully determined by their spherical co-ordinates. The successive entries of the moon and planets into the *nakshatras* (the ascertainment of which was of great astrological importance) were fixed by means of their conjunctions with the *yogatâras*. These, however, soon ceased to be observed, and already in the 11th century, al-Bîrûnî could meet with no Hindu astronomer capable of pointing out to him the complete series. Their successful identification by Colebrooke[5] in 1807 had a purely archaeological interest. The modern *nakshatras* are twenty-seven equal ecliptical divisions, the origin of which shifts, like that of the solar signs, with the vernal equinox. They are, in fact, the *bhogas* of the *Sûrya-Siddhânta*. The mean place of the moon in them, published in all Hindu almanacs, is found to serve unexceptionally the ends of astral vaticination.[6]

The system upon which it is founded is of great antiquity. Belief in the power of the *nakshatras* evidently inspired the invocations of them in the *Atharva-Veda*. In the Brâhmana period they were distinguished as "deva" and "yama," the fourteen lucky asterisms being probably associated with the waxing, the fourteen unlucky with the waning moon.[7] A special *nakshatra* was appropriated to every occurrence of life. One was propitious to marriage, another to entrance upon school-life, a third to the first ploughing, a fourth to laying the foundation of a house. Festivals for the dead were appointed to be held under those that included but one star. Propitiatory abstinences were recommended when the natal asterism was menaced by unfavourable planetary conjunctions. The various members of the body were parcelled out among the *nakshatras*, and a rotation of food was prescribed as a wholesome accompaniment of the moon's revolution among them.[8]

The nomenclature of the Hindu signs of the zodiac, save as regards a few standard asterisms, such as Açvini and Krittikâ, was far from uniform. Considerable discrepancies occur in the lists given by different authorities.[9] Hence it is not surprising to meet in them evidence of foreign communications. Reminiscences of the Greek signs of Gemini, Leo, Libra, Sagittarius, Capricornus and Pisces are obvious severally in the Hindu Two Faces, Lion's Tail, Beam of a Balance, Arrow, Gazelle's Head (figured as a marine nondescript) and Fish. The correspondence does not, however, extend to the stars; and some coincidences adverted to by Humboldt between the *nakshatras* and the zodiacal animals of Central Asia are of the same nominal character.[10] Mexican loans are more remarkable. They were apparently direct as well as indirect. The Aztec calendar includes *nakshatra* titles borrowed, not only through the medium of the Tatar zodiac, but likewise straight from the Indian scheme, apart from any known intervention. The "three footprints of Vishnu," for example, unmistakably gave its name to the Mexican day Ollin, signifying the "track of the sun"; and both series further contain a "flint weapon," a "stick," and a "house."[11] Several houses and couches were ranged along the Hindu zodiac with the naive idea of providing resting-places for the wandering moon.

Relative Antiquity of Hindu, Chinese and Arabian Systems.—Relationship of a more intimate kind connects the Hindu lunar mansions with those of the Arabs and Chinese. The resemblance between the three systems is indeed so close that it has been assumed, almost as axiomatic, that they must have been framed from a single model. It appears nevertheless to have become tolerably clear that the *nakshatras* were both native to India, and the *sieu* to China, but that the *manâzil* were mainly of Indian derivation. The assertion, paradoxical at first sight, that the twenty-eight "hostelries" of the Chinese sphere had nothing to do with the moon's daily motion, seems to convey the actual fact. Their number, as a multiple of four, was prescribed by the quaternary partition of the heavens, fundamental in Chinese astronomy. It was considered by Biot to have been originally twenty-four, but to have been enlarged to twenty-eight about 1100 B.C., by the addition of determinants for the solstices and equinoxes of that period.[12] The essential difference, however, between the *nakshatras* and the *sieu* is that the latter were equatorial, not ecliptical, divisions. They were measured by the meridian-passages of the limiting stars, and varied in amplitude from 2° 42′ to 30° 24′.[13] The use of the specially observed stars constituting or representing the *sieu* was as points of reference for the movements of sun, moon and planets. They served, in fact, and still serve (though with astrological ends in view), the precise purpose of "fundamental stars" in European astronomy. All that is certainly known about the antiquity of the *sieu* is that they were well established in the 3rd century B.C. Their initial point at the autumnal equinox marked by Kio (Spica Virginis) suits a still later date; and there is no valid evidence that the modern series resulted from the rectification of an older superannuated arrangement, analogous to the Krittikâ sequence of *nakshatras*. The Hindu zodiacal constellations belong then to an earlier epoch than the Chinese "stations," such as they have been transmitted to our acquaintance. Yet not only were the latter an independent invention, but it is almost demonstrable that the *nakshatras*, in their more recent organization, were, as far as possible, assimilated to them. The whole system of junction stars was doubtless an imitation of the *sieu*; the choice of them by the Hindu astronomers of the 6th century A.D. was plainly instigated by a consideration of the Chinese list, compiled with a widely different intent. Where they varied from it, some intelligible reason can generally be assigned for the change. Eight junction stars lie quite close to, seven others are actually identical with, Chinese determinants;[14] and many of these coincidences are between insignificant and, for the purposes of ecliptical division, inconveniently situated objects.

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[1] Max Müller, *op. cit.*, p. lxiv.

[2] *Ibid.*, p. 42.

[3] A. Weber, *Indische Studien*. x. 241.

[4] Named from the Açvins, the Hindu Castor and Pollux. It is composed of the stars in the head of Aries, and is figured by a horse's head.

[5] *As. Res.*, ix. 330.

[6] J. B. Biot, *Études sur l'Astronomie Indienne*, p. 225.

[7] A. Weber, "Die Vedischen Nachrichten von den Naxatra," in *Berliner Abhandlungen* (1861), p. 309.

[8] *Ibid.*, p. 322; H. Kern, *Die Yogatara des Varamihira*; Weber's *J*[illegible]–181.

[9] Sir William Jones, *As. Res.*, ii. 294–95.

[10] Humboldt, *Vues des Cordillères*, p. 154.

[11] *Ibid.*, p. 152.

[12] Biot, *Journ. des Savans* (1845), p. 40.

[13] G. Schlegel, *Ur. Chin.*, p. 77.

[14] Biot, *Études*, p. 136.

Arabian Mansions of the Moon.—The small stellar groups characterizing the Arab "mansions of the moon" (*manāzil al-kamār*) were more equably distributed than either the Hindu or Chinese series. They presented, nevertheless, striking resemblances to both. Twenty-four out of twenty-eight were formed, at least in part, of *nakshatra* or *sieu* stars.[1] That the Arab was essentially a copy of the Hindu lunar zodiac can scarcely admit of doubt. They were divided on the same principle; each opened at the spring equinox; the first Arab sign Sharaṭān was strictly equivalent to the Hindu Açvini; and eighteen constellations in each were virtually coincident. The model of the *sieu* was, however, also regarded. Eighteen Chinese determinants were included in the Arab asterisms, and of these five or six were not *nakshatra* stars; consequently, they must have been taken directly from the Chinese series. Nor were the Greek signs without effect in determining the names of the *manāzil*,[2] the late appearance of which, in a complete form, removes all difficulty in accounting for the various foreign influences brought to bear upon them. They were first enumerated by Alfarghāni early in the 9th century, when the Arabs were in astronomy the avowed disciples of the Hindus. But, although they then received perhaps their earliest quasi-scientific organization, the mansions of the moon had for ages previously figured in the popular lore of the Bedouin. A set of twenty-eight rhymes associated their heliacal risings with the changes of season and the vicissitudes of nomad life; their settings were of meteorological and astrological import;[3] in the Koran (x. 5) they are regarded as indispensable for the reckoning of time. Yet even this intimate penetration into the modes of thought of the desert may be explained by prehistoric Indian communication. The alternative view, advocated by Weber, that the lunar zodiac was primitively Chaldaean, rests on a very shadowy foundation. It is true that a word radically identical with *manāzil* occurs twice in the Bible, under the forms *mazzaloth* and *mazzaroth* (2 Kings xxiii. 5; Job xxxviii. 32); but the heavenly halting-places which it seems to designate may be solar rather than lunar. Euphratean exploration has so far brought to light no traces of ecliptical partition by the moon's diurnal motion, unless, indeed, zodiacal associations be claimed for a set of twenty-eight deprecatory formulae against evil spirits inscribed on a Ninevite tablet.[4]

The safest general conclusions regarding this disputed subject appear to be that the *sieu*, distinctively and unvaryingly Chinese, cannot properly be described as divisions of a lunar zodiac, that the *nakshatras*, though of purely Indian origin, became modified by the successive adoption of Greek and Chinese rectifications and supposed improvements; while the *manāzil* constituted a frankly eclectic system, in which elements from all quarters were combined. It was adopted by Turks, Tatars and Persians, and forms part of the astronomical paraphernalia of the *Bundahish*. The *sieu*, on the other hand, were early naturalized in Japan.

Astrological Systems.—The refined system of astrological prediction based upon the solar zodiac was invented in Chaldaea, obtained a second home and added elaborations in Egypt, and spread irresistibly westward about the beginning of the Christian era. For genethliacal purposes the signs were divided into six solar and six lunar, the former counted onward from Leo, the "house" of the sun, the latter backward from the moon's domicile in Cancer. Each planet had two houses—a solar and a lunar—distributed according to the order of their revolutions. Thus Mercury, as the planet nearest the sun, obtained Virgo, the sign adjacent to Leo, with the corresponding lunar house in Gemini; Venus had Libra (solar) and Taurus (lunar); and so for the rest. A ram frequently stamped on coins of Antiochus, with head reverted towards the moon and a star (the planet Mars), signified Aries to be the lunar house of Mars. With the respective and relative positions in the zodiac of the sun, moon and planets, the character of their action on human destiny varied indefinitely. The influence of the signs, though secondary, was hence overmastering: Julian called them θεῶν δυνάμεις,[5] and they were the objects of a corresponding veneration. Cities and kingdoms were allotted to their several patronage on a system fully expounded by Manilius:—

> Hos erit in fines orbis pontusque notandus,
> Quem Deus in partes per singula dividit astra,
> Ac sua cuique dedit tutelae regna per orbem,
> Et proprias gentes atque urbes addidit altas,
> In quibus exercent praestantia sidera vires.[6]

Syria was assigned to Aries, and Syrian coins frequently bear the effigy of a ram; Scythia and Arabia fell to Taurus, India to Gemini. Palmyra, judging from numismatic evidence, claimed the favour of Libra, Zeugma that of Capricorn; Leo protected Miletus, Sagittarius Singara.[7] The "power of the signs" was similarly distributed among the parts of the human body:—

> Et quanquam communis eat tutela per omne
> Corpus, et in proprium divisis artubus exit:
> Namque aries capiti, taurus cervicibus haeret;
> Brachia sub geminis censentur, pectora cancro.[8]

Warnings were uttered against surgical treatment of a member through whose sign the moon happened to be passing;[9] and zodiacal anatomy was an indispensable branch of the healing art in the Middle Ages. Some curious memorials of the superstition have survived in rings and amulets, engraven with the various signs, and worn as a kind of astral defensive armour. Many such, of the 14th and 15th centuries, have been recovered from the Thames.[10] Individuals, too, adopted zodiacal emblems. Capricornus was impressed upon the coins of Augustus, Libra on those of Pythodoris, queen of Pontus; a sultan of Iconium displayed Leo as his "horoscope" and mark of sovereignty; Stephen of England chose the protection of Sagittarius.

Egyptian Astrology.—In Egypt celestial influences were considered as emanating mainly from the thirty-six "decans" of the signs. They were called the "media of the whole circle of the zodiac"; [11] each ten-day period of the Egyptian year was consecrated to the decanal god whose section of the ecliptic rose at its commencement; the body was correspondingly apportioned, and disease was cured by invoking the zodiacal regent of the part affected.[12] As early as the 14th century B.C. a complete list of the decans was placed among the hieroglyphs adorning the tomb of Seti I.; they figured again in the temple of Rameses II., [13] and characterize every Egyptian astrological monument. Both the famous zodiacs of Dendera display their symbols, unmistakably identified by Lepsius. The late origin of these representations was established by the detection upon them of the cartouches of Tiberius and Nero. As the date of inception of the circular zodiac now at Paris the year 46 B.C. has, however, been suggested with high probability, from (among other indications) the position among the signs of the emblem of the planet Jupiter[14] Its design was most likely to serve as a sort of *thema coeli* at the time of the birth of Caesarion. The companion rectangular zodiac still *in situ* on the portico of the temple of Isis at Dendera suits, as to constellational arrangements, the date 29 A.D. It set forth, there is reason to believe, the natal scheme, not of the emperor Tiberius, as had been conjectured by Lauth,[15] but of the building it served to decorate. The Greek signs of the zodiac, including Libra, are obvious upon both these monuments, which have thrown useful light upon the calendar system and method of stellar grouping of the ancient Egyptians.[16]

Planispheres.—An Egypto-Greek planisphere, first described by Bianchini,[17] resembles in its general plan the circular zodiac of Dendera. The decans are ranged on the outermost of its five concentric zones; the planets and the Greek zodiac in duplicate occupy the next three; while the inner circle is unaccountably reserved for the Chinese cyclical animals. The relic was dug up on the Aventine in 1705, and is now in the Louvre. It dates from the 2nd or 3rd century A.D. The Tatar zodiac is not unfrequently found engraven on Chinese mirrors in polished bronze or steel of the 7th century, and figured on the "plateau of the twelve hours" in the treasury of the emperors of the Tang dynasty.[1] Probably the most ancient zodiacal representation in existence is a fragment of a Chaldaean planisphere in the British Museum, once inscribed with the names of the twelve months and their governing signs. Two only now remain.[2]

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[1] Whitney, Notes to *Sūrya-Siddhānta*, p. 200.

[2] *Ibid.*, p. 206.

[3] A. Sprenger, *Z. D. M. G.*, xiii. 161; Bīrūnī, *Chronology*, trans. by Sachau (London, 1879), p. 336 seq.

[4] Lenormant, *Chaldean Magic*, p. 1.

[5] "Orat. in Solem," *Op.*, i. 148 (ed. 1696).

[6] *Astr.*, bk. iv. ver. 696 seq.

[7] Eckhel, *Descriptio Nummorum Antiochiae Syriae*, pp. 18, 25.

[8] Manilius, *Astr.*, bk. iv. ver. 702–5.

[9] A. J. Peirce, *Science of the Stars*, p. 84.

[10] *Journ. Arch. Soc.* xiii. 254, 310, and xx. 80.

[11] In a fragment of *Hermes* translated by Th. Taylor at p. 362 of his version of Iamblichus.

[12] Pettigrew, *Superstitions Connected with Hist. of Medicine*, p. 30.

[13] Lepsius, *Chronologie der Aegypter*, part i. p. 68.

[14] *Ibid.*, p. 102.

[15] *Les Zodiaques de Denderah*, p. 78.

[16] See Riel's *Das feste Jahr von Denderah* (1878).

[17] *Mém. de l' Acad.*, Paris, 1708, Hist., p. 110; see also Humboldt, *Vues des Cordillères*, p. 170; Lepsius, *op. cit.*, p. 83; Fröhner, *Sculpture du Louvre*, p. 17.

A zodiac on the "astrological altar of Gabies" in the Louvre illustrates the apportionment of the signs among the inmates of the Roman Pantheon;[3] and they occur as a classical reminiscence in the mosaic pavements of San Miniato and the baptistery at Florence, the cathedral of Lyons, and the crypt of San Savino at Piacenza.[4] Zodiacal symbolism became conspicuous in medieval art. Nearly all the French cathedrals of the 12th and 13th centuries exhibit on their portals a species of rural calendar, in which each month and sign has its corresponding labour. The zodiac of Notre Dame of Paris, opening with Aquarius, is a noted instance.[5] A similar series, in which sculptured figures of Christ and the Apostles are associated with the signs, is to be seen in perfect preservation on the chief doorway of the abbey church at Vézelay. The cathedrals of Amiens, Sens and Rheims are decorated in the same way. In Italy the signs and works survive fragmentarily in the baptistery at Parma, completely on the porch of the cathedral of Cremona and on the west doorway of St Mark's at Venice. They are less common in England; but St Margaret's, York, and the church of Iffley in Oxfordshire offer good specimens. In the zodiac of Merton College, Oxford, Libra is represented by a judge in his robes and Pisces by the dolphin of Fitzjames, warden of the college, 1482–1507.[6] The great rose-windows of the Early Gothic period were frequently painted with zodiacal emblems; and some frescoes in the cathedral of Cologne contain the signs, each with an attendant angel, just as they were depicted on the vault of the church at Mount Athos. Giotto's zodiac at Padua was remarkable (in its undisturbed condition) for the arrangement of the signs so as to be struck in turns, during the corresponding months, by the sun's rays.[7] The "zodiac of labours" was replaced in French castles and hôtels by a "zodiac of pleasures," in which hunting, hawking, fishing and dancing were substituted for hoeing, planting, reaping and ploughing.[8]

It is curious to find the same sequence of symbols employed for the same decorative purposes in India as in Europe. A perfect set of signs was copied in 1764 from a pagoda at Verdapettah near Cape Comorin, and one equally complete existed at the same period on the ceiling of a temple near Mindurah.[9]

The hieroglyphs representing the signs of the zodiac in astronomical works are found in manuscripts of about the 10th century, but in carvings not until the 15th or 16th.[10] Their origin is unknown; but some, if not all of them, have antique associations. The hieroglyph of Leo, for instance, occurs among the symbols of the Mithraic worship.[11]

See also the article ASTROLOGY, and the separate articles on the constellations. The whole subject of the history of the zodiac is very obscure. See generally Franz Boll, *Sphaera* (Leipzig, 1903); also the bibliographies to ASTROLOGY and BABYLONIAN AND ASSYRIAN RELIGION. (A. M. C.)

ZODIACAL LIGHT, a faint illumination of the sky, surrounding the sun and elongated in the direction of the ecliptic on each side of the sun. It is lenticular in form, brightest near the sun, and shades off by imperceptible gradations, generally becoming invisible at a distance of 90° from the sun. Until a recent time it was never observed except in or near the zodiac; hence its designation. Its breadth varies with the time and place of observation, depending upon the position of the ecliptic with respect to the horizon. In the tropics, where the ecliptic is nearly perpendicular to the horizon, it may be seen after the end of twilight on every clear evening, and before twilight on every clear morning, unless blotted out by moonlight. It then presents a nearly vertical wedge-shaped form, the base of which extends 15° or 20° on each side of the point at which the ecliptic intersects the horizon. The point of the wedge is quite indefinite, the extremely diffuse light gradually fading into invisibility at a height which may range from 50° to 70° or even more, according to the keenness of the observer's vision. The boundary everywhere is ill defined so that no exact statement of the extent of the light can be made. The brightness is at its maximum along its central line, called the axis of the light. Along this axis the brightness continually increases as the sun is approached. Owing to the softness of the outline, it is not possible to fix the position of the axis with precision; but, so far as observations have been made, it is found that it lies near the ecliptic, though deviating from it by a quite sensible amount.

Having this position, the conditions of visibility will be best when the ecliptic, and therefore the axis of the light, are nearly perpendicular to the horizon, and, as the angle between the ecliptic and horizon becomes acute, will deteriorate, slowly at first, more and more rapidly afterwards, owing to the increasing effect of atmospheric absorption. This effect is enhanced by the light being brighter as we approach the sun. More and more of the brighter regions of the light will then be near the horizon the more acute the angle. The result is that the light can be only indistinctly seen when the angle with the horizon is less than 45°, unless in a region where the atmosphere is unusually clear. From this statement of the conditions it will be seen that the tropical zone is the most favourable for observation, and that the most favourable hour of the day at which the light can be seen must always be the earliest after sunset and the last before sunrise. Practically this is when twilight is first ended in the evening, and about to begin in the morning. At these hours the angle of the ecliptic with the horizon varies with the season. At the close of evening twilight the angle is greatest about three weeks before the vernal equinox. The months of February and March are therefore best for the evening observations in the northern hemisphere, but the light can generally be seen from January until April. Similar favourable conditions prevail in the morning from September to November.

It is clear that the light proceeds from a region surrounding the sun, and lenticular in form, the axis of the lens being nearly perpendicular to the ecliptic, while the circumference extends at least to the orbit of the earth. If it did not extend so far as this it could not be seen as frequently as it is at a distance of 90° from the sun. The accompanying figure shows the form of the outline, as it would appear to an observer on an outer planet were the light of the sun cut off. The hypothesis which best explains all the phenomena is that the light is that of the sun reflected from an extremely tenuous cloud of particles having the form and extent described, and becoming more and more tenuous as the earth's orbit is approached until, immediately outside the orbit, it fades into complete invisibility. The fact that the light widens out toward the sun leads to the inference that it entirely surrounds the sun. It is therefore of interest to test this inference by observations at midnight in such a latitude that the distance of the sun below the horizon is no more than necessary to preclude the possibility of twilight. Such an opportunity is offered when the sun is near the summer solstice, in latitudes not differing much from 50° north. A transparent atmosphere and clear horizon are necessary, conditions which can best be secured on a mountain top. The visibility of a light corresponding to the inference was shown by Simon Newcomb, by observations at the top of the Brienzer Rothorn, in 1905. Previously to this, E. E. Barnard had observed the same phenomenon at Chicago. The only source of doubt as to the validity of the conclusion that this is really the zodiacal light arises from the possibility that, after the close of the ordinarily recognized twilight, there may be a faint illumination arising from the reflection of light by the very rare upper atmosphere, shown by the phenomena of meteors to extend some hundred miles or more above the earth's surface. The problem of separating a possible effect produced in this way from the zodiacal light proper may seem to offer some difficulty. But the few observations made show that, after ordinary twilight has ended in the evening, the northern base of the zodiacal light extends more and more toward the north as the hours pass until, towards midnight, it merges into the light of the sky described by the two observers mentioned. Yet more conclusive are the observations of Maxwell Hall at Jamaica, who reached conclusions identical with those of Barnard and Newcomb, from observations of the base of the light at the close of twilight, which he estimated at 60° in the line through the sun.

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[1] Schlegel, *Ur. Chin.*, p. 561; Pettigrew, *Journ. Arch. Soc.*, viii. 21.

[2] Fox Talbot, *Trans. Soc. Bibl. Archaeol.* iv. 260.

[3] Ménard, *La Mythologie dans l'Art*, p. 388.

[4] Fowler, *Archaeologia*, xliv. 172.

[5] Viollet-le-Duc, *Dict. de l'Arch. Française*, ix. 551; Le Gentil, *Mém. de l'Acad.*, Paris, 1785, p. 20.

[6] Fowler, *Archaeologia*, xliv. 150. [7] *Ibid.*, p. 175.

[8] Viollet-le-Duc, *Dict. de l'Arch.*, ix. 551.

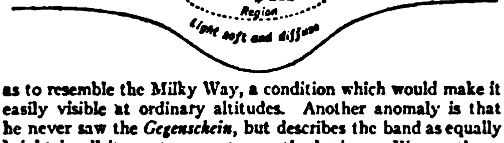
[9] John Call, *Phil. Trans.* lxii. 353. Cf. Houzeau, *Bibliographie Astronomique*, vol. i. pt. i. p. 136, where a useful sketch of the general results of zodiacal research will be found.

[10] R. Brown, *Archaeologia*, xlvii. 341; Sayce, in *Nature*, xxv. 525.

[11] See Lajard, *Culte de Mithra*, pl. xxvii. fig. 5, &c. The actual symbol ♉ can be carried back to about 250 B.C. (see *Journal of the Asiatic Society of Bengal*, vol. 50 (1881), 171, No. 20, and plate 17, No. 6); it occurs there with an Assyrian winged bull. But there is nothing to prove that it there, or elsewhere, means Taurus; it is found, in the same early period, with a lion as well as with a bull—on coins, seals, &c.

These observations show that the outline on that portion of the light commonly seen in the morning or evening is concave instead of convex, as it would be were the cloud strictly lenticular. The actual outline of the cloud is that of which a section through the sun is shown in the figure. Since the tenuous edge of the lens extends beyond the earth's orbit it follows that there must be some zodiacal light, whether it can be seen or not, passing entirely across the sky, along or near the ecliptic. Observations of this zodiacal band are therefore of great interest. It has been seen to stretch across the sky at midnight by several observers, especially Barnard, to whom it appears 3° to 4° wide. He found it to be best seen during the months of October, November and May.

Intimately connected with this band and with the zodiacal light is the *Gegenschein*, or counter-glow, a faint illumination of the sky in the region opposite the sun, which may generally be seen by a trained eye when all the conditions are favourable. Unfavourable conditions are moonlight, nearness to the Milky Way, and elevation of the light above the horizon (and therefore a depression of the sun below the horizon) of less than 20°, and the presence in the region of any bright planet. The Milky Way renders the object invisible during the months of June, July, December and January. Its light is so faint and diffuse that it is impossible to assign dimensions to it, except to say it covers a region of several degrees in extent. Barnard, the most successful observer, assigns diameters of 5° or even 10° or more. From what has been said of its position it is evident that the zodiacal band, when seen across the sky, must include it. It may therefore be regarded as an intensification of this band, possibly produced by the increased intensity of the light when reflected nearly back toward the sun, and therefore toward the earth. From the description given of the zodiacal band and the *Gegenschein*, it is clear that these objects should be best seen at the highest elevation, especially within the tropics. But the only well-authenticated observations we have of this kind show anomalies which have never been cleared up. This is especially the case with those of Chaplain George Jones, who spent eight months at Quito, Peru, at an elevation of more than 9000 ft., for the express purpose of observing the phenomenon in question. He saw the zodiacal band at midnight as a complete arch spanning the sky, agreeing in this point with the observations of Barnard. One anomaly of his observations is his description of the arch as sometimes so bright as to resemble the Milky Way, a condition which would make it easily visible at ordinary altitudes. Another anomaly is that he never saw the *Gegenschein*, but describes the band as equally bright in all its parts, except near the horizon. We are therefore forced to the conclusion that either he must have been a quite untrustworthy observer, or that there are anomalies in the phenomena which are yet to be explained.



The latter possibility is also suggested by the curious fact that the visibility of the light does not seem to be proportional to the transparency of the atmosphere. Barnard reports it as sometimes best seen when the sky is slightly milky, while during the observations already mentioned from the Rothorn the *Gegenschein* was scarcely, if at all, visible, though the conditions were exceptionally favourable. It has even been said that observers at great elevations have failed to see the zodiacal light; but it is scarcely credible that this failure could arise from any other cause than not knowing what it was or where to look for it. Moreover, it has been well seen by Hansky from the observatory on the summit of Mont Blanc.

In studying the causes of the phenomenon we must clearly distinguish between the apparent form as seen from the earth, and the real form of the lenticular-shaped cloud. The former refers to the earth, which is continually changing the point of view of the observer as he is carried around the sun, while the latter relates to the invariable position of the matter which reflects the light. First in importance is the question of the position of the principal plane, passing through the sun, and containing the circumferential regions of the cloud. This plane must be near, but not coincident with, that of the ecliptic. It has therefore a node and a certain inclination to the ecliptic. The determination of these elements requires that, at some point within the tropics where the atmosphere is clear, observations of the position of the axis of the light among the stars should be made from time to time through an entire year. In view of the simplicity of the necessary appliances, and of the small amount of labour that would be required, we find a singular paucity of such observations. The most elaborate attempt in the required direction was made by the American chaplain, George Jones, during a voyage of the "Mississippi" in the Pacific Ocean, in 1852–54. Owing to the varying latitude of the ship, and the fact that the observer attempted to draw curves of equal brilliancy instead of the central line, the required conclusions cannot be drawn with certainty from these observations. More recently Maxwell Hall in Jamaica made a satisfactory determination during the months from January to March, July and October, and carefully discussed his results. But the observations do not extend continuously throughout the year, and do not include a sufficient length of the central line on each evening to enable us to distinguish certainly the heliocentric latitude of the central line, as distinct from its apparent geocentric position. Yet his observations are of the first importance as showing the smallness of the deviation of the central line from the ecliptic. When smoothed out, the maximum latitude is less than 3°, which seems to preclude the coincidence of the central plane of the light with that of the sun's equator. Hall also reaches the interesting conclusion that the plane in question seems to lie near the invariable plane of the solar system, a result which might be expected if the light proceeded from a swarm of independent meteoric particles moving around the sun. Chaplain Jones concluded, from his observations at Quito, that the central line of the arch made an angle of 3° 20′ with the ecliptic, the ascending node being in Taurus, near longitude 62°. This is about 40° from the ascending node of the invariable plane, so that there is a well-marked deviation of his results from those of Hall.

Yet more divergent are the conclusions of Francis J. Bayldon, R.N.R., who made many observations while on voyages through the Pacific Ocean between Australia and the west coast of North America. He places the ascending node at the vernal equinox, and assigns an inclination of 4°. He found that as the observer moved to the north or south the axis of the light appeared to be displaced in the direction of the motion, which is the opposite of the effect due to parallax, but in the same sense as the effect of the greater atmospheric absorption of the light on the side nearest the horizon. He also describes the moon as adding to the zodiacal light during her first and last quarters, a result so difficult to explain that it needs confirmation. It is noteworthy that he could see the zodiacal band across the entire sky during the whole of every very clear moonless night in tropical regions.

If we accept the general conclusion already drawn as to the form and boundary of the region from which the light emanates, the next question is that of the matter sending it forth. The most plausible view is that we have to do with sunlight reflected from meteoric particles moving round the sun within the region of the lens. The polariscope and the spectroscope are the only instruments by the aid of which the nature of the matter can be inferred. The evidence afforded by these instruments is not, however, altogether accordant. In 1867, Ångström, observing at Upsala in March, obtained the bright auroral line (W.L. 5567), and concluded that in the zodiacal light there was the same material as is found in the aurora and in the solar corona, and probably through all space. Upsala, however, is a place where the auroral spectrum can often be observed in the sky, even when no aurora is visible, and it has generally been believed that what Ångström really saw was an auroral and not a zodiacal spectrum.

Professor A. W. Wright, of New Haven, also made careful observations leading to the conclusion that the spectrum differs from sunlight only in intensity. Some evidence has also been found by the same observer of polarization, showing that a considerable portion of the light must be reflected sunlight. The observations of Maxwell Hall also embraced some made with the spectroscope. He was unable to see any marked deviation of the spectrum from that of the sun; but it does not appear that either he or any other of the observers distinctly saw the dark lines of the solar spectrum. Direct proof that we have to do with reflected sunlight is therefore still incomplete.

The question whether the *Gegenschein* can be accounted for by the reflection of light from the same matter as the zodiacal band is still unsettled. Taking the general consensus of the observations it would seem that its light must be so much brighter than that of the band as to imply the action of some different cause. In this connexion may be mentioned the ingenious suggestion of S. Arrhenius, that the phenomenon is due to corpuscles sent off by the earth and repelled by the sun in the same way that they are sent off from a comet and form its tail. In other words, the light may be an exceedingly tenuous cometary tail to the earth, visible only because seen through its very great length. The view that no cause intervenes additional to that producing the zodiacal band is strengthened, though not proved, by a theorem due to F. R. Moulton of Chicago. He shows that, supposing the cloud of particles to move around the sun in nearly circular orbits immediately outside the earth, the perturbations by the earth in the motion of the particles will result in their retardation in that part of the orbit nearest the earth, and therefore in their always being more numerous in a given space in this part of the orbit than in any other. This view certainly accounts for some intensification of the light, to which may be added the intensification produced by the vertical reflection of the sunlight.

A new interest was given to the subject by the investigations of H. H. Seeliger, published in 1906, who showed that the observed excess of motion of the perihelion of Mercury may be accounted for by the action of that portion of the matter reflecting the zodiacal light which lies nearest to the sun. Plausible though his result is, the subject still requires investigation. It seems not unlikely that the final conclusion will be that instead of the reflecting matter being composed of solid particles it is an exceedingly tenuous gaseous envelope surrounding the sun and revolving on an axis the mean position of which is between that of the sun's equator and that of the invariable plane of the solar system.

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ZOFFANY, JOHANN (1733–1810), British painter, whose father was architect to the prince of Thurn and Taxis, was born in Frankfort-on-Main. He ran away from home at the age of thirteen and went to Rome, where he studied art for nearly twelve years. In 1758 he left for England, and after undergoing some hardships was brought into fashion by royal patronage, and in 1769 was included among the foundation members of the Royal Academy. He went to Florence in 1772 with an introduction from George III. to the grand duke of Tuscany, and did not return until 1779. During this second stay in Italy he met with much success, and was commanded by the empress Maria Theresa to paint a picture of the royal family of Tuscany; this work he executed so much to the satisfaction of the empress that in 1778 he was created a baron of the Austrian empire. He went next to India, where he lived from 1783 to 1790, to which period belong some of his best-known paintings; but the last twenty years of his life were spent in England. He died in 1810 and was buried in Kew churchyard. His portrait groups of dramatic celebrities are, perhaps, the most highly esteemed of his many productions; they have considerable technical merit and show much shrewd insight into character. Several of the best are in the Garrick Club, London.

ZOILUS (*c.* 400–320 B.C.), Greek grammarian of Amphipolis in Macedonia. According to Vitruvius (vii., preface) he lived during the age of Ptolemy Philadelphus (285–247 B.C.), by whom he was crucified as the punishment of his criticisms on the king. This account, however, should probably be rejected. Zoilus appears to have been at one time a follower of Isocrates, but subsequently a pupil of Polycrates, whom he heard at Athens, where he was a teacher of rhetoric. Zoilus was chiefly known for the acerbity of his attacks on Homer (which gained him the name of Homeromastix, "scourge of Homer"), chiefly directed against the fabulous element in the Homeric poems. Zoilus also wrote against Isocrates and Plato, who had attacked the style of Lysias of which he approved. The name Zoilus came to be generally used of a spiteful and malignant critic.

See U. Friedländer, *De Zoilo aliisque Homeri Obtrectatoribus* (Königsberg, 1895); J. E. Sandys, *History of Classical Scholarship* (2nd ed. 1906).

ZOISITE, a rock-forming mineral, consisting of basic calcium and aluminium silicate, $Ca_2(AlOH)Al_2(SiO_4)_3$, crystallizing in the orthorhombic system. It is closely related to epidote (*q.v.*) both in the angles of the crystals and in chemical composition: a zoisite containing some iron replacing aluminium may be identical in composition with an epidote ("clinozoisite") poor in iron. The crystals are prismatic in habit and are deeply furrowed parallel to their length; terminal planes are rare; there is a perfect cleavage parallel to the brachy-pinacoid. Columnar and compact masses are more common. The hardness is 6½ and the specific gravity 3·25–3·37. The colour is often grey; a rose-red variety, known as "thulite," occurs with sky-blue vesuvianite at Telemarken in Norway, and has been used to a limited extent as an ornamental stone. According to differences in the optical characters, two kinds of zoisite have been distinguished. Zoisite is a product of dynamo-metamorphism, and occurs as a constituent of some crystalline schists, such as amphibolite and eclogite. It was first observed by Baron Zois (after whom it was named) in the eclogite of Sau-Alpe in Carinthia; other localities are the Ducktown copper mines in Tennessee, where it occurs embedded in chalcopyrite; Loch Garve in Ross-shire, &c. The "saussurite" of the Alps and elsewhere, which has resulted from the alteration of the plagioclase felspar of gabbro, consists largely of zoisite with epidote. (L. J. S.)

ZOLA, ÉMILE ÉDOUARD CHARLES ANTOINE (1840–1902), French novelist, was born in Paris on the 2nd of April 1840, his father being an engineer, part Italian and part Greek, and his mother a Frenchwoman. The father seems to have been an energetic, visionary man, who, dying while his only son was a little lad, left to his family no better provision than a lawsuit against the municipality of the town of Aix It was at Aix, which figures as Plassans in so many of his novels, that the boy received the first part of his education. Thence he proceeded, in 1858, to Paris, where, as later at Marseilles, he failed to obtain his bachelor's degree. Then came a few years of terrible poverty; but at the beginning of 1862 he obtained a clerkship, at the modest salary of a pound a week, in the house of Hachette the publisher. Meanwhile he was writing apace, but nothing of particular merit. His first book, *Contes à Ninon*, appeared on the 24th of October 1864, and attracted some attention, and in January 1866 he determined to abandon clerking and take to literature. Vigorous and aggressive as a critic, his articles on literature and art in Villemessant's paper *L'Événement* created a good deal of interest. So did the gruesome but powerful novel, *Thérèse Raquin* (1867). Meanwhile, with characteristic energy, Zola was projecting something more important: the creation of a world of his own, like that of Balzac's *Comédie Humaine*—the history of a family in its various ramifications during the Second Empire. The history of this family, the Rougon-Macquart, was to be told in a series of novels containing a scientific study of heredity—science was always Zola's *ignis fatuus*—and a picture of French life and society. The first novel of the series, *La Fortune des Rougon*, appeared in book form at the end of 1871. It was followed by *La Curée* (1874), *Le Ventre de Paris* (1874), *La Conquête de Plassans* (1875), *La Faute de l'Abbé Mouret* (1875), *Son Excellence Eugène Rougon* (1876)—all books unquestionably of immense ability, and in a measure successful, but not great popular successes. Then came *L'Assommoir* (1878?), the epic of drink, and the author's fortune was made. Edition followed edition. He became the most discussed, the most read, the most bought novelist in France—the sale of *L'Assommoir* being even exceeded by that of *Nana* (1880) and *La Débâcle* (1892). From the *Fortune des Rougon* to the *Docteur Pascal* (1893) there are some twenty novels in the *Rougon-Macquart* series, the second half of which includes the powerful novels *Germinal* (1885) and *La Terre* (1888). In 1888 Zola departed from his usual vein in the idyllic story of *Le Rêve* Zola also wrote a series of three romances on cities, *Lourdes, Rome, Paris* (1894–98), novels on the "gospels" of population (*Fécondité*) and work (*Travail*), a volume of plays, and several volumes of criticism, and other things. These books are based on study and observation; the novels are crowded with characters. The whole is a gigantic *opus*, the fruit of immense labour, of an admirable tenacity—so many pages written, morning after morning, without intermission, during some thirty years. He prided himself on his motto, *Nulla dies sine linea.*

Zola was the apostle of the "realistic" or "naturalistic" school; but he was in truth not a "naturalist" at all, in so far as "naturalism" is to be regarded as a record of fact. He was an idealist, but while other idealists idealize the nobler elements in human nature, so has he, for the most part—the later books, however, show improvement—idealized the elements that are bestial. He saw man's lust, greed, gluttony, as in a vision, magnified, overwhelming, portentous. And what he saw he presented with tremendous power. His style may lack the classic qualities of French prose—lightness, delicacy, sparkle; it certainly has not Daudet's colour and felicity of touch. The first impression it produces may be one of heaviness, and the later "gospels" on population and work are distinctly ponderous. But for rendering the gloomy horror of the subjects in which he most delights—detail on detail being accumulated till the result is overwhelming—Zola has no superior. Some of his descriptions of crowds in movement have never been surpassed.

Zola played a very important part in the Dreyfus affair, which convulsed French politics and social life at the end of the 19th century. At an early stage he came to the conclusion that Dreyfus was the innocent victim of a nefarious conspiracy, and on the 13th of January 1898, with his usual intrepidity, he published in the *Aurore* newspaper, in the form of a letter beginning with the words *J'accuse*, a terrible denunciation of all those who had had a hand in bounding down that unfortunate officer. Zola's object was a prosecution for libel, and a judicial inquiry into the whole *affaire*, and at the trial, which took place in Paris in February, a fierce flood of light was thrown on the case. The chiefs of the army put forth all their power, and Zola was condemned. He appealed. On the 2nd of April the Cour de Cassation quashed the proceedings. A second trial took place at Versailles, on the 18th of July, and without waiting the result Zola, by the advice of his counsel and friends, and for reasons of legal strategy, abruptly left France and took refuge in England. Here he remained in hiding, writing *Fécondité*, till the 4th of June 1899, when, immediately on hearing that there was to be a revision of the first Dreyfus trial, he returned to Paris. Whatever may be thought of the *affaire* itself, there can be no question of Zola's superb courage and disinterestedness.

On the morning of the 29th of September 1902 Zola was found dead in the bedroom of his Paris house, having been accidentally asphyxiated by the fumes from a defective flue. He received a public funeral, at which Captain Dreyfus was present. Anatole France delivered an impassioned oration at the grave. At the time of his death Zola had just completed a novel, *Vérité*, dealing with the incidents of the Dreyfus trial. A sequel, *Justice*, had been planned, but not executed. After a life of constant struggle and an obloquy which never relaxed, the sensational close of Zola's career was the signal for an extraordinary burst of eulogy. The verdict of posterity will probably be kinder than the first, and less unmeasured than the second. Zola's literary position would have more than qualified him for the French Academy. He was several times a candidate in vain. (F. T. M.)

See *Émile Zola, Novelist and Reformer* (1904), giving a full account of his life and work, by E. A. Vizetelly, who translated and edited many of his works in English; also P. Alexis, *Émile Zola, Notes d'un ami*; F Brunetière, *Le Roman Naturaliste* (1883); vols. iii., v and vi. of the *Journal des Goncourt* (1888–92); E. Hennequin, *Quelques Écrivains français* (1890), R. H. Sherard, *Émile Zola. a biographical and critical study* (1903); A. Laporte, *Émile Zola, l'homme et l'œuvre* (1894) with a bibliography. A complete report of the proceedings against Zola is printed in *Le Procès Zola* (2 vols. 1898, Eng. trans. 1898).

ZOLKIEWSKI, STANISLAUS (1547–1619), the most illustrious member of an ancient Ruthenian family which emigrated to Galicia in the 15th century. During the interregnum in Poland after the death of Henry of Valois, Zolkiewski was an ardent partisan of the chancellor Zamoyski, and supported the candidature of Stephen Báthory, under whose banner he learned the art of war in the Muscovite campaigns. On the death of Stephen, Zolkiewski vigorously supported the policy of Zamoyski, and took an active part in the battle of Byczyna, when the Austrian archduke Maximilian was defeated by the Polish chancellor. Shortly afterwards Zolkiewski was made castellan of Lemberg and acting commander-in-chief. On the accession of Sigismund III he retired from court and divided his time between improving his estates, where he built towns and fortresses, and disciplining the Cossacks, with whom he enjoyed great influence. In 1601–2 he served with distinction in the Livonian war against the Swedes, whom he defeated at Reval. During the insurrection of Nicholas Zebrzydowski he led the army which routed the rebels at Guzow in 1607, though protesting against the necessity of shedding "his brothers' blood." For his services he received the palatinate of Kiev. He was opposed to the expedition sent to place the false Demetrius on the throne of Muscovy; but nevertheless accompanied the king to Smolensk and was sent thence with a handful of men against Moscow. On his way thither he defeated and captured Tsar Vasily Shuiski at the battle of Klushino (July 14, 1610), and two months later entered the Russian capital in triumph. His tactful and conciliatory diplomacy speedily won over the boyars, whom he persuaded to offer the Muscovite crown to the Polish crown prince, Wladislaus. For a moment it seemed possible that the Vasa family might occupy the throne of Ivan the Terrible; but Sigismund III. would not consent to the reception of his son into the Greek Church, and refused to ratify the terms made with the boyars. Zolkiewski then returned to the Polish camp and assisted in the reduction of Smolensk, but Moscow in the meantime drove out the Polish garrison and proclaimed a native dynasty under Michael Romanov. When Zolkiewski presented his captives, Tsar Vasily and his family, to the Polish diet, he received an ovation and was rewarded with the dignity of *hetman wielki* (commander-in-chief). For the next few years he defended the Ukraine against the Tatars and Cossacks, and in 1617 was involved in a war with the Porte owing to the unauthorized interference of the Polish nobles in the affairs of Wallachia and Moldavia. Unable to defeat the vastly superior forces of the Turkish commander Skinder, he concluded with him an advantageous truce at Jaruda (27th of August 1618), by the terms of which he pledged himself to curb the Cossacks and at the same time renounced all the claims of Poland to the Danubian principalities. Thus he saved the one army of Poland to guard her southern frontier from apparently inevitable destruction. On his return he was fiercely assailed by the diet for not risking everything in a pitched battle, but Zolkiewski defended himself with an eloquence which silenced his most venomous opponents. The peace of Jaruda was then confirmed, and the king conferred upon Zolkiewski the grand-chancellorship, an honour he had neither desired nor expected. Fresh attacks were presently made against him for failing, it was alleged, to prevent the Tatar incursions. So deeply wounded was the hero by these calumnies that when in 1619 he was sent against the Turks he publicly declared that he would never return alive unless victorious. He was as good as his word. Surrounded near the Dniester by countless hosts of Turks, Tatars and Janissaries, he retreated through the Steppes, fighting night and day without food or water, towards Cecora. By the time he reached it, he saw clearly that success was impossible, and deliberately determined to die where he stood. Disguising himself so that his dead body might not be recognized, he turned upon the pursuers and was slain after a desperate resistance (6th of October 1620). His head was cut off, exhibited in the Turkish camp and then sent to Constantinople as a present to the sultan, from whom it was subsequently ransomed at a great price. Zolkiewski is one of the most heroic figures in Polish history. An accomplished general, a skilful diplomatist, and a patriot who not only loved his country above all things, but never feared to tell his countrymen the truth, he excelled in all private and public virtues. As a writer he made a name by an important history of his Muscovite campaigns.

See Stanislaw Gabryel Kozlowski, *Life of Stanislaus Zolkiewski* (Pol.) (Cracow, 1904). (R. N. B.)

ZÖLLNER, JOHANN KARL FRIEDRICH (1834–1882), German astronomer and physicist, was born at Berlin on the 8th of November 1834. From 1872 he held the chair of astrophysics at Leipzig University. He wrote numerous papers on photometry and spectrum analysis in Poggendorff's *Annalen* and *Berichte der k. sächsischen Gesellschaft der Wissenschaften*, two works on celestial photometry (*Grundzüge einer allgemeinen Photometrie des Himmels*, Berlin, 1861, 4to, and *Photometrische Ur*[illegible], 1865, 8vo), and a curious book, *Ueber die Natur der Cometen* (Leipzig, 1872, 3rd ed. 1883). He died at Leipzig on the 25th of April 1882.

ZOLLVEREIN (Ger. *Zoll*, toll, customs, and *Verein*, union), a term used generally for a certain form of Customs Union, but specially for the system among the German states which was in force between 1819 and 1871 (see TARIFF, and GERMANY: *History*).

ZOMBOR, a town of Hungary, capital of the county of Bács Bodrog, 146 m. S. of Budapest by rail. Pop. (1900) 29,036, two-thirds Servians. It is situated in a fertile plain near the Franz Josef canal, which connects the Danube and the Theiss, and is the centre of the corn and cattle trade of an extensive area.

ZONARAS, JOANNES (JOHN), Byzantine chronicler and theologian, flourished at Constantinople in the 12th century. Under Alexius I. Comnenus he held the offices of commander of the bodyguard and private secretary to the emperor, but in the succeeding reign he retired to Hagia Glykeria (one of the Princes' Islands), where he spent the rest of his life in writing books. His most important work, Ἐπιτομὴ Ἱστοριῶν (compendium of history), in eighteen books, extends from the creation of the world to the death of Alexius (1118). The earlier part is largely drawn from Josephus; for Roman history he chiefly followed Dio Cassius, whose first twenty books are not otherwise known to us. His history was continued by Nicetas Acominatus. Various ecclesiastical works have been attributed to Zonaras—commentaries on the Fathers and the poems of Gregory of Nazianzus; lives of Saints; and a treatise on the Apostolical Canons—and there is no reason to doubt their genuineness. The lexicon, however, which has been handed down under his name (ed. J. A. H. Tittmann 1808) is probably the work of a certain Antonius Monachus (Stein's *Herodotus*, ii. 479 f.).

Complete edition in Migne, *Patrologia Graeca*, cxxxiv. cxxxv. cxxxvii.; the *Chronicon* by M. Pinder and T. Büttner-Wobst in the Bonn *Corpus Scriptorum Hist. Byz.* (1841–97) and by L. Dindorf in the Teubner series (1868–76); see bibliography in C. Krumbacher, *Geschichte der byzantinischen Litteratur* (2nd ed. 1897).

ZONE (Gr. *ζώνη*, a girdle, from *ζωννύναι*, to gird), a term for a belt or girdle, now used chiefly in the transferred sense of a demarcated area. Thus the earth's surface is divided, for classification of climates, into five climatic zones: the two temperate and the two frigid zones and the tropical or torrid zone. (See CLIMATE AND CLIMATOLOGY.)

ZOOLOGICAL DISTRIBUTION (also known as Zoogeography), the science dealing, in the first place, with the distribution of living animals on the surface of the globe (both land and water), and secondly with that of their forerunners (both in time and in space). The science is thus a side-branch of zoology,[1] intimately connected on the one hand with geography and on the other with geology. It is a comparatively modern science, which dates, at all events in its present form, from the second half of the 19th century.

Different parts of the land-surface of the globe are inhabited by different kinds of animals, or, in other words, by different faunas. These differences, in many cases at any rate, are not due to differences of temperature or of climate; and they do not depend on the distance of one place from another. The warm-blooded land-animals of Japan are, for example, very much more closely related to those of the British Isles than is the corresponding fauna of Africa to that of Madagascar. Again, on the hypothesis of the evolution of one species from another, in the case of land-animals unprovided with the means of flight such resemblances and differences between the faunas of different parts of the world depend in a great degree on the presence or absence of facilities for free communication by land between the areas in question. Prima facie, therefore, it is natural to suppose that the fauna of an island will differ more from that of the adjacent continent than will those of different parts of that continent from one another.

To a great extent this is the case; and if the present continents and islands had always been *in statu quo*, the proposition would, for the most part at any rate, be universally true. Geology has, however, taught us that many parts of what are now continents formed at earlier periods of the earth's history portions of the ocean-bed, while what are now islands have in some instances been connected with the adjacent mainlands, or even with land-masses the sites of which are now occupied by the open sea.

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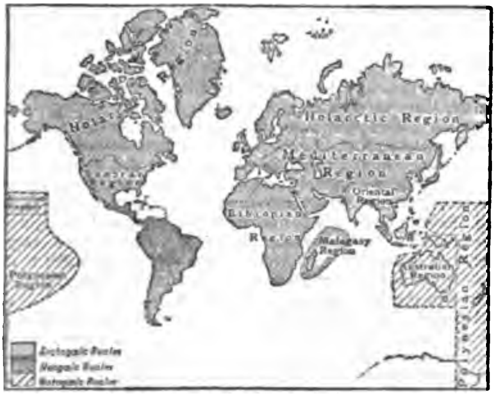
[1] For the distribution of plants, see PLANTS: *Distribution*.

We can hope, therefore, to understand and explain the present distribution of terrestrial animal life only by taking into account what geology teaches us as to past changes in the configuration of the land-masses of the globe, accompanied by investigations into the past history of animals themselves, as revealed by their fossil remains.

Although to understand the reason of many facts in the present distribution of animals—as, for example, why tapirs are confined to the Malay countries and South America—it is essential to study fossil faunas, yet it has been found possible from the consideration of existing faunas alone to map out the land-surface of the globe into a number of zoological "regions," or provinces, more or less independent of the ordinary geographical boundaries, and severally characterized by a greater or smaller degree of distinctness in the matter of their faunas. One of the pioneers in this line of research was Dr P. L Sclater, who in a paper on the geographical distribution of birds, published in the *Journal* of the Linnean Society of London for 1858, was enabled to define and name six of such zoological regions; these being mainly based on the distribution of the perching or passerine birds. Two years later Dr A. Russel Wallace, in the same journal, discussed in some detail the problems presented by the distribution of animals in the Malay Archipelago and Australasia. This preliminary essay was followed in 1876 by the appearance of the latter author's *Geographical Distribution of Animals*, an epoch-making work, which may be said to have first put the study of the distribution of animals generally on a thoroughly firm and scientific basis. With some slight modifications, the names proposed for the six zoological regions by Dr Sclater were adopted by Dr Wallace. Certain changes in regard to the limits and number of the zoological regions adopted by Sclater and Wallace have been proposed; but the original scheme forms the basis of all the later modifications, and these eminent naturalists are entitled to be regarded as the fathers of the study of distributional zoology. T. H. Huxley was also one of those who did much to advance the science in its early days, while among those who have proposed more or less important modifications of the original scheme special mention may be made of Dr W. T. Blanford, Dr A. Heilprin, Prof. P. Matschie and Prof. Max Weber.



The zoological regions proposed by Dr Sclater were based mainly on the distribution of the perching birds; but in the writings of Dr Wallace and of later authors mammals were very largely taken into consideration, and in later schemes there has been a similarly extensive use of the evidence afforded by mammalian distribution. That different groups of animals do not agree with another in the matter of geographical distribution will be evident when we reflect that in many instances there are very great differences in the relative ages of such groups, or, at all events, in the dates of their dispersal, or "radiation," over the surface of the earth. The radiation and dominance of reptiles, for example, greatly antedated that of either birds or mammals. Consequently, the zoological regions indicated by the present geographical distribution of the former group are very different from those suggested by the distribution of the two latter. If zoological regions are based on the evidence of the existing distribution of animals, groups with a relatively late radiation are clearly to be preferred to those the dispersal of which was earlier Mammals and birds, therefore, are of greater value from this point of view than reptiles; while the absence of the power of flight in the great bulk of the class renders the evidence afforded by mammals superior to that derived from birds. The marked general agreement between the geographical distribution of birds on the one hand and of mammals on the other is, however, a fact of the greatest importance in regard to the value of the zoological regions established on their evidence. Further testimony in the same direction is afforded by the distribution of certain other groups, more especially spiders (Arachnida); and it is also noteworthy that the distribution of the three main divisions of the human race accords to a certain extent with the boundaries of some of the zoological regions based on the distribution of the lower animals.

With regard to the theory of the polar origin of life and the gradual dispersal of animals from the arctic regions, it may be briefly stated that the presumed series of radiations of life southward from the northern pole can have nothing to do with the present geographical distribution of animals, since we have abundant evidence that mammals have been spread over the whole of the warmer parts of the globe since, at any rate, the commencement of the Tertiary period, while the radiation of reptiles commenced at a much earlier epoch.

As regards barriers to the free dispersal of nonvolant terrestrial animals these may be grouped under two main heads, namely, climatic and geographical, of which the second is by far the more important. At the present day a certain number of animals are fitted to live respectively only in hot and in cold climates. The man-like apes and elephants among mammals, and trogons and parrots among birds, are, for example, now exclusively dwellers in tropical or subtropical climates, whereas the polar bear, the musk-ox and ptarmigan are equally characteristic of the arctic zone. To a great extent this must be regarded as a comparatively modern adaptive feature, since many of these arctic and tropical animals belong to groups the distribution of which, either in the past or the present, is more or less independent of climate. Elephants, for instance, formerly inhabited Siberia at a time when the climate, although probably less cold than at present, was certainly not tropical; while the polar bear is a specialized member of a group some of the representatives of which are denizens of the tropics.

It is true, indeed, that within the limits of the different zoological regions temperature-control has had an important influence on the distribution of animals, and has resulted in certain cases in the formation of life-zones, as in North America. As remarked, however, by H. A. Pilsbry and J. H. Ferriss[1] in connexion with the distribution of land-molluscs, "the life-zones of the United States as mapped by Dr C. H. Merriam emphasize the secondary and not the primary facts of distribution. The laws of temperature-control do not define transcontinental zones of primary import zoologically. These zones are secondary divisions of vertical life-areas of which the molluscan faunas were evolved in large part independently." And what is true of molluscs will hold good in the case of several other groups.

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[1] *Proc. Academy of Philadelphia*, 1906, p. 123.

There is also the phenomenon of vertical temperature-control. On this subject Dr A. R. Wallace has written (*Ency. Brit.*, 9th ed., art. "Distribution"): "As we ascend lofty mountains, the forms of life change in a manner somewhat analogous to the changes observed in passing from a warm to a cold country. This change is, however, far less observable in animals than in plants; and it is so unequal in its action, and can so frequently be traced to mere change of climate and deficiency of food, that it must rank as a phenomenon of secondary importance. Vertical distribution among animals will be found in most cases to affect species rather than generic or family groups, and to involve in each case a mass of local details. . . . The same remarks apply to the bathymetrical zones of marine life. Many groups are confined to tidal, or shallow, or deeper waters; but these differences of habit are hardly geographical, but involve details, suited rather to the special study of individual groups." Temperature-control is therefore mainly a factor which has acted independently in the different zoological regions of the globe, and as such demands little or no further mention in a general sketch of the present nature.

The same remark will apply in the case of the influence of humidity on distribution, and also as regards "station." To illustrate the latter we may take the instances of the European squirrel and the chamois, the former of which is found only in wooded districts and is entirely absent from the open plains, while the latter occurs only in the isolated mountain ranges of the Pyrenees, the Alps, the Apennines and the Caucasus. The distributional area of both may, however, be regarded as including Europe generally, so that these local restrictions of range have nothing to do with the wider problems of distribution.

Very different is the case with regard to geographical barriers to the free dispersal of terrestrial animals. It should be observed, however, that even these act with different degrees of intensity in the case of different groups. From the fact that the great majority of them are oviparous, reptiles, whose powers of dispersal in the adult state are generally as restricted as those of mammals, have an advantage over the latter in that their eggs may be carried long distances on floating timber down rivers and thence across the ocean, or may even be occasionally transported by birds. The eggs of batrachians, like those of fresh-water fishes, will in some cases at any rate withstand being frozen, and hence conceivably may be transported by floating ice. Adult insects may be carried in the same manner as the eggs of reptiles. After all, however, such unusual means of transport are probably of no great importance; and it seems most likely that the varying features in the geographical distribution of different groups of animals are due much more to differences in the dates of radiation, or dispersal of those groups, than to varying degrees of facility for overcoming natural geographical barriers to dispersal.

The greatest barriers of all are formed by the ocean and the larger rivers; and from the former factor it follows that zoological regions coincide to a considerable extent—although by no means altogether—with the main geographical (as distinct from political) divisions of the earth's surface. In the main, mammals and other nonvolant terrestrial animals are debarred from crossing anything more than comparatively narrow channels of the sea, while even these and the larger rivers form a more or less effectual barrier to the dispersal of the great majority of the species. Hence it results that oceanic islands are usually devoid of such forms of life; while it may be laid down, as a general rule, that the existence of nearly allied types of terrestrial animals in countries now separated by stretches of sea implies a former land-connexion between them. There are, however, in many cases great difficulties in determining the nature of such connexions, largely owing to the fact that we are still in the dark as to whether the dispersal of many groups of animals has taken place down the lines of the present continents from north to south or equatorially by means of belts of land long since swallowed up by the ocean. In this connexion it may be remarked, as tending against the old idea of the radiation of all the modern groups of terrestrial animals from the north towards the south, that there is decisive evidence to prove the existence during the Tertiary period (so far at least as mammals are concerned) of certain great centres of development, and in some instances, at all events, also of radiation, in the southern hemisphere; one of these developmental centres being in Africa, a second in South America, and a third in Australia.

To the general law that straits and arms of the sea form an effectual barrier to the dispersal of the larger land-animals, and more especially mammals, certain exceptions may be pleaded. Jaguars have, for instance, been known to cross the Rio de la Plata, while tigers constantly swim from island to island in the delta of the Ganges and probably also in the Malay Archipelago, and a polar bear has been observed swimming twenty miles away from land in Bering Sea. Deer, certain antelopes, pigs and elephants are also good swimmers; while hippopotamuses and crocodiles—especially the latter—can cross channels of considerable width. The great tropical and subtropical rivers also carry down masses of floating soil or large trees upon which mammals and reptiles are borne, and although in many or most instances such are swept out to sea and their occupants drowned, in other instances they may be stranded upon the opposite bank or shore where their living freight can effect a landing. Such instances, however, cannot be very frequent, and they cannot affect widely sundered countries, owing to the lack of food supplies. Moreover, supposing a mammal to have reached a new land, unless it happened to be a pregnant female, or unless another individual of the opposite sex be similarly stranded, it would eventually die without progeny. Even in the case of a pregnant female, there is no certainty that the offspring, if but one, would be a male; and even supposing this to be the case, the progeny might perish from the attacks of other animals or from inbreeding. On the whole, it may be said, that instances of such methods of dispersal must be relatively few and can affect only countries not very widely sundered. The most important case that can be cited is the occurrence of a pig and an extinct hippopotamus in Madagascar, which probably reached that island by swimming from Africa. As a rule, a strait like that separating Ceylon from India may be considered an effectual barrier to the dispersal of large land-animals.

Although the Rio de la Plata has effectually prevented the amphibious carpincho from reaching Argentina, deserts form even more impassable barriers than large rivers, the Sahara having prevented the North African fauna from reaching the heart of that continent. High and continuous mountain-ranges are likewise most effective in restricting the range of animals; this being more especially the case when, like the Himalaya, their trend is equatorial instead of, as in the case of the Rocky Mountains and the Andes, from north to south in the direction of the main continental extension. Forests also present great obstacles to animal migration, although this is to a great extent of a local nature and comes, in fact, under the category of "station." Indeed, there appears to be no instance of the separation of one zoological region from another by forest alone.

Lastly it should be mentioned that ice may serve as a factor in the dispersal of animals by acting as a bridge between different land-areas; and at some period this means of communication may have aided in the great migrations of animals that have taken place between the Old and the New World by way of what is now Bering Sea.

I. TERRESTRIAL DISTRIBUTION

Zoological Regions.

The zoological regions recognized by Dr A. R. Wallace in 1876, which are in the main identical with those proposed by Dr P. L. Sclater in 1858, and are chiefly based on the distribution of birds and mammals, are as follows:—

1. *Palaearctic*, which includes Europe to the Azores and Iceland, temperate Asia from the high Himalaya and west of the Indus, with Japan, and China from Ningpo and to the north of the watershed

of the Yang-tse-kiang; also North Africa and Arabia, to about the line of the tropic of Cancer.

2. *Ethiopian*, including Africa south of the tropic of Cancer, as well as the southern part of Arabia, with Madagascar and the adjacent islands.

3. *Oriental*, or Indo-Malay, comprising India and Ceylon, the Indo-Chinese countries and southern China, and the Malay Archipelago as far as the Philippines, Borneo and Java.

4. *Australian*, composed of the remainder of the Malay Archipelago, Australia, New Zealand and all the tropical islands of the Pacific, as far east as the Marquesas and the Low Archipelago.

5. *Neotropical*, which comprises South America and the adjacent islands, the West Indies or Antilles, and Central America and Mexico.

6. *Nearctic*, consisting of temperate and arctic North America, with Greenland.

"These six regions," remarks Dr Wallace, "although all of primary importance from their extent, and well marked by their total assemblage of animal forms, vary greatly in their zoological richness, their degree of isolation and their relationship to each other. The Australian region is the most peculiar and the most isolated, but it is comparatively small and poor in the higher animals. The Neotropical region comes next in peculiarity and isolation, but it is extensive and excessively rich in all forms of life. The Ethiopian and Oriental regions are also very rich, but they have much in common. The Palaearctic and Nearctic regions being wholly temperate are less rich, and they too have many resemblances to each other; but while the Nearctic region has many groups in common with the Neotropical, the Palaearctic is closely connected with the Oriental and Ethiopian regions."

In Dr Sclater's original scheme the first four of the above regions were bracketed together under the designation of *Palaeogaea*, and the fifth and sixth, or those belonging to the New World, as *Neogaea*. T. H. Huxley, in a paper on the distribution of game-birds, published in the *Proceedings of the Zoological Society of London for* 1868, instead of dividing the world into an eastern and a western division, adopted a northern and a southern division, calling the former *Arctogaea*, and the latter (which included Australasia and the Neotropical region of Messrs Sclater and Wallace, but not the Ethiopian region) *Notogaea*.

In 1874 Dr Sclater,[1] taking mammals as well as birds into consideration, adopted Huxley's Arctogaea as the major northern division to include the Nearctic, Palaearctic, Oriental and Ethiopian regions; and instead of Huxley's Notogaea recognized three primary divisions, namely, *Dendrogaea* for the Neotropical region, *Antarctogaea* for the Australian region (in a somewhat restricted sense), and *Ornithogaea* for New Zealand and Polynesia.

The tendency of these amendments on the original scheme of a simple division into six regions was to recognize three primary divisions of higher rank than such "regions." This view was adopted in 1890 by Dr W. T. Blanford,[2] who proposed to designate these three major divisions of the earth's land surface respectively the Australian, the South American and the Arctogaean regions. A weak point in this scheme is that since the term "region" is likewise applied to the subdivisions of Arctogaea, there is a danger of confusion between the primary and secondary divisions. An amendment proposed anonymously[3] in 1893 was to substitute the names Notogaea, Neogaea and Arctogaea for the three primary divisions of Dr Blanford. Yet another emendation, suggested by R. Lydekker[4] and subsequently adopted by Prof. H. F. Osborn,[5] was to designate these three primary divisions as "realms," and to reserve the name "region" for their subdivisions.

Emendations on the original scheme also included modifications in the limits of the regions themselves. In 1878, for instance, Dr A. Heilprin[6] (in accordance with a suggestion of Prof. A. Newton) proposed to unite the Nearctic with the Palaearctic region under the name of Holarctic; separating at the same time from the former a "transitional" Sonoran, and from the latter a similar Mediterranean, or Tyrrhenian, region, while he also recognized a distinct Polynesian region, distinguished in the main by negative characters. The Sonoran region was subsequently adopted by Dr C. H. Merriam[7] in 1892, and later on by Dr Blanford in the address already cited, the title being, however, changed to Medio-Columbian. A most important proposal was also embodied in Dr Blanford's scheme, namely, the separation from the Ethiopian region of Madagascar and the Comoro islands to form a separate Malagasy region. Another modification of the original scheme was to transfer the island of Celebes, together with Lombok, Flores and Timor, from the Australian to the Oriental region, or to regard them as representing a transitional region between the two.[8] The effect of this change was practically to abolish "Wallace's line" (the deep channel between the islands of Bali and Lombok and thence northward through the Macassar Strait), the deepest channel being really situated to the eastward of Timor.

The later evolution of the scheme, as presented by Dr Max Weber,[9] may be tabularized, with some slight alteration, as follows, the "realms" being printed in capitals, the regions and sub-regions in ordinary type, and the transitional regions in italics:—

I. ARCTOGAEA

1. Holarctic. 2. Ethiopian. 3. Malagasy. 4. Oriental.
Nearctic Palaearctic
Sonoran *Mediterranean* *Austro-Malayan*

II. NEOGAEA
5. Neotropical.

III. NOTOGAEA.
6. Australian
(?) 7. Polynesian
(?) 8. Hawaiian.

In the accompanying map the Sonoran and Mediterranean transitional regions are represented as equivalent in value to the main regions, and the Austro-Malayan transitional region is not indicated. The recognition of a Polynesian and still more of a Hawaiian region, is provisional.

Notogaea.

The most distinct of the three primary realms is undoubtedly Notogaea, the Australian section of which is the sole habitat of egg-laying mammals (Monotremata) and of a great variety of marsupials, inclusive of the whole of the diprotodonts, with the exception of the few (cuscuses) found in the Austro-Malayan transitional region. Apart from monotremes and marsupials, the only indigenous mammals found in Notogaea are rodents and bats, with perhaps a pig in New Guinea; although it is most probable that the latter is introduced, as is almost certainly the dingo, or native dog, in Australia. The rodents are all referable to the family Muridae, and are mostly of peculiar types, such as the golden water-rat (*Hydromys*) and the jerboa-rats (*Conilurus*, *Notomys*, &c.); they are, however, in many instances more or less nearly related to species found in Celebes, the mountains of the Philippines and Borneo, and apparently represent an ancient fauna. The mammalian fauna of Notogaea is practically limited to the Australian region, its indigenous representatives in New Zealand being only a couple of bats. The monotremes are in all probability the survivors of a group which was widely spread in Jurassic times; while marsupials, as represented by the American opossums (Didelphyidae), had a very wide range even as late as the Oligocene division of the Tertiary period. The diprotodont marsupials may not improbably have originated within the Australian region, or this region conjointly with the Austro-Malayan transitional region.

Notogaea is likewise the home of a number of peculiar types of birds, some of which range, however, into the Austro-Malayan area, that is to say, Celebes and Ceram. In the Australian region the peculiar avian families include the birds-of-paradise (Paradiseidae), the honeysuckers (Meliphagidae), and the lyre-birds (Menuridae) among the perching group, the cockatoos (Cacatuidae) and lories (Loriidae) among the parrots, the mound-builders, or brush-turkeys (Megapodiidae) among the game-birds, and the cassowaries and emeus (Casuariidae and Dromaeidae) in the ostrich group. The peculiarity of the region is also marked by the absence of certain widely spread family groups, such as the barbets (Megalaemidae), the otherwise cosmopolitan woodpeckers (Picidae), the trogons (Trogonidae), and the pheasant and partridge tribe (Phasianidae).

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[1] *Manchester Science Lectures*, ser. 5 and 6, p. 202 seq.

[2] *Proc. Geol. Soc.* (London, 1890), p. 76.

[3] *Natural Science*, iii. 289.

[4] *Geographical Distribution of Mammals* (London, 1896), p. 27.

[5] "Correlation between Tertiary Mammal Horizons of Europe and America," *Annals New York Academy*, xiii. 48 (1900).

[6] *The Geographical and Geological Distribution of Animals* (London, 1878).

[7] "The Geographical Distribution of Life in North America with special reference to the Mammalia," *Proc. Biol. Soc., Washington*, vol. vii. pp. 1–64 (1892).

[8] See W. L. Sclater, "The Geography of Mammals," part v., *Geographical Journal*, 1896; M. Weber, "On the Origin of the Fauna of Celebes," *Ann. Mag. Nat. Hist.*, ser. 7, vol. iii. pp. 121–136 (1899), and *Der Indo-australische Archipel und die Geschichte seiner Tierwelt* (Jena, 1902); Lydekker, "Celebes: a Problem in Distribution," *Knowledge*, vol. xxi. pp. 175–177 (1898); see also *Deer of All Lands*, p. 168 (1898).

[9] *Die Säugetiere* (Jena, 1904), p. 308.

The reptiles, owing probably to their earlier radiation, are much less peculiar, such widely spread types as the monitors (Varanidae) and skinks, (Scincidae) being abundant, as are also crocodiles (Crocodilidae). The tortoises belong, however, exclusively to the side-necked group (Pleurodira), now restricted to the southern hemisphere; among these the most noteworthy being the giant horned tortoise (*Miolania*) from the Pleistocene of Queensland, which belongs to a genus elsewhere known only from the South American Tertiary. The Australian lung-fish (*Ceratodus*, or *Neoceratodus*) is the sole survivor of a widely spread Triassic and Jurassic type. The salmon tribe (Salmonidae), however, is notable for its absence, although one peculiar form occurs in New Zealand; and the Cyprinidae, or carps, are wanting throughout the realm, this absence extending to Celebes, although in Borneo the group is abundantly represented.

New Zealand, here provisionally included in a separate Polynesian region, is characterized by the absence of all indigenous mammals except two bats, each representing a peculiar genus. Among birds, the Neogaeic family Meliphagidae includes several peculiar genera, as does also the widely spread starling group (Sturnidae); while the parrots of the genera *Stringops* and *Nestor* are likewise peculiar. Still more noteworthy is the abundance of the ostrich group, represented by the living kiwis (*Apteryx*), and the moas (Dinornithidae) which have been exterminated within comparatively recent times. Reptiles are scarce, but among them the tuatera lizard (*Sphenodon*) is especially noteworthy on account of being the sole survivor of an ordinal group (Rhynchocephalia) widely spread during Triassic and Jurassic times.

Of the Hawalian area (whether or no rightly regarded as a distinct region), it must suffice to state that it is the sole habitat of the gorgeously coloured birds known as mamos, or sickle-bills (Drepanididae).

With regard to the origin of the modern fauna of Notogaea, and more especially the Australian region, as here restricted, we enter extrémely debatable ground. Dr Wallace, who refused to admit the existence of any great inter-continental connexions in the past, was of opinion that Australia received the ancestors of its marsupials and monotremes from Asia by way of the Austro-Malayan area (as it certainly has its rodents) "far back in the Secondary period." This view has been endorsed by the present writer[1] who suggested the early Eocene as the most probable date of immigration; and it has also received the assent of Dr Max Weber,[2] who is of opinion that in pre-Tertiary—very likely Cretaceous—times Australia was united by land with Asia. A Euro-Asiatic fauna inhabited this land, from which during the Eocene a southern portion was cut off by partial submergence, this southern portion being the modern Australia and New Guinea, the home of monotremes, marsupials and ancient forms of other groups, such as cassowaries and birds-of-paradise, while widely distributed specialized types are wanting. Northwards extended a coral-sea, in the islands of which dwelt primitive rodents, insectivores and other ancient groups, with perhaps cuscuses. During the Miocene, great changes of level took place in the archipelago, which attained its present form in the Pleistocene. Celebes was insulated early, Java later. Intermittent land-connexions took place, which allowed of periodical immigrations of Asiatic forms from one side and of Australian types from the other. The question is left undecided whether the cuscuses of the Austro-Malayan islands are remnants of the primitive Euro-Asiatic fauna or later immigrants from Australia. The suggestion is also made that the Australian and Philippine rodents are survivors of the original pre-Tertiary fauna, although it is admitted that the specialization of *Hydromys* is against this. The author fails to see any evidence in favour of a former connexion of Australasia with either South America or a former large antarctic continent (Antarctica).

While admitting that this may be the true explanation, Mr B. A. Bensley[3] considers it possible that opossums (Didelphyidae), which he regards as the ancestral stock of the marsupials, may have effected an entrance into Neogaea by way of Antarctica. In either event, he would place the date of entry as post-Eocene; but against this view is the occurrence of remains of a diprotodont marsupial (*Wynyardia*) in Tasmanian strata believed to be of Eocene age. Prof. Baldwin Spencer[4] is also of opinion that the Australian marsupials and monotremes reached their present habitat by means of a land-connexion in the south subsequent to the insulation of New Zealand. This, of course, implies the existence of an extinct southern marsupial fauna of which we have no knowledge except in the case of the Epanorthidae of Patagonia.

That Australia formed part of a great equatorial land-belt connecting the southern continents in Jurassic times appears to be demonstrated by the evidence of the "Gondwana flora." The question is whether such a connexion—either by way of Antarctica or not—persisted in the case of Neogaea long enough to admit of the ancestors of the modern fauna (supposing it all to have come by a southern route) having effected an entrance. The existence of such a land-bridge was suggested by Sir Joseph Hooker in 1847; and the idea of a late connexion between Neogaea and Notogaea has been adopted by L. Rütimeyer (1867), Captain F. W. Hutton (1873), Prof. H. O. Forbes (1893), Mr C. Hedley (1895), Dr H. von Ihering (1891 and 1900), Prof. H. F. Osborn, who takes an intermediate view of the extent of the part played by Antarctica (1900), and by Dr A. F. Ortmann (1902). On the other hand, Dr T. Gill (1875) believed in the existence of an "Eogaea" connecting the three great continents exclusive of Antarctica; and in 1884 Capt. Hutton, abandoning his former view, suggested the connexion of Australia and South America by means of a mid-Pacific continent. A summary of these views, with references, is given by Dr Ortmann in vol. xxxv. pp. 139–142 of the *American Naturalist* (1901).

So far as mammals are concerned, the evidence in favour of a comparatively late land-connexion is weakened by the recent view that certain supposed Patagonian Tertiary marsupials, such as *Prothylacinus*, are really creodont Carnivora. On the other hand (putting aside these carnivores), Mr W. J. Sinclair[5] is of opinion that the living South American marsupial *Caenolestes* and its extinct relatives are annectant forms between diprotodonts and polyprotodonts, and not far removed from the ancestral stock which gave rise to the Australian phalangers. The occurrence in the Tertiary of Patagonia of primitive opossums, which cannot be regarded as ancestral to the modern South American forms, is also an important determination. From this, coupled with the testimony afforded by the invertebrate faunas, he considers himself justified in stating that "considerable evidence is now available to show that a land-connexion between Patagonia and the Australian region existed not later than the close of the Cretaceous or the beginning of the Tertiary, and it is possible that at this time the interchange of marsupials between the two continents was effected. Whether the marsupials originated in South America and migrated thence to Australia, or the reverse, cannot at present be determined." The above-mentioned tortoises of the genus *Miolania* also appear to afford strong evidence of the persistence of the Jurassic connexion between Notogaea and Neogaea to a comparatively late epoch.

Again, Prof. W. B. Benham,[6] from the evidence of earthworms, is strongly disposed to believe in a late connexion between the areas in question. From their invariable association with angiospermous plants, this author is of opinion that earthworms are a comparatively modern group, which did not attain any important development before the Cretaceous. The ancestral type would appear to have been more or less nearly related to the existing *Notiodrilus*, of which the headquarters, if not the birthplace, was the "Melanesian plateau." New Zealand and the neighbouring islands, which possess the most ancient worm-fauna, were separated at an early date from this plateau. From this area the primitive worms travelled in one direction into the Austro-Malayan countries, while in another, by way of Antarctica, they reached South America and Africa. With this brief summary of the chief views, this part of the subject must be dismissed without the writer being committed to any definite conclusion.

Neogaea.

Next to Notogaea the most distinct faunistic continental area, so far at any rate as its present and later Tertiary mammals are concerned, is Neogaea, containing, as we have seen, only the Neotropical region. It is remarkable as being, with the exception of Notogaea, the only land-area which contains at the present day more than one living genus of marsupials, and also a large middle Tertiary marsupial fauna. The living marsupials include a large number of true opossums, constituting the family Didelphyidae and *Caenolestes* the surviving representative of the Epanorthidae of the Patagonian Tertiaries. The opossums are represented by the genera *Chironectes* and *Didelphys;* the latter divisible into a number of sub-genera of which the typical group alone ranged into North America. Whether the modern opossums belong to the endemic Neogaeic fauna, or whether they are late immigrants from the north (where they were represented in the Oligocene of both hemispheres), is a question in regard to which a definite answer can scarcely at present be given. It appears, however, that *Microbiotherium* and certain allied forms from the middle Tertiary of Patagonia are endemic representatives of the Didelphyidae which did not give rise to the modern types. The Epanorthidae, in the opinion of Prof. Max Weber, indicate a subordinal group by themselves; and if this be correct their evidence in favour of a land-connexion between Neogaea and Notogaea cannot have the weight attributed to it by Mr W. J. Sinclair.

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[1] Lydekker, *Geographical Distribution of Mammals* (1896).

[2] *Der Indo-Australische Archipel, &c.* (Jena, 1902).

[3] *American Naturalist*, xxv. 260 and 261 (1902).

[4] *Report of Horn Expedition to Central Australia*, pp. 187 and 188 (1896).

[5] *Proc. Amer. Phil. Soc.*, xlix. 73 (1905).

[6] *Report, Australian Assoc.*, ix. 319 (1903).

The typical Edentata (sloths, anteaters and armadillos) are at the present day practically confined to Neogaea where they have existed from the date of the Santa Cruz beds of Patagonia (which are probably of Miocene age). A few armadillos, however, have penetrated into Texas; and in the Pleistocene epoch several representatives of the extinct ground-sloths (Megatheriidae) and a glyptodon, or giant armadillo, also ranged into North America. The group is, however, essentially Neogaeic. Among the monkeys the Cebidae, or American monkeys, and their relatives the Hapalidae, or marmosets, are likewise peculiar to Neogaea, where they date from the Santa Cruz epoch. The vampire-bats, or Phyllostomatidae, are likewise peculiar to this realm, and are doubtless also endemic. With the exception of a few shrew-mice, which have evidently entered from the north, continental Neogaea is at the present day devoid of Insectivora. It is, however, very noteworthy that one peculiar family (Solenodontidae) of the order, apparently nearly allied to the Malagasy Centetidae (tenrecs), occurs in the West Indies, while the extinct *Necrolestes*, believed to be near akin to the African golden moles (Chrysochloridae), is found in the Santa Cruz beds. Rodents of more or less peculiar types are highly characteristic of Neogaea and for the most part date from the Santa Cruz epoch. Among these the Caviidae, Chinchillidae and Octodontidae are peculiar to this realm, while the Capromyidae are common to the Ethiopian region of Arctogaea, but are unknown elsewhere.

Ungulates are in the main very poorly represented in Neogaea and include only the llama group (guanaco, &c.), tapirs, and certain small or medium-sized deer related to North American types. Palaeontological evidence tells us that these, like certain peculiar genera of horses now extinct (such as *Hippidium*) and mastodons, were comparatively recent intruders into the realm from the north. On the other hand, Neogaea at the date of the deposition of the Santa Cruz beds was the home of certain endemic groups of ungulates, such as the Toxodontia and Litopterna, some of the representatives of which (*Toxodon* and *Macrauchenia*) flourished during the Pleistocene Pampean epoch.

Of the Carnivora, the civet group (Viverridae) is absent, and the representatives of the dog tribe (Canidae), bears (Ursidae), of which there is only a single existing representative, cats (Felidae), and probably raccoons (Procyonidae), must be regarded as intruders from the north, although several genera of the last-named group are peculiar to the area. In the Santa Cruz epoch the place of these modern specialized Carnivora was taken by marsupial-like creodonts, such as *Prothylacinus*.

In birds Neogaea is especially rich and contains more than a score of family groups unknown elsewhere. Several of these, such as the tyrant-birds (Tyrannidae), manakins (Pipridae), chatterers (Cotingidae), ant-thrushes (Formicariidae), the oven-bird group (Dendrocolaptidae), plant-cutters (Phytotomidae), and wren-thrushes (Pteroptychidae), belong to a low and generalized type of the perching, or passerine, group. Among the so-called picarian birds, which are likewise a generalized type, the big-billed toucans (Rhamphastidae), puff-birds (Bucconidae), jacamars (Galbulidae), motmots (Momotidae), and the vast assemblage of humming-birds (Trochilidae) are in the main peculiar to this realm, although some of the last-named family wander to the northward in summer. The condors (Cathartidae), form a highly characteristic Neogaeic family; while the hoatzin (*Opisthocomus*) represents another. Of the higher forms of perching-birds the quit-quits (Coerebidae), greenlets (Vireonidae), the hang-nests and many other representatives of the Icteridae, and the tanagers (Tanagridae) are exclusively Neogaeic; while crows, starlings, thrushes, warblers and flycatchers are either rare or wanting, although the finches are abundant. Parrots are numerous, and represented by peculiar forms such as the macaws (*Ara*) and conures or ordinary South American parrots (*Conurus*). Very characteristic of the realm, and unknown elsewhere are the curassows and guans (Cracidae) among the game-birds, the chajas, or screamers (Palamedeidae), the trumpeters (Psophiidae), sun-bitterns (Eurypygidae), and the seriema (Cariamidae). Allied apparently to the last is *Phororhachos*, a giant extinct bird from the Santa Cruz beds with a skull nearly as large as that of a pony. The tinamous (Tinamidae), possibly an annectant type between game-birds and the ostrich group, and the rheas or American ostriches (Rheidae) are likewise exclusively Neogaeic. It may be added that the distribution of all the members of the ostrich group affords a strong argument in favour of a former union of the southern continents, especially as their earliest known representative is African.

Among reptiles, the tortoises, with the exception of representatives of the terrestrial genus *Testudo*, all belong to the Pleurodira, and include several peculiar generic types such as *Chelys* (matamata) and one, *Podocnemis*, common to Madagascar. The occurrence in the Tertiary of Patagonia of a representative of *Miolania*, elsewhere known only from the Pleistocene of Queensland, has been already mentioned. A number of snakes of the boa group (Boinae) occur in the realm, to which the genus *Eunectes* (anacondas) is restricted; but *Boa* itself, like *Podocnemis* among the tortoises, is common to Neogaea and Madagascar. The blind burrowing-snakes of the family Glauconiidae occur throughout the warmer parts of the realm, and are also found in Africa and south-western Asia. The caimans or South American alligators (*Caiman*) are solely Neogaean; the iguanas (Iguanidae) are mainly peculiar to the realm, although a few inhabit North America, and there are two outlying genera in Madagascar and a third in Fiji. The tejus (Tejidae) are wholly Neogaean. The Xantusiidae are exclusively Central American and Antillean; while the Amphisbaenidae are practically restricted to Neogaea and Africa. On the other hand, Lacertidae, Varanidae and Agamidae are absent. Tailed amphibians are unknown south of Central America; but the region is the home of several peculiar types of toads, such as *Pipa* (Surinam toad) belonging to an otherwise Ethiopian section, and the majority of the family Cystignathidae, as exemplified by the horned toad and the escuerso (*Ceratophrys*), the remainder of the group being Australian.

Freshwater fishes are very abundant in Neogaea, where they are represented by a number of peculiar generic and certain family types; some of the members have developed the remarkable habit of feeding upon the floating fruits abundant in the rivers of the tropical forest-districts.

The electric eels (Gymnotidae) are peculiar to the waters of Neogaea, as are certain other groups, such as the armoured cat-fishes (Loricariidae), while true cat-fishes (Siluridae) are extremely abundant. Perhaps, however, the most remarkable feature of the fish-fauna of Neogaea is its affinity to that of the Ethiopian region. Among the lung-fishes the family Lepidosirenidae is, for example, restricted to the two areas, with one genus in each, as is also the family Characinidae. Much the same may be said of the Cichlidae, which have, however, representatives in the Malagasy and Oriental regions; and the Cyprinodontidae, which are extremely abundant in Neogaea (where certain of their representatives are separated by some naturalists as a distinct family, Poeciliidae) likewise present the same general type of distribution, although their area includes the southern fringe of the Palaearctic sub-region and a considerable portion of the Oriental region.

As regards the past history of Neogaea, Professor Carl Eigenmann, writing in the *Popular Science Monthly* for June 1906, observes that "in the earliest Tertiary tropical America consisted of two land-areas, Archiguiana and Archamazonia, separated by the lower valley of the Amazon, which was still submerged. There was a land-mass, Hellenis, between Africa and South America, possibly in contact with Guiana and some point in tropical Africa. This land-mass, which was inhabited, among other things, by fishes belonging to the families Lepidosirenida (lung-fishes), Poeciliidae, Characinidae, Cichlidae and Siluridae (cat-fishes), sank beneath the surface of the ocean, forcing the fauna in two directions, towards Africa and towards South America, exterminating all types not moved to the east or to the west. From these two rudiments have developed the present diverse faunas of Africa and South America, each reinforced by intrusions from the ocean and neighbouring land-areas, and by autochthonous development within its own border. . . . The connexion between Africa and South America existed before the origin of present genera, and even before the origin of some of the present families and sub-families, some time before the early Tertiary. There has never been any exchange between Africa and South America since that time."

This connexion between Neogaea and Africa was doubtless a continuation of the old Jurassic equatorial land-belt to which allusion has been already made; freshwater fishes being probably a group of earlier radiation than mammals. Perhaps the distribution of the reptilian genera common to Neogaea and Madagascar may be explained in the same manner, although tortoises apparently identical with *Podocnemis* occur in the Eocene of Europe (as well as in that of Africa and India), so that this group may have radiated from the north. Whether the evidence of the Cystignathidae among the amphibians and of the extinct *Miolania* among chelonians is also evidence of the persistence of the Jurassic connexion between Neogaea and Notogaea till a considerably later epoch must, for the present, be left an open question. The distribution of other families of lizards is, however, not in favour of such a connexion, the Lacertidae and Agamidae being confined to the Old World, inclusive of Australia but exclusive of Madagascar, while the cosmopolitan Scincidae, so abundant in Notogaea, are extremely scarce in Neogaea.

Reverting to the mammalian fauna, its evidence, combined with that of geology, indicates that during the greater portion of the Tertiary period South America was isolated from North America, and inhabited by its autochthonous fauna of monkeys, marmosets, sloths, ground-sloths, ant-eaters, armadillos, glyptodonts, toxodonts, macrauchenias (together with certain other peculiar ungulates), rodents, marsupials and creodonts, as well as by *Phororhachos*, rheas, tinamous and probably some of the other groups of birds now peculiar to the area. This state of things continued till the later Miocene or Pliocene epoch, during some portion of which a connexion was established with North America by way of the isthmus of Darien. By means of this new land-bridge a certain proportion of the autochthonous fauna of Neogaea was enabled to effect an entrance into North America, as is exemplified by the occurrence there of ground-sloths and glyptodonts. Simultaneously a large immigration of northern forms took place into Neogaea; these invaders from Arctogaea, including cats and sabre-toothed tigers, bears, fox-like dogs, raccoons, llamas, horses, tapirs, deer, mastodons and perhaps opossums. While representatives of most of these invaders have persisted to the present day, some groups, such as horses and mastodons, have entirely disappeared, as has also a large portion of the autochthonous fauna. Here it may be well to notice that the evidence for the insulation of Neogaea during a large portion of the Tertiary period does not by any means rest only on that supplied by mammals. C. H. Gilbert and E. C. Starks,[1] for instance, in a work on the fishes of the two sides of the isthmus of Darien, wrote as follows:—"The ichthyological evidence is overwhelmingly in favour of the existence of a former open communication between the two oceans, which must have become closed at a period sufficiently remote from the present to have permitted the specific differentiation of a very large majority of the forms involved. . . . All evidence concurs in fixing the date of that connexion at some time prior to the Pleistocene, probably in the early Miocene." This, it will be observed, agrees almost precisely with the conclusions drawn from the fossil mammalian faunas of North and South America, which indicate that land-communication between those two continents was interrupted during a considerable portion of the Tertiary epoch, and only re-established (or [?] established for the first time) either towards the close of the Miocene or the early part of the Pliocene epoch.

The South American mammalian fauna, as we now know it, is, then, a complex, consisting of an original autochthonous element and of a large foreign infusion from the north. As to the origin of the latter, there is no difficulty; but some degree of obscurity still prevails with regard to the source of the autochthonous fauna. According to Prof. Eigenmann's interpretation of the evidence of the fresh-water fishes the early Tertiary Atlantic "Hellenis" may have been in contact with Guiana on the one side and tropical Africa on the other. That such a connexion did really exist in Tertiary times is the conclusion reached by Dr C. W. Andrews,[2] as the result of his studies of the Tertiary vertebrate fauna of the Fayum district of Egypt, as expressed in the following passage:—"Speaking generally, it appears that (1) probably in Jurassic times Africa and South America formed a continuous land-mass; (2) in the Cretaceous period the sea encroached southwards over this land, forming what is now the South Atlantic. How far this depression had advanced southwards at the end of the Secondary period is not clear, but it appears certain that the final separation of the two continents did not take place till Eocene times, and that there may have been a chain of islands between the northern part of Africa and Brazil which persisted even till the Miocene."

By this route, as was suggested considerably earlier by Prof. W. B. Scott and subsequently by the present writer, Neogaea may have received a considerable portion of its autochthonous mammal-fauna. Further reference to this point is made later; but it may be added that the evidence of the land-faunas is supplemented by that of the shallow-water marine faunas on the two sides of the Atlantic, which present a striking similarity.

In an address to the British Association at the meeting in 1905 in South Africa Mr G. A. Boulenger expressed himself, however, as by no means satisfied with the evidence of a Tertiary connexion between Africa and South America. "It is undeniable," he observed, "that the hypothesis of a South Atlantic land-communication in the Eocene has much in its favour, and when this is really established, all difficulty in explaining the distribution of the Cichlidae will have disappeared. In the meanwhile . . . we must not construct bridges without being sure of our points of attachment." In this connexion it may be mentioned that those who explain the distribution of certain forms of life by the former existence of a land-connexion between the southern continents by way of "Antarctica," have attached some importance to the existence of fishes of the genus *Galaxias* in the freshwaters of New Zealand, Australia, South America and the Cape. This evidence has been shattered by Mr Boulenger's description (in a memoir of the fishes of the Congo) of a marine representative of the genus in question from the Southern Ocean.

For the zoological subregions of Neogaea the reader must refer, as in the case of most of the other regions, to special works on zoological distribution.

Arctogaea. As Arctogaea includes the whole of the rest of the land-surface of the globe (with the exception of Antarctica) it is almost impossible to give any general diagnosis even of its mammalian fauna. It may be mentioned, however, that at the present day monotremes are wholly wanting, while marsupials are represented only by one or two species of opossums (*Didelphys*) in North America and by cuscuses (*Phalanger*) in the Austro-Malayan subregion. The true or typical Edentata are, if we except late wanderers from Neogaea into North America, absent from this realm at the present date and during the Pleistocene; [illegible] urrence of a ground-sloth in the Pleistocene of Madagascar being probably due to a misinterpretation. On the other hand, this region, and more especially its eastern half, is the great home of the ungulate mammals. Indeed rhinoceroses may be considered absolutely characteristic of Arctogaea, since at one time or another they have ranged over the whole area, except Madagascar, and are quite unknown elsewhere. The modern land Carnivora are likewise an essentially Arctogaeic group, which only found its way into Neogaea at a comparatively recent epoch; and the realm may be said to have been the birthplace of most of the higher groups of placental mammals. The tortoises of the family Trionychidae form an exclusively Arctogaean group, once ranging all over the realm, although long since extinct in Europe.

Ethiopian region. If Madagascar be excepted, the Ethiopian region (or Ethiopia) is the most distinct of all the regions of Arctogaea. So distinct is it that, on the evidence of the distribution of moths, Dr H. S. Packard[3] has suggested that it should be separated from Arctogaea to form a realm by itself, under the name of Apogaea. The mammalian fauna, even exclusive of the Tertiary one of Egypt, does not, however, countenance such a separation. By Sclater and Wallace, Madagascar was included in the Ethiopian region, but that island was subsequently made a region by itself by Dr Blanford. This separation of Madagascar to form a Malagasy region has met with general acceptance; but in the opinion of Mr R. I. Pocock,[4] who bases his conclusion on the distribution of trapdoor-spiders (which in other respects accords curiously well with that of mammals), it is not justified. The mammalian evidence appears, however, to be overwhelmingly strong in its favour; and it also receives support from reptilian distribution. All are agreed that the Ethiopian region should exclude that part of Africa which lies, roughly speaking, northward of the tropic of Cancer. By Sclater and Wallace the region was taken to include that portion of Arabia lying to the south of the same tropic; but Mr Pocock[5] has pointed out that this separation of Arabia into two portions is not supported by the distribution of scorpions, and he would refer the whole of it to the Mediterranean transitional region. The occurrence of a tahr-goat (*Hemitragus*) in Oman lends some support to this proposal since that genus has no representative in Africa, and occurs elsewhere only in the Himalaya and the mountains of southern India. Other writers have not accepted Mr Pocock's emendation; and the reference of the northern half of Arabia to the Mediterranean and of the southern half to the Ethiopian region is usually followed. The area is admittedly a meeting-ground of at least two faunas.

Discoveries in the Fayum district of Egypt have conclusively proved that during the early (Eocene) part of the Tertiary period Ethiopia was a great centre of development, and subsequently of dispersal, instead of having received (as was formerly supposed) the whole of its higher modern mammalian fauna from the north. In this Ethiopian centre were developed the ancestors of the elephants (Proboscidea) and of the hyraxes (Hyracoidea); the latter group being represented by species of much larger size than the existing forms, some of the former of which ranged into southern Europe during the later Tertiary. It was also the home of a peculiar subordinal group of ungulates (Barypoda), typified by *Arsinöitherium*, and may likewise have been the birthplace of the swine (Suidae) as the earliest known representative of that group (*Geniohyus*) occurs in the Fayum Eocene. The hippopotamuses (Hippopotamidae), which appear to be descended from the Tertiary Anthracotheriidae, may likewise be of Ethiopian origin, and the same may turn out to be the case with the giraffe group (Giraffidae) although definite evidence with regard to the latter point is wanting.

The occurrence of an ostrich-like flightless bird in the Fayum Eocene—the oldest known representative of that group—is suggestive that the Ratitae originated in Ethiopia, which would accord well with their distribution both in the present and the past. A giant land-tortoise (*Testudo*) is likewise known from the Fayum beds, and as it is allied to the species recently or still inhabiting Madagascar and the Mascarene islands, there is a strong probability that Ethiopian Africa was likewise the centre of development and dispersal of that group.

Turning to its existing mammalian fauna, Ethiopia possesses a number of peculiar family or generic groups, and is also nearly equally well characterized by the absence of others. As remarked by Wallace, one of its characteristics is the great number of species of large size. Among the Primates, it is the home of the typical group of the Negroid branch of the human species, whose northern limits coincide approximately with the boundary of the region itself, being replaced in northern Africa by races of the Caucasian stock. Gorillas and chimpanzees (*Anthropopithecus*) are peculiar to the region, as are also baboons (*Papio* and *Theropithecus*), if southern Arabia be included. Monkeys abound, and although in most cases nearly allied to those of the Oriental region, are generically

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n *Academy*, vol. iv. (1904).

Tertiary Vertebrata of the Fayum (London, 1906).

[3] *Science*, ser. 2, vol. xix. p. 221 (1904). Dr Packard groups Notogaea and Neogaea in a single realm under the name Antarctogaea. Some other writers, such as Dr H. Gadow, take Notogaea to include all the three southern continents, and employ the term Arctogaea for the rest of the world.

[4] *Proc. Zool. Soc., London*, 1903, pp. 340–368.

[5] *Natural Science*, vol. iv., pp. 353–364 (1894).

distinct. The Prosimiae, or lemuroids, include the galagos (*Galago*) and pottos (*Perodicticus*), of which the latter are akin to the Oriental lorises, while the former are quite distinct from the Malagasy lemurs. Among the Carnivora, the aard-wolf (*Proteles*), the hunting-dog (*Lycaon*) and the long-eared fox (*Otocyon*) are peculiar generic types, as are several forms of mungooses (Herpestinae); while the spotted hyaena forms a subgenus by itself. The bear-family (Ursidae), on the other hand, is totally absent. In the great ungulate order the African elephant is widely sundered from its Asiatic cousin, as are the two species of rhinoceros from their representatives in the Oriental region; indeed each group is subgenerically distinct. The hyraxes, forming the suborder Hyracoidea, are, with the exception of a single outlying Syrian species, confined to Ethiopia. Zebras and true wild asses are likewise peculiar to the region. More remarkable is the extraordinary number of peculiar genera of antelopes, a few of which range, however, into North Africa, Syria and Arabia; the African buffaloes are markedly different from those of Asia; and sheep and goats are absent from the region, with the exception of intruding into it to some extent in the mountains of the Sudan and Abyssinia. The giraffe-family (Giraffidae), as represented by giraffes (*Giraffa*) and the okapi (*Ocapia*), is absolutely confined to this region, from which the deer-tribe (Cervidae) is completely absent. Chevrotains, or mouse-deer, are represented by the peculiar genus *Dorcatherium* (or *Hyomoschus*); in the pigs the wart-hogs (*Phacochoerus*), forest-hogs (*Hylochoerus*), and the bush-pigs (subgenus *Potamochoerus*), with the exception of one Malagasy species, are now unknown elsewhere, as are also hippopotamuses. Rodents include a number of peculiar types, among which may be noticed the scaly-tailed squirrels (Anomaluridae), the jumping-hares (*Pedetes*), the strand-moles (Bathyergidae), the crested-rats (*Lophiomys*), and the cane-rats (*Thryonomys*, or *Aulacodus*); the last being nearly allied to South American forms. In the Insectivora, moles (Talpidae) are absent, the jumping-shrews (Macroscelididae) are solely African, although ranging north of the Sahara, while the golden moles (Chrysochloridae) and the Potamogalidae are exclusively Ethiopian. Lastly, the ant-bears, or aard-varks (Orycteropodidae), represent a suborder of the Edentata unknown elsewhere; while the African pangolins (Manidae) differ markedly from their Oriental kindred.

The Ethiopian birds are less peculiar. The ostrich (*Struthio*) ranges, in suitable localities, all over the region, thus entering the Mediterranean transition-region in the north. The guinea-fowls (Numidinae) form a subfamily confined to Ethiopia and Madagascar, where true pheasants are unknown. Other peculiar types are plantain-eaters (Musophagidae), colies (Coliidae), wood-hoopoes (Irrisoridae), barbets (Megalaemidae), ground-hornbills (*Bucorvus*); secretary-birds (Serpentariidae), glossy starlings (*Lamprotornis*), ox-peckers (*Buphaga*), the genera *Laniarius* and *Telephorus*, as well as a number of others, all of which are unknown in Madagascar. In addition to true pheasants, wrens (Troglodytidae) and water-ousels (Cinclidae) are unknown in the Ethiopian region.

Apart from the widespread Trionychoidea (of which there are two genera peculiar to the region), the Ethiopian fresh-water tortoises belong to the section Pleurodira; the two genera *Pelomedusa* and *Sternothaerus* being common to Africa and Madagascar, and unknown elsewhere. The Amphisbaenidae are common to Neogaea and Ethiopia, to the exclusion of Madagascar; but the Gerrhosauridae and Zonuridae, on the other hand, are restricted to the present region and Madagascar, which also form the headquarters of chameleons. In contrast to the latter community is the absence in Madagascar of Agamidae and Varanidae, which are common in Ethiopia. The absence of slow-worms and their kindred (Anguidae) is a marked negative feature of the present region. As regards batrachians, the region has no salamanders or other tailed forms, but, in common with India, possesses caecilians (Apoda); while it shares the group of tongueless toads (Aglossa) with Neogaea, its peculiar family being the Xenopodidae, in contradistinction to the South American Pipidae. The Pelobatidae are absent, and true toads are few, but frogs are abundant.

Among fishes, Africa south of the Sahara possesses a number of peculiar types. With Neogaea it shares the possession of the typical lung-fishes (Lepidosirenidae), while it is the habitat of the species of bichir (*Polypterus*) and *Calamoichthys*, the sole survivors of the ancient group of fringe-finned ganoids (Crossopterygii). The other families peculiar to Ethiopia are the Mormyridae (proboscis-fishes), Pantodontidae, and Phractolaemidae; the two latter being represented only by a single species each. The Notopteridae, Ophiocephalidae, Anabantidae, Osphromenidae and Mastacembelidae are common to Ethiopia and the Oriental region. In addition to the Lepidosirenidae, the Characinidae are peculiar to this region and Neogaea. The Cichlidae occur in Madagascar, Ethiopia, the Oriental region and Neogaea; and the Osteoglossidae are common to the last three of these regions, as well as Australia, while the Nandidae are Ethiopian, Oriental and Neotropical. On the whole, the affinities of the fish-fauna of Ethiopia are nearest to that of the Oriental region, and, secondly, to that of South America.

Although invertebrates do not come within the scope of the present article, it may be mentioned that Ethiopia is remarkable for the total absence of fresh-water cray-fishes.

As regards its past history, Ethiopian Africa was in connexion with India during the Triassic and Jurassic periods, the two areas collectively forming "Gondwanaland," which doubtless constituted a portion of the equatorial land-belt referred to as existing during the epochs in question. Gondwanaland was the home of a large section of the anomodont reptiles from which mammals have sprung; and it is quite probable that the evolution of the latter group took place within the present area. Between the Trias and the Eocene little or nothing is known of the vertebrate palaeontology of Ethiopia;[1] and in Egypt there is also a long gap between the lower Miocene and certain Pliocene beds in the Wadi Natrun. The Tertiary deposits of southern Europe and northern India indicate, however, that Ethiopian Africa was in free communication with these countries during the upper Miocene and Pliocene epochs. There occur, for instance, either in south-eastern Asia or southern Europe, or both, during the latter period numerous genera of antelopes now restricted to Ethiopia, as well as giraffes, okapi-like ruminants (*Palaeotragus*), elephants and rhinoceroses of an African type, probably zebras, hippopotamuses, baboons, chimpanzees and ostriches. Owing to imperfect knowledge of Pliocene Africa, it is impossible to say whether these types were first developed in Ethiopia or to the north-east, and consequently whether or not Professor Huxley was right in his theory that the modern higher mammalian fauna of Ethiopia came from the north. It has, however, been suggested that while the Bovidae are an autochthonous Ethiopian group, the Cervidae originated in either the Holarctic or the Oriental region; a theory which if confirmed will materially aid in explaining the absence of the latter group from Ethiopia. It is supported to some extent by the fact that we are acquainted with primitive ancestral deer in the European Tertiary, while the ancestors of the Bovidae are at present unknown. Whatever be the truth on this point, it is manifest that whether the middle Tertiary Bovidae migrated from Ethiopia to Asia or in the opposite direction, there must have been some cause which barred the entrance by the same route into the latter area of all members of the deer-tribe (as well as bears). It should be added that although the ancestral Proboscidea were Ethiopian, the passage from the mastodons into the true elephants appears to have taken place in Asia; a circumstance which would imply the Asiatic origin of the African elephant.

The evidence in favour of the continuation of the Mesozoic land-bridge between Ethiopia and Neogaea has been discussed under the heading of the latter area. If the arguments in favour of such a connexion are valid, it is to the old mammal fauna of Ethiopia that we must probably look for the progenitors of the Santa Cruz fauna of Patagonia. Very noteworthy is the alleged occurrence of remains of primitive armadillos in the Oligocene beds of southern Europe in association with those of pangolins and aard-varks; since, if these fossils be rightly determined, there at once arises the probability of Africa having been the original home of the entire Edentate order.

Malagasy region.

In the case of an island lying so close to the African continent as does Madagascar the natural expectation would be that its fauna should be intimately related to that of the former. As a matter of fact—in the case of mammals and birds, at any rate—it is much more distinct from the Ethiopian fauna than is the latter from the fauna of either the Oriental or the Holarctic region. The evidence—from the above-mentioned groups—in favour of recognizing a distinct Malagasy region is in fact positively overwhelming, while it is also supported in some degree by the distribution of groups other than those named. In place of the Ethiopian assemblage of apes, monkeys, baboons, galagos and pottos, Madagascar (together with the Comoro islands) possesses an absolutely unique fauna of lemurs, constituting the family Lemuridae, which, as now understood, is confined to this island, where it is represented by the three subfamily-groups of sifakas (Indrisinae), true lemurs (Lemurinae), and aye-ayes (Chiromyinae). All these animals agree with one another in the characters of the tympanic region of the skull; thereby differing from the African and Oriental Prosimiae, but agreeing with the European Oligocene *Adapis*, which must apparently be regarded as the ancestral form. This is a striking confirmation of the theory advanced many years ago by Huxley that Madagascar received its lemuroid fauna from Europe at a very early date, since which time, at any rate, it has been isolated from Africa. Some of the Pleistocene Malagasy lemurs were much larger than any of the living forms, rivalling in this respect a chimpanzee. The Carnivora are represented only by a small number of species, mostly referable to peculiar genera, of Viverridae, among which the fossa (*Cryptoprocta*) is the largest. In the ungulates there are only two extinct species of hippopotamus and a living bush-pig, the ancestors of all three of which probably crossed the Mozambique channel by swimming; and Edentata are equally conspicuous by their absence. Insectivora, on the other hand, are represented by the tenrecs (Centetidae), with numerous generic types, whose nearest relatives appear to be the west Indian solenodons. The bats are likewise different from those of the mainland; a notable feature being the occurrence of flying-foxes of the Asiatic and Australian genus *Pteropus*. Of the countless rodents of Africa, all are wanting; while the only members of that group inhabiting the island are certain rat-like animals collectively constituting the family Nesomyidae.

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[1] The fossils of the Uitenhage beds, now generally classed as Jurassic, consist chiefly of invertebrates and plants.

The birds are scarcely less remarkable than the mammals, such common Ethiopian types as the ostrich, secretary-bird, honey-guides (*Indicator*), wood-hoopoes, ground-hornbills, ox-peckers, barbets and glossy starlings being entirely unknown. On the other hand, the Malagasy region, inclusive of the Mascarene islands, comprises quite a number of distinctive bird-genera, such as *Mesites*, *Tylas*, *Artamia*, *Calicalicus*, *Euryceros*, *Philepitta*, *Atelornis* and *Leptosomus*; the first of these representing a peculiar family of game-birds, while the last, including only the kirombo, forms a subfamily of rollers (Coraciidae). In the Pleistocene the ostrich group was represented by various species of *Aepyornis*, probably the original of the legendary roc; while within historic times Mauritius and Réunion were the respective homes of the two species of dodo (*Didus*), and Rodriguez was inhabited by the solitaire (*Pesophaps*), the three constituting the family Dididae. The guinea-fowls, on the contrary, form a group common to the Ethiopian and Malagasy regions and are unknown elsewhere.

Many of the features of the reptilian fauna are alluded to under the headings of Neogaea and the Ethiopian region. Among lizards, the absence of Agamidae, Veranidae, Lacertidae, Amphisbaenidae and Anguidae is very remarkable, since all these except the last are Ethiopian. In addition, Madagascar possesses, apart from the cosmopolitan skinks and geckos, only Gerrhosauridae, Zonuridae and chameleons (Chamaeleontidae), which are essentially African groups. Affinity with Neogaea is indicated by the presence of a few iguanas, of snakes of the boa group (especially the genus *Boa*), and of *Podocnemis* among the tortoises. The other pleurodiran tortoises are, however, of an Ethiopian type. The same may perhaps be said with regard to the giant land-tortoises of the genus *Testudo*, which in Pleistocene or modern times were spread over all the islands of the region, while they existed in Africa in the Eocene, as well as in India in the Pliocene. The spider-tortoise (*Pyxis*) is a peculiar cryptodiran Malagasy genus. In the matter of batrachians the Malagasy region lacks both coecilians (Apoda) and tongueless toads (Aglossa), while it has abundance of true frogs (Raninae), among them the Oriental genus *Rhacophorus*. Of fishes, the peculiar Ethiopian types are absent from the present region, although the community of the Cichlidae to Neogaea and the Ethiopian, Malagasy and Oriental regions is noteworthy. It may be added that Madagascar differs from Ethiopia in possessing one fresh-water cray-fish, the representative of a genus by itself.

The radical distinctness of the Malagasy fauna is thus demonstrated from all sides. That the island has been separated from Ethiopia during the greater portion of the Tertiary period is self-evident. The interpretation of its relationships with other regions is, however, exceedingly difficult. It is generally considered that the Comoro and Seychelle groups mark the line of a former connexion between Madagascar and India, and also with South Africa; but it is evident that this line must have been closed to the passage of mammals since a very remote date, as is exemplified by the fact that the lorises of Ceylon and southern India are quite distinct from the Malagasy lemurs, and much nearer to the African pottos. Whether the occurrence of South American types of reptiles (boas, *Podocnemis*, and iguanas) in Madagascar and not in Africa can be held to indicate a late connexion with Neogaea by way of the Pacific, cannot yet be decided. The occurrence of iguanas in Fiji is, however, as noteworthy as is the community of *Miolania* to Patagonia and Queensland. Moreover, Polynesia is evidently a subsiding area. In the opinion of Captain F. Hutton[1] the land-shells of the genus *Endodonta*, which range all through Polynesia, New Zealand, eastern Australia, New Guinea and the Philippines, with an outlier in Ceylon, afford the best evidence in favour of a Polynesian continent, the Singhalese outlier pointing to the conclusion that this group of molluscs originally came from the north. The molluscan evidence will not, however, explain the South American connexion.

Zoological evidence of the latter connexion, by way of Antarctica, is afforded by the earthworms of the family Acanthodrilidae, which are unknown north of the equator, although their occurrence in Madagascar may point to a northern origin. Additional evidence of a connexion with Patagonia is afforded by the occurrence in the Tertiary strata of South America and New Zealand of a number of shallow-water marine invertebrates. Further, the occurrence of these forms in older strata in South America than in New Zealand suggests that the migration took place from the former to the latter area.

Oriental region.

The relatively small and wholly tropical or subtropical Oriental region was originally taken to include the Punjab; but in a memoir, of which an abstract appeared in the *Proceedings* of the Royal Society of London for 1900 (vol. lxvii. p. 484), Dr Blanford came to the conclusion that the Punjab differs so remarkably in its fauna from the rest of India that it cannot be included in the Oriental region, and must be assigned to the Mediterranean transitional region. To the latter belongs also the Himalayan area above the forests, as does Tibet. India proper, together with Ceylon, is regarded as a single subdivision of the Oriental region, under the title of Cisgangetic, while the Himalaya and Burma form a second subregion, the Transgangetic, which also includes southern China, Tonquin, Siam and Cambodia. A third subregion, the Malayan, includes southern Tenasserim, the Malay Peninsula, and the Malay Archipelago exclusive of Celebes. In the map in the present article the last-named island is included in the present region, although, as stated, it is by preference referred to an Austro-Malay transitional region. Wallace drew the main line dividing the Oriental from the Australian region between the islands of Bali and Lombok, and between Borneo and Celebes: "The strait [between Bali and Lombok] is here fifteen miles wide, so that we may pass in two hours from one great division of the earth to another, differing as essentially in their animal life as Europe does from America. If we travel from Java or Borneo to Celebes or the Moluccas, the difference is still more striking." The hydrographic results obtained by the Dutch Siboga Expedition show, however, that although there exists a line of great depth separating the two areas, this line on no point corresponds to "Wallace's line." On the contrary, it passes east of Timor and through the Banda and Molucca seas, separating Sula from Buru, Obi and Halmaheira. For this line which replaces "Wallace's line," Dr A. Pelseneer has proposed the name of "Weber's line." It is this "Weber's line" which marks the real division between the Arctogaeic and the Notogaeic faunas, although it has been convenient to make Celebes the centre of an intermediate transitional region.

The Oriental region agrees with the Ethiopian in being inhabited by elephants, rhinoceroses, buffaloes, several large representatives of the Felidae (among which the lion, leopard and hunting-leopard are common to the two areas), and numerous civets and mungooses. The elephant and the three species of rhinoceros are, however, subgenerically distinct from their Ethiopian relatives, and the buffaloes are also widely different from those of Africa. Wild cattle (of the subgenus *Bibos*), as represented by the gaur and the bantin, are peculiar to this region; and, with the exception of gazelles, antelopes are poorly represented, although the three genera *Antilope* (blackbuck), *Tetraceros* (chousingha), and *Tragocamelus* (nilgai) are restricted to the area. Southern India has one tahr (*Hemitragus*) in its mountains, and this genus also occurs in the Himalaya, where serows (*Nemorhaedus*) and gorals (*Urotragus*)—goat-like antelopes ranging through the Malay countries—are likewise met with. Deer (Cervidae) are abundant, and include three peculiar subgenera of *Cervus*, namely *Rusa*, *Hyelaphus* and *Rucervus*, to the exclusion of the typical red deer group. The typical *Tragulus* represents the chevrotains; and the pigs, unlike those of Ethiopia, belong to the typical section of *Sus*. In addition to Neogaea, the Malay subregion is now the sole habitat of tapirs (Tapiridae). A notable distinction from Ethiopia is the presence of bears, which are, however, distinct from the typical *Ursus arctus* group of the north.[2] Borneo and Sumatra form the home of the orang-utan (*Simia*), the sole Oriental representative of the Simiidae, while the gibbons (Hylobatidae), which range as far west as the eastern Himalaya, are restricted to the region. The monkeys are all generically distinct from those of Ethiopia. The tarsier represents a family (Tarsiidae) by itself; and the lorises a subfamily (Nycticebinae) peculiar to the forest-tracts. Fruit-bats of the genera *Pteropus*, *Rousettus* and *Cynopterus* help to distinguish the region from Ethiopia; while among the Insectivora the tupais, or tree-shrews (Tupaiidae), with three genera, and the rat-shrews (Gymnurinae), also with three generic modifications, are likewise solely Oriental. The cobegos, or flying-lemurs (*Galeopithecus*), represent an ordinal group (Dermoptera) peculiar to this region; while there are several distinctive genera of rodents, especially in the mountains of the Philippines, where some approximate closely to the Australian type represented by *Hydromys*.

Pangolins, of a type different from those of Ethiopia, alone represent the Edentata. A striking feature of the mammalian fauna of the region is the presence of so many peculiar and probably archaic types in the Malay subregion, and the affinity of the fauna of this area to that of western Africa. Both districts may be said to be highly conservative in the matter of their faunas.

The birds are extremely abundant, and include a number of peculiar genera to which detailed reference is impossible. There is no representative of the ostrich group; and the place of guinea-fowls is taken by pea-fowl (*Pavo*) and argus-pheasants (*Argusiana*), while francolins (*Francolinus*) abound. Attention may be directed to the abundance of pheasants, pigeons, king-fishers, sunbirds, flycatchers and starlings. The babblers (Timeliidae) are especially numerous, the group allied to the hill-robin (*Leothrix*) being peculiar to the region, as are also the green bulbuls (*Chloropsis*). True bulbuls (Pycnonotidae) and king-crows (Dicruridae) are also more abundant than elsewhere; while the broad-bills (Eurylaemidae) are peculiar.

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[1] *Index Faunae Novae-Zealandiae* (London, 1904).

[2] One member of this group has recently been described from the Shan States.

Among reptiles, the long-snouted crocodiles of the genera *Gavialis* and *Tomistoma* are elsewhere unknown at the present day. The river-tortoises of the family Trionychidae have three peculiar genera· while the other fresh-water tortoises differ from those of Ethiopia in belonging to the section Cryptodira, of which there are a number of peculiar generic types. The family Platysternidae is solely represented by a tortoise confined to the Malay countries In the lizards the family Anguidae is represented by one genus; Agamidae are very abundant; and include several types peculiar to the region, among which may be noticed the flying-dragons (*Draco*). Chameleons are rare. The burrowing-snakes of the genus *Typhlops* are exceedingly numerous; the allied Ilysiidae are common to India and Neogaea; while the Uropeltidae are restricted to India and Ceylon. In the presence of pythons the region agrees with Ethiopia, as it does in possessing cobras; but it divides with Neogaea the range of the Amblycephalidae, while it is also inhabited by pit-vipers (Crotalinae), which form an exclusively Asiatic and American group Among the Amphibia, the region agrees with Ethiopia in possessing representatives of the limbless Apoda, but differs in the presence of frogs of the family Pelobatidae, while toads (Bufonidae) and true frogs (Raninae), especially those of the genus *Rhacophorus*, are abundant.

Of the fishes it must suffice to state that lung-fishes and ganoids are absent, as are also Mormyridae. But the families Ophiocephalidae (serpent-heads) and Rhynchobdellidae (or Mastacembelidae), which have a few African representatives, are abundant; while the Cobitidae are a group unknown in Ethiopia. Siluridae and Cyprinidae are common.

Allusion has been already made to the presence of African forms of mammals in the Tertiary deposits of northern India (some of which are, however, within the Mediterranean transition-region); and it may be added that remains of a baboon (*Papio*) and of a large pangolin allied to the west African species have been found in Madras.

Austro-Malayan transition-region.

Few words must suffice for the Malayan transitional area, which embraces Celebes, the Moluccas, &c.; and has a fauna showing a blending of that of the Oriental with that of the Australian region. While Celebes possesses a small buffalo allied to the Indian species, a monkey (*Cynopithecus*), and a peculiar type of pig (*Babirusa*), it has also cuscuses (*Phalanger*), while cassowaries cockatoos and other Notogaeic types occur in the area. A notable feature is also the absence of Cyprinidae (carps) from Celebes, although they are abundant in Borneo.

Mediterranean transition-region.

The Mediterranean transition-region, the limitations of which are approximately shown on the map, must likewise be dismissed with brief notice; its fauna at the eastern end being intermediate between those of the Oriental and the Holarctic region, while in the west it serves as the No-man's-land between the Holarctic and the Ethiopian faunas. The most distinct portion of the Mediterranean fauna is undoubtedly that of Tibet, where are such peculiar types among mammals as the takin (*Budorcas*), the chiru antelope (*Pantholops*), the yak, representing a subgenus of *Bos*, snub-nosed monkeys (*Rhinopithecus*), the giant panda (*Aeluropus*), and certain peculiar shrews (*Nectogale*).

Farther west the great mole-rat (*Spalax*), the rabbit (subgenus *Oryctolagus*) and the two species of fallow-deer (subgenus *Dama*), are very characteristic of the Mediterranean zone, which is also the home of the addax antelope (*Addax*), the Barbary sheep (subgenus *Ammotragus*), and numerous true sheep, wild goats and gazelles. *Ctenodactylus*, the gundi, is a characteristic North African genus of rodents. It is also noteworthy that with the Mediterranean zone we enter the domain of typical deer of the red deer group (*Cervus*), and of bears of the brown bear group (*Ursus arctus*). The wolf and the fox are also animals whose territory we reach on entering the Mediterranean zone, although neither of these, or the brown bear, are confined to this tract, or even to the Palaearctic section of the Holarctic region.

Reference to many other animals of the Mediterranean tract will be found under the heading of the Palaearctic subregion.

Holarctic region.

The Holarctic region, which comprises the whole of the land lying northward of the Mediterranean transitional zone in the eastern, and north of the Sonoran zone in the western hemisphere, is the largest of all the zoological provinces of the globe. The whole territory is extra-tropical, and it is inhabited at the present day neither by monotremes, marsupials, edentates, lemurs nor monkeys, although representatives of the three latter occur in portions of the Mediterranean transitional region. The types common to the eastern and western halves of this region are to be met with on the two sides of the northern Pacific, and it is evident that the main communication took place by way of Bering Strait, although it has been suggested that there was also a land-bridge connecting the European continent with Iceland, and thus with Greenland.

Among characteristic groups of mammals common to the two halves of the Holarctic region (or in some instances of portions of the adjacent transitional zones to the southward) the following may be mentioned: elk (*Alces*), reindeer (*Rangifer*), wapiti (*Cervus canadensis* and its Asiatic representatives), bison (subgenus *Bison*), bighorn sheep (*Ovis canadensis* and its representatives in north-eastern Asia), musk-ox (*Ovibos*), now extinct in the eastern hemisphere, glutton or wolverine (*Gulo*), brown bear (*Ursus arctus* and its representatives in north-east Asia and America), lynx (*Felis lynx*), wolf (*Canis lupus*), fox (*C. vulpes*), pine-marten (*Mustela martes* and the allied American form), ermine and weasel (*Putorius*), variable hare (*Lepus timidus* and its relatives), picas (*Ochotona*, or *Lagomys*), beavers (*Castor*), marmots (*Arctomys*), chipmunks (*Tamias*), susliks (*Spermophilus*, or *Citillus*), jumping-mice (*Zapus*), field-mice, or voles (*Microtus*, or *Arvicola*), lemmings (*Lemmus* and *Dicrostonyx*), mole-shrews (*Urotrichus*),[1] and several genera of bats. To these may be added, as more exclusively arctic forms, the polar bear (*Ursus maritimus*), and the arctic fox (*Canis lagopus*). There are likewise many groups or species of birds common to the two divisions of the region. Among reptiles, the pond-tortoises of the genus *Emys*, if we include their Pleistocene range, are an essentially Holarctic (and Mediterranean-Sonoran) group. In regard to fishes, the whole area is characterized by the abundance of sturgeons (Acipenseridae), carps (Cyprinidae), pike (Esocidae), and the salmon-group (Salmonidae), coupled with the scarcity of cat-fishes (Siluridae).

Further testimony in favour of the unity of the Holarctic region is afforded by the presence on the two sides of the Pacific (and in most cases nowhere else) of true alligators (*Alligator*), giant salamanders (*Cryptobranchus* and *Megalobatrachus*, really scarcely worthy of separation), and shovel-beaked sturgeons (*Scaphirhynchus*). Again, it is highly probable that Père David's deer of Central Asia, alone representing the genus *Elaphurus*, is akin to the fork-antlered deer, *Mazama*, of North America; and many other analogous instances might be quoted. Finally, the distribution of earthworms affords the strongest confirmation of the view that the two halves of the Holarctic region form but a single zoological province, with the Mediterranean and Sonoran zones as transitional appendages.

Palaearctic sub-region.

In briefly reviewing some of the chief faunistic areas of the Palaearctic, as distinct from the Nearctic, subregion, it will be convenient to include some of the groups and species inhabiting the transitional Mediterranean zone, much of which is in reality only a portion of the Palaearctic subregion. Distinctive of the area in this wider sense are a number of wild sheep, such as *Ovis musimon*, *gmelini*, *ammon*, *poli*, &c., which have no representatives on the other side of Bering Strait, as well as wild goats, like *Capra hircus aegagrus*, *C. ibex*, and *C. sibirica*, belonging to an exclusively Old World genus. The saiga antelope (*Saiga*) and the chamois (*Rupicapra*) may also be regarded as Palaearctic (in the sense of Old World) types; as are also wild horses (*Equus caballus przewalskii*), and the kiang (*E. hemionus*) and onager (*E. hemippus*), the two latter being commonly termed wild asses, although widely different from the African animals properly so-called. There are also many peculiar types of deer, inclusive of the red deer (*Cervus elaphus*), Père David's deer (*Elaphurus*), the roe-deer (*Capreolus*), and the musk-deer (*Moschus*); while the Chinese water-deer (*Hydrelaphus*) is one of the characteristic forms from the Mediterranean zone. Camels (*Camelus*) are a type quite unknown east of Bering Sea. Among the Carnivora, reference may be made to the raccoon-dog (*Nyctereutes*), the panda (*Aelurus*), now a Himalayan and Chinese type, but occurring in the later Tertiary of England and the continent, and the tiger (*Felis tigris*); the last being essentially a Siberian and Mongolian animal which only reached India at a comparatively recent date, and never penetrated to Ceylon. Badgers (*Meles*) are unknown in the Nearctic region. In the Insectivora the water-shrew (*Neomys* or *Crossopus*) is exclusively Palaearctic, as is the allied *Diplomesodon*, while the desmans (*Myogale*), although a Mediterranean type, are solely Old World. Among the rodents, reference may be made to the Old World family of the dormice (Gliridae or Myoxidae), of which the genera *Glis* and *Muscardinus* are restricted to the area; as are the hamsters (*Cricetus*) and zokors (*Ellobius* and *Siphneus*) in the Muridae, and *Euchoreutes*, *Alactaga*, and *Platycercomys* in the jerboa-group (Jaculidae, or Dipodidae). *Sminthus* is another characteristic Palaearctic (and Mediterranean) rodent. To continue the list would merely be wearisome, without any compensating advantage; but it may be added that there are a number of characteristic extinct forms, among the most notable of the latter of which are the aurochs or wild bull (*Bos taurus primigenius*) and the giant Irish deer (*Cervus* [*Megaceros*] *giganteus*).

Of the remaining groups of vertebrates characteristic of this subregion space admits of but scant mention. Among abundant and more or less characteristic birds, reference may be made to thrushes, warblers, jays, magpies, buntings, sparrows, and (in the eastern part of the Mediterranean zone) pheasants, pratincoles, coursers (Glareolidae), and bustards (Otididae), of which there are numerous genera confined to the area. The two families last named, together with that of the Panuridae (represented by the bearded tit), being solely Old World, are of themselves sufficient to distinguish the Palaearctic from the Nearctic fauna.

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[1] The American form is often separated as *Neurotrichus*, but this does not affect the relationship of the two areas.

Of reptiles there is not much to be said, the Palaearctic subregion, in its restricted sense, being characterized by the poverty of its fauna, several of the widely spread families of the Old World, such as the Varanidae and Agamidae, stopping short of its southern limits. Among batrachians, the tailed salamanders are common in this and the Mediterranean region (as in the northern hemisphere generally), the genera *Salamandra* and *Chioglossa*, as well as the frogs and toads of the genera *Alytes* and *Pelobates*, being unknown in the Nearctic subregion, while newts (*Molge*) abound in the Palaearctic and are rare in the Nearctic subregion. The olm (*Proteus*) is a native of the Mediterranean rather than the proper Palaearctic area.

As regards fishes, the subregion differs from the Nearctic province by the absence of bony-pike (Lepidosteidae), bow-fins (Amiidae), and the family Catostomatidae, as typified by the " suckers," " red horses " and " stone-rollers " of the genus *Catostomus*, and the presence of loaches (Cobitidae) and barbels (*Barbus*).

Nearctic subregion.

As compared with the Palaearctic (and Mediterranean) province of the Holarctic region the Nearctic subregion (together with the Sonoran transitional zone) is characterized by the extreme poverty of its fauna of hollow-horned ruminants. Of these the bison is generically (and subgenerically) identical with its European relative, while the musk-ox can scarcely be regarded as a distinctive Nearctic type, seeing that it is only since the Pleistocene epoch that it has ceased to be a denizen of northern Europe and Asia. The only other living members of the group are the bighorn sheep (*Ovis canadensis*), which has representatives in Kamchatka and north-eastern Siberia, and the white, or Rocky Mountain goat (*Oreamnus*, or *Haploceros*), which is a peculiar type. All must be regarded as originally immigrants from Europe; and it is noteworthy that in the Nearctic Pleistocene are several extinct types of musk-oxen, together with certain other genera which may possibly serve to connect the white goat and the musk-ox with the serow and the takin of the Old World. The deer (Cervidae), apart from the three Old World types alluded to under the heading of the Holarctic region, are altogether peculiar types referable to the genus *Mazama* (subgenus *Dorcelaphus*, *Cariacus* or *Odocoileus*), but they may be akin to the Asiatic *Elaphurus*, and the group is certainly of Old World origin. The same may be said of the bears (Ursidae), in which the black bear (*Ursus americanus*) is a peculiar species, although probably allied to the Himalayan *U. torquatus*. In the brown bear group (*U. arctus*) it is noteworthy that while the Alaskan forms are very close to those inhabiting Kamchatka and Amurland, the Rocky Mountain grizzly, which has penetrated farther into the continent, is more distinct. The grey-fox (subgenus *Urocyon*) is a characteristic Nearctic type. Among other groups of mammals, the following generic groups distinguish the Nearctic from the Palaearctic subregion, although some of them enter the Sonoran area. In the Insectivora we have *Blarina*, *Scalops* and *Scapanus*; in the Carnivora *Procyon* among the raccoons, *Mephitis* among the skunks, and *Taxidea* among the badgers. *Cynomys* (" prairie-dog ") is a characteristic rodent; and in the same order a very important feature is the replacement of all the true rats and mice (Murinae) of the Old World by the deer-mice and their allies belonging to the subfamily Cricetinae, which is but poorly represented in the Old World. *Peromyscus* is a very characteristic Nearctic genus, although it has an analogue in the Old World in the form of the single representative of the Persian *Calomyscus*. The wood-rats of the genus *Neotoma* and the musquash (*Fiber*) are characteristic Nearctic types of the vole-group. More important is the family Haplodontidae, represented only by the sewellels (*Haplodon*, or *Aplodon*), all the members of which are exclusively North American, although some are Sonoran. The pocket-gophers (Geomyidae) and kangaroo-rats (Heteromyidae) are also solely American, though more developed in the Sonoran than in the Nearctic area; *Geomys* and *Thomomys* in the former and *Perognathus* in the latter family are, however, found in the Nearctic area. Lastly, among the rodents, we have the Canadian porcupine (*Erithison*), typifying the New World family Erithizontidae. Among bats it must suffice to state that the genus *Lasiurus* (*Atalapha*) is solely North American.

Reference to the Tertiary mammal-faunas of North America must be of the briefest. It may be mentioned that even in the Pleistocene these display a much greater development of large forms than occurs at the present day; while a notable feature at this epoch is the mingling of Arctogaeic and Neogaeic types, as exemplified by the occurrence of elephants and mastodons alongside of ground-sloths (*Megalonyx* and *Mylodon*). In the Pliocene and Miocene, the fauna was more of an Old World type, including a great development of camels (Tylopoda), horses (*Equidae*), rhinoceroses (Rhinocerotidae), mastodons, &c., but also a number of peculiar types, such as the ruminating oreodonts (Oreodontidae, or Merycodidae), the perissodactyle Titanotheriidae, and the more generalized Uintatheriidae, which typify a subordinal ungulate group by themselves. It has been suggested that some of the more widely spread of these groups, such as the camels and horses, may have originated in the New World, but there seems at least an equal probability that Central Asia—or a land-area common to Asia and America—may have been their birthplace.

The earliest Tertiary North American fauna is that of the lowest, or Puerco, Eocene, which includes a number of mammals of various types, some of the largest being of the approximate dimensions of a mastiff. Evidently the Puerco epoch was a period of great development and radiation on the part of mammals; its fauna including primitive creodont Carnivora, amblypodous and condylarthrous Ungulata, and a number of smaller types, some of which were probably related to the modern Rodentia, Insectivora and Primates. As only a foreshadowing of the Puerco mammals is found in the under upper Cretaceous Laramie beds, it has been suggested that the fauna was largely of northern origin.

By the middle of the Eocene period the more generalized types of the Puerco fauna had almost disappeared, although a few creodonts survived till the Oligocene. It is surmised that the low brain-capacity of the members of this fauna rendered them unfit to cope with the irruption of more highly organized mammals which suddenly appeared on the scene in the Lower Eocene; this new fauna, it is conjectured, may have developed from a side-line of the original Puerco stock which had remained in the old northern home at the time of the earlier radiation.

" Assuming that the Puerco mammals," observes Mr Madison Grant,[1] " were driven out of more northerly or boreal lands, where they had originally developed, by a declining temperature, it is conceivable that some animals remained behind and adjusted themselves to the changed conditions, until a still further increase of cold freed them also to follow the path of their predecessors, southward.

"Some of these Lower Eocene types of this second radiation, which are found in the Wasatch beds of Wyoming, have sent down lines of descendants, which have ultimately culminated in existing animals. At this time first appear the horses, tapirs, rhinoceroses, camels and dogs (or rather the ancestral stocks thereof). Some of these animals, such as the horses and rhinoceroses, are found contemporaneously in Europe, others, like the (ancestral) camels, are peculiar to America [some of the later types have recently been discovered in Asia].

" Being more highly organized and better adapted to their environment, these new types entirely supplanted the older fauna, and by the Oligocene this transformation was complete, and the older fauna had disappeared. This Wasatch fauna culminated, and then faded gradually away on this [American] continent, until in the Middle Pleistocene it was largely supplanted by arrivals from Asia."

The relationship of the fauna to that of South America, and the interchanges which took place between the two during the Pleistocene and Pliocene epochs, have been already sufficiently discussed when treating of Neogaea.

Of the birds of the Nearctic subregion and the adjacent Sonoran zone, there are a very large number of peculiar genera in the passerine order, a large proportion of which are referable to the finch-group (Fringillidae), and the American warblers (Mniotiltidae), the latter being solely a New World family; there are also a few stragglers from the Neogaeic family of tanagers (Tanagridae). Among game-birds the turkeys (*Meleagris*), the ruffed grouse (*Bonasa*), the prairie-grouse (*Tympanuchus*, or *Cupidonia*), the sage-cock (*Centrocercus*), the prairie-chicken (*Pedioecetes*), and several genera of the American partridges (Odontophorinae), such as *Lophortyx* and *Ortyx* (" bob-white "), may be cited as characteristic Nearctic groups, although some extend farther south. Turning to reptiles, the presence of rattlesnakes (*Crotalus*) is a feature broadly distinguishing the Nearctic subregion (together with America generally) from the Palaearctic; in the more southern territories we also enter the domain of iguanas; while among chelonians we have the family of snappers (Chelydridae), the " stink-pot terrapins " (Cinosternidae), and in the Testudinidae the box-tortoises (*Cistudo*), and the terrapins of the genera *Chrysemys* and *Malacoclemmys* are solely American, although some of them range far to the south, while during the Pliocene the snappers were represented in Europe. There are several more or less peculiar types of North American amphibians, but since these are for the most part Sonoran in range, they may be best noticed in a later paragraph.

From that of the Palaearctic (+Mediterranean) subregion the fish-fauna of the Nearctic subregion (together with that of at least much of the Sonoran area) is broadly distinguished by the presence of bony-pike (Lepidosteidae), bow-fins (Amiidae), and the members of the family Catostomatidae, for which there appears to be no collective English name, as well as by the absence of the loach family (Cobitidae), and barbels (*Barbus*) among the Cyprinidae.

The last of the zoological provinces into which the land-surface of the globe is divided on the evidence of the distribution of mammals and birds is the Sonoran, which, although often regarded as an

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[1] " The Origin and Relationship of the Large Mammals of North America," *Rep. New York Zool. Soc.* (1904), p. 7.

Sonoran transition-zone.

independent region, is best ranked (on Prof. Max Weber's scheme) as a transitional zone between the Nearctic subregion of the Holarctic region of Arctogaea, on the one hand, and Neogaea on the other. Its fauna is indeed essentially a mixture of Nearctic and Neotropical types (inclusive of those originally indigenous to Neogaea and such as are properly immigrants from the north) together with a few more or less wholly endemic forms. Marsupials are represented by opossums (*Didelphys*), and armadillos by *Tatusia*. Peccaries (*Dicotyles*, or "*Tagassu*") make their appearance, but the fork-antlered deer (*Mazama*) are mainly of the northern type. The pronghorn antelope, representing the family Antilocapridae, may be regarded as mainly a Sonoran type; and the same may be said with regard to the pocket-gophers (Geomyidae) and kangaroo-rats (Heteromyidae), some of the genera of which are peculiar to this area. Among cricetine rats, *Rhithrodontomys*, *Sigmodon* and *Neofiber* are characteristically Sonoran. In the Carnivora the three genera of skunks, *Mephitis*, *Conepatus* and *Spilogale* are represented, as are the three raccoon genera *Procyon*, *Nasua* and *Bassariscus*; the third in each case being mainly confined to this zone. *Scalops* and *Notiosorex* among the Insectivora are almost exclusively Sonoran, while *Blarina* and *Scapanus* here attain their maximum development.

Omitting all reference to birds, it may be mentioned that among reptiles the poisonous lizards (Helodermatidae) and the chelonian family Dermatemydidae, with two or three genera, are almost or quite exclusively Sonoran; while such southern types as iguanas become more numerous than in the north. The Mississippi alligator is also Sonoran, although with a congener in China. Among batrachians the salamanders of the genera *Cryptobranchus* (if distinct from the Old World *Megalobatrachus*), *Amphiuma*, *Typhlomolge*, *Necturus* and *Siren*, together with *Scaphiopus* and certain other genera of the frog and toad groups, are exclusively American and mainly Sonoran. The axolotls, or tiger-salamanders (*Amblystoma*), are also a group attaining a great development in this zone, although also ranging to the northward, and likewise recurring in south-eastern Asia.

Antarctica.

So far as birds and mammals are concerned, the Antarctic continent can scarcely represent a distinct zoological province: its fauna consisting mainly of certain peculiar generic groups of seals (which are at least as much inhabitants of the pack-ice as of the continent) together with a number of species of penguins—a group common to the extremities of the three great southern continents—and certain other birds.

Reptilian and Amphibian regions.

The zoological provinces already discussed are based on the present distribution of mammals and birds (see further MAMMALIA and BIRD). The distribution of reptiles and batrachians, like that of fresh-water fishes, by no means accords with that indicated by mammals and birds, probably owing to the earlier radiation, or rather radiations, of the former groups, and different zoological provinces have been proposed to indicate their distribution, as is more fully recorded in the articles BATRACHIA and REPTILES.

From the evidence of batrachian distribution Dr H. Gadow adopts the view that the world may be divided into a northern and a southern half, for the former of which the name Arctogaea is adopted, while Notogaea is used for the latter. It would, however, be much better if entirely new terms were proposed, since the use of the former in a sense different from that in which they are now employed in the case of mammals is liable to create confusion. Notogaea, which (in this sense) includes Australia, Polynesia and the Neotropical region, is characterized by the presence of that family of frogs known as the Cystignathidae, combined with the preponderance of the section Arcifera, the representatives of which form nearly 90 per cent. of the Anura (frogs and toads) inhabiting this half of the globe. Arctogaea, on the other hand, is characterized by the absence of Cystignathidae, and is divisible into two main provinces, or regions, respectively termed Periarctic and Palaeotropical. Of these latter, the Periarctic province is characterized by the presence of salamanders and their allies (Urodela), which are indeed almost peculiar to the area. It is divisible into the (1) Western Palaearctic, (2) Eastern Palaearctic and (3) Nearctic subregions, of which the first two approximately correspond to the Palaearctic subregion *plus* the Mediterranean transition-zone of the mammalian scheme, while the third represents the combined Nearctic and Sonoran areas. The Palaeotropical region has few salamanders or newts; but possesses caecilians (Apoda) which are wanting in the Periarctic; and includes the Ethiopian, Oriental, Malagasy and Austro-Malayan areas of the system based on mammalian distribution, together with Melanesia. Whether the region should be broken up into the four above-named divisions, or regarded as indivisible, may be a matter of opinion; but if such divisions be adopted, they have no approach to the corresponding mammalian areas, the Oriental tract not even possessing a peculiar subfamily. It is thus evident, as might have been expected, that the zoological provinces indicated by the distribution of batrachians are in no wise comparable to those based on mammalian evidence.

As regards reptiles, Dr H. Gadow has remarked that since the various orders have come into existence at very different geological periods, and have each followed their own line of dispersal, no scheme of zoological distribution can be formulated for the class as a whole. In the case of the crocodilian order little information of importance can be gathered from its present distribution, seeing that representatives of all the principal groups occur together in the older Tertiary deposits of Europe. It is, however, of some interest to note that caimans (*Caiman*) are restricted to Neogaea (in the mammalian sense); while the long-snouted *Gavialis* and *Tomistoma* are equally confined to the Oriental region. An important feature in the present distribution of chelonians is the restriction of the section Pleurodira to the southern hemisphere (inclusive of all the three southern continents, as well as Madagascar), and thus in no wise corresponding to the "batrachian Notogaea." The value of this feature in chelonian distribution is to some extent discounted by the occurrence of Pleurodira in the northern hemisphere during the Eocene period.

In regard to lizards (*Lacertilia*), Dr Gadow remarks that their distribution does not support the division of the land-areas of the globe into a northern and a southern half; the marked distinctness of the lacertian fauna of the New from that of the Old World pointing in the same direction. On the other hand, lizards countenance the view "that the Palaeotropical region is but the tropical and therefore richer continuation of the now impoverished Palaearctic subregion."

The present distribution of snakes, according to the same naturalist, indicates that the Ophidia are a group of late radiation, while it further suggests that some of the divisions adopted in classification are not natural ones. Perhaps the most important fact is that the two families, *Boidae* (boas and pythons) and *Typhlopidae* (blind burrowing-snakes), which alone retain vestiges of hind-limbs, occur all over the tropical zone, while certain allied families are found in portions of the same. The restriction of true vipers (Viperinae) to the Palaeotropical and Periarctic areas of the batrachian distributional scheme is a noteworthy fact. The pit-vipers (Crotalinae), however, may perhaps be presumed to have originated in the Palaearctic area, whence they reached and spread all over America, although they were unable to enter either Africa or Australia. The absence of all venomous snakes (which abound in Africa and India) from Madagascar, is a fact harmonizing with mammalian distribution, so far as the peculiarity of the fauna of that island is concerned.

Distribution of fresh-water fishes.

For a fuller account of the distribution of fishes, both freshwater and marine, see ICHTHYOLOGY; here it will suffice to refer to a zöo-geographical scheme, based on the present distribution of the freshwater families, adopted by Dr A. C. L. G. Günther. According to this scheme, the land-surface of the earth is divided into three parallel zones, the Northern, the Equatorial and the Southern. The Northern zone is characterized by the presence of sturgeons (Acipenseridae), the paucity of cat-fishes (Siluridae), and the abundance of carps (Cyprinidae), the salmon-tribe (Salmonidae), and pike (Esocidae). This zone falls naturally into an eastern and a western section. In the first, forming the Palaearctic, or Europe-Asiatic region, bony-pikes (Lepidosteidae) are lacking, while loaches (Cobitidae) and barbels (*Barbus*) abound. In the second section, constituting the Nearctic or North American region, bony-pikes, bow-fins (*Amiidae*), and the family Catostomatidae, all of which are unknown in the Palaearctic area, are present, while loaches and barbels are lacking.

The Equatorial zone is divisible into two provinces. an Eastern, characterized by the presence of carps and of the family (Anabantidae) typified by the well-known "climbing-perch," and a Western province, in which these two groups are wanting. The Eastern province includes an Indian (Oriental) region, in which lung-fishes (Dipnoi) are absent, while serpent-heads (Ophiocephalidae), Mastacembelidae and loaches are numerous; and an African (Ethiopian) region, distinguished by the presence of lung-fishes, bichirs (Crossopterygii), and proboscis-fishes (Mormyridae), the abundance of chromids (Chromididae) and characinids (Characinidae), and the lack of loaches. The Western Equatorial province is likewise divisible into two regions, namely, a Tropical American (Neotropical), distinguished by the possession of lung-fishes and electric eels and the abundance of chromids and characinids, and a Tropical Pacific (Australian and Hawaiian) characterized by the presence of Dipnoi (widely different, however, from those of Africa and South America, which are nearly related), and the lack of chromids and characinids.

Lastly, the Southern zone is characterized by the absence of carps and the scarcity of cat-fishes, while the salmon tribe is replaced by the Haplochitonidae and pike by the Galaxiidae (since this classification was proposed a marine *Galaxias* has been discovered). This zone includes only a single (Antarctic) region, embracing Tasmania and the south-eastern point of Australia, New Zealand and Patagonia and Tierra del Fuego.

It will be seen that the present distribution of fishes, although showing certain features in common, by no means accords as a whole with that of mammals. Indeed, it is suggestive of the period of the earth's history when there was an extensive and more or less continuous belt of equatorial land

Distribution of spiders.

For the distribution of invertebrate animals generally, the reader may be referred to the articles dealing with the various groups of that assemblage. An exception must, however, be made with regard to that group of spiders known as the Mygalomorphae (which includes the trap-door spiders) on account of the remarkable general similarity presented by its distribution to that of mammals. According to Mr R. I. Pocock,[1] the distribution of this group justifies the mapping of the world into the following zoological regions:—(1) The Holarctic, including Europe north of the southern mountain-chains, North Asia, and North America north of about the 45th parallel of latitude. (2) The Mediterranean, including South Europe, Africa north of the Sahara and the desert-regions of south-western Asia. (3) The Sonoran, comprising the United States of America south of about the 45th parallel and the plateau of Mexico. (4) The Ethiopian, embracing Africa south of the Sahara, South Arabia and Madagascar. The last-mentioned island ranks merely as a subregion of the Ethiopian. (5) The Oriental, including India, Ceylon, Burma, Siam, and all the Indo- and Austro-Malayan Islands to Australia; "Wallace's line" being non-existent so far as spiders are concerned. (6) The Australian, containing Australia and New Zealand; the latter being worthy of recognition as a subregion. (7) The Neotropical, including Central America, apart from the Mexican plateau, the West Indies and South America.

These spiders furnish, moreover, strong evidence in favour of a former union between Africa and South America, and of a connexion between the Afro-Mascarene and Austro-Zealandian continents on the one hand and Austro-Zealandia and the southern extremity of South America on the other. As regards the "regions," apart from the greater divisions, or "realms," the distribution of these spiders accords with remarkable closeness to that of mammals, if we except the more intimate connexion indicated between the faunas of Ethiopian Africa and Madagascar.

The fact that the generally accepted scheme of division of the land-surface of the globe into zoological regions is based almost entirely upon the present distribution of mammals and birds has already been emphasized. It is perhaps only fair to quote the views of Dr A. E. Ortmann[2] (who has devoted much study to the distribution of animals), although they by no means wholly commend themselves to the present writer:—

> "(1) Any division of the earth's surface into zöo-geographical regions which starts exclusively from the present distribution of animals, without considering its origin, must be unsatisfactory, since always only certain cases can be taken in, while others remain outside of this scheme. (2) Considering the geological development of the distribution of animals, we must pronounce it impossible to create any scheme whatever that covers all cases. (3) Under these circumstances, it is incorrect to regard the creation of a scheme of animal distribution as an important feature or purpose of zöo-geographical research."

Dr Ortmann adds in a later paragraph, "the chief aim of zöo-geographical study consists—as in any other branch of biology—in the demonstration of its geological development."

II. Marine Distribution

That the fauna of the ocean, apart from the influence of temperature, would be much more uniform, and therefore less susceptible of being divided into zoological provinces, or regions, will be apparent from a glance at the map of the world on Mercator's projection, in which the fact that the three great oceans—the Pacific, the Atlantic and the Indian—are in free communication with one another in the southern hemisphere is clearly brought out. There is, however, more than this; for there is evidence that during the early part of the Tertiary period the Pacific and the Atlantic were not separated by the isthmus of Darien; while there is a probability that the Mediterranean was at one time in communication with the Red Sea, and that other connexions of a like nature have existed.

In addition to this general community of the marine fauna of the world, there is the further important fact that such faunas may be divided into three main, and for the most part perfectly distinct, groups: namely, the littoral, or shallow water, fauna, the abyssal, or deep-sea, fauna, and the pelagic, or surface, fauna. Of these three the first alone is really susceptible of division into more or less ill-defined zoological regions, the other two being practically uniform in character. Moreover, these three faunas are for the most part perfectly well defined; the pelagic being very sharply sundered from the abyssal, although there may in certain instances be a tendency for the littoral to merge locally into the abyssal. As regards the sharp demarcation between the pelagic and the abyssal faunas, an idea was formerly current that whales, which are essentially pelagic animals, when "sounding," descended to abyssal depths in the ocean. A moment's reflection will show the absurdity of such a supposition; for no surface-dwelling animal could possibly support the enormous pressure existing at great depths, which would crush in the body-cavities. Evidence of this is afforded by the fact that when fishes are brought to the surface from great depths their bodies are practically broken to pieces by the removal of the normal pressure, while their scales start from the skin and the eyes from their sockets. The absolute darkness prevailing at great depths would be another bar to pelagic animals descending to the ocean abysses. We may accordingly regard the pelagic and the abyssal faunas as perfectly distinct and widely sundered from one another; as widely sundered in the case of some species as are beings living in three-dimension space from these (if such there be) inhabiting space of four or more dimensions.

Deep-sea fauna.

Modern research shows that invertebrates, and probably also fishes, live at the greatest depths that have yet been reached by the dredge, and the inference from this is that they occur everywhere. The general results of these explorations is indeed to show that the fauna of the ocean depths is much the same all the world over, and that identical species occur at points sundered as widely as possible from one another. The ocean floor, as has been well remarked, with its uniformity in the matter of temperature, food, station and general conditions of life, contains, in fact, no effectual barriers to the almost indefinite dispersal of species.

The following general conclusions with regard to the deep-sea fauna were arrived at after working out the material and evidence obtained during the cruise of H.M.S. "Challenger":—(1) Animal-life is present at all depths on the ocean floor. (2) At extreme depths life is not nearly so abundant as at moderate depths; but since representatives of all classes of marine invertebrates are met with at all depths, this poverty probably depends more upon certain causes affecting the composition of the bottom deposits, and the degree to which the bottom-water is provided with chemical substances necessary for animals, rather than upon conditions immediately associated with depth. (3) There is reason to believe that the fauna of "blue water" is chiefly restricted to two belts; one at or near the surface, and the other near the bottom, the intervening zone being more or less completely devoid of inhabitants. From the surface-zone a continual rain of organic débris is falling to the bottom, which, however, in the case of the greatest depths may be completely dissolved *in descensu*. (4) Although all the chief groups of invertebrates are represented in the abyssal fauna their relative proportions are unequal; molluscs, crabs and annelids being, as a rule, scarce, while echinoderms and sponges predominate. (5) Depths below 500 fathoms are inhabited by a practically uniform fauna, the genera being usually cosmopolitan, although the species may differ, and be represented by allied forms in widely sundered areas. (6) The abyssal fauna, so far as invertebrates are concerned, is of an archaic type as compared with shallow-water faunas. (7) The most characteristic and archaic abyssal types seen to be most abundant and to attain their maximum dimensions in the southern ocean. (8) In general character the abyssal fauna approximates to that of shallower water in polar latitudes, doubtless owing to the fact that the conditions of temperature, on which the distribution of marine animal life mainly depends, are nearly the same.

In reference to the abundance of sponges in the deep-sea fauna, it may be mentioned that the calcareous group is absent, and that among the siliceous section, the Hexactinellidae, of which the Venus flower-basket (*Euplectella*) and glass-rope sponge (*Hyalonema*) are familiar representatives, are exceedingly abundant; this group being likewise of great geological antiquity. Corals are sparse and belong for the most part to the Turbinolidae. Echinoderms are represented by all the existing ordinal groups; some of the crinoids, or stone-lilies, belong to the family Apiocrinidae, which attained its maximum development during the Jurassic epoch; and somewhat similar relationships are exhibited by certain of the brittle-stars (Ophiuroidea). Very noteworthy is the great development of the sea-cucumber group (Holothuroidea), and likewise the bizarre forms assumed by some of its abyssal representatives. Molluscs, however, are poorly represented, and it is not improbable that cephalopods (nautilus and cuttlefish group) are wanting. Bivalves of the genera *Leda* and *Arca* have, however, been obtained from a depth of 16,000 ft. Lamp-shells (Brachiopoda) are likewise scarce.

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[1] *Proc. Zool. Soc., London*, 1903, vol. i. p. 340.

[2] *Proc. Amer. Phil. Soc.*, xli. p. 267 (1902).

Considerable difficulty exists in determining from what depths fishes are dredged. Although many species display various structural peculiarities, such as a huge head, or an attenuated ribbon-like body, while special phosphorescent organs are very generally present, yet deep-sea fishes as a whole do not represent an ordinal or sectional group by themselves, but are drawn from a number of families, certain members of which have adapted themselves to an abyssal existence. A preponderance of representatives of the families Macruridae, Ophidiidae and Scorpelidae is, however, noticeable.

Whether light or temperature is the prepotent agency in regulating the limitations of the deep-sea fauna, has long been a debated question. It may be noted that reef-building corals, which require an average temperature of from 70° to 75° F. and one which never falls below 68°, are never found below a depth of 20 fathoms (120 ft.). Nevertheless, there are several areas where a temperature of from 70° to 77° obtains to depths of between 80 and 300 fathoms. It is further remarkable that well-characterized deep-sea faunas are locally met with in comparatively shallow waters, one such area occurring in the European Atlantic and a second in the Mediterranean, where they live within the 100-fathom zone. Light, which was formerly supposed not to penetrate to a greater depth than the 40 to 50 fathom-line, has also been regarded as the chief agent controlling vertical distribution. It appears, however, as Prof. Heilprin has remarked, "more than likely that not a single cause, but a combination of causes, is operative in bringing about the general results. That the deep-sea fauna is a fauna of darkness must be admitted; but this is so from the nature of the case rather than a matter of choice resting with the animals composing it."

After referring to the fact of the dissimilarity between the faunas of the two poles, Dr A. E. Ortmann, in a paper on the origin of the deep-sea fauna,[1] observes that we have reason to believe that each of these faunas had a separate origin, "the north-polar fauna being a derivate of the old Mesozoic Mediterranean, the south-polar fauna of the old Pacific fauna. The first developed along the shores of the northern continents, while the second had its original home on the shores of the Antarctic continent. We know that there is a strange element among the littoral fauna of the southern extremities of the continents, differing entirely from the arctic fauna, and we cannot but think that this is a remnant of the old Tertiary antarctic fauna. The above considerations give us a threefold origin of the present deep-sea fauna:—(1) An ancient Mesozoic (or pre-Tertiary) constituent, derived from a transformed part of the old warm-water fauna of the deep sea, adapted to the changed climatic conditions. It is clearly autochthonous. (2) A more modern, immigrant, Tertiary constituent, which came from the north-polar littoral waters, and immigrated into the deep sea together with the cool water (or after it had cooled). This element goes back to an old pre-Tertiary stock that lived in the warm littoral waters of the old Tethys (Mediterranean Sea), but as a cool-water fauna, it is not older than Tertiary. (3) Another Tertiary element, corresponding to the second one, but belonging to the south pole, which is finally to be traced back to the warm waters of the old Pacific Ocean of pre-Tertiary times."

The surface fauna.

The surface, or pelagic, fauna contains some of the smallest and actually the largest of all living animals, for among its members are included a host of so-called animalcules on the one hand and the whales on the other. The essential characteristic of pelagic animals is that they pass the whole of their existence swimming at or near the surface of the ocean, and only by accident touch the shores or the bottom. Much information with regard to the smaller pelagic creatures will be found in the article PLANKTON. Among the groups included in the pelagic fauna may be mentioned the radiolarian animalcules, together with certain representatives of the Foraminifera; the siphon-bearing jelly-fishes, such as *Physalia* (Portuguese man-of-war), *Velella*, *Porpita*, &c.; all the pteropod molluscs, such as *Clio*, *Clione* and *Cavolinia* (*Hyalaea*), together with less aberrant gastropods, like *Janthina* (violet-snail), *Atlanta* and *Glaucus*; a few cephalopodous molluscs, such as the paper-nautilus (*Argonauta*) and *Spirula*, and a number of social ascidians, like *Salpa* and *Pyrosoma*. Crustaceans belonging to the entomostracous (shelled) and schizopod divisions abound; and there is a group of insects (*Halobates*), belonging to the order Hemiptera, whose home is on the ocean-surface at, practically, any distance from land. Fishes form no inconsiderable portion of the pelagic fauna, among these being the true flying-fishes, or flying-herrings (*Exocoetus*), herrings, mackerel, tunny, flying-gurnards (*Dactyloptera*), sword-fishes (*Histiophorus*), sea-horses (*Hippocampus*), pipe-fishes (*Fistularia*) and many of the sharks. With the exception of the comparatively few fluviatile species, the whole of the cetacean mammals—that is to say, whales, grampuses, porpoises, dolphins, &c.—claim a place among the surface-fauna of the ocean. Whether the sea-cows (Sirenia) should likewise be included is doubtful, as they hold a somewhat intermediate position in regard to habits between cetaceans and seals. While they agree with the former in never (or very rarely) landing and in bringing forth their young at sea, they come inshore to feed. Turtles certainly cannot be considered truly pelagic, since they come ashore to lay their eggs.

A large proportion of the smaller pelagic animals are more or less completely transparent, while others, such as the violet-snail, have developed an azure tint which renders them as inconspicuous as possible in the waste of waters. In the case of the larger animals, like mackerel and the finner-whales, the same result is attained by the under surface of the body being silvery white (thus rendering them invisible when looked at from below against the sky), and the upper surface olive or blackish green, sometimes, as in the mackerel, mottled to harmonize with the ripple of the waves.

The distribution of whales and dolphins has been taken by P. L. and W. L. Sclater to some extent as a basis in dividing the ocean into zoological regions. Since, however, such regions were mainly defined on the distributional evidence afforded by seals and sea-cows, they are best considered in connexion with the shallow-water fauna.

The shallow-water fauna.

The shallow-water, or littoral, fauna includes all marine animals which belong neither to the deep-sea nor to the surface fauna, and is the most important of all three. In addition to the great bulk of marine invertebrates, the littoral fauna may be taken to include the reef-building corals (whose distributional limitations under the influence of temperature-control have been already mentioned) and likewise seals and sea-cows among mammals, and turtles among reptiles.

"The fauna of the coast," observes Prof. H. N. Moseley, "has not only given origin to the terrestrial and fresh-water faunas, it has through all time, since life originated, given additions to the pelagic fauna in return for having received from it its starting-point. It has also received some of these pelagic forms back again to assume a fresh littoral existence. The terrestrial fauna has returned some forms to the shores, such as certain shore-birds, seals and the polar bear; and some of these, such as the whales and a small oceanic insect (*Halobates*), have returned thence to pelagic life.

"The deep-sea fauna has probably been formed almost entirely from the littoral, not in most remote antiquity, but only after food, derived from the débris of the littoral and terrestrial faunas and floras, became abundant in deep water. It was in the littoral region that all the primary branches of the zoological family-tree were formed; all terrestrial and deep-sea forms have passed through a littoral phase, and amongst the representatives of the littoral fauna the recapitulative history, in the form of series of larval conditions, is most completely retained."

Marine Zoological regions.

From the distribution of certain groups of animals, it has been attempted (as stated) to divide the ocean into a number of zoological provinces, or regions. Among the more important of such schemes, the following may be mentioned.

Coral regions.

The reef-building corals, whose limitations are defined by conditions of temperature and depth, are necessarily restricted to certain seas and coasts within or near the tropics. "They abound," wrote Dr A. R. Wallace in the ninth edition of the present work, "in and near the West Indies, on the east coast of Africa, in the Indian Ocean, in the Malay and Pacific archipelagoes, and on the coast of Australia; while they are absent from the whole of the west coasts of South America and of Africa, from the Indian peninsula, and from much of the east coast of South America. The coral-reefs of the Bermudas, in 33° N. lat., are the farthest from the equator; in the Red Sea they reach 30° N., in the Pacific 27° N., while they nowhere extend to more than 29° S. of the equator. . . . The coral regions are therefore somewhat peculiar, and differ considerably from those which best exhibit the distribution of other marine animals. The regions adopted by Prof. J. D. Dana are three—the first comprising the Red Sea and Indian Ocean; the second, the whole of the Pacific islands and the adjacent coasts of Australia; and the third the West Indies. This last region is the most isolated in position; and it is not surprising that it should contain the largest proportion of peculiar forms. The corals of the Central Pacific are also very peculiar, as are those of the Red Sea and Indian Ocean."

Crustacean regions.

Prof. J. D. Dana[2] proposed to divide the oceans into three main areas according to the distribution of Crustacea. These areas are respectively termed the Occidental, the Africo-European and the Oriental. The first comprises both coasts of America; the second, the western shores of the Atlantic, both African and European; while the third comprehends the vast area from the east coast of Africa to the Central Pacific. Each of these regions is subdivided into climatal and local provinces but the primary divisions can alone be mentioned here. The facts adduced in support of this scheme of distribution are interesting. At the date of Prof. Dana's memoir 47 genera were known to be exclusively American, 15 being common to both the east and west coasts; but as 26 genera were said to be confined to the west and 6 to the east coast, these two provinces are really distinct, even if they do not form primary regions. The Africo-European region had 19 peculiar genera, and only 8 in common with the

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[1] *Rep. Eighth International Geographic Congress*, p. 619.

[2] See *Amer. Journ. Science*, ser. 2, vol. xvi. p. 155 (1853).

American region; so that the eastern and western shores of the Atlantic appear decidedly more distinct than the eastern and western coasts of America. The extensive Oriental region is by far the richest.

From the distribution of the species (not genera) of barnacles, or cirrhipeds, which are an aberrant group of Crustacea, Darwin considered that the ocean might be divided into the following regions, viz.:—(1) The North Atlantic, comprising North America and Europe down to N. lat. 30°, (2) The West American, from Bering Strait to Tierra del Fuego; (3) The Malayan, from India to New Guinea, and (4) The Australian, comprising Australia and New Zealand. the Malayan and Australian regions being the richest in cirrhipeds.

Molluscan regions.

One of the earliest students of the geographical distribution of marine animals was Dr S. P. Woodward, who, in his *Manual of the Mollusca*, proposed a scheme of zöo-geographical regions. He adopted three main divisions for the warmer parts of the ocean, namely, the Atlantic, the Indo-Pacific and the West American; and these Wallace was inclined to regard as the only valid marine molluscan regions. The Indo-Pacific region extends from the Red Sea and the east coast of Africa to the eastern Pacific islands, and corresponds to Prof. Dana's Oriental region for Crustacea, many species ranging over nearly the whole area. The Atlantic region unites the fauna of the east coast of America with that of West Africa and South Europe, but has considerable affinity with that of West America, many genera being common to both areas. Several genera appear restricted to the north temperate zone, which in Wallace's opinion should perhaps form a distinct region. Numerous genera are confined to the Indo-Pacific region. The Atlantic coasts have few peculiar genera of importance, while the west coast of America has hardly any, the difference of its fauna from that of the Atlantic on the one side and the Pacific on the other being chiefly specific. It is stated that while there is not a single species common to the east and west coasts of tropical South America, the corresponding coasts of North America have a large number in common, while others are so closely representative as to be almost identical.

Inclusive of an Arctic province of somewhat doubtful value, Dr Woodward's three main regions were divided into 18 subregions; but, according to a somewhat modified later scheme, these may be arranged in four main groups, as follows:—

Regions.	Subregions.	Regions.	Subregions.
A. ATLANTIC and CIRCUMPOLAR	1. Arctic. 2. Boreal. 3. Celtic. 4. Lusitanian. 5. W. African. 6. S. African.	*C*. AUSTRALIAN	1. Australian. 2. Neozealanian.
B. INDO-PACIFIC	1. Indo-Pacific. 2. Japanese.	*D*. AMERICAN.	1. Aleutian. 2. Californian. 3. Panamic. 4. Peruvian. 5. Magellanic. 6. Argentinian. 7. Caribbean. 8. Transatlantic.

Fish Regions.—From the distribution of shore-haunting fishes, Dr A. C. L. G. Günther [1] suggested the following marine zoological regions, the characteristic family and generic types of which we are prevented by limitations of space from discussing:—

- I. Arctic Ocean.
- II. Northern Temperate Zone.
  - *A*. Temperate N. Atlantic.
    - 1. British district.
    - 2. Mediterranean district.
    - 3. N. American district.
  - *B*. Temperate N. Pacific.
    - 1. Kamchatkan district.
    - 2. Japanese district.
    - 3. Californian district.
- III. Equatorial Zone.
  - *A*. Tropical Atlantic.
  - *B*. Tropical Indo-Pacific.
  - *C*. Pacific Coast of Tropical America.
    - 1. Central American district.
    - 2. Galapagos district.
    - 3. Peruvian district.
- IV. Southern Temperate Zone.
  - 1. Cape of Good Hope district.
  - 2. South Australian district.
  - 3. Chilean district.
  - 4. Patagonian district.
- V. Antarctic Ocean.

Mammalian Regions.—The last scheme of marine zoological regions necessary to mention is one proposed by P. L. and W. L. Sclater [2] on the distributional evidence afforded by seals, sea-cows and cetaceans. According to this, we have the following six regions, viz.:—

- (i) Arctatlantica (North Atlantic), characterized by the presence of seals of the subfamily *Phocinae*, with the genera *Halichoerus* peculiar to it, and *Phoca* common to it and No. iv.; the absence of sea-cows; and (it is stated) by the bottle-nosed whales (*Hyperoödon*) being peculiar to this area.
- (ii) Mesatlantica (Mid Atlantic), the sole habitat of the monk-seal (*Monachus*) and the manatis (*Manatus*).
- (iii) Philopelagica (Indian Ocean, &c.), characterized by the presence of dugongs and the absence of seals.
- (iv) Arcturenia (North Pacific), agreeing with No. i. in the possession of *Phoca* but distinguished by also having sea-bears and sea-lions (*Otariidae*); formerly the habitat of the northern sea-cow (*Rhytina*), and now of the grey whale (*Rhachianectes*).
- (v) Mesirenia (Mid Pacific), without *Phocinae* or sea-cows, but with the elephant-seal (*Macrorhinus*), from the south, and also *Otariidae*.
- (vi) Notopelagica (Southern Ocean), with four peculiar genera of seals (*Phocidae*), numerous sea-bears and sea-lions, and two peculiar genera of cetaceans, the pigmy-whale (*Neobalaena*) and Arnoux's beaked-whale (*Berardius*).

To explain the absence of sea-bears and sea-lions from the North Atlantic, and likewise the existence of manatis on both Atlantic coasts, the authors of this scheme call in the aid of a land-connexion between Africa and South America, which presented a barrier to the northward progress of the former, while its coasts afforded a means of dispersal to the latter. As the *Otariidae* are at present unknown previous to the Miocene, such an explanation, if valid, requires the persistence of the ancient land-bridge across the Atlantic to a much later date than is commonly supposed.

III. DISTRIBUTION IN TIME

The subject of the distribution of animals in time, *i.e.* the relative dates of their first appearance on the earth, and in the case of extinct forms the length of their sojourn there, can be treated but briefly, reference being restricted to the larger groups, and not even all of these being mentioned. The dates of appearance and disappearance of the various groups are only relative, for although many more or less vague attempts have been made to determine the age of the earth, there is no possibility of indicating in years the length of time occupied by the deposition of any one stratum or series of strata. All that can be attempted is to say that one stratum (and consequently the remains of animals that may be entombed in it) is older or younger, as the case may be, than another. For the sequence and names of the various strata, or time-periods of the geological record, see GEOLOGY. An important factor in regard to the past history of animals is the imperfection of the geological record. Recent discoveries have rendered this imperfection much less marked than was formerly the case. There are, however, still many very serious gaps; and we have, for instance, no definite information as to where and when the transformation from reptiles into mammals took place.

It may nevertheless be emphatically affirmed that the geological, or rather the palaeontological, record indicates a gradual progression in the status of animals from the lowest to the highest fossiliferous strata. That is to say, the earlier animals were creatures of comparatively low grade (although certain representatives of such groups may have attained a relatively high degree of specialization), and that as we ascend the geological ladder higher and higher types of animals make their appearance, till the series culminates in man himself—the crowning effort of creation, in the modern evolutionary signification of that term. It is not, indeed, to be supposed that the higher groups made their appearance exactly according to their relative grades (or what we regard as such); all that can be affirmed is that in the main the higher forms have made their appearance later than the lower. The record is thus almost exactly what it might be expected to be on the theory of evolution; while it also accords fairly well—if regarded with sufficient breadth of view—with the Biblical narrative of creation.

A brief survey of the time-distribution of the leading groups of animals may now be undertaken, commencing with the highest and concluding with the lowest groups.

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[1] See *Study of Fishes* (London, 1880).

[2] *The Geography of Mammals* (London, 1899).

Mammals.

As the highest of all vertebrates, it is natural to expect that mammals should be one of the latest groups of that assemblage to make their appearance; and this as a matter of fact they are, although it is by no means improbable that birds are the latest of all. Mammals are commonly stated to commence in the Trias, where they are presumed to be represented by *Microlestes* in Europe and by *Dromatherium* in North America. From the fact, however, that the approximately contemporary *Tritylodon*, which has cheek-teeth very like those of the former, appears to be in great degree intermediate between reptiles and mammals, it is by no means improbable that none of these Triassic creatures were true mammals. Undoubted mammals occur in the lower Jurassic Stonesfield Slate, in the upper Jurassic Permian beds, and, very sparingly, in the Wealden of England; while a large fauna has been discovered in the upper Cretaceous of North America. The mammals included among these Mesozoic forms appear, for the most part at any rate, to be referable to the Marsupialia, Insectivora, and, not improbably, the Monotremata (see MARSUPIALIA). After the lowest Eocene (when the Puerco fauna represented an inferior and apparently non-progressive type) mammals became abundant; and during that epoch most if not all of the existing orders made their appearance. The lower Eocene representatives of several of the orders, such as the Condylarthra among the Ungulata and the Creodonta among Carnivora, belonged, however, to low suborders which disappeared more or less completely by the Oligocene. Several subordinal groups of Ungulata developed and became extinct at later periods than the Eocene; but with the exception of the Ancylopoda and Tillodontia (whose right to ordinal distinction is by no means universally admitted), none of the Tertiary orders of mammals are extinct. At the present day—as during the greater part of the Tertiary epoch—mammals are the dominant terrestrial representatives of the Vertebrata. We have at present no evidence of the existence of Cretacea before the lower Eocene.

Birds.

Although some of the three-toed bipedal tracks in the Trias of the Connecticut valley were formerly supposed to have been made by birds, there is little doubt that they are really due to dinosaurian reptiles. The class Aves, so far as we know, is therefore first represented by the long-tailed *Archaeopteryx* of the upper Jurassic, which represents a subclass (or order) by itself. Toothed birds also existed in the upper Cretaceous of both Europe and North America, but all these appear referable to existing ordinal (or subordinal) groups. By the lower Eocene, when teeth appear to have been entirely lost, most or all of the existing ordinal groups were developed, since which date the majority at all events have steadily increased.

Reptiles.

In contradistinction to both the preceding classes, reptiles, which date from the Permian, are a waning group, at all events so far as both terrestrial and marine forms of large bodily size are concerned. The Permian reptiles were small or medium-sized creatures, few in number, and of generalized character. The one existing order dating from that epoch (when it was represented by *Protorosaurus*) is the Rhynchocephalia, of which the sole survivor is the New Zealand tuatara (*Sphenodon*). The Mesozoic period, from the Trias to the Chalk, is the true "age of reptiles," a number of orders being confined to that period. It is noteworthy, however, that the Triassic forms were in the case of the marine groups very generally of small size, and apparently amphibious, or perhaps freshwater. Of the various extinct Mesozoic orders, the Dinosauria, as demonstrated by their footprints in the sandstone of the Connecticut valley, were represented by species of huge size even in the Trias. The other extinct orders whose distribution was approximately coequal with the Mesozoic period were the ichthyosaurs (Ichthyopterygia), the plesiosaurs (Sauropterygia), and the pterodactyles (Ornithosauria). The Chelonia and Crocodilia (if we include the Phytosauria) date from the Trias, but are also dominant forms at the present day. But the mammal-like Anomodontia (Theromorpha), which ranged from South Africa to India and Russia, were solely Triassic. The Squamata, including lizards and snakes, together with the extinct Cretaceous Pythonomorpha (*Mosasaurus*, &c.), did not come into being till the upper Jurassic, or lower Cretaceous, and constitute the great bulk of the existing members of the class.

Amphibians.

Batrachia, as represented by the labyrinthodonts, or Stegocephalia, carry the origin of vertebrates one stage further back, namely, to the upper Carboniferous. The stegocephalians, which appear to have included the ancestors of the anomodont reptiles, died out at the close of the Triassic epoch. The existing representatives of the class date, so far as is known, only from the Tertiary, but it is not improbable that the limbless caecilians (Apoda) may really be much older, since they appear to be related to the Stegocephalia.

Fishes.

The class Pisces is the lowest and at the same time the oldest representative of the Vertebrata, dating from the lower Ludlow beds of the upper Silurian. The oldest group is that of the sharks and rays (Elasmobranchii), in which the orders Pleuropterygii, Ichthyotomi and Acanthodii are confined to the Palaeozoic. The lung-fishes (Dipnoi) are also an ancient group, although surviving in the form of three genera widely sundered in space; the order Arthrodira (as represented by *Coccosteus* of the Devonian) was solely Palaeozoic. Of the subclass Teleostomi, the fringe-finned group (Crossopterygii) attained its maximum in the Palaeozoic, although it survives in the shape of two African genera. In the case of the subclass Teleostomi the enamel-scaled, or ganoid, division was abundant during the Palaeozoic and early Mesozoic periods (and still survives in North America), but the modern soft-scaled bony fishes did not make their appearance till the Cretaceous, or thereabouts.

Lampreys.

Of the class Agnatha, as typified by the modern lampreys, the palaeontological record is very imperfect. There is, however, an armoured subclass, the Ostracodermi, represented by *Pterichthys*, *Cephalaspis*, &c., which was confined to the upper Silurian and Devonian; and *Palaeospondylus* of the Devonian has been regarded as an early lamprey (Cyclostomi). Whether the so-called conodonts, ranging from the upper Cambrian to the Carboniferous, are really teeth of lampreys, has not been definitely ascertained.

Brachiopods.

The lamp-shells, or Brachiopoda, form an exceedingly ancient group, dating from the lower Cambrian, and surviving at the present day, although in greatly diminished numbers compared to the Palaeozoic epoch, when they far surpassed the now dominant bivalve molluscs. The group attained its maximum in the Silurian, when, as in the Palaeozoic genera, nearly all the forms belonged to the hingeless section. With the beginning of the Mesozoic period the waning of the brachiopoda, which had set in with the Devonian, became more pronounced, and was continued throughout the Mesozoic formations. A remarkable feature is the survival to the present day of the Cambrian genera *Lingula*, *Discina* and *Crania* (or closely allied types).

Polyzoans.

The Polyzoa, of which the sea-mats (*Flustra*) are well-known representatives, date from the Ordovician; the Palaeozoic forms belonging almost exclusively to the section Cyclostomata, which attained its maximum in the Jurassic; while the dominant modern Chilostomata came in with the Tertiary.

Molluscs.

The Mollusca, of which the great bulk are marine and the majority of the remainder freshwater, are perhaps the most important of all fossils from the chronological point of view. Since the three principal classes (Pelecypoda, Gastropoda and Cephalopoda) are represented in the upper Cambrian, it is evident that the origin of the group was much earlier. In the Palaeozoic the chambered cephalopods of the section Tetrabranchiata (now represented by the nautilus) were the dominant forms; the bivalves (Pelecypoda) and gastropods showing a relatively poor development. The tetrabranchiate cephalopods continued throughout the Mesozoic, when they were specially represented by the ammonites; but by the Tertiary they had become almost extinct. The section Dibranchiata (cuttle-fishes) commenced with the Mesozoic. The bivalves and gastropods have shown a steady increase to the present day, and are now the dominant forms.

Insects.

Insects date from the Ordovician graptolite-slates of Sweden, where they are represented by *Protocimex;* the next oldest being *Palaeoblattina* of the French upper Silurian. From the Devonian about a dozen forms are known, belonging to several groups; and from the Coal-measures extensive insect-faunas have been described. All the Palaeozoic forms lack most of the distinctive features by which the modern groups are characterized, the majority of them showing kinship to the cockroach group.

Myriapods.

The Myriapoda (centipedes and millipedes) are of comparatively little importance as fossils. The class dates from the Devonian, and is abundant in the Coal-measures; the Palaeozoic forms for the most representing two orders—Archipolypoda and Protosyngnatha—peculiar to that period, of which the second has only a single known species. The modern centipedes (Chilopoda) date mainly from the Tertiary, although several Carboniferous genera have been assigned to the group. Millipedes (Diplopoda), although known from the Cretaceous of Greenland, elsewhere date from the Tertiary.

Arachnids.

The class Arachnida, now taken to include trilobites and king-crabs, as well as scorpions and spiders, is ancient. Scorpions—not far removed from existing types—are known in the Silurian, while true spiders occur in the Coal-measures. The great majority of the more typical Palaeozoic arachnids are, however, referred to an order by themselves—the Anthracomarti. King-crabs (Xiphosura) date from the Silurian, the existing genus *Limulus* occurring in the Trias; but the gigantic eurypterids (Eurypterida) and the trilobites (Trilobita) are exclusively Palaeozoic, the former dating from the Ordovician, and the latter from the upper Cambrian.

Crustaceans.

Most of the existing ordinal groups of the class Crustacea appear to date from the Palaeozoic; the decapods (lobsters and crabs) which represent the highest development of the class, did not, however, attain a dominant position till well on in the Mesozoic, and are at their maximum in the present day; genuine crabs (Brachyura) apparently not having come into existence till the Cretaceous.

Among the Echinodermata, the classes Blastoidea and Cystoidea are exclusively Palaeozoic, while the stone-lilies (Crinoidea) form a group, dating from the same epoch, now on the verge of extinction. The sea-urchins (Echinoidea), which date from the Ordovician but attain no great development till the Mesozoic, the starfishes (Asteroidea) and brittle-stars (Ophiuroidea), which also date from the Ordovician, and the sea-cucumbers (Holothuroidea), which appear to be represented in the Carboniferous, do not seem, however, to have attained their full development till the modern period.

Echinoderms.

That the Annelida are a very ancient group is indicated by the occurrence of remains of marine worms in the Ordovician; while "tracks" or "burrows" apparently point to the existence of the class in the lower Cambrian, if not indeed in the Laurentian.

Annelids.

The earliest-known representatives of the Coelenterata occur in the upper Cambrian, where we find primitive types of hydroid polyps, especially the graptolites, which lived only till the Silurian, and have no near relatives. The equally isolated stromatoporids, on the other hand, commenced in the Ordovician and survived till the Devonian. The corals (Actinozoa) were completely differentiated from the Hydrozoa in the Ordovician. Most of the Palaeozoic actinozoans belong to the Rugosa (inclusive of the four-rayed corals) which did not survive the Permian, but the Aporosa are also well represented. In the Mesozoic and Tertiary as well as at the present day the Aporosa and Porosa became, however, the dominant forms.

Coelenterates.

As might have been expected from their low grade of organization, the sponges (Porifera) were strongly represented in the early formations; the oldest known form occurring in the Welsh Cambrian. In the Silurian and Carboniferous silicious sponges were extraordinarily abundant, and are represented by several extinct groups.

Sponges.

Foraminifera, extremely abundant in the Carboniferous, date at any rate from the Ordovician, where the existing genus *Saccammina* has been identified. The Chalk consists almost entirely of foraminifera. The Radiolaria, as represented by the Polycystina, are believed to date from the Silurian, or even the Cambrian, but did not attain their maximum till the Mesozoic or Tertiary. The so-called *Eozoon* of the Laurentian is not admitted to be of organic origin.

Protozoa.

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ZOOLOGICAL GARDENS, sometimes called Zoological Parks, institutions in which wild animals are kept in captivity. Their primary object is to gratify the pleasure most persons take in viewing at close range the curious and beautiful living products of nature, but they serve also as means of instruction in natural history, providing material for museums and for investigations in comparative anatomy and pathology, while they may have a commercial value as pleasure resorts, or as show grounds for the display of animals that have been imported or bred for sale.

According to Captain Stanley Flower, director of the Zoological Gardens at Giza, Cairo, Egypt, the ancient Egyptians kept various species of wild animals in captivity, but the first Zoological Garden of which there is definite knowledge was founded in China by the first emperor of the Chóu dynasty, who reigned about 1100 B.C. This was called the "Intelligence Park," and appears to have had a scientific and educational object. The ancient Greeks and Romans kept in captivity large numbers of such animals as leopards, lions, bears, elephants, antelopes, giraffes, camels, rhinoceroses and hippopotamuses, as well as ostriches and crocodiles, but these were destined for slaughter at the gladiatorial shows. In later times royal persons and great feudal magnates frequently kept menageries of wild animals, aviaries and aquaria, and it is from these that modern public Gardens have taken their origin. Henry I. (1100–1135) established a menagerie at Woodstock, Oxfordshire, England. This was transferred to the Tower of London, apparently in the reign of Henry III., and kept up there until at least 1828. Philip VI. had a menagerie in the Louvre at Paris in 1333, Charles V. maintained collections at Conflans, Tournelles and in Paris, and Louis XI. formed a menagerie at Plessis les Tours in Touraine, which after his death was re-established at the Louvre in Paris and enlarged by collections obtained in North Africa. It was destroyed by Henry III. Henry IV. had a small collection, which included an elephant. Louis XIII. kept some animals at Versailles, whilst his son Louis XIV. founded the famous "Menagerie du Parc" at Versailles, which received many animals from Cairo, was maintained for over a century, and furnished much valuable material to French naturalists and anatomists. It gradually decayed, however, and was almost extinguished by the mob in 1789. In 1793 the Paris Museum of Natural History was re-established by law, and Buffon's idea of attaching to it a menagerie was carried out; the latter, as the collection in the Jardin des Plantes, still survives.

In Germany the elector Augustus I. founded a menagerie at Dresden in 1554. In the New World, according to Prescott, King Nezahualcoyotl had zoological gardens at Tezcuco in Mexico in the middle of the 15th century, whilst in the next century Cortes found aviaries and fishponds at Iztapalapan.

and Montezuma II., emperor of Mexico in the beginning of the 16th century, maintained large collections of animals in the gardens of his capital.

Most of the modern zoological gardens date from comparatively recent years, and there are a larger number stocked with a finer collection of animals, more suitably housed, than at any past time in the history of the world. According to a reference list compiled by Captain Stanley Flower, there were 102 actually existing public gardens or parks containing collections of wild animals in 1910, while there are also a considerable number of private collections. It is possible to refer here only to the more important of these.

Africa.—The Zoological Gardens at Giza, Cairo, are a government institution administered by the Public Works Department. The grounds are beautifully laid out and the collection is particularly rich in African animals, to which the climate is well adapted. The Khartum Zoological Gardens are free to the public and are under the control of the municipality, but the collection of animals is under the Game Preservation Department. The Transvaal Zoological Gardens at Pretoria are a government institution, and are associated with the Museum.

America, North.—The Zoological Park at Bronx Borough, New York City, opened in 1899, is one of the largest in the world. It is controlled by the Zoological Society of New York, with representatives of the municipality of the City of New York, and is financed largely out of municipal funds, and is open free to the public five days a week. The Park occupies nearly 300 acres, of great natural beauty, which has been increased by the judicious arts of the landscape gardener. It contains many fine buildings, designed on the most modern lines, but its special feature is a series of spacious enclosures for large herds of bison and deer. In a sense it serves also as a national reserve, and has already been an important factor in the preservation of the American bison. The National Zoological Park at Washington, D.C., was founded by Congress in 1889–1890 "for the advancement of science and the instruction and recreation of the people." The site was purchased by the United States government, and all the expenses come from national funds, the management being vested in the Smithsonian Institution. The Park consists of about 265 acres of undulating land with natural woods and rocks, traversed by a gorge cut by Rock Creek, a tributary of the Potomac. The river and gorge extend into the country far beyond the Park, and in addition to the animals that have been introduced, there are many wild creatures living in their native freedom, such as musk rats in the creek, grey squirrels, crested cardinals and turkey buzzards. The varied natural conditions form an almost ideal site for a collection of animals; great care and skill have been expended on the designing and construction of the houses, the collection receives many accessions from various government departments, including the foreign consular service, and the whole institution is rapidly becoming a model of what is possible. The Zoological Gardens in Fairmount Park, Philadelphia, resemble the gardens of the Zoological Society of London, on which they were modelled. They are controlled by the Zoological Society of Philadelphia, founded in 1859, and are supported partly by subscriptions of members, partly by gate-money and partly by an allowance from the city of Philadelphia. They contain an admirable collection, well housed and carefully managed, a specially interesting feature being the careful quarantine system of new arrivals and the post-mortem examinations of animals that have died. There are many smaller collections in the United States and several in Canada, but none of these present features of special interest.

America, South.—The Zoological Gardens at Buenos Aires are supported by the municipality, and contain many interesting animals, well housed in beautiful surroundings. The director issues a popular illustrated guide and a valuable quarterly scientific journal. At Para, Brazil, is a good collection attached to the Museum Goeldi, and there are unimportant collections at Rio de Janeiro and Bahia.

Asia.—There are many small collections in different parts of Asia, but the only garden of great interest is at Alipore, Calcutta, supported chiefly by gate-money and a contribution from government, and managed by an honorary committee. It was established in 1875 by the government of Bengal, in co-operation with the public, and is 33 acres in area. An extremely interesting collection is maintained, the variety of bird life, both feral and in captivity, being notable.

Australia and New Zealand.—There are Zoological Gardens at Melbourne (founded in 1857), Adelaide, Sydney and Perth, and small gardens at Wellington, New Zealand, supported partly by private societies and partly by the municipalities. These collections are not specially rich in the very interesting and peculiar native fauna, but devote themselves preponderatingly to imported animals.

Europe.—There are a large number of zoological gardens in Europe, but those of real importance are not numerous. The Imperial Menagerie of the palace of Schönbrunn, Vienna, was founded about 1752. The public are admitted free to the greater part of the grounds, but the gardens and collection are the property of and are supported by the emperor of Austria. The collection is fine and well cared for in beautiful surroundings. The garden and large menagerie of the Royal Zoological Society of Antwerp were founded in 1843, and have been maintained at a very high level. The collection is not usually very rich in species, but there have been great and long-continued successes in the breeding of large animals such as hippopotamuses, lions and antelopes, and a very large business is done in domesticated birds, water-fowl and cage birds. The annual sales of wild animals, held in the Gardens, chiefly surplus stock from various European Gardens, are famous. The revenue is derived partly from subscriptions, partly from gate-money, from the fine concert-hall and refreshment pavilions, and from sales. The Gardens of the Zoological Society of London in Regent's Park, founded in 1828, extend to only about 35 acres, but the collection, if species and rare animals be considered rather than the number of individuals, has always been the finest in existence The Society is not assisted by the state or the municipality, but derives its revenue from the subscriptions of Fellows, gate-money, Garden receipts and so forth. In addition to the menagerie, there is an infirmary and operating room, an anatomical and pathological laboratory, and the Society holds scientific meetings and publishes stately volumes containing the results of zoological research. Partly because of its long and successful existence, and partly because of the extensive possessions of Great Britain throughout the world, the Zoological Society of London has been able to exhibit for the first time in captivity a greater number of species of wild animals than probably the total of those shown by all other collections. The Royal Zoological Society of Ireland, founded in 1830, maintains a fine collection in the Phoenix Park at Dublin, and has been specially successful in the breeding of lions. The Bath, Clifton and West of England Zoological Society owns small but extremely well-managed Zoological Gardens, well situated on the edge of Clifton Downs. Messrs Jennison have maintained since 1831 a Zoological Collection in their pleasure Park at Belle Vue, Manchester. The animals exhibited are selected chiefly because of their popular interest, but the arrangements for housing are specially ingenious and successful, those for monkeys and snakes being notable. The Zoologisk Have at Copenhagen, founded in 1859, contains a good collection, with a specially well-designed monkey-house. At Lyons and at Marseilles in France there are beautifully situated Gardens with small collections, in each case owned and controlled by the municipalities. In Paris there are two well-known Gardens. That of the Jardin des Plantes was founded in 1793 and is under the control of the Museum authorities. It is open free to the public and generally contains a good collection of mammals. The larger and better known Jardin d'Acclimatation in the Bois de Boulogne is owned and conducted by a private company. It was founded in 1858 and is beautifully situated and well laid out. In addition to wild animals it usually contains many domesticated creatures of commercial value. In recent years it has been somewhat neglected and presents no features of special interest, but efforts are being made to revive its prosperity. Germany contained in 1910 nineteen Zoological Gardens in active existence whilst several others were in process of formation. In most cases they are associated with concert-halls and open-air restaurants, which account for much of their material prosperity, but the natural taste of the people for wild animals, and the increasing scientific and commercial enterprise of the nation have combined to make the collections rich and interesting. The great Gardens at Berlin were founded in 1844, and belong to a private company, but owe much to the interest and beneficence of the Royal House. The collection is extremely good, the houses are well constructed and sumptuously decorated, and the general management is conducted on the most adequate scientific lines. The Zoological Gardens at Breslau, founded in 1863 and owned by a private company, although not large, contain many fine buildings and are a notably well-managed institution. They possessed a fine gorilla, keeping it alive for a longer period than has been done in any other zoological collection. The beautiful Gardens at Cologne, founded in 1860, contain many interesting features and in particular one of the finest aviaries in Europe. The Gardens of the Zoological Society of Hamburg, founded in 1863, always contain a large and fine collection and display many ingenious devices for the housing of the animals. More recently C. Hagenbeck has constructed a remarkable zoological park at Stellingen, near Hamburg. The chief feature of this is a magnificent panorama, from the central point of which large collections of wild animals are visible without any intervening bars. The background consists of artificial rockwork, supported on huge wooden scaffoldings. The surface is formed of cement moulded over metal gimmel-work, and arranged to form ledges and boulders, peaks and escarpments, and faced with coloured sand and paint. It is made sufficiently strong to bear the weight of the animals, which are confined within their bounds by undercut overhanging ridges, and by deep and wide ditches, masked by rockwork. The arrangement is extremely successful from the because of tautonomy, and thus *Āpus apus apus* may be a valid designation of a sub-species if the names are otherwise valid.

It has happened frequently and continues to happen that a creature is discovered to have been given more than one name. Which of these is valid? The decision of this is one of the most difficult and controverted problems in nomenclature. In the hope of settling it by some system which should be as nearly as possible automatic and should leave the least possible to the inclination or choice of the individual worker, there was formulated what is called the rule of priority. The valid name of a genus or species is that name under which it was first designated, but with the conditions first that the name was published and accompanied by an indication, definition or description, and second that the author applied the principles of binary nomenclature. The tenth edition of Linnaeus' *Systema naturae* (1758) is the work that first consistently applied the binary system to zoology generally and is accepted as the starting-point of zoological nomenclature. Beginning from this the oldest available name is therefore to be retained. The application of the rule of priority is in many cases very difficult, but the labours of zoologists in many groups are rapidly succeeding in making the necessary direct and incidental changes in nomenclature, whilst, with regard to recent work, the rule is invaluable. A special difficulty has, however, arisen and is pressing so acutely that a most important modification is likely to be introduced. To systematists working with a large series of species in a museum or collection, one species is as important as another, and changes of names even of familiar animals are matters of little moment. But a comparatively small number of animals hold a prominent place in the attention of zoologists who are not specially systematists and of the public interested in natural history. It is complained that application of the rules of priority is changing the names of many familiar animals, designations that are sanctioned by long usage in museums and laboratories, in the famous treatises of comparative anatomy, of general biology, of travel, medicine, and the sciences and subjects closely related to zoology. There is being claimed, in fact, protection against the law of priority for a certain number of such familiar and customary appellations. The machinery for drafting such a list of exceptions exists in the permanent nomenclature commission of the International Congress of Zoology, and there is more than a hope that this change will come into operation.

To make the denotation of zoological names precise, exact workers are endeavouring to associate the conception of types with names, a process which can be made simple and definite with new work, but which presents great difficulties in the attempt to apply it to existing terms. Every family should have designated one of its genera as the type genus, every genus a type species and so forth. In the case of species or sub-species the type is a single specimen, either the only one before the author when writing his description, or one definitely selected by him, the others being paratypes. Such type specimens are the keynote of modern expert systematic work and their careful preservation and registration is of fundamental importance. A co-type is one of several specimens which have together formed the basis of a species, no one of them having been selected by the author as a type. A topotype is a specimen killed at the typical locality. (P. C. M.)

ZOOLOGY (from Gr. *ζῶον*, a living thing, and *λόγος*, theory), that portion of biology (*q.v.*) which relates to animals, as distinguished from that portion (Botany) which is concerned with plants.

HISTORY

There is something almost pathetic in the childish wonder and delight with which mankind in its earlier phases of civilization gathered up and treasured stories of strange animals from distant lands or deep seas, such as are recorded in the *Physiologus*, in Albertus Magnus, and even at the present the popular treatises of Japan and China. That universally credulous stage, which may be called the "legendary," was succeeded by the age of collectors and travellers, when many of the strange stories believed in were actually demonstrated as true by the living or preserved trophies brought to Europe. The possibility of verification established verification as a habit; and the collecting of *things*, instead of the accumulating of *reports*, developed a new faculty of minute observation. The early collectors of natural curiosities were the founders of zoological science, and to this day the naturalist-traveller and his correlative, the museum curator and systematist, play a most important part in the progress of zoology. Indeed, the historical and present importance of this aspect or branch of zoological science is so great that the name "zoology" has until recently been associated entirely with it, to the exclusion of the study of minute anatomical structure and function which have been distinguished as anatomy and physiology. Anatomy and the study of animal mechanism, animal physics and animal chemistry, all of which form part of a true zoology, were excluded from the usual definition of the word by the mere accident that the zoologist had his museum but not his garden of living specimens as the botanist had;[1] and, whilst the zoologist was thus deprived of the means of anatomical and physiological study—only later supplied by the method of preserving animal bodies in alcohol—the demands of medicine for a knowledge of the structure of the human animal brought into existence a separate and special study of human anatomy and physiology.

Change in the character of the science.

From these special studies of human structure the knowledge of the anatomy of animals has proceeded, the same investigator who had made himself acquainted with the structure of the human body desiring to compare with the standard given by human anatomy the structures of other animals. Thus comparative anatomy came into existence as a branch of inquiry apart from zoology, and it was only in the latter part of the 19th century that the limitation of the word "zoology" to a knowledge of animals which expressly excludes the consideration of their internal structure was rejected by the general consent of those concerned in the progress of science. It is now generally recognized that it is mere tautology to speak of zoology *and* comparative anatomy, and that museum naturalists must give attention as well to the inside as to the outside of animals.

Scientific zoology really started in the 16th century with the awakening of the new spirit of observation and exploration, but for a long time ran a separate course uninfluenced by the progress of the medical studies of anatomy and physiology. The active search for knowledge by means of observation and experiment found its natural home in the universities. Owing to the connexion of medicine with these seats of learning, it was natural that the study of the structure and functions of the human body and of the animals nearest to man should take root there; the spirit of inquiry which now for the first time became general showed itself in the anatomical schools of the Italian universities of the 16th century, and spread fifty years later to Oxford.

In the 17th century the lovers of the new philosophy, the investigators of nature by means of observation and experiment, banded themselves into academies or societies for mutual support and intercourse. The first founded of surviving European academies, the Academia Naturae Curiosorum (1651),[2] especially confined itself to the description and illustration of the structure of plants and animals; eleven years later (1662) the Royal Society of London was incorporated by royal charter, having existed without a name or fixed organization for seventeen years previously (from 1645). A little later the Academy of Sciences of Paris was established by Louis XIV. The influence of these great academies of the 17th century on the progress of zoology was precisely to effect that bringing together of the museum-men and the physicians or anatomists which was needed for further development. Whilst the race of collectors and systematizers culminated in the latter part of the 18th century in Linnaeus, a new type of student made its appearance in such men as John Hunter and other anatomists, who, not satisfied with the superficial observations of the popular "zoologists," set themselves to work to examine anatomically the whole animal kingdom, and to classify its members by aid of the results of such profound study. Under the influence of the touchstone of strict inquiry set on foot by the Royal Society, the marvels of witchcraft, sympathetic powders and other relics of medieval superstition disappeared like a mist before the sun, whilst accurate observations and demonstrations of a host of new wonders accumulated, amongst which were numerous contributions to the anatomy of animals, and none perhaps more noteworthy than the observations, made by the aid of microscopes constructed by himself, of Leeuwenhoek, the Dutch naturalist (1683), some of whose instruments were presented by him to the society.

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[1] The medieval attitude towards both plants and animals had no relation to real knowledge, but was part of a peculiar and in itself highly interesting mysticism. A fantastic and elaborate doctrine of symbolism existed which comprised all nature; witchcraft, alchemy and medicine were its practical expressions. Animals as well as plants were regarded as "simples" and used in medicine, and a knowledge of them was valued from this point of view.

[2] The Academia Secretorum Naturae was founded at Naples in 1560, but was suppressed by the ecclesiastical authorities.

It was not until the 19th century that the microscope, thus early applied by Leeuwenhoek, Malpighi, Hook and Swammerdam to the study of animal structure, was perfected as an instrument, and accomplished for zoology its final and most important service. The perfecting of the microscope led to a full comprehension of the great doctrine of cell-structure and the establishment of the facts—(1) that all organisms are either single corpuscles (so-called cells) of living material (microscopic animalcules, &c.) or are built up of an immense number of such units; (2) that all organisms begin their individual existence as a single unit or corpuscle of living substance, which multiplies by binary fission, the products growing in size and multiplying similarly by binary fission; and (3) that the life of a multicellular organism is the sum of the activities of the corpuscular units of which it consists, and that the processes of life must be studied in and their explanation obtained from an understanding of the chemical and physical changes which go on in each individual corpuscle or unit of living material or protoplasm.

Ideas of development.

Meanwhile the astronomical theories of development of the solar system from a gaseous condition to its present form, put forward by Kant and by Laplace, had impressed men's minds with the conception of a general movement of spontaneous progress or development in all nature. The science of geology came into existence, and the whole panorama of successive stages of the earth's history, each with its distinct population of strange animals and plants, unlike those of the present day and simpler in proportion as they recede into the past, was revealed by Cuvier, Agassiz and others. The history of the crust of the earth was explained by Lyell as due to a process of slow development, in order to effect which he called in no cataclysmic agencies, no mysterious forces differing from those operating at the present day. Thus he carried on the narrative of orderly development from the point at which it was left by Kant and Laplace—explaining by reference to the ascertained laws of physics and chemistry the configuration of the earth, its mountains and seas, its igneous and its stratified rocks, just as the astronomers had explained by those same laws the evolution of the sun and planets from diffused gaseous matter of high temperature. The suggestion that living things must also be included in this great development was obvious.

The delay in the establishment of the doctrine of organic evolution was due, not to the ignorant and unobservant, but to the leaders of zoological and botanical science. Knowing the almost endless complexity of organic structures, realizing that man himself with all the mystery of his life and consciousness must be included in any explanation of the origin of living things, they preferred to regard living things as something apart from the rest of nature, specially cared for, specially created by a Divine Being. Thus it was that the so-called "Natur-philosophen" of the last decade of the 18th century, and their successors in the first quarter of the 19th, found few adherents among the working zoologists and botanists. Lamarck, Treviranus, Erasmus Darwin, Goethe, and Saint-Hilaire preached to deaf ears, for they advanced the theory that living beings had developed by a slow process of transmutation in successive generations from simpler ancestors, and in the beginning from simplest formless matter, without being able to demonstrate any existing mechanical causes by which such development must necessarily be brought about. They were met by the criticism that possibly such a development had taken place; but, as no one could show as a simple fact of observation that it *had* taken place, nor as a result of legitimate inference that it *must* have taken place, it was quite as likely that the past and present species of animals and plants had been separately created or individually brought into existence by unknown and inscrutable causes, and (it was held) the truly scientific man would refuse to occupy himself with such fancies, whilst ever continuing to concern himself with the observation and record of indisputable facts. The critics did well; for the "Natur-philosophen," though right in their main conception, were premature.

The Natur-philosophen.

Darwin's doctrine of organic evolution.

It was reserved for Charles Darwin, in the year 1859, to place the whole theory of organic evolution on a new footing, and by his discovery of a mechanical cause actually existing and demonstrable by which organic evolution must be brought about, entirely to change the attitude in regard to it of even the most rigid exponents of the scientific method. Darwin succeeded in establishing the doctrine of organic evolution by the introduction into the web of the zoological and botanical sciences of a new science. The subject-matter of this new science, or branch of biological science, had been neglected: it did not form part of the studies of the collector and systematist, nor was it a branch of anatomy, nor of the physiology pursued by medical men, nor again was it included in the field of microscopy and the cell-theory. The area of biological knowledge which Darwin was the first to subject to scientific method and to render, as it were, contributory to the great stream formed by the union of the various branches, is that which relates to the breeding of animals and plants, their congenital variations, and the transmission and perpetuation of those variations. This branch of biological science may be called thremmatology (θρέμμα, "a thing bred"). Outside the scientific world an immense mass of observation and experiment had grown up in relation to this subject. From the earliest times the shepherd, the farmer, the horticulturist, and the "fancier" had for practical purposes made themselves acquainted with a number of biological laws, and successfully applied them without exciting more than an occasional notice from the academic students of biology. It is one of Darwin's great merits to have made use of these observations and to have formulated their results to a large extent as the laws of variation and heredity. As the breeder selects a congenital variation which suits his requirements, and by breeding from the animals (or plants) exhibiting that variation obtains a new breed specially characterized by that variation, so in nature is there a selection amongst all the congenital variations of each generation of a species. This selection depends on the fact that more young are born than the natural provision of food will support. In consequence of this excess of births there is a struggle for existence and a survival of the fittest, and consequently an ever-present necessarily acting selection, which either maintains accurately the form of the species from generation to generation or leads to its modification in correspondence with changes in the surrounding circumstances which have relation to its fitness for success in the struggle for life.

Darwin's introduction of thremmatology into the domain of scientific biology was accompanied by a new and special development of a branch of study which had previously been known as teleology, the study of the adaptation of organic considerable use of anatomical characters in his definitions of larger groups, and may thus be considered as the father of modern zoology. Associated with Ray in his work, and more especially occupied with the study of the Worms and *Mollusca*, was Martin Lister (1638–1712), celebrated also as the author of the first geological map.

After Ray's death the progress of anatomical knowledge, and of the discovery and illustration of new forms of animal life from distant lands, continued with increasing vigour. We note the names of Vallismieri (1661–1730) and Alexander Monro (1697–1767); the travellers Tournefort (1656–1708) and Shaw (1692–1751); the collectors Rumphius (1637–1706) and Hans Sloane (1660–1753); the entomologist Réaumur (1683–1757); Lhwyd (1703) and Linck (1674–1734), the students of Star-Fishes; Peyssonel (b. 1694), the investigator of Polyps and the opponent of Marsigli and Réaumur, who held them to be plants; Woodward, the palaeontologist (1665–1722)—not to speak of others of less importance.

From Ray to Linnaeus.

Two years after Ray's death Carl Linnaeus (1707–1778) was born. Unlike Jacob Theodore Klein (1685–1759), whose careful treatises on various groups of plants and animals were published during the period between Ray and Linnaeus, the latter had his career marked out for him in a university, that of Upsala, where he was first professor of medicine and subsequently of natural history. His lectures formed a new departure in the academic treatment of zoology and botany, which, in direct continuity from the middle ages, had hitherto been subjected to the traditions of the medical profession and regarded as mere branches of "materia medica." Linnaeus taught zoology and botany as branches of knowledge to be studied for their own intrinsic interest. His great work, the *Systema naturae*, ran through twelve editions during his lifetime (1st ed. 1735, 12th 1768). Apart from his special discoveries in the anatomy of plants and animals, and his descriptions of new species, the great merit of Linnaeus was his introduction of a method of enumeration and classification which may be said to have created systematic zoology and botany in their present form, and establishes his name for ever as the great organizer, the man who recognized a great practical want in the use of language and supplied it. Linnaeus adopted Ray's conception of species, but he made species a practical reality by insisting that every species shall have a double Latin name—the first half to be the name of the genus common to several species, and the second half to be the specific name. Previously to Linnaeus long many-worded names had been used, sometimes with one additional adjective, sometimes with another, so that no true *names* were fixed and accepted. Linnaeus by his binomial system made it possible to write and speak with accuracy of any given species of plant or animal. He was, in fact, the Adam of zoological science. He proceeded further to introduce into his enumeration of animals and plants a series of groups, viz. genus, order, class, which he compared to the subdivisions of an army or the subdivisions of a territory, the greater containing several of the less, as follows:—

Linnaeus.

Class.	Order.	Genus.	Species.	Variety.
Genus summum.	Genus intermedium.	Genus proximum.	Species.	Individuum.
Provincia.	Territorium.	Paroecia.	Pagus.	Domicilium.
Legio.	Cohors.	Manipulus.	Contubernium.	Miles.

Linnaeus himself recognized the purely subjective character of his larger groups; for him species were, however, objective: "there are," he said, "just so many species as in the beginning the Infinite Being created." It was reserved for a philosophic zoologist of the 19th century (Agassiz, *Essay on Classification*, 1859) to maintain that genus, order and class were also objective facts capable of precise estimation and valuation. This climax was reached at the very moment when Darwin was publishing the *Origin of Species* (1859), by which universal opinion has been brought to the position that species, as well as orders and classes, are the subjective expressions of a vast ramifying pedigree in which the only objective existences are individuals, the apparent species as well as higher groups being marked out, not by any distributive law, but by the interaction of living matter and its physical environment, causing the persistence of some forms and the destruction of vast series of ancestral intermediate kinds.

Classification of Linnaeus.

The classification of Linnaeus (from *Syst. Nat.*, 12th ed., 1766) should be compared with that of Aristotle. It is as follows—the complete list of Linnaean genera being here reproduced:—

Class I. MAMMALIA.
Order 1. *Primates*.
Genera: *Homo, Simia, Lemur, Vespertilio.*
" 2. *Bruta*.
Genera: *Elephas, Trichecus, Bradypus, Myrmecophaga, Manis, Dasypus.*
" 3. *Ferae*.
Genera: *Phoca, Canis, Felis, Viverra, Mustela, Ursus, Didelphys, Talpa, Sorex, Erinaceus.*
" 4. *Glires*.
Genera: *Hystrix, Lepus, Castor, Mus, Sciurus, Noctilio.*
" 5. *Pecora*.
Genera: *Camelus, Moschus, Cervus, Capra, Ovis, Bos.*
" 6. *Belluae*.
Genera: *Equus, Hippopotamus, Sus, Rhinoceros.*
" 7. *Cete*.
Genera: *Monodon, Balaena, Physeter, Delphinus.*

Class II. AVES.
Order 1. *Accipitres*.
Genera: *Vultur, Falco, Strix, Lanius.*
" 2. *Picae*.
Genera: (a) *Trochilus, Certhia, Upupa, Buphaga, Sitta, Oriolus, Coracias, Gracula, Corvus, Paradisea;* (b) *Ramphastos, Trogon, Psittacus, Crotophaga, Picus, Yunx, Cuculus, Bucco;* (c) *Buceros, Alcedo, Merops, Todos.*
" 3. *Anseres*.
Genera: (a) *Anas, Mergus, Phaethon, Plotus;* (b) *Rhyncops, Diomedea, Alca, Procellaria, Pelecanus, Larus, Sterna, Colymbus.*
" 4. *Grallae*.
Genera: (a) *Phoenicopterus, Platalea, Palamedea, Mycteria, Tantalus, Ardea, Recurvirostra, Scolopax, Tringa, Fulica, Parra, Rallus, Psophia, Cancroma;* (b) *Hematopus, Charadrius, Otis, Struthio.*
" 5. *Gallinae*.
Genera: *Didus, Pavo, Meleagris, Crax, Phasianus, Tetrao, Numida.*
" 6. *Passeres*.
Genera: (a) *Loxia, Fringilla, Emberiza;* (b) *Caprimulgus, Hirundo, Pipra;* (c) *Turdus, Ampelis, Tanagra, Muscicapa;* (d) *Parus, Motacilla, Alauda, Sturnus, Columba.*

Class III. AMPHIBIA.
Order 1. *Reptilia*.
Genera: *Testudo, Draco, Lacerta, Rana.*
" 2. *Serpentes*.
Genera: *Crotalus, Boa, Coluber, Anguis, Amphisbaena, Caecilia.*
" 3. *Nantes*.
Genera: *Petromyzon, Raja, Squalus, Chimaera, Lophius, Acipenser, Cyclopterus, Balistes, Ostracion, Tetrodon, Diodon, Centriscus, Syngnathus, Pegasus.*

Class IV. PISCES.
Order 1. *Apodes*.
Genera: *Muraena, Gymnotus, Trichiurus, Anarrhichas, Ammodytes, Ophidium, Stromateus, Xiphias.*
" 2. *Jugulares*.
Genera: *Callionymus, Uranoscopus, Trachinus, Gadus, Blennius.*
" 3. *Thoracici*.
Genera: *Cepola, Echeneis, Coryphaena, Gobius, Cottus, Scorpaena, Zeus, Pleuronectes, Chaetodon, Sparus, Labrus, Sciaena, Perca, Gasterosteus, Scomber, Mullus, Trigla.*
" 4. *Abdominales*.
Genera: *Cobitis, Amia, Silurus, Zeuthis, Loricaria, Salmo, Fistularia, Esox, Elops, Argentina, Atherina, Mugil, Mormyrus, Exocoetus, Polynemus, Clupea, Cyprinus.*

Class V. INSECTA.
Order 1. *Coleoptera.*
Genera: (*a*) *Scarabaeus, Lucanus, Dermestes, Hister, Byrrhus, Gyrinus, Attelabus, Curculio, Silpha, Coccinella*; (*b*) *Bruchus, Cassida, Ptinus, Chrysomela, Hispa, Meloe, Tenebrio, Lampyris, Mordella, Staphylinus*; (*c*) *Cerambyx, Leptura, Cantharis, Elater, Cicindela, Buprestis, Dytiscus, Carabus, Necydalis, Forficula.*
„ 2. *Hemiptera.*
Genera: *Blatta, Mantis, Gryllus, Fulgora, Cicada, Notonecta, Nepa, Cimex, Aphis, Chermes, Coccus, Thrips.*
„ 3. *Lepidoptera.*
Genera: *Papilio, Sphinx, Phalaena.*
„ 4. *Neuroptera.*
Genera: *Libellula, Ephemera, Myrmeleon, Phryganea, Hemerobius, Panorpa, Raphidia.*
„ 5. *Hymenoptera.*
Genera: *Cynips, Tenthredo, Sirex, Ichneumon, Sphex, Chrysis, Vespa, Apis, Formica, Mutilla.*
„ 6. *Diptera.*
Genera: *Oestrus, Tipula, Musca, Tabanus, Culex, Empis, Conops, Asilus, Bombylius, Hippobosca.*
„ 7. *Aptera.*
Genera: (*a*) Pedibus sex; capite a thorace discreto: *Lepisma, Podura, Termes, Pediculus, Pulex.*
(*b*) Pedibus 8–14; capite thoraceque unitis: *Acarus, Phalangium, Aranea, Scorpio, Cancer, Monoculus, Oniscus.*
(*c*) Pedibus pluribus; capite a thorace discreto: *Scolopendra, Julus.*

Class VI. VERMES.
Order 1. *Intestina.*
Genera: (*a*) Pertusa laterali poro: *Lumbricus, Sipunculus, Fasciola.*
(*b*) Imperforata poro laterali nullo: *Gordius, Ascaris, Hirudo, Myxine.*
„ 2. *Mollusca.*
Genera: (*a*) Ore supero; basi se affigens: *Actinia, Ascidia.*
(*b*) Ore antico; corpore pertuso laterali foraminulo: *Limax, Aplysia, Doris, Tethis.*
(*c*) Ore antico; corpore tentaculis antice cincto: *Holothuria, Terebella.*
(*d*) Ore antico; corpore brachiato: *Triton, Sepia, Clio, Lernaea, Scyllaea.*
(*e*) Ore antico; corpore pedato: *Aphrodita, Nereis.*
(*f*) Ore infero centrali: *Medusa, Asteria, Echinus.*
„ 3. *Testacea.*
Genera: (*a*) Multivalvia: *Chiton, Lepas, Pholas.*
(*b*) Bivalvia (=*Conchae*): *Mya, Solen, Tellina, Cardium, Mactra, Donax, Venus, Spondylus, Chama, Arca, Ostrea, Anomia, Mytilus, Pinna.*
(*c*) Univalvia spira regulari (=*Cochleae*): *Argonauta, Nautilus, Conus, Cypraea, Bulla, Voluta, Buccinum, Strombus, Murex, Trochus, Turbo, Helix, Nerita, Haliotis.*
(*d*) Univalvia absque spira regulari: *Patella, Dentalium, Serpula, Teredo, Sabella.*
„ 4. *Lithophyta.*
Genera: *Tubipora, Madrepora, Millepora, Cellepora.*
„ 5. *Zoophyta.*
Genera: (*a*) Fixata: *Isis, Gorgonia, Alcyonium, Spongia, Flustra, Tubularia, Corallina, Sertularia, Vorticella.*
(*b*) Locomotiva: *Hydra, Pennatula, Taenia, Volvox, Furia, Chaos.*

The characters of the six classes are thus given by Linnaeus:—

Cor biloculare, biauritum; Sanguine calido, rubro:	viviparis, *Mammalibus*; oviparis, *Avibus.*
Cor uniloculare, uniauritum;[1] Sanguine frigido, rubro:	pulmone arbitrario, *Amphibiis*; branchiis externis, *Piscibus.*
Cor uniloculare, inauritum; Sanie frigida, albida:	antennatis, *Insectis*; tentaculatis, *Vermibus.*

From Linnaeus to Cuvier.

Between Linnaeus and Cuvier there are no very great names; but under the stimulus given by the admirable method and system of Linnaeus observation and description of new forms from all parts of the world, both recent and fossil, accumulated. We can only cite the names of Charles Bonnet (1720–1793), the entomologist, who described the reproduction of *Aphis;* Banks and Solander, who accompanied Captain Cook on his first voyage (1768–1771); Thomas Pennant (1726–1798), the describer of the English fauna; Peter Simon Pallas (1741–1811), who specially extended the knowledge of the Linnaean *Vermes*, and under the patronage of the empress Catherine explored Russia and Siberia; De Geer (1720–1778), the entomologist; Lyonnet (1707–1789), the author of the monograph of the anatomy of the caterpillar of *Cossus ligniperdus;* Cavolini (1756–1810), the Neapolitan marine zoologist and forerunner of Della Chiaje (fl. 1828); O. F. Müller (1730–1784), the describer of fresh-water *Oligochaeta;* Abraham Trembley (1700–1784), the student of *Hydra;* and O. F. Ledermüller (1719–1769), the inventor of the term *Infusoria.* The effect of the Linnaean system upon the general conceptions of zoologists was no less marked than were its results in the way of stimulating the accumulation of accurately observed details. The notion of a *scala naturae*, which had since the days of classical antiquity been a part of the general philosophy of nature amongst those who occupied themselves with such conceptions, now took a more definite form in the minds of skilled zoologists. The species of Linnaeus were supposed to represent a series of steps in a scale of ascending complexity, and it was thought possible thus to arrange the animal kingdom in a single series—the orders within the classes succeeding one another in regular gradation, and the classes succeeding one another in a similar rectilinear progression.

Lamarck's classification.

J. B. P. de Lamarck (1744–1829) represents most completely, both by his development theory (to be further mentioned below) and by his scheme of classification, the high-water mark of the popular but fallacious conception of a *scala naturae.* His classification (1801–1812) is as follows:—

Invertebrata.
1. *Apathetic Animals.*
Class I. INFUSORIA.
Orders: *Nuda, Appendiculata.*
Class II. POLYPI.
Orders: *Ciliati* (*Rotifera*), *Denudati* (Hydroids), *Vaginati* (*Anthozoa* and *Polyzoa*), *Natantes* (Crinoids).
Class III. RADIARIA.
Orders: *Mollia* (*Acalephae*), *Echinoderma* (including *Actiniae*).
Class IV. TUNICATA.
Orders: *Bothryllaria, Ascidia.*
Class V. VERMES.
Orders: *Molles* (Tape-Worms and Flukes), *Rigiduli* (Nematoids), *Hispiduli* (*Nais*, &c.), *Epizoariae* (Lernaeans, &c.).
2. *Sensitive Animals.*
Class VI INSECTA (*Hexapoda*).
Orders: *Aptera, Diptera, Hemiptera, Lepidoptera, Hymenoptera, Neuroptera, Orthoptera, Coleoptera.*
Class VII. ARACHNIDA.
Orders: *Antennato-Trachealia* (=*Thysanura* and *Myriapoda*), *Exantennato-Trachealia, Exantennato-Branchialia.*
Class VIII. CRUSTACEA.
Orders: *Heterobranchia* (*Branchiopoda, Isopoda, Amphipoda, Stomapoda*), *Homobranchia* (*Decapoda*).
Class IX. ANNELIDA.
Orders. *Apoda, Antennata, Sedentaria.*
Class X. CIRRIPEDIA.
Orders: *Sessilia, Pedunculata.*
Class XI CONCHIFERA.
Orders: *Dimyaria, Monomyaria.*
Class XII. MOLLUSCA.
Orders: *Pteropoda, Gasteropoda, Trachelipoda, Cephalopoda, Heteropoda.*

Vertebrata.
3. *Intelligent Animals.*
Class XIII. FISHES.
„ XIV. REPTILES.
Class XV. BIRDS.
„ XVI. MAMMALS.

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[1] The anatomical error in reference to the auricles of Reptiles and Batrachians on the part of Linnaeus is extremely interesting, since it shows to what an extent the most patent facts may escape the observation of even the greatest observers, and what an amount of repeated dissection and unprejudiced attention has been necessary before the structure of the commonest animals has become known.

The enumeration of orders above given will enable the reader to form some conception of the progress of knowledge relating to the lower forms of life during the fifty odd years which intervened between Linnaeus and Lamarck. The number of genera recognized by Lamarck is more than ten times as great as that recorded by Linnaeus.

We have mentioned Lamarck before his great contemporary Cuvier because, in spite of his valuable philosophical doctrine of development, he was, as compared with Cuvier and estimated as a systematic zoologist, a mere enlargement and logical outcome of Linnaeus.

Cuvier.

The distinctive merit of G. L. Cuvier (1769–1832) is that he started a new view as to the relationship of animals, which he may be said in a large measure to have demonstrated as true by his own anatomical researches. He opposed the *scala naturae* theory, and recognized four distinct and divergent branches or *embranchemens*, as he called them, in each of which he arranged a certain number of the Linnaean classes, or similar classes. The *embranchemens* were characterized each by a different type of anatomical structure. Cuvier thus laid the foundation of that branching tree-like arrangement of the classes and orders of animals now recognized as being the necessary result of attempts to represent what is practically a genealogical tree or pedigree. Apart from this, Cuvier was a keen-sighted and enthusiastic anatomist of great skill and industry. It is astonishing how many good observers it requires to dissect and draw and record over and over again the structure of an animal before an approximately correct account of it is obtained. Cuvier dissected many Molluscs and other animals which had not previously been anatomized; of others he gave more correct accounts than had been given by earlier writers. Another special distinction of Cuvier is his remarkable work in comparing extinct with recent organisms, his descriptions of the fossil *Mammalia* of the Paris basin, and his general application of the knowledge of recent animals to the reconstruction of extinct ones, as indicated by fragments only of their skeletons.

It was in 1812 that Cuvier communicated to the Academy of Sciences of Paris his views on the classification of animals. He says:—

> "Si l'on considère le règne animal d'après les principes que nous venons de poser, en se debarassant des préjugés établis sur les divisions anciennement admises, en n'ayant égard qu' à l'organisation et à la nature des animaux, et non pas à leur grandeur, à leur utilité, au plus ou moins de connaissance que nous en avons, ni à toutes les autres circonstances accessoires, on trouvera qu'il existe quatre formes principales, quatre plans généraux, si l'on peut s'exprimer ainsi, d'après lesquels tous les animaux semblent avoir été modelés et dont les divisions ultérieures, de quelque titre que les naturalistes les aient décorées, ne sont que des modifications assez légères, fondées sur le développement, ou l'addition de quelques parties qui ne changent rien à l'essence du plan."

Cuvier's classification.

His classification as finally elaborated in *Le Règne Animal* (Paris, 1829) is as follows:—

First Branch. **Animalia Vertebrata.**
- Class I. MAMMALIA.
  - Orders: *Bimana, Quadrumana, Carnivora, Marsupialia, Rodentia, Edentata, Pachydermata, Ruminantia, Cetacea.*
- Class II. BIRDS.
  - Orders: *Accipitres, Passeres, Scansores, Gallinae, Grallae, Palmipedes.*
- Class III. REPTILIA.
  - Orders: *Chelonia, Sauria, Ophidia, Batrachia.*
- Class IV. FISHES.
  - Orders: (*a*) *Acanthopterygii, Abdominales, Subbrachis, Apodes, Lophobranchii, Plectognathi;* (*b*) *Sturiones, Selachii, Cyclostomi.*

Second Branch. **Animalia Mollusca.**
- Class I. CEPHALOPODA.
- Class II. PTEROPODA.
- Class III. GASTROPODA.
  - Orders: *Pulmonata, Nudibranchia, Inferobranchia, Tectibranchia, Heteropoda, Pectinibranchia, Tubulibranchia, Scutibranchia, Cyclobranchia.*
- Class IV. ACEPHALA.
  - Orders: *Testacea, Tunicata.*
- Class V. BRACHIOPODA.
- Class VI. CIRRHOPODA.

Third Branch. **Animalia Articulata.**
- Class I. ANNELIDES.
  - Orders: *Tubicolae, Dorsibranchiae, Abranchiae.*
- Class II. CRUSTACEA.
  - Orders: (*a*) Malacostraca: *Decapoda, Stomapoda, Amphipoda, Laemodipoda, Isopoda;* (*b*) Entomostraca: *Branchiopoda, Poecilopoda, Trilobitae.*
- Class III. ARACHNIDES.
  - Orders: *Pulmonariae, Trachearíae.*
- Class IV. INSECTS.
  - Orders: *Myriapoda, Thysanura, Parasita, Suctoria, Coleoptera, Orthoptera, Hemiptera, Neuroptera, Hymenoptera, Lepidoptera, Rhipiptera, Diptera.*

Fourth Branch. **Animalia Radiata.**
- Class I. ECHINODERMS.
  - Orders. *Pedicellata, Apoda.*
- Class II INTESTINAL WORMS.
  - Orders. *Nematoidea, Parenchymatosa.*
- Class III. ACALEPHAE.
  - Orders. *Simplices, Hydrostaticae.*
- Class IV POLYPI (including the *Coelentera* of later authorities and the *Polyzoa*).
  - Orders: *Carnosi, Gelatinosi, Polypiarii.*
- Class V. INFUSORIA.
  - Orders: *Rotifera, Homogenea* (this includes the *Protozoa* of recent writers and some *Protophyta*).

Von Baer.

The leading idea of Cuvier, his four *embranchemens*, was confirmed by the Russo-German naturalist Von Baer (1792–1876), who adopted Cuvier's divisions, speaking of them as the peripheric, the longitudinal, the massive, and the vertebrate types of structure. Von Baer, however, has another place in the history of zoology, being the first and most striking figure in the introduction of embryology into the consideration of the relations of animals to one another.

The morphologists.

Cuvier may be regarded as *the* zoologist by whom anatomy was made the one important guide to the understanding of the relations of animals. But the belief, dating from Malpighi (1670), that there *is* a relationship to be discovered, and not merely a haphazard congregation of varieties of structure to be classified, had previously gained ground. Cuvier was familiar with the speculations of the "Natur-philosophen," and with the doctrine of transmutation and filiation by which they endeavoured to account for existing animal forms. The noble aim of F. W. J. Schelling, "das ganze System der Naturlehre von dem Gesetze der Schwere bis zu den Bildungstrieben der Organismus als ein organisches Ganze darzustellen," which has ultimately been realized through Darwin, was a general one among the scientific men of the year 1800. Lamarck accepted the development theory fully, and pushed his speculations far beyond the realm of fact. The more cautious Cuvier adopted a view of the relationships of animals which, whilst denying genetic connexion as the explanation, recognized an essential identity of structure throughout whole groups of animals. This identity was held to be due to an ultimate law of nature or the Creator's plan. The tracing out of this identity in diversity, whether regarded as evidence of blood-relationship or as a remarkable display of skill on the part of the Creator in varying the details whilst retaining the essential, became at this period a special pursuit, to which Goethe, the poet, who himself contributed importantly to it, gave the name "morphology." C. F. Wolff, Goethe and Oken share the credit of having initiated these views, in regard especially to the structure of flowering plants and the Vertebrate skull. Cuvier's doctrine of four plans of structure was essentially a morphological one, and so was the single-scale doctrine of Buffon and Lamarck, to which it was opposed. Cuvier's morphological doctrine received its fullest development in the principle of the "correlation of parts," which he applied to palaeontological investigation, namely, that every animal is a definite whole, and that no part can be varied without entailing correlated and law-abiding variations in other parts, so that from a fragment it should be possible, had we a full knowledge of the laws of animal structure or morphology, to reconstruct the whole. Here Cuvier was imperfectly formulating, without recognizing the real physical basis of the phenomena, the results of the laws of heredity, which were subsequently investigated and brought to bear on the problems of animal structure by Darwin.

Owen.

Sir Richard Owen (1804–1892) may be regarded as the foremost of Cuvier's disciples. Owen not only occupied himself with the dissection of rare animals, such as the Pearly Nautilus, *Lingula, Limulus, Protopterus, Apteryx,* &c., and with the description and reconstruction of extinct reptiles, birds and mammals—following the Cuvierian tradition—but gave precision and currency to the morphological doctrines which had taken their rise in the beginning of the century by the introduction of two terms, "homology" and "analogy," which were defined so as to express two different kinds of agreement in animal structures, which, owing to the want of such "counters of thought," had been hitherto continually confused.

Analogous structures in any two animals compared were by Owen defined as structures performing similar functions, but not necessarily derived from the modification of one and the same part in the "plan" or "archetype" according to which the two animals compared were supposed to be constructed. *Homologous* structures were such as, though greatly differing in appearance and detail from one another, and though performing widely different functions, yet were capable of being shown by adequate study of a series of intermediate forms to be derived from one and the same part or organ of the "plan-form" or "archetype." It is not easy to exaggerate the service rendered by Owen to the study of zoology by the introduction of this apparently small piece of verbal mechanism; it takes place with the classificatory terms of Linnaeus. And, though the conceptions of "archetypal morphology," to which it had reference, are now abandoned in favour of a genetic morphology, yet we should remember, in estimating the value of this and of other speculations which have given place to new views in the history of science, the words of the great reformer himself. "Erroneous observations are in the highest degree injurious to the progress of science, since they often persist for a long time. But erroneous theories, when they are supported by facts, do little harm, since every one takes a healthy pleasure in proving their falsity" (Darwin). Owen's definition of analogous structures holds good at the present day. His homologous structures are now spoken of as "homogenetic" structures, the idea of community of representation in an archetype giving place to community of derivation from a single representative structure present in a common ancestor. Darwinian morphology has further rendered necessary the introduction of the terms "homoplasy" and "homoplastic" (E. Ray Lankester, in *Ann. and Mag. Nat. Hist.* 1870) to express that close agreement in *form* which may be attained in the course of evolutional changes by organs or parts in two animals which have been subjected to similar moulding conditions of the environment, but have not a close genetic community of origin, to account for their similarity in form and structure, although they have a certain identity in primitive quality which is accountable for the agreement of their response to similar moulding conditions.

Owen's classification.

The classification adopted by Owen in his lectures (1855) does not adequately illustrate the progress of zoological knowledge between Cuvier's death and that date, but, such as it is, it is worth citing here.

Province: Vertebrata (*Myelencephala*, Owen).
  Classes: MAMMALIA, AVES, REPTILIA, PISCES.
Province: Articulata.
  Classes: ARACHNIDA, INSECTA (including Sub-Classes *Myriapoda*, *Hexapoda*), CRUSTACEA (including Sub-Classes *Entomostraca*, *Malacostraca*), EPIZOA (Epizootic *Crustacea*), ANNELLATA (Chaetopods and Leeches), CIRRIPEDIA.
Province: Mollusca.
  Classes: CEPHALOPODA, GASTEROPODA, PTEROPODA, LAMELLIBRANCHIATA, BRACHIOPODA, TUNICATA.
Province: Radiata.
  Sub-Province: Radiaria.
    Classes: ECHINODERMATA, BRYOZOA, ANTHOZOA, ACALEPHAE, HYDROZOA.
  Sub-Province: Entozoa.
    Classes: COELELMINTHA, STERELMINTHA.
  Sub-Province: Infusoria.
    Classes: ROTIFERA, POLYGASTRIA (the *Protozoa* of recent authors).

The real centre of progress of systematic zoology was no longer in France nor with the disciples of Cuvier in England, but after his death moved to Germany. The wave of morphological speculation, with its outcome of new systems and new theories of classification (see Agassiz, *Essay on Classification*, 1859), which were as numerous as the professors of zoological science, was necessarily succeeded in the true progress of the science by a period of minuter study in which the microscope, the discovery of embryological histories, and the all-important cell-theory came to swell the stream of exact knowledge.

Müller.

The greatest of all investigators of animal structure in the 19th century was Johann Müller (1801–1858), the successor in Germany of the anatomists Rathke (1793–1860) and Meckel (1781–1833). His true greatness can only be estimated by a consideration of the fact that he was a great teacher not only of human and comparative anatomy and zoology but also of physiology, and that nearly all the most distinguished German zoologists and physiologists of the period 1850 to 1870 were his pupils and acknowledged his leadership. The most striking feature about Johann Müller's work, apart from the comprehensiveness of his point of view, in which he added to the anatomical and morphological ideas of Cuvier a consideration of physiology, embryology and microscopic structure, was the extraordinary accuracy, facility and completeness of his recorded observations. He could do more with a single specimen of a rare animal (*e.g.* in his memoir on *Amphioxus*, Berlin, 1844) in the way of making out its complete structure than the ablest of his contemporaries or successors could do with a plethora. His power of rapid and exhaustive observation and of accurate pictorial reproduction was phenomenal. His most important memoirs, besides that just mentioned, are those on the anatomy and classification of Fishes, on the Caecilians and on the developmental history of the Echinoderms.

J. V. Thompson.

A name which is apt to be forgotten in the period between Cuvier and Darwin, because its possessor occupied an isolated position in England and was not borne up by any great school or university, is that of John Vaughan Thompson (1779–1847), an army surgeon, who in 1816 became district medical inspector at Cork, and then took to the study of marine *Invertebrata* by the aid of the microscope. Thompson made three great discoveries, which seem to have fallen in his way in the most natural and simple manner, but must be regarded really as the outcome of extraordinary genius. He showed (1830) that the organisms like *Flustra* are not hydroid Polyps, but of a more complex structure resembling Molluscs, and he gave them the name *Polyzoa*. He discovered (1823) the *Pentacrinus europaeus*, and showed that it was the larval form of the Feather-Star *Antedon* (*Comatula*). He upset (1830) Cuvier's retention of the Cirripedes among *Mollusca*, and his subsequent treatment of them as an isolated class, by showing that they begin life as free-swimming *Crustacea* identical with the young forms of other *Crustacea*. Vaughan Thompson is a type of the marine zoologists, such as Dalyell, Michael Sars, P. J. Van Beneden, Claparède, and Allman, who during the 19th century approached the study of the lower marine organisms in the same spirit as that in which Trembley and Schäffer in the 18th century, and Swammerdam in the 17th, gave themselves to the study of the minute fresh-water forms of animal life.

It is impossible to enumerate or to give due consideration to all the names in the army of anatomical and embryological students of the middle third of the 19th century whose labours bore fruit in the modification of zoological theories and in the building up of a true classification of animals. Their results are best summed up in the three schemes of classification which follow below—those of Rudolph Leuckart (1823–1896), Henri Milne-Edwards (1800–1884), and T. H. Huxley (1825–1895), all of whom individually contributed very greatly by their special discoveries and researches to the increase of exact knowledge.

Single-fact systems of classification.

Contemporaneous with these were various schemes of classification which were based, not on a consideration of the entire structure of each animal, but on the variations of a single organ, or on the really non-significant fact of the structure of the egg. All such single-fact systems have proved to be departures from the true line of growth of the zoological system which was shaping itself year by year—unknown to those who so shaped it—as a genealogical tree. They were attempts to arrive at a true knowledge of the relationships of animals by "royal roads"; their followers were landed in barren wastes.

Leuckart's classification.

R. Leuckart's classification (*Die Morphologie und die Verwandtschaftsverhältnisse der wirbellosen Thiere*, Brunswick, 1848) is as follows:—

Type 1. Coelenterata.
  Class I. POLYPI
      Orders: *Anthozoa* and *Cylicozoa*.
  " II. ACALEPHAE.
      Orders: *Discophorae* and *Ctenophorae*.

Type 2. **Echinodermata.**
Class I. PELMATOZOA.
Orders: *Cystidea* and *Crinoidea.*
„ II. ACTINOZOA.
Orders: *Echinida* and *Asterida.*
„ III. SCYTODERMATA.
Orders: *Holothuriae* and *Sipunculida.*
Type 3. **Vermes.**
Class I. ANENTERAETI.
Orders: *Cestodes* and *Acanthocephali.*
„ II. APODES.
Orders: *Nemertini, Turbellarii, Trematodes* and *Hirudinei.*
„ III. CILIATI.
Orders: *Bryozoa* and *Rotifera.*
„ IV. ANNELIDES.
Orders: *Nematodes Lumbricini* and *Branchiati.*
Type 4. **Arthropoda.**
Class I. CRUSTACEA.
Orders: *Entomostraca* and *Malacostraca.*
„ II. INSECTA.
Orders: *Myriapoda, Arachnida* (*Acera*, Latr.), and *Hexapoda.*
Type 5. **Mollusca.**
Class I. TUNICATA.
Orders: *Ascidiae* and *Salpae.*
„ II. ACEPHALA.
Orders: *Lamellibranchiata* and *Brachiopoda.*
„ III. GASTEROPODA.
Orders: *Heterobranchia, Dermatobranchia, Heteropoda, Ctenobranchia, Pulmonata,* and *Cyclobranchia.*
„ IV. CEPHALOPODA.
Type 6. **Vertebrata.** (Not specially dealt with.)

Milne-Edwards's classification.

The classification given by Henri Milne-Edwards (*Cours Élémentaire d'Histoire Naturelle*, Paris, 1855) is as follows:—

Branch I. **Osteozoaria** or **Vertebrata.**
Sub-Branch 1. **Allantoidians.**
Class I. MAMMALIA.
Orders: (*a*) Monodelphia: *Bimana, Quadrumana, Cheiroptera, Insectivora, Rodentia, Edentata, Carnivora, Amphibia, Pachydermata, Ruminantia, Cetacea*; (*b*) Didelphia: *Marsupialia, Monotremata.*
„ II. BIRDS.
Orders: *Rapaces, Passeres, Scansores, Gallinae, Grallae, Palmipedes.*
„ III. REPTILES.
Orders: *Chelonia, Sauria, Ophidia.*
Sub-Branch 2. **Anallantoidians.**
Class I. BATRACHIANS.
Orders: *Anura, Urodela, Perennibranchia, Caeciliae.*
„ II. FISHES.
Section 1. *Ossei.*
Orders: *Acanthopterygii, Abdominales, Subbrachii, Apodes, Lophobranchii, Plectognathi.*
Section 2. *Chondropterygii.*
Orders: *Sturiones, Selachii, Cyclostomi.*

Branch II. **Entomozoa** or **Annelata.**
Sub-Branch 1. **Arthropoda.**
Class I. INSECTA.
Orders: *Coleoptera, Orthoptera, Neuroptera, Hymenoptera, Lepidoptera, Hemiptera, Diptera, Rhipiptera, Anopleura, Thysanura.*
„ II. MYRIAPODA.
Orders: *Chilognatha* and *Chilopoda.*
„ III. ARACHNIDS.
Orders: *Pulmonaria* and *Trachearia.*
„ IV. CRUSTACEA.
Section 1. *Podophthalmia.*
Orders: *Decapoda* and *Stomopoda.*
Section 2. *Edriophthalmi.*
Orders: *Amphipoda; Loemodipoda* and *Isopoda.*
Section 3. *Branchiopoda.*
Orders: *Ostracoda, Phyllopoda* and *Trilobitae.*
Section 4. *Entomostraca.*
Orders: *Copepoda, Cladocera, Siphonostoma, Lernaeida, Cirripedia.*
Section 5. *Xiphosura.*
(The orders of the classes which follow are not given in the work quoted.)
Sub-Branch 2. **Vermes.**
Class I. ANNELIDS.
„ II. HELMINTHS.
„ III. TURBELLARIA.
Class IV. CESTOIDEA.
„ V. ROTATORIA.

Branch III. **Malacozoaria** or **Mollusca.**
Sub-Branch 1. **Mollusca** proper,
Class I. CEPHALOPODA.
„ II. PTEROPODA.
Class III. GASTEROPODA.
„ IV. ACEPHALA.
Sub-Branch 2. **Molluscoidea.**
Class I. TUNICATA.
Class II. BRYOZOA.
Branch IV. **Zoophytes.**
Sub-Branch 1. **Radiaria.**
Class I. ECHINODERMS.
„ II. ACALEPHS.
Class III. CORALLARIA or POLYPI.
Sub-Branch 2. **Sarcodaria.**
Class I. INFUSORIA.
Class II. SPONGIARIA.

Huxley's classification.

In England T. H. Huxley adopted in his lectures (1869) a classification which was in many respects similar to both of the foregoing, but embodied improvements of his own. It is as follows:—

Sub-Kingdom I. **Protozoa.**
Classes: RHIZOPODA, GREGARINIDA, RADIOLARIA, SPONGIDA.
Sub-Kingdom II. **Infusoria.**
Sub-Kingdom III. **Coelenterata.**
Classes: HYDROZOA, ACTINOZOA.
Sub-Kingdom IV. **Annuloida.**
Classes: SCOLECIDA, ECHINODERMATA.
Sub-Kingdom V. **Annulosa.**
Classes: CRUSTACEA, ARACHNIDA, MYRIAPODA, INSECTA, CHAETOGNATHA, ANNELIDA.
Sub-Kingdom VI. **Molluscoida.**
Classes: POLYZOA, BRACHIOPODA, TUNICATA.
Sub-Kingdom VII. **Mollusca.**
Classes: LAMELLIBRANCHIATA, BRANCHIOGASTROPODA, PULMOGASTROPODA, PTEROPODA, CEPHALOPODA.
Sub-Kingdom VIII. **Vertebrata.**
Classes: PISCES, AMPHIBIA, REPTILIA, AVES, MAMMALIA.

We now arrive at the period when the doctrine of organic evolution was established by Darwin, and when naturalists, being convinced by him as they had not been by the transmutationists of fifty years' earlier date, were compelled to take an entirely new view of the significance of all attempts at framing a "natural" classification.

Classifications based on structure.

Many zoologists—prominent among them in Great Britain being Huxley—had been repelled by the airy fancies and assumptions of the "philosophical" morphologists. The efforts of the best minds in zoology had been directed for thirty years or more to ascertaining with increased accuracy and minuteness the structure, microscopic and gross, of all possible forms of animals, and not only of the adult structure but of the steps of development of that structure in the growth of each kind of organism from the egg to maturity. Putting aside fantastic theories, these observers endeavoured to give in their classifications a strictly objective representation of the facts of animal structure and of the structural relationships of animals to one another capable of demonstration. The groups within groups adopted for this purpose were necessarily wanting in symmetry: the whole system presented a strangely irregular character. From time to time efforts were made by those who believed that the Creator must have followed a symmetrical system in his production of animals to force one or other artificial, neatly balanced scheme of classification upon the zoological world. The last of these was that of Louis Agassiz (1807–1873), who, whilst surveying all previous classifications, propounded a scheme of his own (*Essay on Classification*, 1859), in which, as well as in the criticisms he applies to other systems, the leading notion is that sub-kingdoms, classes, orders and families have a real existence, and that it is possible to ascertain and distinguish characters which are of class value, others which are only of ordinal value, and so on, so that the classes of one sub-kingdom should on paper, and in nature actually do, correspond in relative value to those of another sub-kingdom, and the orders of any one class similarly should be so taken as to be of equal

Agassiz.

value with those of another class, and have been actually so created.

Influence of Darwinian doctrine on taxonomy.

The whole position was changed by the acquiescence, which became universal, in the doctrine of Darwin. That doctrine took some few years to produce its effect, but it became evident at once to those who accepted Darwinism that *the* natural classification of animals, after which collectors and anatomists, morphologists, philosophers and embryologists had been so long striving, was nothing more nor less than a genealogical tree, with breaks and gaps of various extent in its record. The facts of the relationships of animals to one another, which had been treated as the outcome of an inscrutable law by most zoologists and glibly explained by the transcendental morphologists, were amongst the most powerful arguments in support of Darwin's theory, since they, together with all other vital phenomena, received a sufficient explanation through it. It is to be noted that, whilst the zoological system took the form of a genealogical tree, with main stem and numerous diverging branches, the actual form of that tree, its limitation to a certain number of branches corresponding to a limited number of divergences in structure, came to be regarded as the necessary consequence of the operation of the physico-chemical laws of the universe, and it was recognized that the ultimate explanation of that limitation is to be found only in the constitution of matter itself.

Haeckel.

The first naturalist to put into practical form the consequences of the new theory, in so far as it affected zoological classification, was Ernst Haeckel of Jena (b. 1834), who in 1866, seven years after the publication of Darwin's *Origin of Species*, published his suggestive *Generelle Morphologie*. Haeckel introduced into classification a number of terms intended to indicate the branchings of a genealogical tree. The whole "system" or scheme of classification was termed a genealogical tree (*Stammbaum*); the main branches were termed "phyla," their branchings "sub-phyla"; the great branches of the sub-phyla were termed "cladi," and the "cladi" divided into "classes," these into sub-classes, these into legions, legions into orders, orders into sub-orders, sub-orders into tribes, tribes into families, families into genera, genera into species. Additional branchings could be indicated by similar terms where necessary. There was no attempt in Haeckel's use of these terms to make them exactly or more than approximately equal in significance; such attempts were clearly futile and unimportant where the purpose was the exhibition of lines of descent, and where no natural equality of groups was to be expected *ex hypothesi*. Haeckel's classification of 1866 was only a first attempt. In the edition of the *Natürliche Schöpfungsgeschichte* published in 1868 he made a great advance in his genealogical classification, since he now introduced the results of the extraordinary activity in the study of embryology which followed on the publication of the *Origin of Species*.

The pre-Darwinian systematists since the time of Von Baer had attached very great importance to embryological facts, holding that the stages in an animal's development were often more significant of its true affinities than its adult structure. Von Baer had gained unanimous support for his dictum, "Die Entwickelungsgeschichte ist der wahre Lichtträger für Untersuchungen über organische Körper." Thus J. Müller's studies on the larval forms of Echinoderms and the discoveries of Vaughan Thompson were appreciated. But it was only after Darwin that the cell-theory of Schwann was extended to the embryology of the animal kingdom generally, and that the knowledge of the development of an animal became a knowledge of the way in which the millions of cells of which its body is composed take their origin by fission from a smaller number of cells, and these at last from the single egg-cell. Kölliker (*Development of Cephalopods*, 1844), Remak (*Development of the Frog*, 1850), and others had laid the foundations of this knowledge in isolated examples; but it was Kovalevsky, by his accounts of the development of Ascidians and of *Amphioxus* (1866), who really made zoologists see that a strict and complete cellular embryology of animals was as necessary and feasible a factor in the comprehension of their relationships as at the beginning of the century the coarse anatomy had been shown to be by Cuvier. Kovalevsky's work appeared between the dates of the *Generelle Morphologie* and the *Schöpfungsgeschichte*. Haeckel himself, with his pupil Miklucho-Maclay, had in the meantime made studies on the growth from the egg of Sponges—studies which resulted in the complete separation of the unicellular or equicellular *Protozoa* from the Sponges, hitherto confounded with them. It is this introduction of the consideration of cell-structure and cell-development which, subsequently to the establishment of Darwinism, has most profoundly modified the views of systematists, and led in conjunction with the genealogical doctrine to the greatest activity in research—an activity which culminated in the work (1873–1882) of F. M. Balfour, and produced the profoundest modifications in classification.

Haeckel's second pedigree is as follows:—

Haeckel's 1868 arrangement.

Phyla.	Clades.	Classes.
Protozoa.	Ovularia.	*Archezoa.*
		Gregarinae.
		Infusoria.
	Blastularia.	*Planaeada.*
		Gastraeada.
Zoophyta.	Spongiae.	*Porifera.*
	Acalephae.	*Coralla.*
		Hydromedusae.
		Ctenophora.
Vermes.	Acoelomi.	*Platyhelminthes.*
	Coelomati.	*Nemathelminthes.*
		Bryozoa.
		Tunicata.
		Rhynchocoela.
		Gephyraea.
		Rotatoria.
		Annelida.
Mollusca.	Acephala.	*Spirobranchia.*
		Lamellibranchia.
	Eucephala.	*Cochlides.*
		Cephalopoda.
Echinoderma.	Colobrachia	*Asterida.*
		Crinoida.
	Lipobrachia.	*Echinida.*
		Holothuriae.
Arthropoda.	Carides.	*Crustacea.*
	Tracheata.	*Arachnida.*
		Myriapoda.
		Insecta.
Vertebrata.	Acrania.	*Leptocardia.*
	Monorrhina.	*Cyclostoma.*
	Anamnia.	*Pisces.*
		Dipneusta.
		Halisauria.
		Amphibia.
	Amniota	*Reptilia.*
		Aves.
		Mammalia.

Dendriform distribution of animal kingdom.

In representing pictorially the groups of the animal kingdom as the branches of a tree, it becomes obvious that a distinction may be drawn, not merely between the individual main branches, but further as to the level at which they are given off from the main stem, so that one branch or set of branches may be marked off as belonging to an earlier or lower level than another set of branches; and the same plan may be adopted with regard to the clades, classes and smaller branches. The term "grade" was introduced by Ray Lankester ("Notes on Embryology and Classification," in *Quart. Journ. Micr. Sci.* 1877), to indicate this giving off of branches at a higher or lower, *i.e.* a later or earlier, level of a main stem.[1] The mechanism for the statement of the genealogical relationships of the groups of the animal kingdom was thus completed. Renewed study of every group was the result of the acceptance of the genealogical idea and of the recognition of the importance of cellular embryology. On the one hand, the true method of arriving at a knowledge of the genealogical tree was recognized as lying chiefly in attacking the problem of the genealogical relationships of the smallest twigs of the tree, and proceeding from them to the larger branches. Special studies of small families or orders of animals with this object in view were taken in hand by many zoologists. On the other hand, a survey of the facts of cellular embryology which were accumulated in regard to a variety of classes within a few years of Kovalevsky's work led to a generalization, independently arrived at by Haeckel and Lankester, to the effect that a lower grade of animals may be distinguished, the *Protozoa* or *Plastidozoa*, which consist either of single cells or colonies of equiformal cells, and a higher grade, the *Metazoa* or *Enterozoa*, in which the egg-cell by "cell division" gives rise to two layers of cells, the endoderm and the ectoderm, surrounding a primitive digestive chamber, the archenteron. Of these latter, two grades were further distinguished by Lankester—those which remain possessed of a single archenteric cavity and of two primary cell-layers (the *Coelentera* or *Diploblastica*), and those which by nipping off the archenteron give rise to two cavities, the coelom or body-cavity and the metenteron or gut (*Coelomata* or *Triploblastica*). To the primitive two-cell-layered form, the hypothetical ancestor of all *Metazoa* or *Enterozoa*, Haeckel gave the name *Gastraea*; the embryonic form which represents in the individual growth from the egg this ancestral condition he called a "gastrula." The term "diblastula" was subsequently adopted in England for the gastrula of Haeckel. The tracing of the exact mode of development, cell by cell, of the diblastula, the coelom, and the various tissues of examples of all classes of animals was in later years pursued with immense activity and increasing instrumental facilities.

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[1] Sir Edwin Ray Lankester (b. 1847) was the eldest son of Edwin Lankester (1814–1874), a physician and naturalist (F.R.S. 1845), who became well known as a scientific writer and lecturer, editor of the *Quarterly Journal of Microscopical Science* from 1853 to 1871, and from 1862, in succession to Thomas Wakley, coroner for Central Middlesex. Educated at St Paul's and both at Downing College, Cambridge, and Christ Church, Oxford, E. Ray Lankester obtained the Radcliffe Travelling Fellowship at Oxford in 1870, and became a fellow and lecturer at Exeter College in 1872. From 1874 to 1890 he was professor of zoology and comparative anatomy at University College, London; and from 1891 to 1898 Linacre professor of comparative anatomy at Oxford. From 1898 to 1907 he was director of the Natural History Department of the British Museum. He was made K.C.B. in 1907. [Ed. *E. B.*].

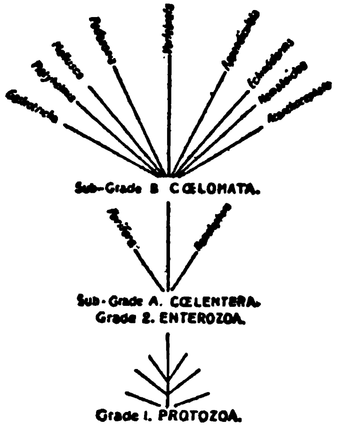
Fritz Müller's recapitulation.

Two names in connexion with post-Darwinian taxonomy and the ideas connected with it require brief mention here. Fritz Müller, by his studies on *Crustacea* (*Für Darwin*, 1864), showed the way in which genealogical theory may be applied to the minute study of a limited group. He is also responsible for the formulation of an important principle, called by Haeckel "the biogenetic fundamental law," viz. that an animal in its growth from the egg to the adult condition tends to pass through a series of stages which are recapitulative of the stages through which its ancestry has passed in the historical development of the species from a primitive form; or, more shortly, that the development of the individual (ontogeny) is an epitome of the development of the race (phylogeny). Pre-Darwinian zoologists had been aware of the class of facts thus interpreted by Fritz Müller, but the authoritative view on the subject had been that there is a parallelism between (*a*) the series of forms which occur in individual development, (*b*) the series of existing forms from lower to higher, and (*c*) the series of forms which succeed one another in the strata of the earth's crust, whilst an explanation of this parallelism was either not attempted, or was illusively offered in the shape of a doctrine of harmony of plan in creation. It was the application of Fritz Müller's law of recapitulation which gave the chief stimulus to embryological investigations between 1865 and 1890; and, though it is now recognized that "recapitulation" is vastly and bewilderingly modified by special adaptations in every case, yet the principle has served, and still serves, as a guide of great value.

Dohrn's doctrine of degeneration.

Another important factor in the present condition of zoological knowledge as represented by classification is the doctrine of degeneration propounded by Anton Dohrn. Lamarck believed in a single progressive series of forms whilst Cuvier introduced the conception of branches. The first post-Darwinian systematists naturally and without reflexion accepted the idea that existing simpler forms represent stages in the gradual progress of development—are in fact survivors from past ages which have retained the exact grade of development which their ancestors had reached in past ages. The assumption made was that (with the rare exception of parasites) all the change of structure through which the successive generations of animals have passed has been one of progressive elaboration. It is Dohrn's merit to have pointed out[1] that this assumption is not warranted, and that degeneration or progressive simplification of structure may have, and in many lines certainly has, taken place, as well as progressive elaboration and in other cases continuous maintenance of the *status quo*. The introduction of this conception necessarily has had a most important effect in the attempt to unravel the genealogical affinities of animals. It renders the task a more complicated one; at the same time it removes some serious difficulties and throws a flood of light on every group of the animal kingdom.

One result of the introduction of the new conceptions dating from Darwin was a healthy reaction from that attitude of mind which led to the regarding of the classes and orders recognized by authoritative zoologists as sacred institutions which were beyond the criticism of ordinary men. That state of mind was due to the fact that the groupings so recognized did not profess to be simply the result of scientific reasoning, but were necessarily regarded as the expressions of the "insight" of some more or less gifted persons into a plan or system which had been arbitrarily chosen by the Creator. Consequently there was a tinge of theological dogmatism about the whole matter. To deny the Linnaean, or later the Cuvierian, classes was very much like denying the Mosaic cosmogony. But systematic zoology is now entirely free from any such prejudices, and the Linnaean taint which is apparent even in Haeckel and Gegenbaur may be considered as finally expunged.



A genealogical tree of animal kingdom (Lankester, 1884).

Lankester's system.

There are, and probably always will be, differences of opinion as to the exact way in which the various kinds of animals may be divided into groups and those groups arranged in such an order as will best exhibit their probable genetic relationships. The main divisions which, writing in 1910, the present writer prefers, are those adopted in his *Treatise on Zoology* (Part II. ch. ii.) except that Phylum 17, Diplochorda (a name doubtfully applicable to *Phoronis*) is replaced by Podaxonia, a term employed by Lankester in the 9th edition of this encyclopaedia and now used to include a number of groups of doubtful but possible affinity. The terms used for indicating groups are "Phylum" for the large diverging branches of the genealogical tree as introduced by Haeckel, each Phylum bears secondary branches which are termed "classes," classes again branch or divide into orders, orders into families, families into genera, genera into species. The general purpose is to give something like an equivalence of importance to divisions or branches indicated by the same term, but it is not intended to imply that every phylum has the same range and distinctive character as every other, nor to make such a proposition about classes, orders, families and genera. Where a further subdivision is desirable without descending to the next lower term of grouping, the prefix "sub" is made use of, so that a class *may* be divided first of all into sub-classes each of which is divided into orders, and an order into sub-orders each of which bears a group of families. The term "grade" is also made use of for the purpose of indicating the conclusion that certain branches on a larger or smaller stem of the genealogical tree have been given off at an earlier period in the history of the evolution of the stem in question than have others marked off as forming a higher grade. Thus, to begin with, the animal pedigree is divided into two very distinct grades, the Protozoa and the Metazoa. The Metazoa form two main branches; one, Parazoa, is but a small unproductive stock comprising only the Phylum Porifera or Sponges; the other, the great stem of the animal series Enterozoa, gives rise to a large number of diverging Phyla which it is necessary to assign to two levels or grades—a lower, Enterocoela (often called Coelentera), and a higher, Coelomocoela (often called Coelomata). These relations are exhibited by the two following diagrams.

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[1] *Ursprung der Wirbelthiere* (Leipzig, 1875); and Lankester, *Degeneration* (London, 1880).

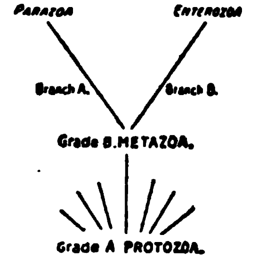

Diagram showing the primary grades and branches of the Animal Pedigree.

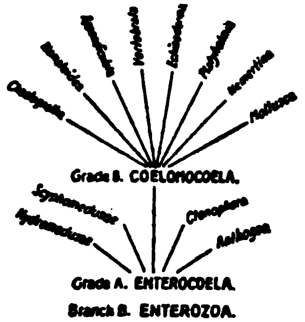

Diagram to show the division of the great branch Enterozoa into two grades and the Phyla given off therefrom.

The Phylum Vertebrata in the above scheme branches into the sub-phyla Hemichorda, Urochorda, Cephalochorda and Craniata. The Phylum Appendiculata similarly branches into sub-phyla, viz. the Rotifera, the Chaetopoda and the Arthropoda. Certain additional small groups should probably be recognized as independent lines of descent or phyla, but their relationships are obscure—they are the Mesozoa, the Polyzoa, the Acanthocephala and the Gastrotricha.

We may now enumerate these various large groups in tabular form.

BIONTA—Phyta, Animalia.

- Grade A. **Protozoa** (various groups included).
- Grade B. **Metazoa.**
  - Branch *a*. **Parazoa.**
    - Phylum 1. Porifera.
  - Branch *b*. **Enterozoa.**
    - Grade 1. Enterocoela.
      - Phylum 2. Hydromedusae.
      - 3. Scyphomedusae.
      - 4. Anthozoa.
      - 5. Ctenophora.
    - Grade 2. Coelomocoela.
      - Phylum 6. Platyelmia.
      - 7. Nematoidea.
      - 8. Chaetognatha
      - 9. Nemertina.
      - 10. Mollusca.
      - 11. Appendiculata.
        - Sub-phyla: Rotifera, Chaetopoda, Arthropoda.
      - 12. Echinoderma.
      - 13. Vertebrata.
        - Sub-phyla: Hemichorda, Urochorda, Cephalochorda, Craniata.
      - 14. Mesozoa.
      - 15. Polyzoa.
      - 16. Acanthocephala
      - 17. Podaxonia.
      - 18. Gastrotricha.

A statement may now be given of the classes and orders in each group, as recognized by the writers of the various special zoological articles in the Eleventh Edition of the *Encyclopaedia Britannica*. These subdivisions of the larger groups are not necessarily those theoretically approved by the present writer, but they have the valuable sanction of the individual experts who have given special attention to different portions of the vast field represented by the animal kingdom.[1]

Classification adopted in the present work.

- Grade A. **Protozoa** (*q.v.*).
  - Phylum 1. **Sarcodina** (*q.v.*).
    - Class 1. Proteomyxa (*q.v.*)
    - Class 2. Rhizopoda (*q.v.*).
      - Orders: *Lobosa*, *Filosa*.
    - Class 3. Heliozoa (*q.v.*).
    - Class 4. Foraminifera (*q.v.*).
      - Orders: *Nuda*, *Allogromidiaceae*, *Astrorhizidiaceae*, *Lituolidaceae*, *Miliolidaceae*, *Textularidaceae*, *Cheilostomellaceae*, *Lagenidaceae*, *Globigerinidaceae*, *Rotalidaceae*, *Nummulidiaceae*.
      - *Insertae sedis*. Xenophyophoridae (see Foraminifera).
    - Class 5. Radiolaria.
      - Orders: *Spumellaria* (= *Peripylaea*), *Acantharia* (= *Actipylaea*), *Nasselaria* (= *Monopylaea*), *Phaeodaria* (= *Tripylaea*).
    - Class 6. Labyrinthulidea (*q.v.*).
      - No Orders.
    - Class 7. Myxomycetes.
      - No Orders.
  - Phylum 2. **Mastigophora** (*q.v.*).
    - Class 1. Flagellata (*q.v.*).
      - Sub-class A. Rhizoflagellata.
        - Orders: *Holomastigaceae*, *Rhizomastigaceae*.
      - Sub-class B. Euflagellata.
        - Orders: *Protomastigaceae*, *Chrysomonadaceae*, *Cryptomonadaceae*, *Chloromonadaceae*, *Euglenaceae*, *Volvocaceae*.
    - Class 2. Dinoflagellata.
      - Orders: *Gymnodiniaceae*, *Prorocentraceae*, *Peridiniaceae*.
    - Class 3. Cystoflagellata.
      - No Orders.
  - Phylum 3. **Sporozoa** (*q.v.*).
    - Class 1. Endospora (*q.v.*).
      - Orders: *Myxosporidia*, *Actinomyxidia*, *Sarcosporidia*, *Haplosporidia*.
    - Class 2. Ectospora (*q.v*).
      - Orders: *Gregarina* (see Gregarines), *Coccidia* (*q.v.*), *Haemosporidia* (*q.v.*).
  - Phylum 4. **Infusoria** (*q.v.*).
    - Class 1. Ciliata.
      - Orders: *Gymonostomaceae*, *Trichostomata*, *Aspirotrichaceae*, *Spirotricha*, *Heterotrichaceae*, *Oligotrichaceae*, *Hypotrichaceae*, *Peritrichaceae*.
    - Class 2. Suctoria.
      - No orders.

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[1] It is to be noted that the terms used for designating categories in the classification are not always identical in this summary and separate articles, as authors differ as to the use of these.

- GRADE B. **Metazoa.**
  - Branch *a*. **Parazoa.**
    - Phylum 1. **Porifera** (see SPONGES).
      - Sub-phylum 1. Calcarea.
        - Class. CALCAREA.
          - Orders: *Homocoela*, *Heterocoela*.
      - Sub-phylum 2. Non-Calcarea.
        - Class 1. MYXOSPONGIDA.
          - Order: *Myxospongida*.
        - Class 2. TRIAXONIDA (= HEXACTINELLIDA).
          - Orders: *Amphidiscophora*, *Hexasterophora*.
        - Class 3. TETRAXONIDA.
          - Sub-Class 1. Tetractinellida.
            - Orders: *Homosclerophora*, *Astrophora*, *Sigmatophora*.
          - Sub-class 2. Lithistida.
            - No Orders.
          - Sub-class 3. Monaxonellida.
            - Orders: *Astromonaxonellida*, *Sigmatomonaxonellida*.
        - Class 4. EUCERATOSA.
          - Order: *Euceratosa*.
  - Branch *b*. **Enterozoa.**
    - Grade 1. ENTEROCOELA (see COELENTERA).
      - Phylum 2. **Hydromedusae** or **Hydrozoa** (*q.v.*
        - Class. HYDROMEDUSAE, (*q.v.*).
          - Orders: *Eleutheroblastea*, *Hydroidae* seu *Leptolinae* (Sub-orders: *Anthomedusae*, *Leptomedusae*), *Hydrocorallinae*, *Graptolitoidea* *Trachylinae* (Sub-orders: *Trachomedusae*, *Narcomedusae*), *Siphonophora*.
      - Phylum 3. **Scyphomedusae** (*q.v.*).
        - Class. SCYPHOMEDUSAE.
          - Orders: *Cubomedusae*, *Stauromedusae*, *Coronata*, *Discophora*.
      - Phylum 4. **Anthozoa** (*q.v.*).
        - Class. ANTHOZOA.
          - Sub-class 1. Alcyonaria.
            - Orders: *Stolonifera*, *Alcyonacea*, *Pseudaxonia*, *Axifera*, *Stelechotokea*, *Coenothecalia*.
          - Sub-class 2. Zoantharia.
            - Orders: *Zoanthidea*, *Cereanthidea*, *Antipathidea*, *Actiniidea* (Sub-orders: *Malacactiniae* and *Scleractiniae* or *Madreporia*).
      - Phylum 5. **Ctenophora.**
        - Class. CTENOPHORA.
          - Sub-class 1. Tentaculata.
            - Orders: *Cydippidea*, *Lobata*, *Cestoidea*.
          - Sub-class 2. Nuda.
            - No Orders.
    - Grade 2. COELOMOCOELA.
      - Phylum 6. **Platyelmia** (*q.v.*).
        - Class 1. PLANARIA (see PLANARIANS).
          - Order: *Turbellaria*.
        - Class 2. TEMNOCEPHALOIDEA (see appendix to PLANARIANS).
          - No Orders.
        - Class 3. TREMATODA (see TREMATODES).
          - Orders: *Heterocotylea*, *Aspidocotylea*, *Malacocotylea*.
        - Class 4. CESTODA (see TAPEWORMS).
          - Orders: *Monozoa*, *Merozoa*.
      - Phylum 7. **Nematoidea.**
        - Class 1. NEMATODA (see NEMATODE).
          - No Orders.
        - Class 2. CHAETOSOMIDAE (see CHAETOSOMATIDA).
          - No Orders.
        - Class 3. DESMOSCOLECIDA (*q.v.*).
          - No Orders.
        - Class 4. NEMATOMORPHA (*q.v.*).
          - No Orders.
      - Phylum 8. **Chaetognatha** (*q.v.*).
        - No Orders.
      - Phylum 9. **Nemertina.**
        - Class. NEMERTINA (*q.v.*).
          - Orders: *Protonemertini*, *Mesonemertini*, *Metanemertini*, *Heteronemertini*.
      - Phylum 10. **Mollusca** (*q.v.*).
        - Grade A. ISOPLEURA.
          - Class 1. AMPHINEURA (see CHITON).
            - Orders: *Polyplacophora*, *Aplacophora*.
        - Grade B. PRORHIPIDOGLOSSOMORPHA.
          - Class 2. GASTROPODA (*q.v.*).
            - Sub-class 1. Streptoneura.
              - Orders: *Aspidobranchia*, *Pectinibranchia*.
            - Sub-class 2. Euthyneura.
              - Orders: *Opisthobranchia*, *Pulmonata*.
          - Class 3. SCAPHOPODA (*q.v.*).
            - No Orders.
          - Class 4. LAMELLIBRANCHIA (*q.v.*).
            - Orders: *Protobranchia*, *Filibranchia*, *Eulamellibranchia*, *Septibranchia*.
        - Grade C. SIPHONOPODA.
          - Class 5. CEPHALOPODA (*q.v.*).
            - Orders: *Tetrabranchia*, *Dibranchia*.
      - Phylum 11. **Appendiculata.**
        - Sub-phylum 1. Rotifera (*q.v.*).
          - Class. ROTIFERA.
            - Orders: *Asplanchnaceae*, *Melicertaceae*, *Trochosphaeraceae*, *Ploimoidaceae*, *Bdelloidaceae*, *Floscularaceae*, *Ploima*, *Seisonaceae*.
        - Sub-phylum 2. Chaetopoda (*q.v.*).
          - Class 1. POLYCHAETA.
            - Orders: *Nereidiformia*, *Cryptocephala*, *Capitelliformia*, *Terebelliformia*, *Spioniformia*, *Scoleciformia*.
          - Class 2. OLIGOCHAETA.
            - Orders: *Aphaneura*, *Limicolae*, *Moniligastres*, *Terricolae*.
          - Class 3. HIRUDINAE (see LEECH).
            - Orders: *Rhynchobdellidae*, *Gnathobdellidae*, *Acanthobdellidae*.
          - Class 4. MYZOSTOMIDA (*q.v.*).
            - No Orders.
          - Class 5. SACCOCIRRIDA.
            - No Orders.
          - Class 6. HAPLODRILI (*q.v.*).
            - No Orders.
          - Class 7. ECHIUROIDEA (*q.v.*).
            - No Orders.
        - Sub-phylum 3. Arthropoda (*q.v.*).
        - Grade 1. CERATOPHORA.
          - Class 1. PERIPATIDEA (see PERIPATUS).
            - No Orders.
          - Class 2. CHILOPODA (see CENTIPEDE).
            - Sub-class 1. Pleurostigma.
              - Orders: *Geophilomorpha*, *Scolopendromorpha*, *Craterostigmomorpha*, *Lithobiomorpha*.
            - Sub-class 2. Notostigma.
              - Order: *Scutigeromorpha*.
          - Class 3. DIPLOPODA (see MILLIPEDE).
            - Sub-class 1. Pselaphognatha.
              - Order: *Penicillata*.
            - Sub-class 2. Chilognatha.
              - Orders: *Oniscomorpha*, *Limacomorpha*, *Colobognatha*, *Ascospermophora*, *Proterospermophora*, *Merochaeta*, *Opisthospermophora*.
          - Class 3. PAUROPODA (see MILLIPEDE).
            - No Orders.
          - Class 4. SYMPHYLA (see MILLIPEDE).
            - No Orders.
          - Class 5. HEXAPODA (*q.v.*).
            - Sub-class 1. Apterygota.
              - Order: *Aptera*.
            - Sub-class 2. Exopterygota.
              - Orders: *Dermaptera*, *Orthoptera*, *Plecoptera*, *Isoptera*, *Corrodentia*, *Ephemoptera*, *Odonata*, *Thysanoptera*, *Hemiptera*, *Anoplura*.
            - Sub-class 3. Endopterygota.
              - Orders: *Neuroptera*, *Coleoptera*, *Mecaptera*, *Trichoptera*, *Lepidoptera*, *Diptera*, *Siphonaptera*, *Hymenoptera*.
        - Grade 2. ACERATA.
          - Class 1. CRUSTACEA (*q.v.*).
            - Sub-class 1. **Entomostraca** (*q.v.*).
              - Orders: *Branchiopoda* (Sub-orders: *Phyllopoda*, *Cladocera*, *Branchiura*), *Ostracoda*, *Copepoda*.
            - Sub-class 2. Thyrostraca (*q.v.*) = (Cirripedia).
              - No Orders.
            - Sub-class 3. Leptostraca.
              - No Orders.
            - Sub-class 4. Malacostraca (*q.v.*).
              - Orders: *Decapoda* (Sub-orders: *Brachyura*, *Macrura*), *Schisopoda* (including *Anaspides*), *Stomatopoda*, *Sympoda* (*Cumacea*), *Isopoda* (including *Tanaidacea*), *Amphipoda*.
          - Class 2. ARACHNIDA (*q.v.*).
            - Grade A. TRILOBITAE (see TRILOBITE).
              - (Orders not determined.)
            - Grade B. NOMOMERISTICA.
              - Sub-class 1. Pantopoda.
                - Orders: *Nymphonomorpha*, *Ascorhynchomorpha*, *Pycnogonomorpha*.
              - Sub-class 2. Eu-Arachna.
                - Grade *a*. Delobrancha (or Hydropneusta).
                  - Orders: *Xiphosura*, *Gigantostraca*.

Grade *b*. Embolobranchia (or Aeropneusta).
Section. *Pectinifera*.
Order: *Scorpionidea*.
Section. *Epectinata*.
Orders: *Pedipalpi*, *Araneae*, *Palpigradi*, *Solifugae*, *Pseudoscorpiones*, *Podogona*, *Opiliones*, *Rhynchostomi* (*Acari*).
Class 3. TARDIGRADA (*q.v.*).
No Orders.
Class 4. LINGUATALINA (see PENTASTOMIDA).
No Orders.
Phylum 12. **Echinoderma** (see ECHINODERMS).
Branch A. PELMATOZOA.
Class 1. CYSTIDEA.
Orders: *Amphoridea*, *Carpoidea*, *Rhombifera*, *Aporita*, *Diploporita*.
Class 2. BLASTOIDEA.
Divisions: Protoblastoidea, Eublastoidea.
No Orders.
Class 3. CRINOIDEA.
Orders: *Monocyclica Inadunata*, *Adunata*, *Monocyclica Camerata*, *Dicyclica Inadunata*, *Flexibilia*, *Dicyclica Camerata*.
Class 4. EDRIOASTEROIDEA.
No Orders.
Branch B. ELEUTHEROZOA.
Class 1. HOLOTHUROIDEA.
Orders: *Aspidochirota*, *Dendrochirota*.
Class 2. STELLIFORMIA.
Sub-class 1. Asterida.
Orders: *Phanerozonia*, *Cryptozonia*.
Sub-class 2. Ophiurida.
Orders: *Streptophiurae*, *Zygophiurae*, *Cladophiurae*.
Class 3. ECHINOIDEA.
Orders: *Bothriocidaroida*, *Melonitoida*, *Cystocidaroida*, *Cidaroida*, *Diademoida*, *Holectypoida*, *Spatangoida*, *Clypeastroida*.
Phylum 13. **Vertebrata** (*q.v.*).
Sub-phylum *a*. Hemichorda (*q.v.*).
Class. ENTEROPNEUSTA (see BALANOGLOSSUS).
No Orders.
Sub-phylum *b*. Urochorda.
Class. TUNICATA (*q.v.*).
Orders: *Larvacea*, *Thaliacea* (Sub-orders: *Cyclomyaria*, *Hemimyaria*), Ascidiacea (Sub-orders: *Ascidiae Simplices*, *Ascidiae Compositae*, *Ascidiae Luciae*).
Sub-phylum *c*. Cephalochorda (see AMPHIOXUS).
Class. CEPHALOCHORDA.
No Orders.
Sub-phylum *d*. Craniata.[1]
Class 1. PISCES (see ICHTHYOLOGY).
Sub-class 1. Cyclostomata (*q.v.*).
Orders: *Myxinoides* (or *Hyperotreti*), *Petromyzontes* (or *Hyperoartii*).
Sub-class 2. Selachia or Elasmobranchii (see SELACHIANS).
Orders: *Pleuropterygii*, *Acanthodii*, *Ichthyotomi*, *Plagiostomi*, *Holocephali*.
Sub-class 3. Teleostoma.
Orders: *Ganoidea*, *Crossopterygii*, *Dipneusti*, *Teleostei*.
Class 2. BATRACHIA (*q.v.*).
Orders: *Stegocephalia*, *Apoda* (or *Peromela*), *Caudata* (or *Urodela*), *Ecaudata* (or *Anura*).
Class 3. REPTILIA (see REPTILES).
Orders: *Anomodontia*, *Chelonia*, *Samopterygia*, *Ichthyopterygia*, *Rhyncocephalia*, *Dinosauria*, *Crocodilia*, *Ornithosauria*, *Squamata*.
Class 4. AVES (see BIRD and ORNITHOLOGY).
Sub-class 1. Archaeornithes.
No Orders.
Sub-class 2. Neornithes.
Division 1. Ratitae.
Orders: *Struthiones*, *Rheae*, *Casuariae*, *Apteryges*, *Dinornithes*, *Aepyornithes*.
Division 2. Odontolcae.
No Orders.
Division 3. Carinatae.
Orders: *Ichthyornes*, *Colymbiformes*, *Sphenisciformes*, *Procellariiformes*, *Ciconiiformes*, (Sub-orders: *Steganopodes*, *Ardeae*, *Ciconiae*, *Phoenicopteri*). *Anseriformes* (Sub-orders: *Palamedeae*, *Anseres*), *Falconiformes* (Sub-orders: *Cathartae*, *Accipitres*), *Tinamiformes*, *Galliformes* (Sub orders: *Mesites*, *Turnices*, *Galli*, *Opisthocomi*), *Gruiformes*, *Charadriiformes* (Sub-orders: *Limicolae*, *Lari*, *Pterocles*, *Columbae*), *Cuculiformes* (Sub-orders: *Cuculi*, *Psittaci*), *Coraciiformes* (Sub-orders: *Coraciae*, *Striges*, *Caprimulgi*, *Cypseli*, *Colii*, *Trogones*, *Pici*), *Passeriformes* (Sub-orders: *Passeres Anisomyodae*, *Passeres Diacromyodae*).
Class 4. MAMMALIA (*q.v.*).
Sub-class 1. Monotremata (*q.v.*) (Prototheria).
No Orders.
Sub-class 2. Marsupialia (*q.v.*) (Metatheria).
One Order: *Marsupialia*.
Sub-orders: *Polyprotodontia*, *Paucituberculata*, *Diprotodontia*.
Sub-class 3. Placentalia (Monodelphia, *q.v.*; or Eutheria).
Orders: *Insectivora*, *Chiroptera*, *Dermoptera*, *Edentata* (Sub-orders: *Xenarthra*, *Pholidota*, *Tubulidentata*), *Rodentia* (Sub-orders: *Duplicidentata*, *Simplicidentata*), *Tillodontia*, *Carnivora* (Sub-orders: *Fissipedia*, *Pinnipedia*, *Creodonta*), *Cetacea* (Sub-orders: *Archaeoceti*, *Odontoceti*, *Mystacoceti*), *Sirenia*, *Ungulata* (Sub-orders: *Proboscidea*, *Hyracoidea*, *Barypoda*, *Toxodontia*, *Amblypoda*, *Litopterna*, *Ancylopoda*, *Condylarthra*, *Perissodactyla*, *Artiodactyla*), *Primates* (Sub-orders: *Prosimiae*, *Anthropoidea*).
Phylum 14. **Mesozoa** (*q.v.*).
Class 1. RHOMBOZOA.
No Orders.
Class 2. ORTHONECTIDA.
No Orders.
Phylum 15. **Polyzoa** (*q.v.*).
Class 1. ENTOPROCTA.
No Orders.
Class 2. ECTOPROCTA.
Orders: *Gymnolaemata* (Sub-orders: *Tripostomata*, *Cryptostomata*, *Cyclostomata*, *Ctenostomata*, *Cheilostomata*), *Phylactolaemata*.
Phylum 16. **Acanthocephala** (*q.v.*).
Class. ACANTHOCEPHALA.
No Orders.
Phylum 17. **Podaxonia**.
Class 1. SIPUNCULOIDEA (*q.v.*).
No Orders.
Class 2. PRIAPULOIDEA (*q.v.*).
No Orders.
Class 3. PHORONIDEA (*q.v.*).
No Orders.
Class 4. PTEROBRACHIA (*q.v.*).
No Orders.
Class 5. BRACHIOPODA (*q.v.*).
Sub-class 1. Ecardines (Inarticulata).
Orders: *Atremata*, *Neotremata*.
Sub-class 2. Testicardines (Articulata).
Orders: *Protremata*, *Telotremata*.
Phylum 18. **Gastrotricha** (*q.v.*).
Class. GASTROTRICHA.
Sub-orders: *Ichthydina*, *Cepodina*. (Possibly *Kinorhyncha* (*q.v.*) with only *Echinoderes* is to be placed here).

GENERAL TENDENCIES SINCE DARWIN

Darwin may be said to have founded the science of bionomics, and at the same time to have given new stimulus and new direction to morphography, physiology, and plasmology, by uniting them as contributories to one common biological doctrine—the doctrine of organic evolution—itself but a part of the wider doctrine of universal evolution based on the laws of physics and chemistry. The immediate result was, as pointed out above, a reconstruction of the classification of animals upon a genealogical basis, and an investigation of the individual development of animals in relation to the steps of their gradual building up by cell-division, with a view to obtaining evidence of their genetic relationships. On the other hand, the studies which occupied Darwin himself so largely subsequently to the publication of the *Origin of Species*, viz. the explanation of animal (and vegetable) mechanism, colouring, habits, &c., as advantageous to the species or to its ancestors, are only gradually being carried further. The most important work in this direction has been done by Fritz Müller (*Für Darwin*), by Herman Müller (*Fertilization of Plants by Insects*), by August Weismann (memoirs translated by Meldola) by Edward B. Poulton (see his addresses and memoirs published in the *Transactions* of the Entomological Society and elsewhere), and by Abbot Thayer (*Concealing Coloration in the Animal Kingdom*, Macmillan & Co. 1910). In the branch of bionomics, however, concerned with the laws of variation and heredity (thremmatology), there has been considerable progress. In the first place, the continued study of human population has thrown additional light on some of the questions involved, whilst the progress of microscopical research has given us a clear foundation as to the structural facts connected with the origin of the egg-cell and sperm-cell and the process of fertilization.

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[1] Craniata may be usefully divided into 3 grades: (*a*) Branchiata Heterodactyla, which includes Pisces except Cyclostomes. (*b*) Branchiata Pentadactyla, which includes Batrachia. (*c*) Lipobranchia Pentadactyla, which includes Reptiles, Birds and Mammals.

Great attention has been given lately to the important experiments upon the results of hybridizing certain cultivated varieties of plants which were published so long ago as 1865, by the Abbé Mendel, but failed to attract notice until thirty-five years later, sixteen years after his death (see MENDELISM).

Mendelism. Mendel's object was to gain further knowledge as to the result of mixing by cross-fertilization or interbreeding two strains exhibiting diverse characters or structural features. The whole question as to the mixture of characters in offspring thus produced was—and remains—very imperfectly observed. Mendel's observations constitute an ingenious attempt to throw light on the matter, and in the opinion of some biologists have led to the discovery of an important principle. Mendel made his chief experiments with cultivated varieties of the self-fertilizing edible pea. He selected a variety with some one marked structural feature and crossed it with another variety in which that feature was absent. Instances of his selected varieties are the tall variety which he hybridized with a dwarf variety, a yellow-seeded variety which he hybridized with a green-seeded variety, and again a smooth-seeded variety which he hybridized with a wrinkle-seeded variety. In each set of experiments he concentrated his attention on the one character selected for observation. Having obtained a first hybrid generation, he allowed the hybrids to self-fertilize, and recorded the result in a large number of instances (a thousand or more) as to the number of individuals in the first, second, third and fourth generations in which the character selected for experiment made its appearance. In the first hybrid generation formed by the union of the reproductive germs of the positive variety (that possessing the structural character selected for observation) with those of the negative variety, it is not surprising that all or nearly all the individuals were found to exhibit, as a result of the mixture, the positive character. In subsequent generations produced by self-fertilization of the hybrids it was found that the positive character was not present in all the individuals, but that a result was obtained showing that in the formation of the reproductive cells (ova and sperms) of the hybrid, half were endowed with the positive character and half with the negative. Consequently the result of the haphazard pairing of a large number of these two groups of reproductive cells was to yield, according to the regular law of chance combination, the proportion 1PP, 2PN, 1NN, where P stands for the positive character and N for its absence or negative character—the positive character being accordingly present in three-fourths of the offspring and absent from one-fourth. The fact that in the formation of the reproductive cells of the hybrid generation the material which carries the positive quality is not subdivided so as to give a half-quantity to each reproductive cell, but on the contrary is apparently distributed as an undivided whole to half only of the reproductive cells and not at all to the remainder, is the important inference from Mendel's experiments. Whether this inference is applicable to other classes of cases than those studied by Mendel and his followers is a question which is still under investigation. The failure of the material carrying a positive character to divide so as to distribute itself among all the reproductive cells of a hybrid individual, and the limitation of its distribution to half only of those cells, must prevent the "swamping" of a newly appearing character in the course of the inter-breeding of those individuals possessed of the character with those which do not possess it. The tendency of the proportions in the offspring of 1PP, 2PN, 1NN is to give in a series of generations a regular reversion from the hybrid form PN to the two pure races, viz. the race with the positive character simply and the race with the total absence of it. It has been maintained that this tendency to a severance of the hybrid stock into its components must favour the persistence of a new character of large volume suddenly appearing in a stock, and the observations of Mendel have been held to favour in this way the views of those who hold that the variations upon which natural selection has acted in the production of new species are not small variations but large and "discontinuous." It does not, however, appear that "large" variations would thus be favoured any more than small ones, nor that the eliminating action of natural selection upon an unfavourable variation could be checked.

A good deal of confusion has arisen in the discussions of this latter topic, owing to defective nomenclature. By some writers the word "mutation" is applied only to large and suddenly appearing variations which are found to be capable of hereditary transmission, whilst the term "fluctuation" is applied to small variations whether capable of transmission or not. By others the word "fluctuation" is apparently applied only to those small "acquired" variations due to the direct action of changes in food, moisture and other features of the environment. It is no discovery that this latter kind of variation is not hereditable, and it is not the fact that the small variations, to which Darwin attached great but not exclusive importance as the material upon which natural selection operates, are of this latter kind. The most instructive classification of the "variations" exhibited by fully formed organisms consists in the separation in the first place of those which arise from antecedent congenital, innate, constitutional or germinal variations from those which arise merely from the operation of variation of the environment or the food-supply upon normally constituted individuals. The former are "innate" variations, the latter are "superimposed" variations (so-called "acquired variations"). Both innate and superimposed variations are capable of division into those which are more and those which are less obvious to the human eye. Scarcely perceptible variations of the innate class are regularly and invariably present in every new generation of every species of living thing. Their greatness or smallness so far as human perception goes is not of much significance; their real importance in regard to the origin of new species depends on whether they are of value to the organism and therefore capable of selection in the struggle for existence. An absolutely imperceptible physiological difference arising as a variation may be of selective value, and it may carry with it correlated variations which appeal to the human eye but are of no selective value themselves. The present writer has, for many years, urged the importance of this consideration.

The views of de Vries and others as to the importance of "saltatory variation," the soundness of which was still by no means generally accepted in 1910, may be gathered from the articles MENDELISM and VARIATION. A due appreciation of the far-reaching results of "correlated variation" must, it appears, give a new and distinct explanation to the phenomena which are referred to as "large mutations," "discontinuous variation" and "saltatory evolution." Whatever value is to be attached to Mendel's observation of the breaking up of self-fertilized hybrids of cultivated varieties into the two original parent forms according to the formula "1PP, 2PN, 1NN," it cannot be considered as more than a contribution to the extensive investigation of heredity which still remains to be carried out. The analysis of the specific variations of organic form so as to determine what is really the nature and limitation of a single "character" or "individual variation," and whether two such true and strictly defined single variations of a single structural unit can actually "blend" when one is transmitted by the male parent and the other by the female parent, are matters which have yet to be determined. We do not yet know whether such absolute blending is possible or not, or whether all apparent blending is only a more or less minutely subdivided "mosaic" of non-combinable characters of the parents, in fact whether the combinations due to heredity in reproduction are ever analogous to chemical compounds or are always comparable to particulate mixtures. The attempt to connect Mendel's observation with the structure of the sperm-cells and egg-cells of plants and animals has already been made. The suggestion is obvious that the halving of the number of nuclear threads in the reproductive cells as compared with the number of those present in the ordinary cells of the tissues—a phenomenon which has now been demonstrated as universal—may be directly connected with the facts of segregation of hybrid characters observed by Mendel. The suggestion requires further experimental testing, for which the case of the parthenogenetic production of a portion of the offspring, in such insects as the bee, offers a valuable opportunity for research.

Variation.

Another important development of Darwin's conclusions deserves special notice here, as it is the most distinct advance in the department of bionomics since Darwin's own writings, and at the same time touches questions of fundamental interest. The matter strictly relates to the consideration of the "causes of variation," and is as follows. The fact of variation is a familiar one. No two animals, even of the same brood, are alike: whilst exhibiting a close similarity to their parents, they yet present differences, sometimes very marked differences, from their parents and from one another. Lamarck had put forward the hypothesis that structural alterations acquired by (that is to say, superimposed upon) a parent in the course of its life are transmitted to the offspring, and that, as these structural alterations are acquired by an animal or plant in consequence of the direct action of the environment, the offspring inheriting them would as a consequence not unfrequently start with a greater fitness for those conditions than its parents started with. In its turn, being operated upon by the conditions of life, it would acquire a greater development of the same modification, which it would in turn transmit to its offspring. In the course of several generations, Lamarck argued, a structural alteration amounting to such difference as we call "specific" might be thus acquired. The familiar illustration of Lamarck's hypothesis is that of the giraffe, whose long neck might, he suggested, have been acquired by the efforts of a primitively short-necked race of herbivores who stretched their necks to reach the foliage of trees in a land where grass was deficient, the effort producing a distinct elongation in the neck of each generation, which was then transmitted to the next. This process is known as "direct adaptation"; and there is no doubt that such structural adaptations are acquired by an animal in the course of its life, though such changes are strictly limited in degree and rare rather than frequent and obvious.

Causes of congenital variation.

Transmission of acquired and inherited characters.

Whether such acquired characters can be transmitted to the next generation is a separate question. It was not proved by Lamarck that they can be, and, indeed, never has been proved by actual observation. Nevertheless it has been assumed, and also indirectly argued, that such acquired characters *must* be transmitted. Darwin's great merit was that he excluded from his theory of development any *necessary* assumption of the transmission of acquired characters. He pointed to the admitted fact of congenital variation, and he showed that congenital variations are arbitrary and, so to speak, non-significant. Their causes are extremely difficult to trace in detail, but it appears that they are largely due to a "shaking up" of the living matter which constitutes the fertilized germ or embryo-cell, by the process of mixture in it of the substance of two cells—the germ-cell and the sperm-cell—derived from two different individuals. Other mechanical disturbances may assist in this production of congenital variation. Whatever its causes, Darwin showed that it is all-important. In some cases a pair of animals produce ten million offspring, and in such a number a large range of congenital variation is possible. Since on the average only two of the young survive in the struggle for existence to take the place of their two parents, there is a selection out of the ten million young, none of which are exactly alike, and the selection is determined in nature by the survival of the congenital variety which is fittest to the conditions of life. Hence there is no *necessity* for an assumption of the perpetuation of direct adaptations. The selection of the fortuitously (fortuitously, that is to say, so far as the conditions of survival are concerned) produced varieties is sufficient, since it is ascertained that they will tend to transmit those characters with which they themselves were born, although it is *not* ascertained that they could transmit characters *acquired* on the way through life. A simple illustration of the difference is this: a man born with four fingers only on his right hand is ascertained to be likely to transmit this peculiarity to some at least of his offspring; on the other hand, there is not the slightest ground for supposing that a man who has had one finger chopped off, or has even lost his arm at any period of his life, will produce offspring who are defective in the slightest degree in regard to fingers, hand or arm. Darwin himself, influenced by the consideration of certain classes of facts which seem to favour the Lamarckian hypothesis, was of the opinion that acquired characters are *in some cases* transmitted. It should be observed, however, that Darwin did not attribute an essential part to this Lamarckian hypothesis of the transmission of acquired characters, but expressly assigned to it an entirely subordinate importance.

The new attitude which has been taken since Darwin's writings on this question is to ask for evidence of the asserted transmission of acquired characters. It is held[1] that the Darwinian doctrine of selection of fortuitous congenital variations is sufficient to account for all cases, that the Lamarckian hypothesis of transmission of acquired characters is not supported by experimental evidence, and that the latter should therefore be dismissed. Weismann has also ingeniously argued from the structure of the egg-cell and sperm-cell, and from the way in which, and the period at which, they are derived in the course of the growth of the embryo from the egg—from the fertilized egg-cell—that it is impossible (it would be better to say highly improbable) that an alteration in parental structure *could* produce any exactly representative change in the substance of the germ or sperm-cells.

The one fact which the Lamarckians can produce in their favour is the account of experiments by Brown-Séquard, in which he produced epilepsy in guinea-pigs by section of the large nerves or spinal cord, and in the course of which he was led to believe that in a few rare instances the artificially produced epilepsy and mutilation of the nerves was transmitted. This instance does not stand the test of criticism. The record of Brown-Séquard's original experiment is not satisfactory, and the subsequent attempts to obtain similar results have not been attended with success. On the other hand, the vast number of experiments in the cropping of the tails and ears of domestic animals, as well as of similar operations on man, are attended with negative results. No case of the transmission of the results of an injury can be produced. Stories of tailless kittens, puppies and calves, born from parents one of whom had been thus injured, are abundant, but they have hitherto entirely failed to stand before examination.

Whilst simple evidence of the fact of the transmission of an acquired character is wanting, the *a priori* arguments in its favour break down one after another when discussed. The very cases which are advanced as only to be explained on the Lamarckian assumption are found on examination and experiment to be better explained, or only to be explained, by the Darwinian principle. Thus the occurrence of blind animals in caves and in the deep sea was a fact which Darwin himself regarded as best explained by the atrophy of the organ of vision in successive generations through the absence of light and consequent disuse, and the transmission (as Lamarck would have supposed) of a more and more weakened and structurally impaired eye to the offspring in successive generations, until the eye finally disappeared. But this instance is really fully explained (as the present writer has shown) by the theory of natural selection acting on congenital fortuitous variations. It is definitely ascertained that many animals are thus born with distorted or defective eyes whose parents have not had their eyes submitted to any peculiar conditions. Supposing a number of some species of arthropod or fish to be swept into a cavern or to be carried from less to greater depths in the sea, those individuals with perfect eyes would follow the glimmer of light and eventually escape to the outer air or the shallower depths, leaving behind those with imperfect eyes to breed in the dark place. A natural selection would thus be effected. In every succeeding generation this would be the case, and even those with weak but still seeing eyes would in the course of time escape, until only a pure race of eyeless or blind animals would be left in the cavern or deep sea.

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[1] Weismann, *Vererbung*, &c. (1886).

Educability.

It is a remarkable fact that it was overlooked alike by the supporters and opponents of Lamarck's views until pointed out by the present writer (*Nature*, 1894, p. 127), that the two statements called by Lamarck his first and second laws are contradictory one of the other. Lamarck's first law asserts that a past history of indefinite duration is powerless to create a bias by which the present can be controlled. He declares that in spite of long-established conditions and correspondingly evoked characters new conditions will cause new responsive characters. Yet in the second law he asserts that these new characters will resist the action of yet newer conditions or a reversion to the old conditions and be maintained by heredity. If the earlier characters were not maintained by heredity why should the later be? If a character of much longer standing (certain properties of height, length, breadth, colour, &c.) had not become fixed and congenital after many thousands of successive generations of individuals had developed it in response to environment, but gave place to a new character when new moulding conditions operated on an individual (Lamarck's first law), why should we suppose that the new character is likely to become fixed and transmitted by mere heredity after a much shorter time of existence in response to environmental stimulus? Why should we assume that it will be able to escape the moulding by environment (once its evoking cause is removed) to which, according to Lamarck's first law, all parts of organisms are subject? Clearly Lamarck gives us no reason for any such assumption, and his followers or latter-day adherents have not attempted to do so. His enunciation of his theory is itself destructive of that theory. Though an acquired or "superimposed" character is not transmitted to offspring as the consequence of the action of the external agencies which determine the "acquirement," yet the tendency to react to such agencies possessed by the parent *is* transmitted and may be increased and largely developed by survival, if the character developed by the reaction is valuable. This newly discovered inheritance of "variation in the tendency to react" has a wide application and has led the present writer to coin the word "educability." It has application to all kinds of organs and qualities, but is of especial significance in regard to the development of the brain and the mental qualities of animals and of man (see the jubilee volume of the Soc. de Biologie, 1899, and *Nature*, 1900, p. 624).

Theory of transmission of instincts.

It has been argued that the elaborate structural adaptations of the nervous system which are the corporeal correlatives of complicated instincts must have been slowly built up by the transmission to offspring of acquired experience, that is to say, of acquired brain structure. At first sight it appears difficult to understand how the complicated series of actions which are definitely exhibited as so-called "instincts" by a variety of animals can have been due to the selection of congenital variations, or can be otherwise explained than by the transmission of habits acquired by the parent as the result of experience, and continuously elaborated and added to in successive generations. It is, however, to be noted, in the first place, that the imitation of the parent by the young possibly accounts for some part of these complicated actions, and, secondly, that there are cases in which curiously elaborate actions are performed by animals as a characteristic of the species, and as subserving the general advantage of the race or species, which, nevertheless, can *not* be explained as resulting from the transmission of acquired experience, and must be supposed to be due to the natural selection of a fortuitously developed habit which, like fortuitous colour or form variation, happens to prove beneficial. Such cases are the habits of "shamming dead" and the combined posturing and colour peculiarities of certain caterpillars (Lepidopterous larvae) which cause them to resemble dead twigs or similar surrounding objects. The advantage to the animal of this imitation of surrounding objects is that it escapes the pursuit of (say) a bird which would, were it not deceived by the resemblance, attack and eat the caterpillar. Now it is clear that preceding generations of caterpillars cannot have acquired this habit of posturing by experience. Either the caterpillar postures and escapes, or it does not posture and is eaten; it is not half eaten and allowed to profit by experience. We seem to be justified in assuming that there are many movements of stretching and posturing possible to caterpillars, and that some caterpillars had a congenital fortuitous tendency to one position, some to another, and, finally that among all the variety of habitual movements thus exhibited one has been selected and perpetuated because it coincided with the necessary conditions of safety, since it happened to give the caterpillar an increased resemblance to a twig.

The view that instinct is the hereditarily fixed result of habit derived from experience long dominated all inquiry into the subject, but we may now expect to see a renewed and careful study of animal instincts carried out with the view of testing the applicability to each instance of the pure Darwinian theory without the aid of Lamarckism.

The Record of the Past.

Nothing can be further from the truth than the once favourite theory that instincts are the survivals of lapsed reasoning processes. Instincts, or the inherited structural mechanisms of the nervous centres, are in antagonism to the results of the reasoning process, which are not capable of hereditary transmission. Every higher vertebrate animal possesses the power of forming for itself a series of cerebral mechanisms or reasoned conclusions based on its individual experience, in proportion as it has a large cerebrum and has got rid of or has acquired the power of controlling its inherited instincts. Man, compared with other animals, has the fewest inherited mental mechanisms or instincts and at the same time the largest cerebrum in proportion to the size of his body. He builds up, from birth onwards, his own mental mechanisms, and forms more of them, that is to say, is more "educable," and takes longer in doing so, that is to say, in growing up and maturing his experience, than any other animal. The later stages of evolution leading from his ape-like ancestors to man have consisted definitely in the acquirement of a larger and therefore more educable brain by man and in the consequent education of that brain. A new and most important feature in organic development makes its appearance when we set out the facts of man's evolutional history. It amounts to a new and unprecedented factor in organic development, external to the organism and yet produced by the activity of the organism upon which it permanently reacts. This factor is the Record of the Past, which grows and develops by laws other than those affecting the perishable bodies of successive generations of mankind, and exerts an incomparable influence upon the educable brain, so that man, by the interaction of the Record and his educability, is removed to a large extent from the status of the organic world and placed in a new and unique position, subject to new laws and new methods of development unlike those by which the rest of the living world is governed. That which we term the Record of the Past comprises the "taboos," the customs, the traditions, the beliefs, the knowledge which are handed on by one generation to another independently of organic propagation. By it a new heredity, free from the limitations of protoplasmic continuity, is established. Its first beginnings are seen in the imitative tendencies of animals by which the young of one generation acquire some of the habits of their parents, and by which gregarious and social animals acquire a community of procedure ensuring the advantage of the group. "Taboo," the systematic imposition by the community of restrictions upon the conduct of the individual, is one of its earliest manifestations in primitive man and can be observed even in animal communities. But with the development of the power of inter-communication by the use of language, the Record rapidly acquired an increased development, which was enormously extended by the continuous growth in mankind of the faculty of memory. To the mere tradition preserved by memory and handed on by speech was then added the written record and its later multiplication by the mechanical arts of printing, by which it acquired permanence and universal distribution. The result is the creation of an almost inconceivably vast body of traditional custom, law and knowledge into which every human being is born, less in the more isolated and barbarous communities, but large everywhere. Education is not in its essential nature a training administered to the young by an older generation, but is the natural and unaided assimilation of the Record of the Past by the automatically educable brain—an assimilation which is always in all races very large but becomes far larger in civilized communities. It is among them so important whilst the Record in all its details is so far beyond the receptive capacity of the brain, that selection and guidance are employed by the elders in order to enable the younger generation to benefit to the utmost by the absorption (so to speak) in the limited span of a lifetime of the most valuable influences to be acquired from this prodigious envelope of Recorded Experience. The imperishable Record invests the human race like a protective atmosphere, a new and yet a natural dispensation, giving to man, as compared with his animal ancestry, a new heaven and a new earth!

A result of the very greatest importance arising from the application of the generalizations of Darwinism to human development and to the actual phase of existing human population is that education has no direct effect upon the mental or physical features of the race or stock: it can only affect those of the individual. Educability, defects or excellences, or peculiarities of mind or body, can be handed on from parent to offspring by protoplasmic continuity in reproduction. But the results of education cannot be so handed on. The educated man who has acquired new experiences, new knowledge, can place these on the great Record for the benefit of future generations of men, but he cannot bodily transmit his acquirements to his offspring. Were acquired (superimposed) characters really transmissible by breeding, then every child born would inherit, more or less completely, the knowledge acquired by both its parents. But we know this is not the case: the child has to begin with a clean slate and learn for itself. Aptitudes and want of aptitude, which are innate and constitutional, are transmitted to offspring, but not the results of experience, education and training. Blemishes in the stock, defects of mind or body, though they may be to some extent corrected in the individual by training, cannot be got rid of from the stock by any such process. A defective stock, if allowed to breed, will perpetuate its defects, in spite of the concealment of those defects in an individual by training or other treatment. Equally it must be concluded that the weakness and degradation produced by semi-starvation and insanitary conditions of life are only an effect on the individual and cannot affect the stock. The stock may be destroyed, killed out by adverse conditions, but its quality is not directly affected, and if removed to more favourable conditions it will show no hereditary results of the previous adversity; indeed it will probably have been strengthened in some ways by the destruction in severe conditions of its weaker members and the survival of the stronger individuals. Such considerations have the very greatest importance for the guidance of the action of civilized man in seeking the health and happiness of the community. But it must not be forgotten that the problems presented by human communities are extremely complex, and that the absence of any selection of healthy or desirable stock in the breeding of human communities leads to undesirable consequences. The most thrifty and capable sections of the people at the present day are not (it has been shown) in overcrowded areas, producing offspring at such a rate as to contribute to the increase of the population. That increase, it has been shown, is due to the early marriage and excessive reproduction of the reckless and hopeless, the poorest, least capable, least desirable members of the community. The questions raised by these considerations have attracted much public attention under the newly invented name of "eugenics," but they are of an exceedingly difficult and delicate nature.

(E. R. L.)

ZORILLA, MANUEL RUIZ, Don (1834–1895), Spanish politician, was born at Burgo de Osma in 1834. He began his education at Valladolid, and studied law afterwards at Madrid University, where he leaned towards Radicalism in politics. In 1856 he was elected deputy, and soon attracted notice among the most advanced Progressists and Democrats. He took part in the revolutionary propaganda that led to the military movement in Madrid on the 22nd of June 1866. He had to take refuge in France for two years, like his fellow-conspirators, and only returned to Spain when the revolution of 1868 took place. He was one of the members of the first cabinet after the revolution, and in 1869, under the regency of Marshal Serrano, he became minister of grace and justice. In 1870 he was elected president of the House of Deputies, and seconded Prim in offering the throne to Amadeus of Savoy. He went to Italy as president of the commission, carrying to the prince at Florence the official news of his election. On the arrival of Amadeus in Spain, Ruiz Zorilla became minister of public works for a short time, and resigned by way of protesting against Serrano and Topete entering the councils of the new king. Six months later, in 1871, he was invited by Amadeus to form a cabinet, and he continued to be the principal councillor of the king until February 1873, when the monarch abdicated in disgust at the resistance he met with in the army, and at the lack of sincerity on the part of the very politicians and generals who had asked him to ascend the throne. After the departure of Amadeus, Ruiz Zorilla advocated the establishment of a republic. Notwithstanding this, he was not called upon either by the Federal Republicans to help them during the year 1873, or by Marshal Serrano during 1874 to join Martos and Sagasta in his cabinet. Immediately after the restoration of Alphonso XII., early in 1875, Ruiz Zorilla went to France. He was for nearly eighteen years the soul of the republican conspiracies, the prompter of revolutionary propaganda, the chief inspirer of intrigues concerted by discontented military men of all ranks. He gave so much trouble to the Madrid governments that they organized a watch over him with the assistance of the French government and police, especially when it was discovered that the two military movements of August 1883 and September 1886 had been prepared and assisted by him. During the last two years of his life Ruiz Zorilla became less active; failing health and the loss of his wife had decreased his energies, and the Madrid government allowed him to return to Spain some months before he died at Burgos, on the 13th of June 1895, of heart disease.

ZORNDORF, a village of Prussia, in the Oder valley, north-east of Cüstrin. It is famous as the scene of a battle in which the Prussians under Frederick the Great defeated the Russians commanded by Fermor, on the 25th of August 1758 (see SEVEN YEARS' WAR).

ZOROASTER, one of the great teachers of the East, the founder of what was the national religion of the Perso-Iranian people from the time of the Achaemenidae to the close of the Sassanian period. The name (Ζωροάστρης) is the correct Greek form of the old Iranian *Zarathustra* (new- [illegible]

Zardusht). Its signification is obscure; but it certainly contains the word *ushtra*, "camel."

Evidence for his life.

Zoroaster was already famous in classical antiquity as the founder of the widely renowned wisdom of the Magi. His name is not mentioned by Herodotus in his sketch of the Medo-Persian religion (i. 131 seq.). It occurs for the first time in a fragment of Xanthus (29), and in the *Alcibiades* of Plato (i. p. 122), who calls him the son of Oromazdes. For occidental writers, Zoroaster is always the *Magus*, or the founder of the whole Magian system (Plut. *de Is. et Osir.* 46; Plat. *loc. cit.*; Diog. Laërt. *prooem.* 2: other passages in Jackson's *Zoroaster*, 6 seq.). They sometimes call him a Bactrian, sometimes a Median or Persian (cf. Jackson, *op. cit.* 186). The ancients also recount a few points regarding the childhood of Zoroaster and his hermit-life. Thus, according to Pliny (*Nat. Hist.* vii. 15), he laughed on the very day of his birth—a statement found also in the *Zardusht-Nāma*—and lived in the wilderness upon cheese (xi. 97). Plutarch speaks of his intercourse with the deity, and compares him with Lycurgus and Numa (*Numa*, 4). Dio Chrysostom, Plutarch's contemporary, declares that neither Homer nor Hesiod sang of the chariot and horses of Zeus so worthily as Zoroaster, of whom the Persians tell that, out of love to wisdom and righteousness, he withdrew himself from men, and lived in solitude upon a mountain. The mountain was consumed by fire, but Zoroaster escaped uninjured and spoke to the multitude (vol. ii. p. 60). Plutarch, drawing partly on Theopompus, speaks of his religion in his *Isis and Osiris* (cc. 46–47). He gives a faithful sketch of the doctrines, mythology and dualistic system of the Magian Zoroaster.

As to the period in which he lived, most of the Greeks have already lost the true perspective. Hermodorus and Hermippus of Smyrna place him 5000 years before the Trojan war, Xanthus 6000 years before Xerxes, Eudoxus and Aristotle 6000 years before the death of Plato. Agathias remarks (ii. 24), with perfect truth, that it is no longer possible to determine with any certainty when he lived and legislated. "The Persians," he adds, "say that Zoroaster lived under Hystaspes, but do not make it clear whether by this name they mean the father of Darius or another Hystaspes. But, whatever may have been his date, he was their teacher and instructor in the Magian religion, modified their former religious customs, and introduced a variegated and composite belief."

He is nowhere mentioned in the cuneiform inscriptions of the Achaemenidae, although Darius and his successors were without doubt devoted adherents of Zoroastrianism. The Avesta is, indeed, our principal source for the doctrine of Zoroaster; on the subject of his person and his life it is comparatively reticent; with regard to his date it is, naturally enough, absolutely silent. The 13th section, or *Spend Nask*, which was mainly consecrated to the description of his life, has perished; while the biographies founded upon it in the 7th book of the *Dinkard* (9th century A.D.), the *Shāh-Nāma*, and the *Zardusht-Nāma* (13th century), are thoroughly legendary—full of wonders, fabulous histories and miraculous deliverances.

Under all circumstances we must imitate the ancient authors in holding fast to the historic personality of Zoroaster; though he—like many another name of the dim past—has failed to escape the fate of being regarded as a purely mythical creation (for instance, by Kern and by Darmesteter, in the *Sacred Books of the East*, vol. iv. 1880, Introd. 76). According to Darmesteter, the Zarathustra of the Avesta is a mere myth, a divinity invested with human attributes, an incarnation of the storm-god, who with his divine word, the thunder, comes and smites the demons. Darmesteter has failed to realize sufficiently the distinction between the Zoroaster of the later Avesta and the Zoroaster of the Gāthās. It cannot be denied that in the later Avesta, and still more in writings of more recent date, he is presented in a legendary light and endowed with superhuman powers. At his appearing all nature rejoices (*Yasht*, 13, 93); he enters into conflict with the demons and rids the earth of their presence (*Yasht*, 17, 19); Satan approaches him as tempter to make him renounce his faith (*Vendidad*, 19, 6).

The Gāthās alone within the Avesta make claim to be the *ipsissima verba* of the prophet; in the rest of that work they are put into Zoroaster's own mouth (*Yasna*, 9, 1) and are expressly called "the Gāthās of the holy Zoroaster" (*Yasna*, 57, 8). The litanies of the Yasna, and the Yashts, refer to him as a personage belonging to the past. The Vendidad also merely gives accounts of the dialogues between Ormazd and Zoroaster. The Gāthās alone claim to be authentic utterances of Zoroaster, his actual expressions in presence of the assembled congregation. They are the last genuine survivals of the doctrinal discourses with which—as the promulgator [illegible] religion—he appeared at the court of King Vishtāspa.

The person of the Zoroaster whom we meet with in these hymns differs *toto coelo* from the Zoroaster of the younger Avesta. He is the exact opposite of the miraculous personage of later legend—a mere man, standing always on the solid ground of reality, whose only arms are trust in his God and the protection of his powerful allies. At times his position is precarious enough. He whom we hear in the Gāthās has had to face, not merely all forms of outward opposition and the unbelief and lukewarmness of adherents, but also the inward misgivings of his own heart as to the truth and final victory of his cause. At one time hope, at another despondency, now assured confidence, now doubt and despair, here a firm faith in the speedy coming of the kingdom of heaven, there the thought of taking refuge by flight—such is the range of the emotions which find their immediate expression in these hymns. And the whole breathes such a genuine originality, all is psychologically so accurate and just, the earliest beginnings of the new religious movement, the childhood of a new community of faith, are reflected so naturally in them all, that it is impossible for a moment to think of a later period of composition by a priesthood whom we know to have been devoid of any historical sense, and incapable of reconstructing the spiritual conditions under which Zoroaster lived. So soon as the point of view is clear—that in the Gāthās we have firm historical ground on which Zoroaster and his surroundings may rest, that here we have the beginnings of the Zoroastrian religion—then it becomes impossible to answer otherwise than affirmatively every general question as to the historical character of Zoroaster. Yet we must not expect too much from the Gāthās in the way of definite detail. They give no historical account of the life and teaching of their prophet, but rather are, so to say, *versus memoriales*, which recapitulate the main points of interest, often again in brief outlines. They are more of general admonitions, asseverations, solemn prophecies, sometimes directed to the faithful flock or to the princes, but generally cast in the form of dialogues with God and the archangels, whom he repeatedly invokes as witnesses to his veracity. Moreover, they contain many allusions to personal events which later generations have forgotten. It must be remembered, too, that their extent is limited, and their meaning, moreover, frequently dubious or obscure.

The Person of the Prophet.—As to his birthplace the testimonies are conflicting. According to the Avesta (*Yasna*, 9, 17), Airyanem Vaējō, on the river Dāitya, the old sacred country of the gods, was the home of Zoroaster, and the scene of his first appearance. There, on the river Darejya, assuming that the passage (*Vend.*, 19, 4) is correctly interpreted, stood the house of his father; and the *Bundahish* (20, 32 and 24, 15) says expressly that the river Dāraja lay in Airan Vej, on its bank was the dwelling of his father, and that there Zoroaster was born. Now, according to the *Bundahish* (29, 12), Airan Vej was situated in the direction of Atropatene, and consequently Airyanem Vaējō is for the most part identified with the district of Arrān on the river Aras (Araxes), close by the north-western frontier of Media. Other traditions, however, make him a native of Rai (Ragha, Ῥάγαι). According to *Yasna*, 19, 18, the *zarathushtrōtema*, or supreme head of the Zoroastrian priesthood, had at a later (Sasanian) time, his residence in Ragha. The Arabic writer Shahrastānī endeavours to bridge the divergence between the two traditions by means of the following theory: his father was a man of Atropatēne, while the mother was from Rai. In his home tradition recounts he enjoyed the celestial visions and the conversations with the archangels and Ormazd which are mentioned already in the Gāthās. There, too, according to *Yasht*, 5, 105, he prayed that he might succeed in converting King Vīshtāspa. He then appears to have quitted his native district. On this point the Avesta is wholly silent: only one obscure passage (*Yasna*, 53, 9) seems to intimate that he found an ill reception in Rai. Finally, in the person of Vīshtāspa, who seems to have been a prince resident in east Iran, he gained the powerful protector and faithful disciple of the new religion whom he desired—though after almost superhuman dangers and difficulties, which the later books depict in lively colours. According to the epic legend, Vīshtāspa was king of Bactria. Already in the later Avesta he has become a half-mythical figure, the last in the series of heroes of east Iranian legend, in the arrangement of which series priestly influence is unmistakably evident. He stands at the meeting-point between the old world and the new era which begins with Zoroaster. In the Gāthās he appears as a quite historical personage; it is essentially to his power and good example that the prophet is indebted for his success. In *Yasna*, 53, 2;

he is spoken of as a pioneer of the doctrine revealed by Ormazd. In the relation between Zoroaster and Vīshtāspa already lies the germ of the state church which afterwards became completely subservient to the interests of the dynasty and sought its protection from it.

Among the grandees of the court of Vīshtāspa mention is made of two brothers, Frashaoshtra and Jāmāspa; both were, according to the later legend, vizirs of Vīshtāspa. Zoroaster was nearly related to both: his wife, Hvōvi, was the daughter of Frashaoshtra, and the husband of his daughter, Pourucista, was Jāmāspa. The actual rôle of intermediary was played by the pious queen Hutaosa. Apart from this connexion, the new prophet relies especially upon his own kindred (*hvaētush*). His first disciple, Maidhyōimāongha, was his cousin: his father was, according to the later Avesta, Pourushaspa, his mother Dughdōvā, his great-grandfather Haēcataspa, and the ancestor of the whole family Spitama, for which reason Zarathushtra usually bears this surname. His sons and daughters are repeatedly spoken of. His death is, for reasons easily intelligible, nowhere mentioned in the Avesta; in the *Shāh-Nāma* he is said to have been murdered at the altar by the Turanians in the storming of Balkh.

We are quite ignorant as to the date of Zoroaster; King Vīshtāspa does not seem to have any place in any historical chronology, and the Gāthās give no hint on the subject. In former times the assertion often was, and even now is often put forward, that Vīshtāspa was one and the same person with the historical Hystaspes, father of Darius I. This identification can only be purchased at the cost of a complete renunciation of the Avestan genealogy. Hutaosa is the same name as Atossa: but in history Atossa was the wife of Cambyses and Darius. Otherwise, not *one* single name in the entourage of our Vīshtāspa can be brought into harmony with historical nomenclature. According to the Arda Vīrāf, 1, 2, Zoroaster taught, in round numbers, some 300 years before the invasion of Alexander. The testimony of Assyrian inscriptions relegates him to a far more ancient period. If these prove the name Mazdaka to have formed part of Median proper names in the year 715 B.C., Eduard Meyer (v. *Ancient Persia*) is justified in maintaining that the Zoroastrian religion must even then have been predominant in Media. Meyer, therefore, conjecturally puts the date of Zoroaster at 1000 B.C., as had already been done by Duncker (*Geschichte des Altertums*, 4^4, 78). This, in its turn, may be too high: but, in any case, Zoroaster belongs to a prehistoric era. Probably he emanated from the old school of Median Magi, and appeared first in Media as the prophet of a new faith, but met with sacerdotal opposition, and turned his steps eastward. In the east of Iran the novel creed first acquired a solid footing, and subsequently reacted with success upon the West.

Zoroastrianism.—Zoroaster taught a new religion; but this must not be taken as meaning that everything he taught came, so to say, out of his own head. His doctrine was rooted in the old Iranian—or Aryan—folk-religion, of which we can only form an approximate representation by comparison with the religion of the Veda. The newly discovered Hittite inscriptions have now thrown a welcome ray of light on the primitive Iranian creed (Ed. Meyer, *Sitzungsberichte der Preuss. Akademie*, 1908). In these inscriptions Mitra, Varuna, Indra and Nāsatya are mentioned as deities of the Iranian kings of Mitani at the beginning of the 14th century—all of them names with which we are familiar from the Indian pantheon. The Aryan folk-religion was polytheistic. Worship was paid to popular divinities, such as the war-god and dragon-slayer Indra, to natural forces and elements such as fire, but the Aryans also believed in the ruling of moral powers and of an eternal law in nature (*v.* Ed. Meyer in the article PERSIA: *History*, § *Ancient*). On solemn occasions the inspiring drink soma (*haoma*) ministered to the enjoyment of the devout. Numerous coincidences with the Indian religion survive in Zoroastrianism, side by side with astonishing diversities.

The most striking difference between Zoroaster's doctrine of God and the old religion of India lies in this, that while in the Avesta the evil spirits are called *daēva* (Modern Persian *dīv*), the Aryans of India, in common with the Italians, Celts and Letts, gave the name of *dēva* to their good spirits, the spirits of light. An alternative designation for deity in the *Rig-Veda* is *asura*. In the more recent hymns of the *Rig-Veda* and in later India, on the other hand, only *evil* spirits are understood by *asuras*, while in Iran the corresponding word *ahura* was, and ever has continued to be, the designation of God the Lord. Thus *ahura-daēva*, *dēva-asura* in Zoroastrian and in later Brahman theology are in their meanings diametrically opposed.

Asura-daiva represent originally two distinct races of gods (like the Northern Aser and Vaner)—two different aspects of the conception of deity, comparable to δαίμων and θεός. *Asura* indicates the more sublime and awful divine character, for which man entertains the greater reverence and fear: *daiva* denotes the kind gods of light, the vulgar—more sensuous and anthropomorphic—deities. This twofold development of the idea of God formed the point of leverage for Zoroaster's reformation. While in India the conception of the *asura* had veered more and more towards the dreadful and the dreaded, Zoroaster elevated it again—at the cost, indeed, of the daivas (*daēvas*), whom he degraded to the rank of malicious powers and devils. In one *Asura*, whose Aryan original was Varuna, he concentrated the whole of the divine character, and conferred upon it the epithet of "the wise" (*mazdao*). This culminating stage in the *asura*-conception is the work of Zoroaster. The Wise Lord (*Ahurō Mazdāo*—later *Ormazd*) is the primeval spiritual being, the All-father, who was existent before ever the world arose. From him that world has emanated, and its course is governed by his foreseeing eye. His guiding spirit is the Holy Spirit, which wills the good: yet it is not free, but restricted, in this temporal epoch, by its antagonist and own twin-brother (*Yasna*, 30, 3), the Evil Spirit (*angrō mainyush*, *Ahriman*), who in the beginning was banished by the Good Spirit by means of the famous ban contained in *Yasna*, 45, 2, and since then drags out his existence in the darkness of Hell as the principle of ill—the arch-devil. In the Gāthās the Good Spirit of Mazda and the Evil Spirit are the two great opposing forces in the world, and Ormazd himself is to a certain extent placed above them both. Later the Holy Spirit is made directly equivalent to Ormazd; and then the great watchword is: "Here Ormazd, there Ahriman!" The very *daēvas* are only the inferior instruments, the corrupted children of Ahriman, from whom come all that is evil in the world. The *daēvas*, unmasked and attacked by Zoroaster as the true enemies of mankind, are still, in the Gāthās, without doubt the perfectly definite gods of old popular belief—the idols of the people. For Zoroaster they sink to the rank of spurious deities, and in his eyes their priests and votaries are idolaters and heretics. In the later, developed system the *daēvas* are the evil spirits in general, and their number has increased to millions. Some few of these have names; and among those names of the old Aryan divinities emerge here and there, *e.g.* Indra and Nāonhaitya. With some, of course—such as the god of fire—the connexion with the good deity was a priori indissoluble. Other powers of light, such as Mitra the god of day (Iranian *Mithra*), survived unforgotten in popular belief till the later system incorporated them in the angelic body. The authentic doctrine of the Gāthās had no room either for the cult of Mithra or for that of the Haoma. Beyond the Lord and his Fire, the Gāthās only recognize the archangels and certain ministers of Ormazd, who are, without exception, personifications of abstract ideas. This hypostasization and all-egotization is especially characteristic of the Zoroastrian religion. The essence of Ormazd is Truth and Law *asha* = Vedic *rta*): this quality he embodies, and its personification (though conceived as sexless) is always by his side, a constant companion and intimate. The essence of the wicked spirit is falsehood: and falsehood, as the embodiment of the evil principle, is much more frequently mentioned in the Gāthās than Ahriman himself.

Zoroaster says of himself that he had received from God a commission to purify religion (*Yasna*, 44, 9). He purified it from the grossly sensual elements of *daēva* worship, and uplifted the idea of religion to a higher and purer sphere. The motley body of Aryan folk-belief, when subjected to the unifying thought of a speculative brain, was transformed to a self-contained theory of the universe and a logical dualistic principle. But this dualism is a temporally limited dualism—no more than an episode in the world-whole—and is destined to terminate in monotheism. Later sects sought to rise from it to a higher unity in other ways. Thus the Zarvanites represented Ormazd and Ahriman as twin sons proceeding from the fundamental principle of all—*Zrvana Akarana*, or limitless time.

Ethically, too, the new doctrine stands on a higher plane, and represents, in its moral laws, a superior civilization. The devil-worshippers, at their sacrifices, slay the ox; and this the *daēvas* favour, for they are foes to the cattle and to cattle-breeding, and friends to those who work ill to the cow. In Zoroaster's eyes this is an abomination: for the cow is a gift of Ormazd to man, and the religion of Mazda protects the sacred animal. It is the religion of the settled grazier and the peasant, while the ruder *daēva*-cult holds its ground among the uncivilized nomadic tribes. In an old confession of faith, the convert is pledged to abjure the theft and robbery of cattle and the ravaging of villages inhabited by worshippers of Mazda (*Yasna*, 12, 2).

Zoroaster's teachings show him to have been a man of a highly speculative turn, faithful, however, with all his originality, to the Iranian national character. With zeal for the faith, and boldness and energy, he combined diplomatic skill in his dealings with his exalted protectors. His thinking is consecutive, self-restrained, practical, devoid of everything that might be called fantastic or excessive. His form of expression is tangible and concrete: his system is constructed on a clearly conceived plan and stands on a high moral level; for its time it was a great advance in civilization. *The doctrine of Zoroaster* and the Zoroastrian Church may be summarized somewhat as follows:—

At the beginning of things there existed the two spirits who represented good and evil (*Yasna*, 30, 3). The existence of evil in the world is thus presupposed from the beginning. Both spirits possess creative power, which manifests itself positively in the one and negatively in the other. Ormazd is light and life, and creates all that is pure and good—in the ethical world of law, order and truth. His antithesis is darkness, filth, death, and produces all that is evil in the world. Until then the two spirits had counterbalanced one another. The ultimate triumph of the good spirit is an ethical demand of the religious consciousness and the quintessence of Zoroaster's religion.

The evil spirit with his wicked hosts appears in the Gāthās much less endowed with the attributes of personality and individuality than does Ahura Mazda. Within the world of the good Ormazd is Lord and God alone. In this sense Zoroastrianism is often referred to as the faith of Ormazd or as Mazdaism. Ormazd in his exalted majesty is the ideal figure of an Oriental king. He is not alone in his doings and conflicts, but has in conjunction with himself a number of genii—for the most part personifications of ethical ideas. These are his creatures, his instruments, servants and assistants. They are comprehended under the general name of *ameshā spentā* (" immortal holy ones ") and are the prototypes of the seven *amshaspands* of a later date. These are—(1) Vohu Manō (εὔνοια), good sense, *i.e.* the good principle, the idea of the good, the principle that works in man inclining him to what is good; (2) Ashem, afterwards Ashem Vahishtem (Plutarch's ἀλήθεια), the genius of truth and the embodiment of all that is true, good and right, upright law and rule—ideas practically identical for Zoroaster; (3) Khshathrem, afterwards Khshathrem Vairīm (εὐνομία), the power and kingdom of Ormazd, which have subsisted from the first but not in integral completeness, the evil having crept in like tares among the wheat: the time is yet to come when it shall be fully manifested in all its unclouded majesty; (4) Ārmaiti (σοφία), due reverence for the divine, *verecundia*, spoken of as daughter of Ormazd and regarded as having her abode upon the earth; (5) Haurvatāt (πλοῦτος), perfection; (6) Ameretāt, immortality. Other ministering angels are Gēush Urvan (" the genius and defender of animals "), and Sraosha, the genius of obedience and faithful hearing.

As soon as the two separate spirits (cf. *Bundahish*, 1, 4) encounter one another, their creative activity and at the same time their permanent conflict begin. The history of this conflict is the history of the world. A great cleft runs right through the world: all creation divides itself into that which is Ahura's and that which is Ahriman's. Not that the two spirits carry on the struggle in person; they leave it to be fought out by their respective creations and creatures which they sent into the field. The field of battle is the present world.

In the centre of battle is man: his soul is the object of the war. Man is a creation of Ormazd, who therefore has the right to call him to account. But Ormazd created him free in his determinations and in his actions, wherefore he is accessible to the influences of the evil powers. This freedom of the will is clearly expressed in *Yasna*, 31, 11: " Since thou, O Mazda, didst at the first create our being and our consciences in accordance with thy mind, and didst create our understanding and our life together with the body, and works and words in which man according to his own will can frame his confession, the liar and the truth-speaker alike lay hold of the word, the knowing and the ignorant each after his own heart and understanding. Armaiti searches, following thy spirit, where errors are found." Man takes part in this conflict by all his life and activity in the world. By a true confession of faith, by every good deed, word and thought, by continually keeping pure his body and his soul, he impairs the power of Satan and strengthens the might of goodness, and establishes a claim for reward upon Ormazd; by a false confession, by every evil deed, word and thought and defilement, he increases the evil and renders service to Satan.

The life of man falls into two parts—its earthly portion and that which is lived after death is past. The lot assigned to him after death is the result and consequence of his life upon earth. No religion has so clearly grasped the ideas of guilt and of merit. On the works of men here below a strict reckoning will be held in heaven (according to later representations, by Rashnu, the genius of justice, and Mithra). All the thoughts, words and deeds of each are entered in the book of life as separate items—all the evil works, &c., as debts. Wicked actions cannot be undone, but in the heavenly account can be counterbalanced by a surplus of good works. It is only in this sense that an evil deed can be atoned for by a good deed. Of a real remission of sins the old doctrine of Zoroaster knows nothing, whilst the later Zoroastrian Church admits repentance, expiation and remission. After death the soul arrives at the *cinvatō peretu*, or accountant's bridge, over which lies the way to heaven. Here the statement of his life account is made out. If he has a balance of good works in his favour, he passes forthwith into paradise (*Garō demāna*) and the blessed life. If his evil works outweigh his good, he falls finally under the power of Satan, and the pains of hell are his portion for ever. Should the evil and the good be equally balanced, the soul passes into an intermediary stage of existence (the *Hamēstakāns* of the Pahlavi books) and its final lot is not decided until the last judgment. This court of reckoning, the *judicium particulare*, is called *ākā*. The course of inexorable law cannot be turned aside by any sacrifice or offering, nor yet even by the free grace of God.

But man has been smitten with blindness and ignorance: he knows neither the eternal law nor the things which await him after death. He allows himself too easily to be ensnared by the craft of the evil powers who seek to ruin his future existence. He worships and serves false gods, being unable to distinguish between truth and lies. Therefore it is that Ormazd in his grace determined to open the eyes of mankind by sending a prophet to lead them by the right way, the way of salvation. According to later legend (*Vd.*, 2, 1), Ormazd at first wished to entrust this task to Yima (Jemshīd), the ideal of an Iranian king. But Yima, the secular man, felt himself unfitted for it and declined it. He contented himself therefore with establishing in his paradise (*vara*) a heavenly kingdom in miniature, to serve at the same time as a pattern for the heavenly kingdom that was to come. Zoroaster at last, as being a spiritual man, was found fit for the mission. He experienced within himself the inward call to seek the amelioration of mankind and their deliverance from ruin, and regarded this inner impulse, intensified as it was by long, contemplative solitude and by visions, as being the call addressed to him by God Himself. Like Mahommed after him he often speaks of his conversations with God and the archangels. He calls himself most frequently *manthran* (" prophet "), *ratu* (" spiritual authority "), and *saoshyant* (" the coming helper "—that is to say, when men come to be judged according to their deeds).

The full contents of his dogmatic and ethical teaching we cannot gather from the Gāthās. He speaks for the most part only in general references of the divine commands and of good and evil works. Among the former those most inculcated are renunciation of Satan, adoration of Ormazd, purity of soul and body, and care of the cow. We learn little otherwise regarding the practices connected with his doctrines. A ceremonial worship is hardly mentioned. He speaks more in the character of prophet than in that of lawgiver. The contents of the Gāthās are essentially eschatological. Revelations concerning the last things and the future lot, whether bliss or woe, of human souls, promises for true believers, threatenings for misbelievers, his firm confidence as to the future triumph of the good—such are the themes continually dwelt on with endless variations.

It was not without special reason—so Zoroaster believed—that the calling of a prophet should have taken place precisely when it did. It was, he held, the final appeal of Ormazd to mankind at large. Like John the Baptist and the Apostles of Jesus, Zoroaster also believed that the fulness of time was near, that the kingdom of heaven was at hand. Through the whole of the Gāthās runs the pious hope that the end of the present world is not far distant. He himself hopes, with his followers, to live to see the decisive turn of things, the dawn of the new and better aeon. Ormazd will summon together all his powers for a final decisive struggle and break the power of evil for ever; by his help the faithful will achieve the victory over their detested enemies, the *daêva* worshippers, and render them impotent. Thereupon Ormazd will hold a *judicium universale*, in the form of a general ordeal, a great test of all mankind by fire and molten metal, and will judge strictly according to justice, punish the wicked, and assign to the good the hoped-for reward. Satan will be cast, along with all those who have been delivered over to him to suffer the pains of hell, into the abyss, where he will henceforward lie powerless. Forthwith begins the one undivided kingdom of God in heaven and on earth. This is called, sometimes the good kingdom, sometimes simply the kingdom. Here the sun will for ever shine, and all the pious and faithful will live a happy life, which no evil power can disturb, in the eternal fellowship of Ormazd and his angels. Every believer will receive as his guerdon the inexhaustible cow and the gracious gifts of the *Vohu manô*. The prophet and his princely patrons will be accorded special honour.

History and Later Development.—For the great mass of the people Zoroaster's doctrine was too abstract and spiritualistic. The vulgar fancy requires sensuous, plastic deities, which admit of visible representation; and so the old gods received honour again and new gods won acceptance. They are the angels (*yazata*) of New Zoroastrianism. Thus, in the later Avesta, we find not only Mithra but also purely popular divinities such as the angel of victory, Verethraghna, Anâhita (Anaïtis), the goddess of the water, Tishrya (Sirius), and other heavenly bodies, invoked with special preference. The Gâthâs know nothing of a new belief which afterwards arose in the *Fravashi*, or guardian angels of the faithful. *Fravashi* properly means "confession of faith," and when personified comes to be regarded as a protecting spirit. Unbelievers have no *fravashi*.

On the basis of the new teaching arose a widely spread priesthood (*âthravanô*) who systematized its doctrines, organized and carried on its worship, and laid down the minutely elaborated laws for the purifying and keeping clean of soul and body, which are met with in the Vendidad. To these ecclesiastical precepts and expiations belong in particular the numerous ablutions, bodily chastisements, love of truth, beneficial works, support of comrades in the faith, alms, chastity, improvement of the land, arboriculture, breeding of cattle, agriculture, protection of useful animals, as the dog, the destruction of noxious animals, and the prohibition either to burn or to bury the dead. These are to be left on the appointed places (*dakhmas*) and exposed to the vultures and wild dogs. In the worship the drink prepared from the *haoma* (Indian *soma*) plant had a prominent place. Worship in the Zoroastrian Church was devoid of pomp; it was independent of temples. Its centre was the holy fire on the altar. The fire altars afterwards developed to fire temples. In the sanctuary of these temples the various sacrifices and high and low masses were celebrated. As offerings meat, milk, show-bread, fruits, flowers and consecrated water were used. The priests were the privileged keepers and teachers of religion. They only performed the sacrifices (Herodotus, i. 132), educated the young clergy, imposed the penances; they in person executed the circumstantial ceremonies of purification and exercised a spiritual guardianship and pastoral care of the laymen. Every young believer in Mazda, after having been received into the religious community by being girt with the holy lace, had to choose a confessor and a spiritual guide (*ratu*).

Also in eschatology, as may be expected, a change took place. The last things and the end of the world are relegated to the close of a long period of time (3000 years after Zoroaster), when a new Saoshyant is to be born of the seed of the prophet, the dead are to come to life, and a new incorruptible world to begin.

Zoroastrianism was the national religion of Iran, but it was not permanently restricted to the Iranians, being professed by Turanians as well. The worship of the Persian gods spread to Armenia and Cappadocia and over the whole of the Near East (Strabo, xv. 3, 14; xi. 8, 4; 14, 76). Of the Zoroastrian Church under the Achaemenides and Aeracides little is known. After the overthrow of the dynasty of the Achaemenides a period of decay seems to have set in. Yet the Aeracides and the Indo-Scythian kings as well as the Achaemenides were believers in Mazda. The national restoration of the Sasanides brought new life to the Zoroastrian religion and long-lasting sway to the Church. Protected by this dynasty, the priesthood developed into a completely organized state church, which was able to employ the power of the state in enforcing strict compliance with the religious law-book hitherto enjoined by their unaided efforts only. The head of the Church (Zara-Shushtrôtema) had his seat at Rai in Media and was the first person in the state next to the king. The formation of sects was at this period not infrequent (cf. MANICHAEISM). The Mohammedan invasion (636), with the terrible persecutions of the following centuries, was the death-blow of Zoroastrianism. In Persia itself only a few followers of Zoroaster are now found (in Kerman and Yezd). The PARSEES (*q.v.*) in and around Bombay hold by Zoroaster as their prophet and by the ancient religious usages, but their doctrine has reached the stage of a pure monotheism.

LITERATURE.—See under ZEND-AVESTA. Also Hyde, *Historia Religionis veterum Pursarum* (Oxon, 1700); Windischmann, *Zoroastrische Studien* (Berlin, 1863); A. V. Williams Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1899); Jackson, in the *Grundriss der iranischen Philologie*, vol. ii. 612 sqq. (Strassburg, 1896–1904); Tiele, *Die Religion bei den iranischen Völkern* (Gotha, 1898); Tiele, *Kompendium der Religionsgeschichte*, German transl. by Söderblom (Breslau, 1903); Rastamji Edulji Dastoor Peshotan Sanjana, *Zarathushtra and Zarathushtrianism in the Avesta* (Bombay, 1906); E. Lehmann, *Zarathushtra*, 2 vols. (Copenhagen, 1899 1902); E. W. West, "Marvels of Zoroastrianism" in the *Sacred Books of the East*, vol. xlvii.; Z. A. Ragozin, *The Story of Media, Babylon and Persia* (New York, 1888); Dosabhai Framji Karaka, *History of the Parsis* (2 vols., London, 1884). (K. G.)

ZORRILLA Y MORAL, JOSÉ (1817–1893), Spanish poet and dramatist, son of a magistrate in whom Ferdinand VII. placed special confidence, was born at Valladolid on the 21st of February 1817. He was educated by the Jesuits at the Real Seminario de Nobles in Madrid, wrote verses when he was twelve, became an enthusiastic admirer of Scott and Chateaubriand, and took part in the school performances of plays by Lope de Vega and Calderon. In 1833 he was sent to read law at the University of Toledo, but, after a year of idleness, he fled to Madrid, where he horrified the friends of his absolutist father by making violent speeches and by founding a newspaper which was promptly suppressed by the government. He narrowly escaped transportation to the Philippines, and passed the next few years in poverty. The death of the satirist Larra brought Zorrilla into notice. His elegiac poem, declaimed at Larra's funeral in February 1837, served as an introduction to the leading men of letters. In 1837 he published a book of verses, mostly imitations of Lamartine and Hugo, which was so favourably received that he printed six more volumes within three years. His subjects are treated with fluency and grace, but the carelessness which disfigures much of his work is prominent in these juvenile poems. After collaborating with García Gutiérrez, in a piece entitled *Juan Dándolo* (1839) Zorrilla began his individual career as a dramatist with *Cada cual con su razón* (1840), and during the following five years he wrote twenty-two plays, many of them extremely successful. His *Cantos del trovador* (1841), a collection of national legends versified with infinite spirit, showed a decided advance in skill, and secured for the author the place next to Espronceda in popular esteem. National legends also supply the themes of his dramas, though in this department Zorrilla somewhat compromised his reputation for originality by adapting older plays which had fallen out of fashion. For example, in *El Zapatero y el Rey* he recasts *El montañés Juan Pascual* by Juan de la Hoz y Mota; in *La mejor razón la espada* he borrows from Moreto's *Travesuras del estudiante Pantoja*; in *Don Juan Tenorio* he adapts from Tirso de Molina's *Burlador de Sevilla* and from the elder Dumas's *Don Juan de Marana* (which itself derives from *Les âmes du purgatoire* of Prosper Mérimée). But his rearrangements usually contain original elements, and in *Sancho García*, *El Rey loco*, and *El Alcalde Ronquillo* he apparently owes little to any predecessor. The last and (as he himself believed) the best of his plays is *Traidor, inconfeso y mártir* (1845). Upon the death of his mother in 1847 Zorrilla left Spain, resided for a while at Bordeaux, and settled in Paris, where his incomplete *Granada*, a striking poem of gorgeous local colour, was published in 1852. In a fit of depression, the causes of which are not known, he emigrated to America three years later, hoping, as he says, that yellow fever or smallpox would carry him off. During eleven years spent in Mexico he produced little, and that little was of no merit. He returned in 1866, to find himself a half-forgotten classic. His old fertilit was gone, and new standards of taste were coming into fashi A small post, obtained for him through the influence of Jov and Cánovas del Castillo, was abolished by the repub minister. He was always poor, and for some twelve years after 1871 he was in the direst straits. The law of copyright was not retrospective, and, though some of his plays made the fortunes of managers, they brought him nothing. In his untrustworthy autobiography, *Recuerdos del tiempo viejo* (1880), he complained of this. A pension of 30,000 reales secured him from want in his old age, and the reaction in his favour became an apotheosis. In 1885 the Spanish Academy, which had elected him a member many years before, presented him with a gold medal of honour, and in 1889 he was publicly crowned at Granada as the national laureate. He died at Madrid on the 23rd of January 1893.

Zorrilla is so intensely Spanish that it is difficult for foreign critics to do him justice. It is certain that the extraordinary rapidity of his methods seriously injured his work. He declares that he wrote *El Caballo del Rey Don Sancho* in three weeks, and that he put together *El Puñal del Godo* (which, like *La Calentura*, owes much to Southey) in two days; if so, his deficiencies need no other explanation. An improvisator with the characteristic faults of redundance and verbosity, he wrote far too much, and in most of his numbers there are numerous technical flaws. Yet the richness of his imagery, the movement, fire and variety of his versification, will preserve some few of his poems in the anthologies. His appeal to patriotic pride, his accurate dramatic instinct, together with the fact that he invariably gives at least one of his characters a most effective acting part, have enabled him to hold the stage. It is by *Don Juan Tenorio*, the play of which he thought so meanly, that Zorrilla will be best remembered. (J. F.-K.)

ZOSIMUS, bishop of Rome from the 18th of March 417 to the 26th of December 418, succeeded Innocent I. and was followed by Boniface I. For his attitude in the Pelagian controversy, see PELAGIUS. He took a decided part in the protracted dispute in Gaul as to the jurisdiction of the see of Arles over that of Vienne, giving energetic decisions in favour of the former, but without settling the controversy. His fractious temper coloured all the controversies in which he took part, in Gaul, Africa and Italy, including Rome, where at his death the clergy were very much divided.

ZOSIMUS, Greek historical writer, flourished at Constantinople during the second half of the 5th century A.D. According to Photius, he was a count, and held the office of "advocate" of the imperial treasury. His *New History*, mainly a compilation from previous authors (Dexippus, Eunapius, Olympiodorus), is in six books: the first sketches briefly the history of the early emperors from Augustus to Diocletian (305); the second, third and fourth deal more fully with the period from the accession of Constantius and Galerius to the death of Theodosius; the fifth and sixth cover the period between 395 and 410. The work, which is apparently unfinished, must have been written between 450–502. The style is characterized by Photius as concise, clear and pure. The historian's object was to account for the decline of the Roman empire from the pagan point of view, and in this undertaking he at various points treated the Christians with some unfairness.

The best edition is by Mendelssohn (1887), who fully discusses the question of the authorities used by Zosimus; there is an excellent appreciation of him in Ranke's *Weltgeschichte*, iv. French translation by Cousin (1678); English (anonymous), 1684, 1814.

ZOSTEROPS,[1] originally the scientific name of a genus of birds founded by N. A. Vigors and T. Horsfield (*Trans. Linn. Society*, xv. p. 235) on an Australian species called by them *Z. dorsalis*, but subsequently shown to be identical with the *Certhia caerulescens*, and also with the *Sylvia lateralis*, previously described by J. Latham. The name has been Anglicized in the same sense, and, whether as a scientific or a vernacular term, applied to a great number of species[2] of little birds which inhabit for the most part the tropical districts of the Old World, from Africa to most of the islands in the Indian and Pacific Oceans, and northwards in Asia through India and China to the Amur regions and Japan.

The birds of this group are mostly of unpretending appearance, the plumage above being generally either mouse-coloured or greenish olive; but some are varied by the white or bright yellow of their throat, breast or lower parts, and several have the flanks of a more or less lively bay. Several islands are inhabited by two perfectly distinct species, one belonging to the brown and the other to the green section, the former being wholly insular. The greater number of species seem to be confined to single islands, often of very small area, but others have a very wide distribution, and the type-species, *Z. caerulescens*, has largely extended its range. First described from New South Wales, where it is very plentiful, it had been long known to inhabit all the eastern part of Australia. In 1856 it was found in the South Island of New Zealand, when it became known to the Maories by a name signifying "Stranger," and to the British as the "Blight-bird,"[3] from its clearing the fruit-trees of a blight. It soon after appeared in the North Island, where it speedily became common, and thence not only spread to the Chatham Islands, but was met with in considerable numbers 300 miles from land, as though in search of new countries to colonize. In any case it is obvious that this *Zosterops* must be a comparatively modern settler in New Zealand.

All the species of *Zosterops* are sociable, consorting in large flocks, which only separate on the approach of the pairing season. They build nests—sometimes suspended from a horizontal fork and sometimes fixed in an upright crotch—and lay (so far as is known) pale blue, spotless eggs, thereby differing wholly from several of the groups of birds to which they have been thought allied. Though mainly insectivorous, they eat fruits of various kinds. The habits of *Z. caerulescens* have been well described by Sir W. Buller (*Birds of New Zealand*), and those of a species peculiar to Ceylon, *Z. ceylonensis*, by Col. Legge (*B. Ceylon*), while those of the widely ranging Indian *Z. palpebrosa* and of the South-African *Z. capensis* have been succinctly treated by Jerdon (*B. India*, ii.) and Layard (*B. South Africa*) respectively.

It is remarkable that the largest known species of the genus, *Z. albigularis*, measuring nearly 6 in. in length, is confined to so small a spot as Norfolk Island, where also another, *Z. tenuirostris*, not much less in size, occurs; while a third, of intermediate stature, *Z. strenua*, inhabits the still smaller Lord Howe's Island. A fourth, *Z. valensis*, but little inferior in bulk, is found on one of the New Hebrides; the rest are from one-fifth to one-third less in length, and some of the smaller species hardly exceed 3½ in.

Placed by some writers, if not systematists, with the *Paridae* (see TITMOUSE), by others among the Meliphagidae (see HONEY-EATER), and again by others with the Nectariniidae (see SUNBIRD), the structure of the tongue, as shown by H. F. Gadow (*Proc. Zool. Society*, 1883, pp. 63, 68, pl. xvi. fig. 2), entirely removes it from the first and third, and from most of the forms generally included among the second. It seems safest to regard the genus, at least provisionally, as the type of a distinct family—Zosteropidae—as families go among Passerine birds. (A. N.)

ZOUAVE, the name given to certain infantry regiments in the French army. The corps was first raised in Algeria in 1831 with one and later two battalions, and recruited solely from the Zouaves, a tribe of Berbers, dwelling in the mountains of the Jurjura range (see KABYLES). In 1838 a third battalion was raised, and the regiment thus formed was commanded by Lamoricière. Shortly afterwards the formation of the *Tirailleurs algériens*, the Turcos, as the corps for natives, changed the enlistment for the Zouave battalions, and they became, as they now remain, a purely French body. Three regiments were formed in 1852, and a fourth, the Zouaves of the Imperial Guard, in 1854. The Crimean War was the first service which the regiments saw outside Algeria. There are now four regiments, of five battalions each, four of which are permanently in Africa, the fifth being stationed in France as a depôt regiment. For the peculiarly picturesque uniform of these regiments, see UNIFORM.

The Papal Zouaves were formed in defence of the Papal states by Lamoricière in 1860. After the occupation of Rome by Victor Emmanuel in 1870, the Papal Zouaves served the government of National Defence in France during the Franco-Prussian war, and were disbanded after the entrance of the German troops into Paris.

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[1] The derivation is ζωστήρ-ηρος and ὤψ, whence the word should be pronounced with all the vowels long. The allusion is to the ring of white feathers round the eyes, which is very conspicuous in many species.

[2] In 1883 R. B. Sharpe (*Cat. B. Brit. Museum*, ix. pp. 146–203) admitted 85 species, besides 3 more which he had not been able to examine.

[3] By most English-speaking people the prevalent species of *Zosterops* is commonly called "White-eye" or "Silver-eye."

ZOUCH, RICHARD (*c.* 1590–1661), English jurist, was born at Anstey, Wiltshire, and educated at Winchester and afterwards at Oxford, where he became a fellow of New College in 1609. He was admitted at Doctor's Commons in January 1618, and was appointed regius professor of law at Oxford in 1620. In 1625 he became principal of St Alban Hall and chancellor of the diocese of Oxford; in 1641 he was made judge of the High Court of Admiralty. Under the Commonwealth, having submitted to the parliamentary visitors, he retained his university appointments, though not his judgeship; this last he resumed at the Restoration, dying soon afterwards at his apartments in Doctor's Commons, London, on the 1st of March 1661.

He published *Elementa jurisprudentiae* (1629), *Descriptio juris et judicii feudalis, secundum consuetudines Mediolani et Normanniae, pro introductione ad jurisprudentiam Anglicanam* (1634), *Descriptio juris et judicii temporalis, secundum consuetudines feudales et Normannicas* (1636), *Descriptio juris et judicii ecclesiastici, secundum canones et consuetudines Anglicanas* (1636), *Descriptiones juris et judicii sacri, . . . militaris, . . . maritimi* (1640), *Juris et judicii fecialis sive juris inter gentes . . . explicatio* (1650), and *Solutio quaestionis de legati delinquentis judice competente* (1657). In virtue of the last two he has the distinction of being one of the earliest systematic writers on international law. He was also the author of a poem, *The Dove, or Passages of Cosmography* (1613).

ZOUCHE, or ZOUCH, the name of an English family descended from Alan la Zouche, a Breton, who is sometimes called Alan de Porrhoet. Having settled in England during the reign of Henry II., Alan obtained by marriage Ashby in Leicestershire (called after him Ashby de la Zouch) and other lands. His grandson, another Alan la Zouche, was justice of Chester and justice of Ireland under Henry III.; he was loyal to the king during the struggle with the barons, fought at Lewes and helped to arrange the peace of Kenilworth. As the result of a quarrel over some lands with John, Earl Warenne, he was seriously injured in Westminster Hall by the earl and his retainers, and died on the 10th of August 1270. Alan's elder son Roger (d. 1285) had a son Alan la Zouche, who was summoned to parliament as a baron about 1298. He died without sons, and this barony fell into abeyance between his daughters and has never been revived. The elder Alan's younger son, Eudes or Ivo, had a son William (*c.* 1276–1352), who was summoned to parliament as a baron in 1308, and this barony, which is still in existence, is known as that of Zouche of Haryngworth.

John, 7th baron Zouche of Haryngworth (*c.* 1460–1526), was attainted in 1485 as a supporter of Richard III., but was restored to his honours in 1495. His descendant, Edward, the 11th baron (*c.* 1556–1625), was one of the peers who tried Mary, queen of Scots, and was sent by Elizabeth as ambassador to Scotland and to Denmark. He was president of Wales from 1602 to 1615 and lord warden of the Cinque Ports from 1615 to 1624. He was a member of the council of the Virginia Company and of the New England council. He had many literary friends, among them being Ben Jonson and Sir Henry Wotton. Zouche left no sons, and the barony remained in abeyance among the descendants of his two daughters until 1815, when the abeyance was terminated in favour of Sir Cecil Bisshopp, Bart. (1753–1828), who became the 12th baron. He died without sons, a second abeyance being terminated in 1829 in favour of his daughter Harriet Anne (1787–1870), wife of the Hon. Robert Curzon (1771–1863). In 1873 her grandson, Robert Nathaniel Curzon (b. 1851), became the 15th baron.

Two antiquaries, Henry Zouch (*c.* 1725–1795) and his brother Thomas Zouch (1737–1815), claimed descent from the family of Zouche. Both were voluminous writers, Thomas's works including a *Life of Izaak Walton* (1823) and *Memoirs of Sir Philip Sidney* (1808).

ZOUTPANSBERG, the north-eastern division of the Transvaal. This was the district to which Louis Trichard and Jan van Rensburg, the forerunners of the Great Trek, journeyed in 1835. In 1845 Hendrik Potgieter, a prominent leader of the Trek Boers, removed thither. The Zoutpansberg Boers formed a semi-independent community, and in 1857 Stephanus Schoeman, their commandant-general, sided against Marthinus Pretorius and Paul Kruger when they invaded the Orange Free State. It was not until 1864 that Zoutpansberg was definitely incorporated in the South African Republic. Trichard and his companions had been shown gold workings by the natives, and it was in this district in 1867–70, and in the neighbouring region of Lydenburg, that gold mines were first worked by Europeans south of the Limpopo. The white settlers in Zoutpansberg had for many years a reputation for lawlessness, and were later regarded as typical "back velt Boers." Zoutpansberg contains a larger native population than any other region of the Transvaal. It is highly mineralized, next to gold, copper, found near the Limpopo (where is the Messina mine) being the chief metal worked. The district long suffered from lack of railway communications, but in 1910 the completion of the Selati line giving it direct access to Delagoa Bay was begun. The chief towns are Pietersburg and Leydsdorp.

See S. Hofmeyr, *Twintig jaren in Zoutpansberg* (Cape Town, 1890); *Report on a Reconnaissance of the N.-W. Zoutpansberg District* (Pretoria, 1908).

ZRINYI, MIKLÓS, COUNT (1508–1566), Hungarian hero, was a son of Miklós Zrinyi and Ilóna Karlovics. He distinguished himself at the siege of Vienna in 1529, and in 1542 saved the imperial army from defeat before Pest by intervening with 400 Croats, for which service he was appointed ban of Croatia. In 1542 he routed the Turks at Somlyo. In 1543 he married Catherine Frangipán, who placed the whole of her vast estates at his disposal. The Emperor Ferdinand also gave him large possessions in Hungary, and henceforth the Zrinyis became as much Magyar as Croatian magnates. In 1556 Zrinyi won a series of victories over the Turks, culminating in the battle of Babócsa. The Croatians, however, overwhelmed their ban with reproaches for neglecting them to fight for the Magyars, and the emperor simultaneously deprived him of the captaincy of Upper Croatia and sent 10,000 men to aid the Croats, while the Magyars were left without any help, whereupon Zrinyi resigned the banship (1561). In 1563, on the coronation of the Emperor Maximilian as king of Hungary, Zrinyi attended the ceremony at the head of 3000 Croatian and Magyar mounted noblemen, in the vain hope of obtaining the dignity of palatine, vacant by the death of Thomas Nadasdy. Shortly after marrying (in 1564) his second wife, Eva Rosenberg, a great Bohemian heiress, he hastened southwards to defend the frontier, defeated the Turks at Segesd, and in 1566 from the 5th of August to the 7th of September heroically defended the little fortress of Szigetvár against the whole Turkish host, led by Suleiman the Magnificent in person, perishing with every member of the garrison in a last desperate sortie.

See F. Salamon, *Ungarn im Zeitalter der Türkenherrschaft* (Leipzig, 1887); J. Csuday, *The Zrinyis in Hungarian History* (Hung.), Szombathely, 1884, 8vo. (R. N. B.)

ZRINYI, MIKLÓS, COUNT (1620–1664), Hungarian warrior, statesman and poet, the son of George Zrinyi and Magdalena Széchy, was born at Csákvár. At the court of Péter Pásmány the youth conceived a burning enthusiasm for his native language and literature, although he always placed arms before arts. From 1635 to 1637 he accompanied Szenkveczy, one of the canons of Esztergom, on a long educative tour through Italy. During the next few years he learnt the art of war in defending the Croatian frontier against the Turks, and approved himself one of the first captains of the age. In 1645 he acted against the Swedes in Moravia, equipping an army corps at his own expense. At Szkalec he scattered a Swedish division and took 2000 prisoners. At Eger he saved the emperor, who had been surprised at night in his camp by Wrangel. Subsequently he routed the army of Rákóczy on the Upper Theiss. For his services the emperor appointed him captain of Croatia. On his return from the war he married the wealthy Eusebia Draskovics. In 1646 he distinguished himself in the Turkish war. At the coronation of Ferdinand IV. he carried the sword of state, and was made ban and captain-general of Croatia. In this double capacity he presided over many Croatian diets, always strenuously defending the political rights of the Croats and steadfastly maintaining that as regarded Hungary they were to be looked upon not as *partes annexae* but as a *regnum*. During 1652–53 he was continually fighting against the Turks, yet from his castle at Csáktornya he was in constant communication with the learned world; the Dutch scholar, Jacobus Tollius, even visited him, and has left in his *Epistolae itinerariae* a lively account of his experiences. Tollius was amazed at the linguistic resources of Zrinyi, who spoke German, Croatian, Hungarian, Turkish and Latin with equal facility. Zrinyi's Latin letters (from which we learn that he was married a second time, to Sophia Löbel) are fluent and agreeable, but largely interspersed with Croatian and Magyar expressions. The last year of his life was also its most glorious one. He set out to destroy the strongly fortified Turkish bridge at Esseg, and thus cut off the retreat of the Turkish army, re-capturing all the strong fortresses on his way. He destroyed the bridge, but the further pursuance of the campaign was frustrated by the refusal of the imperial generals to co-operate. Still the expedition had covered him with glory. All Europe rang with his praises. It was said that only the Zrinyis had the secret of conquering the Turks. The emperor offered him the title of prince. The pope struck a commemorative medal with the effigy of Zrinyi as a field-marshal. The Spanish king sent him the Golden Fleece. The French king created him a peer of France. The Turks, to wipe out the disgrace of the Esseg affair, now laid siege to Uj-Zerin, a fortress which Zrinyi had built, and the imperial troops under Montecuculi looked on while he hastened to relieve it, refusing all assistance, with the result that the fortress fell. It was also by the advice of Montecuculi that the disgraceful peace of Vásvár was concluded. Zrinyi hastened to Vienna to protest against it, but in vain. Zrinyi quitted Vienna in disgust, after assuring the Venetian minister, Sagridino, that he was willing at any moment to assist the Republic against the Turks with 6000 men. He then returned to Csáktornya, and there, on the 18th of November, was killed by a wild boar which he had twice wounded and recklessly pursued to its lair in the forest swamps, armed only with his hunting-knife.

His poetical works first appeared at Vienna in 1651, under the title of *The Siren of the Adriatic* (Hung.); but his principal work, *Obsidio Szigetiana*, the epopoeia of the glorious self-sacrifice of his heroic ancestor of the same name, only appeared in fragments in Magyar literature till Arany took it in hand. It was evidently written under the influence of both Virgil and Tasso, though the author had no time to polish and correct its rough and occasionally somewhat wooden versification. But the fundamental idea—the duty of Hungarian valour to shake off the Turkish yoke, with the help of God—is sublime, and the whole work is intense with martial and religious enthusiasm. It is no unworthy companion of the other epics of the Renaissance period, and had many imitators. Arany first, in 1848, began to recast the *Zrinyiad*, as he called it, on modern lines, and the work was completed by Antal Vékóny in 1892.

See J. Arany and Kazmir Greksa, *Zrinyi and Tasso* (Hung.), Eger, 1892; Karoly Széchy, *Life of Count Nicholas Zrinyi, the poet* (Hung.), Budapest, 1896; Sándor Körösi, *Zrinyi and Macchiavelli* (Hung.), Budapest, 1893. (R. N. B.)

ZSCHOKKE, JOHANN HEINRICH DANIEL (1771–1848), German author, was born at Magdeburg on the 22nd of March 1771. He was educated at the monasterial (*kloster*) school and at the Altstädter gymnasium of his native place. He spent some time as playwright with a company of strolling actors, but afterwards studied philosophy, theology and history at the university of Frankfort-on-the-Oder, where in 1792 he established himself as *Privatdozent*. He created much sensation by an extravagant novel, *Abällino, der grosse Bandit* (1793; subsequently also dramatized), modelled on Schiller's *Räuber*, and the melodramatic tragedy, *Julius von Sassen* (1796). The Prussian government having declined to make him a full professor, Zschokke in 1796 settled in Switzerland, where he conducted an educational institution in the castle of Reichenau. The authorities of the Grisons admitted him to the rights of a citizen, and in 1798 he published his *Geschichte des Freistaats der drei Bünde im hohen Rätien*. The political disturbances of this year compelled him to close his institution. He was, however, sent as a deputy to Aarau, where he was made president of the educational department, and afterwards as government commissioner to Unterwalden, his authority being ultimately extended over the cantons of Uri, Schwyz and Zug. Zschokke distinguished himself by the vigour of his administration and by the enthusiasm with which he devoted himself to the interests of the poorer classes of the community. In 1800 he reorganized the institutions of the Italian cantons and was appointed lieutenant-governor of the canton of Basel. Zschokke retired from public life when the central government at Bern proposed to re-establish the federal system, but after the changes effected by Bonaparte he entered the service of the canton of Aargau, with which he remained connected. In 1801 he attracted attention by his *Geschichte vom Kampfe und Untergange der schweizerischen Berg- und Wald-Kantone*. Through his *Schweizerbote*, the publication of which began in 1804, he exercised a wholesome influence on public affairs; and the like may be said of his *Miscellen für die neueste Weltkunde*, issued from 1807 to 1813. In 1811 he also started a monthly periodical, the *Erheiterungen*. He wrote various historical works, the most important of which is *Des Schweizerlandes Geschichte für das Schweizervolk* (1822, 8th ed. 1849). Zschokke's tales, on which his literary reputation rests, are collected in several series, *Bilder aus der Schweiz* (5 vols., 1824–25), *Ausgewählte Novellen und Dichtungen* (16 vols., 1838–39). The best known are: *Addrich im Moos* (1794); *Der Freihof von Aarau* (1794); *Alamontade* (1802); *Der Creole* (1830); *Das Goldmacherdorf* (1817); and *Meister Jordan* (1845). In *Stunden der Andacht* (1809–1816; 27 editions in Zschokke's lifetime), which was widely read, he expounded in a rationalistic spirit the fundamental principles of religion and morality. *Eine Selbstschau* (1842) is a kind of autobiography. Zschokke was not a great original writer, but he secured an eminent place in the literature of his time by his enthusiasm for modern ideas in politics and religion, by the sound, practical judgment displayed in his works, and by the energy and lucidity of his style. He died at his country house of Blumenhalde on the Aar on the 27th of June 1848.

An edition of Zschokke's selected works, in forty volumes, was issued in 1824–28. In 1851–54 an edition in thirty-five volumes was published. A new edition of the *Novellen* was published by A. Vögtlin in twelve volumes (1904). There are biographies of Zschokke by E. Münch (1831); Emil Zschokke (3rd ed. 1876); R. Sauerländer (Aarau, 1884); and R. Wernly (Aarau, 1894). See also M. Schneiderreit, *Zschokke, seine Weltanschauung und Lebensweisheit* (1904).

ZSCHOPAU, a town in the kingdom of Saxony, on the left bank of the Zschopau, 18 m. S.E. from Chemnitz by the railway to Annaberg. Pop. (1900) 6748. It contains a handsome parish church dedicated to St Martin, a town hall and a castle (Wildeck), built by the Emperor Henry I. in 932. The industries include ironfounding, cotton and thread-spinning, cloth-weaving and furniture making.

ZUCCARELLI, FRANCESCO (1702–1788), Italian painter, was born at Pitigliano in Tuscany, and studied in Rome under Onesi, Morandi, and Nelli. At Rome, and later in Venice, he became famous as one of the best landscape painters of the classicizing 18th century. Having visited England on a previous occasion, he was induced by some patrons to return thither in 1752, remaining until 1773, when he settled in Florence, dying there in 1788. Zuccarelli, who was one of the foundation members of the Royal Academy, enjoyed the patronage of royalty and of many wealthy English collectors, for whom he executed his principal works—generally landscapes with classic ruins and small figures. A large number of them are at Windsor Castle, and of the seven examples which formed part of the John Samuel collection two are now at the National Gallery. The royal palace in Venice contains as many as twenty-one, and the academy four. Others are at the Vienna Gallery and at the Louvre in Paris. His work was very unequal, but at his best he rivals the leading landscape painters of his time. His paintings often bear a mark representing a pumpkin, a pictorial representation of his name, which signifies "little pumpkin."

ZUCCARO, or Zucchero,[1] the name of two Italian painters.

I. Taddeo Zuccaro (1529–1566), one of the most popular painters of the so-called Roman mannerist school, was the son of Ottaviano Zuccaro, an almost unknown painter at St Angelo in Vado, where he was born in 1529. Taddeo found his way to Rome, and he succeeded at an early age in gaining a knowledge of painting and in finding patrons to employ him. When he was seventeen a pupil of Correggio, named Daniele da Parma, engaged him to assist in painting a series of frescoes in a chapel at Vitto near Sora, on the borders of the Abruzzi. Taddeo returned to Rome in 1548, and began his career as a fresco painter, by executing a series of scenes in monochrome from the life of Furius Camillus on the front of the palace of a wealthy Roman named Jacopo Mattei. From that time his success was assured, and he was largely employed by the popes Julius III. and Paul IV., by Della Rovere, duke of Urbino, and by other rich patrons. His best frescoes were a historical series painted on the walls of a new palace at Caprarola, built for Cardinal Alessandro Farnese, for which Taddeo also designed a great quantity of rich decorations in stucco relief after the style of Giulio Romano and other pupils of Raphael. Nearly all his paintings were in fresco, very large in scale, and often in *chiaroscuro* or monochrome; they were more remarkable for rapidity of execution and a certain boldness of style than for any higher qualities. His work is mannered in style, artificial and pompous in conception, and lacks any close or accurate knowledge of the human form and its movements. He died in Rome in 1566, and was buried in the Pantheon, not far from Raphael.

Taddeo's easel pictures are less common than his decorative frescoes. A small painting on copper of the Adoration of the Shepherds, formerly in the collection of James II., is now at Hampton Court; it is a work of very small merit. The Caprarola frescoes were engraved and published by Prenner, *Illustri Fatti Farnesiani Coloriti nel Real Palazzo di Caprarola* (Rome, 1748–50).

II. Federigo Zuccaro (1543–1609) was in 1550 placed under his brother Taddeo's charge in Rome, and worked as his assistant; he completed the Caprarola frescoes. Federigo attained an eminence far beyond his very limited merits as a painter, and was perhaps the most popular artist of his generation. Probably no other painter has ever produced so many enormous frescoes crowded with figures on the most colossal scale, all executed under the unfortunate delusion that grandeur of effect could be attained merely by great size combined with extravagance of attitude and exaggeration of every kind. Federigo's first work of this sort was the completion of the painting of the dome of the cathedral at Florence; the work had been begun by the art-historian Vasari, who wrote in the most generous language about his more successful rival. Regardless of the injury to the apparent scale of the interior of the church, Federigo painted about 300 figures, each nearly 50 ft. high, sprawling with violent contortions all over the surface. Happily age has so dimmed these pictures that their presence is now almost harmless. Federigo was recalled to Rome by Gregory XIII. to continue in the Pauline chapel of the Vatican the scheme of decoration begun by Michelangelo during his failing years, but a quarrel between the painter and members of the papal court led to his departure from Italy. He visited Brussels, and there made a series of cartoons for the tapestry-weavers. In 1574 he passed over to England, where he received commissions to paint the portraits of Queen Elizabeth, Mary, queen of Scots, Sir Nicholas Bacon, Sir Francis Walsingham, Lord High Admiral Howard, and others. A curious full-length portrait of Elizabeth in fancy dress, now at Hampton Court, is attributed to this painter, though very doubtfully. Another picture in the same collection appears to be a *replica* of his painting of the "Allegory of Calumny," as suggested by Lucian's description of a celebrated work by Apelles; the satire in the original painting, directed against some of his courtier enemies, was the immediate cause of Federigo's temporary exile from Rome. His success as a painter of portraits and other works in oil was more reasonable than the admiration expressed for his colossal frescoes. A portrait of a "Man with Two Dogs," in the Pitti Palace at Florence, is a work of some real merit, as is also the "Dead Christ and Angels" in the Borghese Gallery in Rome. Federigo was soon recalled to Rome to finish his work on the vault of the Pauline chapel. In 1585 he accepted an offer by Philip II. of Spain to decorate the new Escorial at a yearly salary of 2000 crowns, and worked at the Escorial from January 1586 to the end of 1588, when he returned to Rome. He there founded in 1595, under a charter confirmed by Sixtus V., the Academy of St Luke, of which he was the first president. Its organization suggested to Sir Joshua Reynolds his scheme for founding the English Royal Academy.

Like his contemporary Giorgio Vasari, Federigo aimed at being an art critic and historian, but with very different success. His chief book, *L'Idea de' Pittori, Scultori, ed Architetti* (Turin, 1607), is a senseless mass of the most turgid bombast. Little can be said in praise of his smaller works, consisting of two volumes printed at Bologna in 1608, describing his visit to Parma and a journey through central Italy. Federigo was raised to the rank of a *cavaliere* not long before his death, which took place at Ancona in 1609.

For both Taddeo and Federigo Zuccaro, see Vasari, pt. iii., and Lanzi, *Storia Pittorica*, Roman School, epoch iii. (J. H. M.)

ZUG (Fr. *Zoug*), a canton of central Switzerland. It is the smallest undivided canton, both as regards area and as regards population. Its total area is but 92·3 sq. m., of which, however, no fewer than 75·1 sq. m. are reckoned as "productive," forests covering 19·9 sq. m. Of the rest 10 sq. m. are occupied by the cantonal share of the lake of Zug (*q.v.*), and 2¾ sq. m. by the lake of Aegeri, which is wholly within the canton.

It includes the fertile strips on the eastern and western shores of the lower portion of the lake of Zug, together with the alluvial plain at its northern extremity. The lower range, culminating in the Zugerberg (3255 ft.), and the Wildspitz (5194 ft.), the highest summit of the Rossberg, that rises east of the lake of Zug, separates it from the basin and lake of Aegeri, as well as from the hilly district of Menzingen. The Lorze issues from the lake of Aegeri, forces its way through moraine deposits in a deep gorge with fine stalactite caverns and falls into the lake of Zug, issuing from it very soon to flow into the Reuss. The canton thus belongs to the hilly, not to the mountainous, Swiss cantons, but as it commands the entrance to the higher ground it has a certain strategical position. Railways connect it both with Lucerne and with Zürich, while lines running along either shore of the lake of Zug join at the Arth-Goldau station of the St Gotthard railway. On the eastern shore of the lake of Aegeri, and within the territory of the canton, is the true site of the famous battle of Morgarten (*q.v.*) won by the Swiss in 1315. Till 1814 Zug was in the diocese of Constance, but on the reconstruction of the diocese of Basel in 1828 it was assigned to it. In 1900 the population of the canton was 25,093, of whom 24,042 were German-speaking, 819 Italian-speaking, and 157 French-speaking, while 23,362 were Romanists, 1701 Protestants, and 19 Jews. Its capital is Zug, while the manufacturing village of Baar, 2 m. N., had 4484 inhabitants, and the village of Cham, 3 m. N.W., had 3025 inhabitants. In both cases the environs of the villages are included, and this is even more the case with the wide-spreading parishes of Unter Aegeri with 2593 inhabitants, of Menzingen with 2495 inhabitants, and the great school for girls and female teachers, founded in 1844 by Father Theodosius Florentini, and of Ober Aegeri with 1891 inhabitants.

In the higher regions of the canton the population is mainly engaged in pastoral pursuits and cattle-breeding. There are 61 "alps," or high pastures, in the canton. At Cham is a well-known factory of condensed milk, now united with that of Nestlé of Vevey. At Baar there are extensive cotton-spinning mills and other factories. Round the town of Zug there are great numbers of fruit trees, and "*Kirschwasser*" (cherry-water) and cider are largely manufactured. Apiculture too flourishes greatly. A number of factories have sprung up in the new quarter of the town, but the silk-weaving industry has all but disappeared. The canton forms a single administrative district, which comprises eleven communes. The legislature, or *Kantonsrat*, has one member to every 350 inhabitants, and the seven members of the executive, or *Regierungsrat*, are elected directly by popular vote, proportional representation obtaining in both cases if more than two members are to be elected in the same electoral district to posts in the same authority. The term of office in both cases is four years. Besides the "facultative Referendum" by which, in case of a demand by one-third of the members of the legislative assembly, or by 800 citizens, any law, and any resolution involving a capital expenditure of 40,000, or an annual one of 10,000 francs, must be submitted to a direct popular vote, and the "initiative" at the demand of 1000 citizens in case of amendments to the cantonal constitution; there is also an "initiative" in case of bills, to be exercised at the demand of 800 citizens. The two members of the Federal *Ständerat*, as well as the one member of the Federal *Nationalrat*, are also elected by a popular vote.

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[1] So spelt by Vasari.

The earlier history of the canton is practically identical with that of its capital Zug (see below). From 1728 to 1738 it was distracted by violent disputes about the distribution of the French pensions. In 1798 its inhabitants opposed the French, and the canton formed part of the Tellgau, and later of one of the districts of the huge canton of the Waldstätten in the Helvetic republic. In 1803 it regained its independence as a separate canton, and by the constitution of 1814 the "Landsgemeinde," or assembly of all the citizens, which had existed for both districts since 1376, became a body of electors to choose a cantonal council. The reform movement of 1850 did not affect the canton, which in 1845 was a member of the Sonderbund and shared in the war of 1847. In 1848 the remaining functions of the Landsgemeinde were abolished. Both in 1848 and in 1874 the canton voted against the acceptance of the federal constitutions. The constitution of 1873–76 was amended in 1881, and was replaced by a new one in 1894.

AUTHORITIES.—J. J. Blumer, *Staats- und Rechtsgeschichte der schweiz. Demokratien*, 3 vols. (St. Gall, 1850–9); *Geschichtsfreund*, from 1843; A. Lütolf, *Sagen, Bräuche, Legenden aus den fünf Orten* (Lucerne, 1862); Achille Renaud, *Staats- und Rechtsgeschichte d. Kant. Zug* (Pforzheim, 1847); H. Ryffel, *Die schweiz. Landsgemeinden* (Zürich, 1903); F. K. Stadlin, *Die Topographie d. Kant. Zug*, 4 parts (Lucerne, 1819–24); B. Staub, *Der Kant. Zug*, 2nd ed. (Zug, 1869); A. Strüby, *Die Alp- und Weidewirthschaft im Kant. Zug* (Soleure, 1901); and the *Zugerisches Neujahrsblatt* (Zug from 1882). (W. A. B. C.)

ZUG, capital of the Swiss canton of that name, a picturesque little town at the N.E. corner of the lake of Zug, and at the foot of the Zugerberg (3255 ft.), which rises gradually, its lower slopes thickly covered with fruit trees. Pop. (1900) 6508, mainly German-speaking and Romanists. The lake shore has been embanked and forms a promenade, whence glorious views of the snowy peaks of the Bernese Oberland, as well as of the Rigi and Pilatus, are gained. Towards its northerly end a monument marks the spot where a part of the shore slipped into the lake in 1887. The older part of the town is rather crowded together, though only four of the wall towers and a small part of the town walls still survive. The most striking old building in the town is the parish church of St Oswald (late 15th century), dedicated to St Oswald, king of Northumbria (d. 642), one of whose arms was brought to Zug in 1485. The town hall, also a 15th-century building, now houses the Historical and Antiquarian Museum. There are some quaint old painted houses close by. A little way higher up the hill-side is a Capuchin convent in a striking position, close to the town wall and leaning against it. Still higher, and outside the old town, is the fine new parish church of St Michael, consecrated in 1902. The business quarter is on the rising ground north of the old town, near the railway station. Several fine modern buildings rise on or close to the shore in the town and to its south, whilst to the south-west is a convent of Capuchin nuns, who manage a large girls' school, and several other educational establishments.

The town, first mentioned in 1240, is called an "*oppidum*" in 1242, and a "*castrum*" in 1255. In 1273 it was bought by Rudolph of Habsburg from Anna, the heiress of Kyburg and wife of Eberhard, head of the cadet line of Habsburg, and in 1278 part of its territory, the valley of Aegeri, was pledged by Rudolph as security for a portion of the marriage gift he promised to Joanna, daughter of Edward I. of England, who was betrothed to his son Hartmann, whose death in 1281 prevented the marriage from taking place. The town of Zug was governed by a bailiff appointed by the Habsburgs, and a council, and was m[illegible]t family. Several country districts (Baar, Menzingen, and Aegeri) had each its own "Landsgemeinde" but were governed by one bailiff, also appointed by the Habsburgs; these were known as the "Aeusser Amt," and were always favourably disposed to the Confederates. On the 27th of June 1352 both the town of Zug and the Aeusser Amt entered the Swiss Confederation, the latter being received on exactly the same terms as the town, and not, as was usual in the case of country districts, as a subject land; but in September 1352 Zug had to acknowledge its own lords again, and in 1355 to break off its connexion with the league. About 1364 the town and the Aeusser Amt were recovered for the league by the men of Schwyz, and from this time Zug took part as a full member in all the acts of the league. In 1379 the German king Wenceslaus exempted Zug from all external jurisdictions, and in 1389 the Habsburgs renounced their claims, reserving only an annual payment of twenty silver marks, and this came to an end in 1415. In 1400 Wenceslaus gave all criminal jurisdiction to the town only. The Aeusser Amt then, in 1404, claimed that the banner and seal of Zug should be kept in one of the country districts, and were supported in this claim by Schwyz. The matter was finally settled in 1414 by arbitration and the banner was to be kept in the town. Finally in 1415 the right of electing their "landammann" was given to Zug by the Confederates, and a share in the criminal jurisdiction was granted to the Aeusser Amt by the German king Sigismund. In 1385 Zug joined the league of the Swabian cities against Leopold of Habsburg and shared in the victory of Sempach, as well as in the various Argovian (1415) and Thurgovian (1460) conquests of the Confederates, and later in those in Italy (1512); having already taken part in the occupation of the Val d'Ossola. Between 1379 (Walchwil) and 1477 (Cham) Zug had acquired various districts in her own neighbourhood, principally to the north and the west, which were ruled till 1798 by the town alone as subject lands. At the time of the Reformation Zug clung to the old faith and was a member of the "Christliche Vereinigung" of 1529. In 1586 it became a member of the Golden League. (W. A. B. C.)

ZUG, LAKE OF, one of the minor Swiss lakes, on the outskirts of the Alps and N. of that of Lucerne. Probably at some former date it was connected by means of the Lake of Lowerz and the plain of Brunnen with the Lake of Lucerne. At present it is formed by the Aa, which descends from the Rigi and enters the southern extremity of the lake. The Lorze pours its waters into the lake at its northern extremity, but 1¼ m. further W. issues from the lake to pursue its course towards the Reuss. The Lake of Zug has an area of about 15 sq. m., is about 9 m. in length, 2½ m. in breadth, and has a maximum depth of 650 ft., while its surface is 1368 ft. above sea-level. For the most part the lake is in the Canton of Zug, but the southern end is, to the extent of 3¾ sq. m., in that of Schwyz, while the Canton of Lucerne claims about ¾ sq. m., to the N. of Immensee. Toward the S.W. extremity of the lake the Rigi descends rather steeply to the water's edge, while part of its east shore forms a narrow level band at the foot of the Rossberg (5194 ft.) and the Zugerberg. At its northern end the shores are nearly level, while on the west shore the wooded promontory of Buonas (with its castles, old and new) projects picturesquely into the waters. The principal place on the lake is the town of Zug, whence a railway (formerly part of the St Gotthard main route) runs along its eastern shore past Walchwil to Arth at its south end, which is connected by a steam tramway with the Arth-Goldau station of the St Gotthard line. This line runs from Arth along the western shore to Immensee, where it bears S.W. to Lucerne, while from Immensee another railway leads (at first some way from the shore) to Cham, 3 m. W. of Zug. The first steamer was placed on the lake in 1852. Many fish (including pike and carp of considerable weights) are taken in the lake, which is especially famous by reason of a peculiar kind of trout (*Salmo salvelinus*, locally called *Rötheli*). (W. A. B. C.)

ZUHAIR [Zuhair ibn Abī Sulmā Rabī'a ul-Muzanī] (6th century), one of the six great Arabian pre-Islamic poets. Of his life practically nothing is known save that he belonged to a family of poetic power; his stepfather, Aus ibn Hajar, his sister, Khansā, and his son, Ka'b ibn Zuhair, were all poets of eminence. He is said to have lived long, and at the age of one hundred to have met Mahomet. His home was in the land of the Banī Ghatafān. His poems are characterized by their peaceful nature and a sententious moralizing. One of them is contained in the *Moallakāt.*

As a whole his poems have been published by W. Ahlwardt in his *The Diwans of the six Ancient Arabic Poets* (London, 1870); and with the commentary of al-A'lam (died 1083) by Count Landberg in the second part of his *Primeurs arabes* (Leiden, 1889). Some supplementary poems are contained in K. Dyroff's *Zur Geschichte der Überlieferung des Zuhairdiwans* (Munich, 1892). (G. W. T.)

ZUIDER ZEE, or ZUYDER ZEE, a land-locked inlet on the coast of Holland, bounded N. by the chain of the Frisian Islands, and W., S., and E. by the provinces of North Holland, Utrecht, Gelderland, Overysel, and Friesland. It is about 85 m. long N. to S., and from 10 to 45 m. broad, with an area of 2027 sq. m., and contains the islands of Marken, Schokland, Urk, Wieringen, and Griend. In the early centuries of the Christian era the Zuider (*i.e.* Southern) Zee was a small inland lake situated in the southern part of the present gulf, and called *Flevo* by Tacitus, Pliny, and other early writers. It was separated from the sea by a belt of marsh and fen uniting Friesland and North Holland, the original coast-line being still indicated by the line of the Frisian Islands. Numerous streams, including the Vecht, Eem, and Ysel, discharged their waters into this lake and issued thence as the Vlie (Latin *Flevus*), which reached the North Sea by the Vliegat between the islands of Vlieland and Terschelling. In the *Lex Frisonum* the Vlie (Fli, or Flehi) is accepted as the boundary between the territory of the East and West Frisians. In time, however, and especially during the 12th century, high tides and north-west storms swept away the western banks of the Vlie and submerged great tracts of land. In 1170 the land between Stavoren, Texel, and Medemblik was washed away, and a century later the Zuider Zee was formed. The open waterway between Stavoren and Enkhuizen, however, as it now exists, dates from 1400. In the south and east the destruction was arrested by the high sandy shores of Gooi, Veluwe, Voorst, and Gasterland in the provinces of Utrecht, Gelderland, Overysel, and Friesland respectively.

The mean depth of the Zuider Zee is 11·48 ft.; depth in the southern basin of the former lake, 19 ft.; at Val van Urk (deep water to the west of the island of Urk), 14½ ft. If a line be drawn from the island of Urk to Marken, and thence westwards to Hoorn (North Holland) and N.N.E. to Lemmer (Friesland), these lines will connect parts of the Zuider Zee having a uniform depth of 8 ft. The other parts on the coast are only 3 ft. deep or less. This shallowness of its waters served to protect the Zuider Zee from the invasion of large ships of war. It also explains how many once flourishing commercial towns, such as Stavoren, Medemblik, Enkhuizen, Hoorn, Monnikendam, declined to the rank of provincial trading and fishing ports. The fisheries of the Zuider Zee are of considerable importance. Eighty per cent. of the bottom consists of sea clay and the more recent silt of the Ysel; 20 per cent. of sand, partly in the north about Urk and Enkhuizen, partly in the south along the high shores of Gooi, Veluwe, &c. The shallowness of the sea and the character of its bottom, promising fertile soil, occasioned various projects of drainage. The scheme recommended by the Zuider Zee Vereeniging (1886) formed the subject of a report in 1894 by a state commission. The principal feature in the scheme was the building of a dike from the island of Wieringen to the coast of Friesland. The area south of this would be divided into four polders, with reservation, however, of a lake, Yselmeer, in the centre, whence branches would run to Ysel and the Zwolsche Diep, to Amsterdam, and, by sluices near Wieringen, to the northern part of the sea. The four polders with their areas of fertile soil would be:—

(1)	North-west	polder,	area	53,599	acres;	fertile	soil,	46,189	acres.
(2)	South-west	"	"	77,854	"	"	"	68,715	"
(3)	South-east	"	"	266,167	"	"	"	222,275	"
(4)	North-east	"	"	125,599	"	"	"	120,783	"

The Lake Yselmeer would have an area of 560 sq. m. The gain would be the addition to the kingdom of a new and fertile province of the area of North Brabant, a saving of expenses on dikes, diminution of inundations, improvement of communication between the south and the north of the kingdom, protection of isles of the sea, &c. The costs were calculated as follows: (1) enclosing dike, sluices, and regulation of Zwolsche Diep, £1,760,000; (2) reclamation of four polders, £5,200,000; (3) defensive works, £400,000; (4) indemnity to fishermen, £180,000; total, £7,540,000.

In 1901 the government introduced a bill in the States General, based on the recommendations of the commission, providing for enclosing the Zuider Zee by building a dike from the North Holland coast, through the Amsteldiep to Wieringen and from that island to the Friesland coast at Piaam; and further providing for the draining of two portions of the enclosed area, namely the N.W. and the S.W. polders shown in the table. The entire work was to be completed in 18 years at an estimated cost of £7,916,000. The bill failed to become law and in consequence of financial difficulties the project had not, up to 1910, advanced beyond the stage of consideration.

With the exception of Griend and Schokland, the islands of the Zuider Zee are inhabited by small fishing communities, who retain some archaic customs and a picturesque dress. Urk is already mentioned as an island in 966. The inhabitants of Schokland were compelled to leave the island by order of the state in 1859, it being considered insecure from inundation. The island of Griend (or Grind) once boasted a walled town, which was destroyed by flood at the end of the 13th century. But the island continued for some centuries to serve as a pasturage for cattle, giving its name to a well-known description of cheese. Like some of the other islands, sheep are still brought to graze upon it in summer, and a large number of birds' eggs are collected upon it in spring. Several of the islands were once the property of religious houses on the mainland.

The British Foreign Office report, *Draining of the Zuiderzee* (1901), gives full particulars of the Dutch government's scheme and a retrospect of all former proposals. See also *De economische beteekens van de afsluiting en drooglegging der Zuiderzee vom Zuiderzee-Verein* (2nd ed., 1901), and D. Bellet, "Le dessèchement du Zuiderzee," *Rev. Geog.* (1902) and W. J. Tuyn, *Oude Hollandsche Dorpen aan de Zuiderzee* (Haarlem, 1900).

ZULA, a small town near the head of Annesley Bay on the African coast of the Red Sea. It derives its chief interest from ruins in its vicinity which are generally supposed to mark the site of the ancient emporium of Adulis (Ἄδουλις, Ἀδουλεί), the port of Axum (*q.v.*) and chief outlet in the early centuries of the Christian era for the ivory, hides, slaves and other exports of the interior. Cosmas Indicopleustes saw here an inscription of Ptolemy Euergetes (247–222 B.C.); and hence, as the earliest mention of Adulis is found in the geographers of the first century A.D., it is conjectured that the town must have previously existed under another name and may have been the Berenice Panchrysus of the Ptolemies. Described by a Greek merchant of the time of Vespasian as "a well-arranged market," the place has been for centuries buried under sand. The ruins visible include a temple, obelisks and numerous fragments of columns.

In 1857 an agreement was entered into by Dejaj Negusye, a chief of Tigré, in revolt against the Negus Theodore of Abyssinia, to cede Zula to the French. Negusye was defeated by Theodore, and the commander of a French cruiser sent to Annesley Bay in 1859 found the country in a state of anarchy. No farther steps were taken by France to assert its sovereignty, and Zula with the neighbouring coast passed, nominally, to Egypt in 1866. Zula was the place where the British expedition of 1867–68 against Theodore disembarked, Annesley Bay affording safe and ample anchorage for the largest ocean-going vessels. The road made by the British from Zula to Senafé on the Abyssinian plateau is still in use. The authority of Egypt having lapsed, an Italian protectorate over the district of Zula was proclaimed in 1888, and in 1890 it was incorporated in the colony of Eritrea (*q.v.*).

See Eduard Rüppell, *Reise in Abyssinien*, i. 266 (1838); G. Rohlfs in *Zeitschr. d. Gesell. f. Erdkunde in Berlin*, iii. (1868), and, for further references, the editions of the *Periplus* by C. Müller (*Geog. Gr. Min.*, i. 259) and Fabricius (1883). Consult also ETHIOPIA: *The Axumite Kingdom.*

ZULOAGA, IGNACIO (1870–), Spanish painter, was born at Eibar, in the Basque country, the son of the metal-worker and damascener Placido Zuloaga, and grandson of the organizer and director of the royal armoury in Madrid. The career chosen for him by his father was that of an architect, and with this object in view he was sent to Rome, where he immediately followed the strong impulse that led him to painting. After only six months' work he completed his first picture, which was exhibited at the Paris Salon of 1890. Continuing his studies in Paris, he was strongly influenced by Gauguin and Toulouse Lautrec. Only on his return to his native soil he found his true style, which is based on the national Spanish tradition embodied in the work of Velazquez, Zurbaran, El Greco, and Goya. His own country was slow in acknowledging the young artist whose strong, decorative, rugged style was the very negation of the aims of such well-known modern Spanish artists as Fortuny, Madrazo, and Benlliure. It was first in Paris, and then in Brussels and other continental art centres, that Zuloaga was hailed by the reformers as the regenerator of Spanish national art and as the leader of a school. He is now represented in almost every great continental gallery. Two of his canvases are at the Luxembourg, one at the Brussels Museum ("Avant la Corrida"), and one ("The Poet Don Miguel") at the Vienna Gallery. The Pau Museum owns an interesting portrait of a lady, the Barcelona Municipal Museum the important group "Amies," the Venice Gallery, "Madame Louise"; the Berlin Gallery, "The Topers." Other examples are in the Budapest, Stuttgart, Ghent and Posen galleries and in many important private collections.

A fully illustrated account of the artist and his work, by M. Utrillo, was published in a special number of *Forma* (Barcelona, 1907).

ZULULAND, a country of south-east Africa, forming the N.E. part of the province of Natal in the Union of South Africa. The "Province of Zululand," as it was officially styled from 1898 to 1910, lies between 26° 50′ and 29° 15′ S. and 30° 40′ and 33° E., and has an area of 10,450 sq. m. It includes in the north the country of the Ama Tonga, Zaambanland, and other small territories not part of the former Zulu kingdom and stretches north from the lower Tugela to the southern frontier of Portuguese East Africa. Bounded S.E. by the Indian Ocean it has a coast line of 210 m. North and north-west it is bounded by the Utrecht and Vryheid districts of Natal and by Swaziland. Its greatest length in a direct line is 185 m., its greatest breadth 105 m. (For map see SOUTH AFRICA.)

Physical Features.—Zululand is part of the region of hills and plateaus which descend seaward from the Drakensberg—the great mountain chain which buttresses the vast tableland of inner South Africa. The coast, which curves to the N.E., is marked by a line of sandhills covered with thick bush and rising in places to a height of 500 ft. There are occasional outcrops of rock and low perpendicular cliffs. Behind the sandhills is a low-lying plain in which are a number of shallow lagoons. Of these St Lucia Lake and Kosi Lake are of considerable size and communicate with the sea by estuaries. St Lucia, the larger of the two, is some 35 m. long by 10 m. broad with a depth of 9 to 10 ft. It runs parallel to the ocean, from which it is separated by sandhills. The opening to the sea, St Lucia river, is at the south end. Kosi Lake lies further north, in Tongaland. It is not more than half the size of St Lucia and its opening to the sea is northward. Between Kosi and St Lucia lakes lies Lake Sibayi, close to the coast but not communicating with the sea. The coast plain extends inland from 5 to 30 m., increasing in width northward, the whole of Tongaland being low lying. The rest of the country is occupied by ranges of hills and plateaus 2000 to 4000 ft. above sea level. Behind Eshowe, in the south, are the Entumeni Hills (3000 ft.), beyond which stretch the Nkandhla uplands (rising to 4500 ft.) densely wooded in parts and abounding in flat-topped hills with precipitous sides. Westward of the uplands are the Kyudeni Hills (5000 ft.), also densely wooded, situated near the junction of the Buffalo and Tugela rivers. Further north, along the S.W. frontier, are Isandhlwana and the Nqutu hills. To the N.W. the Lebombo Mts. (1800 to 2000 ft.), which separate the coast plains from the interior, mark the frontier between Swaziland and Zululand. On their eastern (Zululand) side the slope of the Lebombo mountains is gentle, but on the west they fall abruptly to the plain.

The geological structure of the country is comparatively simple, consisting in the main of plateaus formed of sedimentary rocks, resting on a platform of granitic and metamorphic rocks (see NATAL: *Geology*).

The country is well watered. Rising in the high tablelands or on the slopes of the Drakensberg or Lebombo mountains the rivers in their upper courses have a great slope and a high velocity. In the coast plains they become deep and sluggish. Their mouths are blocked by sand bars, which in the dry season check their flow and produce the lagoons and marshes which characterize the coast. After the rains the rivers usually clear the bars for a time. The following are the chief rivers in part or in whole traversing the country:—The Pongola, in its lower course, flows through Tongaland, piercing the Lebombo Mts. through a deep, narrow gorge with precipitous sides. Its point of confluence with the Maputa (which empties into Delagoa Bay) marks the parallel along which the frontier between Zululand and Portuguese East Africa is drawn. The Umgavuma which rises in Swaziland and also pierces the Lebombo, joins the Pongola about ten miles above its confluence with the Maputa. The Umkuzi which rises in the Vryheid district of Natal forces its way through the Lebombo Mts. at their southern end and flows into the northern end of St Lucia Lake. The Umfolosi, with two main branches, the Black and White Umfolosi, drains the central part of the country and reaches the ocean at St Lucia Bay. In the bed of the White Umfolosi are dangerous quicksands. Farther south the Umhlatuzi empties into a lagoon which communicates with the ocean by Richards Bay. For a considerable part of their course the Blood, Buffalo and Tugela rivers form the S.W. frontier of Zululand (see TUGELA). There are numerous other rivers—every valley has its stream, for the most part unnavigable.

Climate.—The climate of the coast belt is semi-tropical and malaria is prevalent; that of the highlands temperate. The summer is the rainy season, but in the higher country snow and sleet are not uncommon in the winter months of May, June and July. On the coast about 40 in. of rain fall in the summer months and about 7 in. in the winter months. A fresh S.E. wind is fairly constant in the inland regions during the middle of the day. A hot wind from the N.W. is occasionally experienced in the highlands.

Flora and Fauna.—The coast plain (in large part), the river valleys, and the eastern sides of the lower hills are covered with mimosa and other thorn trees. This is generally known as thornbush and has little undergrowth. "Coast forests" grow in small patches along the lower courses of the rivers, at their mouths, and on the sandhills along the coast. They contain stunted timber trees, palms, mangroves and other tropical and sub-tropical plants and have an almost impenetrable undergrowth. The largest coast forest is that of Dukuduku, some 9 m. by 15 m. in extent, adjacent to St Lucia Bay. The upland regions are those of high timber forests, the trees including the yellow-wood and iron-wood. The most noteworthy timber forests are those of Nkandhla and Kyudeni and that near Eshowe. Large areas of the plateau are covered with grass and occasional thorn trees. Orchids are among the common flowers.

The fauna includes the lion and elephant, found in the neighbourhood of the Portuguese frontier (the lion was also found as late as 1895 in the Ndwandwe district), the white and the black rhinoceros, the leopard, panther, jackal, spotted hyena, aard-wolf, buffalo, zebra, gnu, impala, inyala, oribi, hartebeeste, kudu, springbok, waterbuck, eland, roan antelope, duiker, &c., hares and rabbits. Hippopotami are found on the coast, and alligators are common in the rivers and lagoons of the low country. Venomous snakes abound. The great kori bustard, the koorhan, turkey buzzards (known as *insingisi*), wild duck, and paauw are among the game birds. The ostrich and secretary-bird are also found. Of domestic animals the Zulus possess a dwarf breed of smooth-skinned humped cattle. Locusts are an occasional pest.

Inhabitants.—The population in 1904 was estimated at 230,000. Of these only 5635 lived outside the area devoted to native locations. The white population numbered 1693. The vast majority of the natives are Zulu (see KAFFIRS), but there is a settlement of some 2000 Basutos in the Nqutu district. After the establishment of the Zulu military ascendancy early in the 19th century various Zulu hordes successively invaded and overran a great part of east-central Africa, as far as and even beyond the Lake Nyasa district. Throughout these regions they are variously known as Ma-Zitu, Ma-Ravi, Wa-Ngoni (Angoni), Matabele (Ame-Ndebeli), Ma-Viti, and Aba-Zanzi. Such was the terror inspired by these fierce warriors that many of the tribes, such as the Wa-Nindi of Mozambique, adopted the name of their conquerors or oppressors. Hence the impression that the true Zulu are far more numerous north of the Limpopo than has ever been the case. In most places they have become extinct or absorbed in the surrounding populations owing to their habit of incorporating prisoners in the tribe. But they still hold their ground as the ruling element in the region between the Limpopo and the middle Zambezi, which from them takes the name of Matabeleland. The circumstances and history of the two chief migrations of Zulu peoples northward are well known; the Matabele were led by Mosilikatze (Umsiligazi), and the Angoni by Sungandaba, both chiefs of Chaka who revolted from him in the early 19th century.

The Zulu possess an elaborate system of laws regulating the inheritance of personal property (which consists chiefly of cattle), the complexity arising from the practice of polygamy and the exchange of cattle made upon marriage. The giving of cattle in the latter case is generally referred to as a barter and sale of the bride, from which indeed it is not easily distinguishable. But it is regarded in a different light by the natives. The kraal is under the immediate rule of its headman, who is a patriarch responsible for the good behaviour of all its members. Over the headman, whose authority may extend to more than one kraal, is the tribal chief, and above the tribal chief was the king, whose authority is now exercised by a British commissioner. By the custom of *hlonipa* a woman carefully avoids meeting her husband's parents or the utterance of any word which occurs in the names of the principal members of her husband's family: *e.g.* if she have a brother-in-law named U'Nkomo, she would not use the Zulu for "cow," *inkomo*, but would invent some other word for it. The husband observes the same custom with regard to his mother-in-law. The employment of "witch doctors" for "smelling out" criminals or *abatagati* (usually translated "wizards," but meaning evildoers of any kind, such as poisoners), once common in Zululand, as in neighbouring countries, was discouraged by Cetywayo, who established "kraals of refuge" for the reception of persons rescued by him from condemnation as *abatagati*. "Smelling out" was finally suppressed by the British in the early years of the 20th century. (For the Zulu speech, see BANTU LANGUAGES.)

Towns.—The Zulus live in kraals, circular enclosures with, generally, a ring fence inside forming a cattle pen. Between this fence and the outer fencing are the huts of the inhabitants. The royal kraal for a considerable period was at Ulundi, in the valley of the White Umfolosi. The last king to occupy it was Cetywayo; Dinizulu's kraal was farther north near the Ndwandwe magistracy. The chief white settlements are Eshowe and Melmoth. Eshowe (pop. 1904, 1855 of whom 570 were whites) is about 95 m. N.E. of Durban, lies 15 m. inland and some 1800 ft. above the sea. Eshowe is 2 m. W. of the mission station of the same name in which Col. Pearson was besieged by the Zulus in 1879, and was laid out in 1883. It is picturesquely situated on a well-wooded plateau and has a bracing climate. Two hundred acres of forest land in the centre of the town have been reserved as a natural park. Melmoth, 25 m. N.N.E. of Eshowe, lies in the centre of a district farmed by Boers. Somkele is the headquarters of the St Lucia coal-fields district. Nkandhla is a small settlement in the south-west of the country.

Communications.—Notwithstanding its 210 m. of coast-line Zululand possesses no harbours. Thirty-six miles N.E. of the mouth of the Tugela there is, however, fairly safe anchorage, except in S.S.W. or W. winds, about 1500 yds. from the shore. The landing-place is on the open sandy beach, where a small stream enters the sea. This landing-place is dignified with the name of Port Durnford. It was used to land stores in the war of 1879. Well-made roads connect all the magistracies. The Tugela is crossed by well-known drifts, to which roads from Natal and Zululand converge. Two, the Lower Tugela and Bond's Drift, are both near the mouth of the river. The Middle Drift is 36 m. in a direct line above the mouth of the Tugela. Rorke's Drift, 48 m., also in a direct line, above the Middle Drift, is a crossing of the Buffalo river a little above the Tugela confluence. A railway, completed in 1904, which begins at Durban and crosses into Zululand by a bridge over the Tugela near the Lower Drift, runs along the coast belt over nearly level country to the St Lucia coal-fields in Hlabisa magistracy—167 m. from Durban, of which 98 are in Zululand. There is telegraphic communication between the magistracies and townships and with Natal.

Industries.—The Zulu gives little attention to the cultivation of the soil. Their main wealth consists in their herds of cattle and flocks of sheep. They raise, however, crops of maize, millet, sweet potatoes and tobacco. Sugar, tea and coffee are grown in the coast belt by whites. Anthracite is mined in the St Lucia Bay district, and bituminous coal is found in the Nqutu and Kyudeni hills. Gold, iron, copper and other minerals have also been found, but the mineral wealth of the country is undeveloped. There is a considerable trade with the natives in cotton goods, &c., and numbers of Zulu seek service in Natal. (Trade statistics are included in those of Natal.)

Administration.—Zululand for provincial purposes is governed by the provincial council of Natal; otherwise it is subject to the Union parliament, to which it returns one member of the House of Assembly. It was formerly represented in the Natal legislature by three members, one member sitting in the Legislative Council, and two being elected to the Legislative Assembly, one each for the districts of Eshowe and Melmoth. Their selection and election were governed by the same laws as in Natal proper, and on the establishment of the Union the franchise qualifications—which practically exclude natives—remained unaltered. The parliamentary voters in 1910 numbered 1442. The executive power is in the hands of a civil commissioner whose residence is at Eshowe. Zululand is divided into eleven magistracies, and the district of Tongaland (also called Mputa or Amaputaland). In the magistracies the authority of the chiefs and *indunas* (headmen) is exercised under the control of resident magistrates. The Ama-Tonga enjoy a larger measure of home rule, but are under the general supervision of the civil commissioner. The Ingwavuma magistracy, like Tongaland, formed no part of the dominions of the Zulu kings, but was ruled by independent chiefs until its annexation by Great Britain in 1895.

With the exception of the townships and a district of Emtonjaneni magistracy known as "Proviso B,"[1] mainly occupied by Boer farmers, all the land was vested in the crown and very little has been parted with to Europeans. The crown lands are, in effect, native reserves. A hut tax of 14s. per annum is levied on all natives. The tax has to be paid for each wife a Zulu may possess, whether or not each wife has a separate hut. Since 1906 a poll tax of £1 a head is also levied on all males over eighteen, European or native.

History.—At what period the Zulu (one of a number of closely allied septs) first reached the country to which they have given their name is uncertain; they were probably settled in the valley of the White Umfolosi river at the beginning of the 17th century, and they take their name from a chief who flourished about that time. The earliest record of contact between Europeans and the Zulu race is believed to be the account of the wreck of the "Doddington" in 1756. The survivors met with hospitable treatment at the hands of the natives of Natal, and afterwards proceeded up the coast to St Lucia Bay. They describe the natives as "very proud and haughty, and not so accommodating as those lately left." They differed from the other natives in the superior neatness of their method of preparing their food, and were more cleanly in their persons, bathing every morning, apparently as an act of devotion. Their chief pride seemed to be to keep their hair in order. It is added that they watched strictly over their women.

Rise of the Zulu nation.

Chaka.

At the close of the 18th century the Zulu were an unimportant tribe numbering a few thousands only. At that time the most powerful of the neighbouring tribes was the Umtetwa (mTetwa or Aba-Tetwa) which dwelt in the country north-east of the Tugela. The ruler of the Umtetwa was a chief who had had in early life an adventurous career and was known as Dingiswayo (the Wanderer). He had lived in Cape Colony, and there, as is supposed, had observed the manner in which the whites formed their soldiers into disciplined regiments. He too divided the young men of his tribe into *impis* (regiments), and the Umtetwa became a formidable military power. Dingiswayo also encouraged trade and opened relations with the Portuguese at Delagoa Bay, bartering ivory and oxen for brass and beads. In 1805 he was joined by Chaka, otherwise Tshaka (born *c.* 1783), the son of the Zulu chief Senzangakona; on the latter's death in 1810 Chaka, through the influence of Dingiswayo, was chosen as ruler of the Ama-Zulu, though not the rightful heir. Chaka joined in his patron's raids, and in 1812 the Umtetwa and Zulu drove the Amangwana across the Buffalo river. About this time Dingiswayo was captured and put to death by Zwide, chief of the Undwandwe clan, with whom he had waged constant war. The Umtetwa army then placed themselves under Chaka, who not long afterwards conquered the Undwandwe. By the incorporation of these tribes Chaka made of the Zulu a powerful nation. He strengthened the regimental system adopted by Dingiswayo and perfected the discipline of his army. A new order of battle was adopted—the troops being massed in crescent formation, with a reserve in the shape of a parallelogram ready to strengthen the weakest point.[2] Probably Chaka's greatest innovation was the introduction of the stabbing assegai. The breaking short of the shaft of the assegai when the weapon was used at close quarters was already a common practice among the Ama-Zulu, but Chaka had the shaft of the assegais made short, and their blades longer and heavier, so that they could be used for cutting or piercing. At the same time the size of the shield was increased, the more completely to cover the body of the warrior. Military kraals were formed in which the warriors were kept apart. Members of a regiment were of much the same age, and the young warriors were forbidden to marry until they had distinguished themselves in battle.

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[1] The Boers obtained the right to settle in this district in virtue of Proviso B of an agreement made, on the 22nd of October 1886, between the settlers in the "New Republic" and Sir A. E. Havelock, governor of Natal.

[2] Dr G. McCall Theal states that the ancestors of the tribes living in what is now Natal and Zululand were acquainted with the regimental system and the method of attack in crescent shape formation in the 17th century. Memories of these customs lingered even if the practice had died out. Among the Ama-Xosa section of Kaffirs they appear to have been quite unknown.

Chaka had but two ways of dealing with the tribes with whom he came in contact; either they received permission to be incorporated in the Zulu nation or they were practically exterminated. In the latter case the only persons spared were young girls and growing lads who could serve as carriers for the army. No tribe against which he waged war was able successfully to oppose the Zulu arms. At first Chaka turned his attention northward. Those who could fled before him, the first of importance so to do being a chief named Swangendaba (Sungandaba), whose tribe, of the same stock as the Zulu, was known as Angoni. He was followed by another tribe, which under Manikusa for many years ravaged the district around and north of Delagoa Bay (see Gazaland). Chaka next attacked the tribes on his southern border, and by 1820 had made himself master of Natal, which he swept almost clear of inhabitants. It was about 1820 that Mosilikatze (properly Umsilikazi), a general in the Zulu army, having incurred Chaka's wrath by keeping back part of the booty taken in an expedition, fled with a large following across the Drakensberg and began to lay waste a great part of the country between the Vaal and Limpopo rivers. Mosilikatze was not of the Zulu tribe proper, and he and his followers styled themselves Abaka-Zulu. Chaka's own dominions, despite his conquests, were not very extensive. He ruled from the Pongolo river on the north to the Umkomanzi river on the south, and inland his power extended to the foot of the Drakensberg; thus his territory coincided almost exactly with the limits of Zululand and Natal as constituted in 1903. His influence, however, extended from the Limpopo to the borders of Cape Colony, and through the ravages of Swangendaba and Mosilikatze the terror of the Zulu arms was carried far and wide into the interior of the continent.

Arrival of the British.

Chaka seems to have first come into contact with Europeans in 1824. In that year (see Natal) he was visited by F. G. Farewell and a few companions, and to them he made a grant of the district of Port Natal. Farewell found the king at Umgungindhlovu, the royal kraal on the White Umfolosi, "surrounded by a large number of chiefs and about 8000 or 9000 armed men, observing a state and ceremony in our introduction little expected." At this time an attempt was made to murder Chaka; but the wound he received was cured by one of Farewell's companions, a circumstance which made the king very friendly to Europeans. Anxious to open a political connexion with the Cape and British governments, Chaka entrusted early in 1828 one of his principal chiefs, Sotobi, and a companion to the care of J. S. King, one of the Natal settlers, to be conducted on an embassage to Cape Town, Sotobi being commissioned to proceed to the king of England. But they were not allowed to proceed beyond Port Elizabeth, and three months later were sent back to Zululand. In July of the same year Chaka sent an army westward which laid waste the Pondo country. The Zulu force did not come into contact with the British troops guarding the Cape frontier, but much alarm was caused by the invasion. In November envoys from Chaka reached Cape Town, and it was determined to send a British officer to Zululand to confer with him. Before this embassy started, news came that Chaka had been murdered (23rd of September 1828) at a military kraal on the Umvote about fifty miles from Port Natal. Chaka was a victim to a conspiracy by his half brothers Dingaan and Umthlangana, while a short time afterwards Dingaan murdered Umthlangana, overcame the opposition of a third brother, and made himself king of the Zulu.

Dingaan.

Bloodstained as had been Chaka's rule, that of Dingaan appears to have exceeded it in wanton cruelty, as is attested by several trustworthy European travellers and merchants who now with some frequency visited Zululand. The British settlers at Port Natal were alternately terrorized and conciliated. In 1835 Dingaan gave permission t[illegible]lers at Port Natal to establish missionary stations in the country, in return for a promise made by the settlers not to harbour fugitives from his dominions. In 1836 American missionaries were also allowed to open stations; in 1837 he permitted the Rev. F. Owen, of the Church Missionary Society, to reside at his great kraal, and Owen was with the king when in November 1837 he received Pieter Retief, the leader of the first party of Boer immigrants to enter Natal.

Arrival of the Boers.

Coming over the Drakensberg in considerable numbers during 1837, the Boers found the land stretching south from the mountains almost deserted, and Retief went to Dingaan to obtain a formal cession of the country west of the Tugela, which river the Zulu recognized as the boundary of Zululand proper. After agreeing to Retief's request Dingaan caused the Boer leader and his companions to be murdered (6th of February 1838), following up his treachery by slaying as many as possible of the other Boers who had entered Natal. After two unsuccessful attempts to avenge their slain, in which the Boers were aided by the British settlers at Port Natal, Dingaan's army was totally defeated on the 16th of December 1838, by a Boer force under Andries Pretorius. Operating in open country, mounted on horseback, and with rifles in their hands, the Boer farmers were able to inflict fearful losses on their enemy, while their own casualties were few. On "Dingaan's day" the Boer force received the attack of the Zulu while in laager; the enemy charged in dense masses, being met both by cannon shot and rifle fire, and were presently attacked in the rear by mounted Boers. After the defeat Dingaan set fire to the royal kraal (Umgungindhlovu) and for a time took refuge in the bush; on the Boers recrossing the Tugela he established himself at Ulundi at a little distance from his former capital. His power was greatly weakened and a year later was overthrown, the Boers in Natal (January 1840) supporting his brother Mpande (usually called Panda) in rebellion against him. The movement was completely successful, several of Dingaan's regiments going over to Panda. Dingaan passed into Swaziland in advance of his retreating forces, and was there murdered, while Panda was crowned king of Zululand by the Boers.

Panda.

When in 1843 the British succeeded the Boers as masters of Natal they entered into a treaty with Panda, who gave up to the British the country between the upper Tugela and the Buffalo rivers, and also the district of St Lucia Bay. (The bay was not then occupied by the British, whose object in obtaining the cession was to prevent its acquisition by the Boers. Long afterwards the treaty with Panda was successfully invoked to prevent a German occupation of the bay.) No sooner had the British become possessed of Natal than there was a large immigration into it of Zulu fleeing from the misgovernment of Panda. That chief was not, however, as warlike as his brothers Chaka and Dingaan; and he remained throughout his reign at peace with the government of Natal.[1] With the Boers who had settled in the Transvaal, however, he was involved in various frontier disputes. He had wars with the Swazis, who in 1855 ceded to the Boers of Lydenburg a tract of land on the north side of the Pongolo in order to place Europeans between themselves and the Zulu. In 1856 a civil war broke out between two of Panda's sons, Cetywayo and Umbulazi, who were rival claimants for the succession. A battle was fought between them on the banks of the Tugela in December 1856, in which Umbulazi and many of his followers were slain. The Zulu country continued, however, excited and disturbed until the government of Natal in 1861 obtained the formal nomination of a successor to Panda; and Cetywayo was appointed. The agent chosen to preside at the nomination ceremony was Mr (afterwards Sir) Theophilus Shepstone, who was in charge of native affairs in Natal and had won in a remarkable degree the respect and liking of the Zulu. Panda died in October 1872, but practically the government of Zululand had been in Cetywayo's hands since the victory of 1856, owing both to political circumstances and the failing health of his father. In 1873 the Zulu nation appealed to the Natal government to preside over the installation of Cetywayo as king; and this request was acceded to, Shepstone being again chosen as British representative. During the whole of Panda's reign the condition of Zululand showed little improvement. Bishop Colenso visited him in 1857 and obtained a grant of land for a mission station, which was opened in 1860, by the Rev. R. Robertson, who laboured in the country for many years, gaining the confidence both of Panda and Cetywayo. German, Norwegian and other missions were also founded. The number of converts was few, but the missionaries exercised a very wholesome influence and to them in measure was due the comparative mildness of Panda's later years.

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[1] Bishop Schreuder, a Norwegian missionary long resident in Zululand, gave Sir Bartle Frere the following estimate of the three brothers who successively reigned over the Zulu:—"Chaka was a really great man, cruel and unscrupulous, but with many great qualities. Dingaan was simply a beast on two legs. Panda was a weaker and less able man, but kindly and really grateful, a very rare quality among Zulus. He used to kill sometimes, but never wantonly or continuously."

Disputes with the Transvaal.

The frontier disputes between the Zulu and the Transvaal Boers ultimately involved the British government and were one of the causes of the war which broke out in 1879. They concerned, chiefly, territory which in 1854 was proclaimed the republic of Utrecht, the Boers who had settled there having in that year obtained a deed of cession from Panda. In 1860 a Boer commission was appointed to beacon the boundary, and to obtain, if possible, from the Zulu a road to the sea at St Lucia Bay. The commission, however, effected nothing. In 1861 Umtonga, a brother of Cetywayo, fled to the Utrecht district, and Cetywayo assembled an army on that frontier. According to evidence brought forward later by the Boers, Cetywayo offered the farmers a strip of land along the border if they would surrender his brother. This they did on the condition that Umtonga's life was spared, and in 1861 Panda signed a deed making over the land to the Boers. The southern boundary of the strip added to Utrecht ran from Rorke's Drift on the Buffalo to a point on the Pongolo. The boundary was beaconed in 1864, but when in 1865 Umtonga fled from Zululand to Natal, Cetywayo, seeing that he had lost his part of the bargain (for he feared that Umtonga[1] might be used to supplant him as Panda had been used to supplant Dingaan), caused the beacon to be removed, the Zulu claiming also the land ceded by the Swazis to Lydenburg. The Zulu asserted that the Swazis were their vassals and denied their right to part with the territory. During the year a Boer commando under Paul Kruger and an army under Cetywayo were posted along the Utrecht border. Hostilities were avoided, but the Zulu occupied the land north of the Pongolo. Questions were also raised as to the validity of the documents signed by the Zulu concerning the Utrecht strip; in 1869 the services of the lieut.-governor of Natal were accepted by both parties as arbitrator, but the attempt then made to settle the difficulty proved unsuccessful.

Cetywayo king.

Frere's ultimatum. The war of 1879.

Such was the position when by his father's death Cetywayo (*q.v.*) became absolute ruler of the Zulu. As far as possible he revived the military methods of his uncle Chaka, and even succeeded in equipping his regiments with firearms. It is believed that he instigated the Kaffirs in the Transkei to revolt, and he aided Sikukuni in his struggle with the Transvaal. His rule over his own people was tyrannous. By Bishop Schreuder he was described as "an able man, but for cold, selfish pride, cruelty and untruthfulness worse than any of his predecessors." In September 1876 the massacre of a large number of girls (who had married men of their own age instead of the men of an older regiment, for whom Cetywayo had designed them) provoked a strong remonstrance from the government of Natal, inclined as that government was to look leniently on the doings of the Zulu. The tension between Cetywayo and the Transvaal over border disputes continued, and when in 1877 Britain annexed the Transvaal the dispute was transferred to the new owners of the country. A commission was appointed by the lieut.-governor of Natal in February 1878 to report on the boundary question. The commission reported in July, and found almost entirely in favour of the contention of the Zulu. Sir Bartle Frere, then High Commissioner, who thought the award "one-sided and unfair to the Boers" (Martineau, *Life of Frere*, ii. xix.), stipulated that, on the land being given to the Zulu, the Boers living on it should be compensated if they left, or protected if they remained. Cetywayo (who now found no defender in Natal save Bishop Colenso) was in a defiant humour, and permitted outrages by Zulu both on the Transvaal and Natal borders. Frere was convinced that the peace of South Africa could be preserved only if the power of Cetywayo was curtailed. Therefore in forwarding his award on the boundary dispute the High Commissioner demanded that the military system should be remodelled. The youths were to be allowed to marry as they came to man's estate, and the regiments were not to be called up except with the consent of the council of the nation and also of the British government. Moreover, the missionaries were to be unmolested and a British resident was to be accepted. These demands were made to Zulu deputies on the 11th of December 1878, a definite reply being required by the 31st of that month.

Isandhlwana.

Rorke's Drift.

Cetywayo returned no answer, and in January 1879 a British force under General Thesiger (Lord Chelmsford) invaded Zululand. Lord Chelmsford had under him a force of 5000 Europeans and 8200 natives; 3000 of the latter were employed in guarding the frontier of Natal; another force of 1400 Europeans and 400 natives were stationed in the Utrecht district. Three columns were to invade Zululand, from the Lower Tugela, Rorke's Drift, and Utrecht respectively, their objective being Ulundi, the royal kraal. Cetywayo's army numbered fully 40,000 men. The entry of all three columns was unopposed. On the 22nd of January the centre column (1600 Europeans, 2500 natives), which had advanced from Rorke's Drift, was encamped near Isandhlwana; on the morning of that day Lord Chelmsford moved out with a small force to support a reconnoitring party. After he had left, the camp, in charge of Col. Durnford, was surprised by a Zulu army nearly 10,000 strong. The British were overwhelmed and almost every man killed, the casualties being 806 Europeans (more than half belonging to the 24th regiment) and 471 natives. All the transport was also lost. Lord Chelmsford and the reconnoitring party returned to find the camp deserted; next day they retreated to Rorke's Drift, which had been the scene of an heroic and successful defence. After the victory at Isandhlwana several impis of the Zulu army had moved to the Drift. The garrison stationed there, under Lieuts. Chard and Bromhead, numbered about 80 men of the 24th regiment, and they had in hospital between 30 and 40 men. Late in the afternoon they were attacked by about 4000 Zulu. On six occasions, the Zulu got within the entrenchments, to be driven back each time at the bayonet's point. At dawn the Zulu withdrew, leaving 350 dead. The British loss was 17 killed and 10 wounded.

In the meantime the right column under Colonel Pearson had reached Eshowe from the Tugela; on receipt of the news of Isandhlwana most of the mounted men and the native troops were sent back to the Natal, leaving at Eshowe a garrison of 1300 Europeans and 65 natives. This force was hemmed in by the enemy. The left column under Colonel (afterwards Sir) Evelyn Wood, which had done excellent work, found itself obliged to act on the defensive after the disaster to the centre column.[2] For a time an invasion of Natal was feared. The Zulu, however, made no attempt to enter Natal, while Lord Chelmsford awaited reinforcements before resuming his advance. During this time (March the 12th) an escort of stores marching to Luneberg, the headquarters of the Utrecht force, was attacked when encamped on both sides of the Intombe river. The camp was surprised, 62 out of 106 men were killed, and all the stores were lost. News of Isandhlwana reached England on the 11th of February, and on the same day about 10,000 men were ordered out to South Africa. The first troops arrived at Durban on the 17th of March. On the 29th a column, under Lord Chelmsford, consisting of 3400 Europeans and 2300 natives, marched to the relief of Eshowe, entrenched camps being formed each night. On the 2nd of April the camp was attacked at Ginginhlovo, the Zulu being repulsed. Their loss was estimated at 1200 while the British had only two killed and 52 wounded. The next day Eshowe was relieved. Wood, who had been given leave to make a diversion in northern Zululand, on the 28th of March occupied Hlobane (Inhlobane) mountain. The force was, however, compelled to retreat owing to the unexpected appearance of the main Zulu army, which nearly outflanked the British. Besides the loss of the native contingent (those not killed deserted) there were 100 casualties among the 400 Europeans engaged.[1] At mid-day next day the Zulu army made a desperate attack, lasting over four hours, on Wood's camp at Kambula; the enemy—over 20,000 strong—was driven off, losing fully 1000 men, while the British casualties were 18 killed and 65 wounded.

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[1] Umtonga had been originally designated by Panda as his successor. He afterwards served in the Zulu war with Wood's column.

[2] With the column were 40 Boers, the Uys clan, under Piet Uys, whose father had been killed in 1838 in the wars with Dingaan.

By the middle of April nearly all the reinforcements had reached Natal, and Lord Chelmsford reorganized his forces. The 1st division, under major-general Crealock, advanced along the coast belt and was destined to act as a support to the 2nd division, under major-general Newdigate, which with Wood's flying column, an independent unit, was to march on Ulundi from Rorke's Drift and Kambula. Owing to difficulties of transport it was the beginning of June before Newdigate was ready to advance. On the 1st of that month the prince imperial of France (Louis Napoleon), who had been allowed to accompany the British troops, was killed while out with a reconnoitring party. On the 1st of July Newdigate and Wood had reached the White Umfolosi, in the heart of the enemy's country. During their advance messengers were sent by Cetywayo to treat for peace, but he did not accept the terms offered. Meantime Sir Garnet (afterwards Lord) Wolseley had been sent out to supersede Lord Chelmsford, and on the 7th of July he reached Crealock's headquarters at Port Durnford. But by that time the campaign was practically over. The 2nd division (with which was Lord Chelmsford) and Wood's column crossed the White Umfolosi on the 4th of July—the force numbering 4200 Europeans and 1000 natives. Within a mile of Ulundi the British force, formed in a hollow square, was attacked by a Zulu army numbering 12,000 to 15,000. The battle ended in a decisive victory for the British, whose losses were about 100, while of the Zulu some 1500 men were killed (see ULUNDI).

Ulundi.

After this battle the Zulu army dispersed, most of the leading chiefs tendered their submission, and Cetywayo became a fugitive. On the 27th of August the king was captured and sent to Cape Town. His deposition was formally announced to the Zulu, and Wolseley drew up a new scheme for the government of the country. The Chaka dynasty was deposed, and the Zulu country portioned among eleven Zulu chiefs, John Dunn,[2] a white adventurer, and Hlubi, a Basuto chief who had done good service in the war. A Resident was appointed who was to be the channel of communication between the chiefs and the British government. This arrangement was productive of much bloodshed and disturbance, and in 1882 the British government determined to restore Cetywayo to power. In the meantime, however, blood feuds had been engendered between the chiefs Usibepu (Zibebu) and Hamu[3] on the one side and the tribes who supported the ex-king and his family on the other. Cetywayo's party (who now became known as Usutus) suffered severely at the hands of the two chiefs, who were aided by a band of white freebooters. When Cetywayo was restored Usibepu was left in possession of his territory, while Dunn's land and that of the Basuto chief (the country between the Tugela and the Umhlatuzi, *i.e.* adjoining Natal) was constituted a reserve, in which locations were to be provided for Zulu unwilling to serve the restored king. This new arrangement proved as futile as had Wolseley's. Usibepu, having created a formidable force of well-armed and trained warriors, and being left in independence on the borders of Cetywayo's territory, viewed with displeasure the re-installation of his former king, and Cetywayo was desirous of humbling his relative. A collision very soon took place; Usibepu's forces were victorious, and on the 22nd of July 1883, led by a troop of mounted whites, he made a sudden descent upon Cetywayo's kraal at Ulundi, which he destroyed, massacring such of the inmates of both sexes as could not save themselves by flight. The king escaped, though wounded, into the Reserve; there he died in February 1884.

Wolseley's settlement.

Cetywayo left a son, Dinizulu, who sought the assistance of some of the Transvaal Boers against Usibepu, whom he defeated and drove into the Reserve. These Boers, led by Lukas Meyer (1846–1902), claimed as a stipulated reward for their services the cession of the greater and more valuable part of central Zululand. On the 21st of May the Boer adventurers had proclaimed Dinizulu king of Zululand; in August following they founded the "New Republic," carved out of Zululand, and sought its recognition by the British government. The Usutu party now repented of their bad bargain, for by the end of 1885 they found the Boers claiming some three-fourths of their country. The British government intervened, took formal possession of St Lucia Bay (to which Germany as well as the Transvaal advanced claims), caused the Boers to reduce their demands, and within boundaries agreed to recognize the New Republic—whose territory was in 1888 incorporated in the Transvaal and has since 1903 formed the Vryheid division of Natal.

The New Republic.

Seeing that peace could be maintained between the Zulu chiefs only by the direct exercise of authority, the British government annexed Zululand (minus the New Republic) in 1887, and placed it under a commissioner responsible to the governor of Natal. In the following year Dinizulu, who continued his feud with Usibepu, rebelled against the British. After a sharp campaign (June to August 1888), the Usutu losing 300 killed in one encounter, Dinizulu fled into the Transvaal. He surrendered himself to the British in November; in April 1889 he and two of his uncles (under whose influence he chiefly acted) were found guilty of high treason and were exiled to St Helena.

Zululand annexed by Great Britain.

Under the wise administration of Sir Melmoth Osborn, the commissioner, whose headquarters were at Eshowe, and the district magistrates, the Zulu became reconciled to British rule, especially as European settlers were excluded from the greater part of the country. Large numbers of natives sought employment in Natal and at the Rand gold mines, and Zululand enjoyed a period of prosperity hitherto unknown. Order was maintained by a mounted native police force.

At the end of 1888 and at the beginning of 1890 some small tracts of territory lying between Zululand and Tongaland, under the rule of petty semi-independent chiefs, were added to Zululand; and in 1895 the territories of the chiefs Zambaan (Sambana) and Umtegiza, 688 sq. m. in extent, lying between the Portuguese territories, Swaziland, Zululand and Tongaland, were also added. In the same year a British protectorate was declared over Tongaland. The coast-line was thus secured for Great Britain up to the boundary of the Portuguese territory at

The Boer road to the sea blocked.

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[1] For his action on this occasion Colonel (afterwards General Sir) Redvers Buller, who was Wood's principal assistant, received the V.C. Piet Uys was among the slain.

[2] Dunn was a son of one of the early settlers in Natal and had largely identified himself with the Zulu. In 1856 he fought for Umbulazi against Cetywayo, but was high in that monarch's favour at the time of his coronation in 1873. When Frere's ultimatum was delivered to Cetywayo, Dunn, with 2000 followers, crossed the Tugela into Natal (10th of January 1879). In 1888 he fought against Dinizulu.

[3] Both these chiefs were members of the royal family.

Delagoa Bay. At that time the Transvaal government—which had been the first to reap the benefit of Great Britain's defeat of the Zulu by acquiring the "New Republic"—was endeavouring to obtain the territories of Zambaan and Umtegiza, hoping also to secure a route through Tongaland to Kosi Bay. President Kruger protested in vain against this annexation, Great Britain being determined to prevent another Power establishing itself on the south-east African seaboard.

Zululand made part of Natal.

Boer raids.

In 1893 Sir M. Osborn was succeeded as resident commissioner by Sir Marshal Clarke,[1] who gained the confidence and good will of the Zulu. At the close of 1897 Zululand, in which Tongaland had been incorporated, was handed over by the imperial government to Natal, and Sir (then Mr) C. J. R. Saunders was appointed civil commissioner of the province, with whose government he had been associated since 1887. In 1898 Dinizulu was allowed to return and was made a "government induna." Officially one of several chiefs subject to the control of the resident magistrate, he was, in fact, regarded by most of the Zulu as the head of their nation. His influence appeared to be in the main exercised on the side of order. During the war of 1899–1902 there was some fighting between the Zulu and the Boers, provoked by the Boers entering Zulu territory. A Zulu kraal having been raided, the Zulu retaliated and, surrounding a small Boer commando, succeeded in killing every member of it. In September 1901 Louis Botha made an attempt to invade Natal by way of Zululand, but the stubborn defence made by the small posts at Itala and Prospect Hill, both within the Zulu border, caused him to give up the project. Throughout the war the Zulu showed marked partiality for the British side.

The Revolt of 1906: Dinizulu's trial.

At the close of the war the Natal government decided to allow white settlers in certain districts of Zululand, and a Lands Delimitation Commission was appointed. The commission, however, reported (1905) that four-fifths of Zululand was unfit for European habitation, and the remaining fifth already densely populated. The commissioners urged that the tribal system should be maintained. Meantime the coal mines near St Lucia Bay were opened up and connected with Durban by railway. At this time rumours were current of disaffection among the Zulu, but this was regarded as the effervescence natural after the war. In 1905 a poll tax of £1 on all adult males was imposed by the Natal legislature; this tax was the ostensible cause of a revolt in 1906 among the natives of Natal, who were largely of Zulu origin. Bambaata, the leader of the revolt, fled to Zululand. He took refuge in the dense bush in the Nkandhla highlands, where Cetywayo's grave became the rallying-point of the rebels, who in April were joined by an aged chief named Sigananda and his tribe. After an arduous campaign, the Natal force (about 5000 strong) being commanded by Col. Sir Duncan McKenzie, the rebellion was crushed by July 1906, without the aid of imperial troops. Bambaata was killed in battle (June 10th); his head was cut off for purposes of identification, but afterwards buried with the body. Sigananda surrendered. In all some 3500 Zulus were killed and about 3000 taken prisoners, the majority of the prisoners being released in 1907 (see further NATAL: *History*). Zululand remained, however, in a disturbed condition, and a number of white traders and officials were murdered. Dinizulu had been accused of harbouring Bambaata, and in December 1907 the Natal government felt justified in charging him with high treason, murder and other crimes. A military force entered Zululand, and Dinizulu surrendered without opposition. He was brought to trial in November 1908, and in March 1909 was found guilty of harbouring rebels. The more serious charges against him were not proved. He was sentenced to four years' imprisonment and deprived of his position as a government induna. Other Zulu chiefs were convicted of various offences and sentenced to imprisonment. At his trial Dinizulu was defended by W. P. Schreiner, ex-premier of Cape Colony, while Miss H. E. Colenso (a daughter of Bishop Colenso) constituted herself his champion in the press of Natal and Great Britain. On the day that the Union of South Africa was established (31st of May 1910), the Botha ministry released Dinizulu from prison. He was subsequently settled on a farm in the Transvaal and given a pension of £500 a year.

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ZUMALACÁRREGUI, THOMAS (1788–1835), Spanish Carlist general, was born at Ormaiztegui in Navarre on the 29th of December 1788. His father, Francisco Antonio Zumalacárregui, was a lawyer who possessed some property, and the son was articled to a solicitor. When the French invasion took place in 1808 he enlisted at Saragossa. He served in the first siege, at the battle of Tudela, and during the second siege until he was taken prisoner in a sortie. He succeeded in escaping and in reaching his family in Navarre. For a short time he served with Gaspar de Jauregui, known as "The Shepherd" (*El Pastor*), one of the minor guerrillero leaders. But Zumalacárregui, who was noted for his grave and silent disposition and his strong religious principles, disliked the disorderly life of the guerrillas, and when regular forces were organized in the north he entered the 1st battalion of Guipuzcoa as an officer. During the remainder of the war he served in the regular army. In 1812 he was sent with despatches to the Regency at Cadiz, and received his commission as captain. In that rank he was present at the battle of San Marciál (31st of August 1813). After the restoration of Ferdinand VII. he continued in the army, and is said to have made a careful study of the theory of war. Zumalacárregui had no sympathy with the liberal principles which were spreading in Spain, and became noted as what was called a *Servil* or strong Royalist. He attracted no attention at headquarters, and was still a captain when the revolution of 1820 broke out. His brother officers, whose leanings were liberal, denounced him to the revolutionary government, and asked that he might be removed. The recommendation was not acted on, but Zumalacárregui knew of it, and laid up the offence in his mind. Finding that he was suspected (probably with truth) of an intention to bring the soldiers over to the royalist side, he escaped to France. In 1823 he returned as an officer in one of the royalist regiments which had been organized on French soil by the consent of the government. He was now known as a thoroughly trustworthy servant of the despotic royalty, but he was too proud to be a courtier. For some years he was employed in bringing regiments which the government distrusted to order. He became lieutenant-colonel in 1825 and colonel in 1829. In 1832 he was named military governor of Ferrol. Before Ferdinand VII. died in 1833, Zumalacárregui was marked out as a natural supporter of the absolutist party which favoured the king's brother, Don Carlos. The proclamation of the king's daughter Isabella as heiress was almost the occasion of an armed conflict between him and the naval authorities at Ferrol, who were partisans of the constitutional cause. He was put on half pay by the new authorities and ordered to live under police observation at Pamplona. When the Carlist rising began on the death of Ferdinand he is said to have held back because he knew that the first leaders would be politicians and talkers. He did not take the field till the Carlist cause appeared to be at a very low ebb, and until he had received a commission from Don Carlos as commander-in-chief in Navarre. The whole force under his orders when he escaped from Pamplona on the night of the 29th of October 1833, and took the command next day in the Val de Araquil, was a few hundred ill-armed and dispirited guerrilleros. In a few months Zumalacárregui had organized the Carlist forces into a regular army. The difficulty he found in obtaining supplies was very great, for the coast towns—and notably Bilbao—were constitutional in politics. It was mainly by captures from the government troops that he equipped his forces. He gradually obtained full possession of Navarre and the Basque provinces, outside of the fortresses, which he had not the means to besiege. Whether as a guerrillero leader, or as a general conducting regular war in the mountains, he proved unconquerable. By July 1834 he had made it safe for Don Carlos to join his headquarters. The pretender was, however, a narrow-minded, bigoted man, who regarded Zumalacárregui with suspicion, and was afraid of his immense personal influence with the soldiers. Zumalacárregui had therefore to drag behind him the whole weight of the distrust and intrigues of the court. Yet by the beginning of June 1835 he had made the Carlist cause triumphant to the north of the Ebro, and had formed an army of more than 30,000 men, of much better quality than the constitutional forces. If Zumalacárregui had been allowed to follow his own plans, which were to concentrate his forces and march on Madrid, he might well have put Don Carlos in possession of the capital. But the court was eager to obtain command of a seaport, and Zumalacárregui was ordered to besiege Bilbao. He obeyed reluctantly, and on the 14th of June 1835 was wounded by a musket bullet in the calf of the leg. The wound was trifling and would probably have been cured with ease if he had been allowed to employ an English doctor whom he trusted. But Don Carlos insisted on sending his own physicians, and in their hands the general died on the 24th of June 1835—not without suspicion of poison. Zumalacárregui was a fine type of the old royalist and religious principles of his people. The ferocity with which he conducted the war was forced on him by the government generals, who refused quarter.

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[1] Lieut.-Col. Sir Marshal James Clarke, R.A. (1841–1909) was A.D.C. to Sir Theophilus Shepstone when the Transvaal was annexed in 1877. He served in the Boer war of 1880–81; was resident commissioner of Basutoland from 1884 to 1893, and after leaving Zululand became resident commissioner in Southern Rhodesia (1898). He was made a K.C.M.G. in 1886.

An engaging account of Zumalacárregui will be found in *The Most Striking Events of a Twelvemonth Campaign with Zumalacárregui in Navarre and the Basque Provinces*, by C. F. Henningsen (London, 1836). A chap-book called *Vida politica y militar de Don Tomas Zumalacárregui*, which gives the facts of his life with fair accuracy, is still very popular in Spain. (D. H.)

ZUMPT, the name of two German classical scholars. Karl Gottlob Zumpt (1792–1894), who was educated at Heidelberg and Berlin, was from 1812 to 1827 a schoolmaster in Berlin, and in 1827 became professor of Latin literature at the university. His chief work was his *Lateinische Grammatik* (1818), which stood as a standard work until superseded by Madvig's in 1844. He edited Quintilian's *Institutio oratoria* (1831), Cicero's *Verrines* and *De officiis* (1837), and Curtius. Otherwise he devoted himself mainly to Roman history, publishing *Annales veterum regnorum et populorum* (3rd ed. 1862), a work in chronology down to A.D. 476, and other antiquarian studies. His nephew, August Wilhelm Zumpt (1815–1877), studied in Berlin, and in 1851 became professor in the Friedrich Wilhelm Gymnasium. He is known chiefly in connexion with Latin epigraphy, his papers on which (collected in *Commentationes epigraphicae*, 2 vols., 1850–54) brought him into conflict with Mommsen in connexion with the preparation of the *Corpus inscriptionum Latinarum*, a scheme for which, drawn up by Mommsen, was approved in 1847. His works include *Monumentum Ancyranum* (with Franck, 1847) and *De monumento Ancyrano supplendo* (1869); *Studia Romana* (1859); *Das Kriminalrecht der röm. Republik* (1865–69); *Der Kriminalprozess der röm. Republik* (1871); editions of Namatianus (1840), Cicero's *Pro Murena* (1859) and *De lege agraria* (1861). Ihne incorporated materials left by him in the 7th and 8th vols. of his *Römische Geschichte* (1840).

ZUNZ, LEOPOLD (1794–1886), Jewish scholar, was born at Detmold in 1794, and died in Berlin in 1886. He was the founder of what has been termed the "science of Judaism," the critical investigation of Jewish literature, hymnology and ritual. Early in the 19th century he was associated with Gans Moser and Heine in an association which the last named called "Young Palestine." The ideals of this *Verein* were not destined to bear religious fruit, but the "science of Judaism" survived. Zunz took no large share in Jewish reform, but never lost faith in the regenerating power of "science" as applied to the traditions and literary legacies of the ages. He had thoughts of becoming a preacher, but found the career uncongenial. He influenced Judaism from the study rather than from the pulpit. In 1832 appeared what E. H. Hirsch rightly terms "the most important Jewish book published in the 19th century." This was Zunz's *Gottesdienstliche Vorträge der Juden*, *i.e.* a history of the Sermon. It lays down principles for the investigation of the Rabbinic exegesis (Midrash, *q.v.*) and of the prayer-book of the synagogue. This book raised Zunz to the supreme position among Jewish scholars. In 1840 he was appointed director of a Lehrerseminar, a post which relieved him from pecuniary troubles. In 1845 appeared his *Zur Geschichte und Literatur*, in which he threw light on the literary and social history of the Jews. Zunz was always interested in politics, and in 1848 addressed many public meetings. In 1850 he resigned his headship of the Teachers' Seminary, and was awarded a pension. He had visited the British Museum in 1846, and this confirmed him in his plan for his third book, *Synagogale Poesie des Mittelalters* (1855). It was from this book that George Eliot translated the following opening of a chapter of *Daniel Deronda:* "If there are ranks in suffering, Israel takes precedence of all the nations" . . . &c. After its publication Zunz again visited England, and in 1859 issued his *Ritus*. In this he gives a masterly survey of synagogal rites. His last great book was his *Literaturgeschichte der synagogalen Poesie* (1865). A supplement appeared in 1867. Besides these works, Zunz published a new translation of the Bible, and wrote many essays which were afterwards collected as *Gesammelte Schriften*. Throughout his early and married life he was the champion of Jewish rights, and he did not withdraw from public affairs until 1874, the year of the death of his wife Adelhei Beermann, whom he had married in 1822.

See Emil G. Hirsch, in *Jewish Encyclopedia*, xii. 699–704. (I. A.)

ZURBARAN, FRANCISCO (1598–1662), Spanish painter, was born at Fuente de Cantos in Estremadura on the 7th of November 1598. His father was Luis Zurbaran, a country labourer, his mother Isabel Marquet. In childhood he set about imitating objects with charcoal; and his father sent him, still young, to the school of Juan de Roélas in Seville. Francisco soon became the best pupil in the studio of Roélas, surpassing the master himself; and before leaving him he had achieved a solid reputation, full though Seville then was of able painters. He may have had here the opportunity of copying some of the paintings of Michelangelo da Caravaggio; at any rate he gained the name of "the Spanish Caravaggio," owing to the forcible realistic style in which he excelled. He constantly painted direct from nature, following but occasionally improving on his model; and he made great use of the lay-figure in the study of draperies, in which he was peculiarly proficient. He had a special gift for white draperies; and, as a consequence, Carthusian houses are abundant in his paintings. To these rigid methods Zurbaran is said to have adhered throughout his career, which was prosperous, wholly confined to Spain, and varied by few incidents beyond those of his daily labour. His subjects were mostly of a severe and ascetic kind—religious vigils, the flesh chastised into subjection to the spirit—the compositions seldom thronged, and often reduced to a single figure. The style is more reserved and chastened than Caravaggio's, the tone of colour often bluish to excess. Exceptional effects are attained by the precise finish of foregrounds, largely massed out in light and shade. Zurbaran married in Seville Leonor de Jordera, by whom he had several children. Towards 1630 he was appointed painter to Philip IV.; and there is a story that on one occasion the sovereign laid his hand on the artist's shoulder, saying, "Painter to the king, king of painters." It was only late in life that Zurbaran made a prolonged stay in Madrid, Seville being the chief scene of his operations. He died, probably in 1662, in Madrid.

In 1627 he painted the great altarpiece of St Thomas Aquinas, now in the Seville museum; it was executed for the church of the college of that saint there. This is Zurbaran's largest composition, containing figures of Christ and the Madonna, various saints, Charles V. with knights, and Archbishop Deza (founder of the college) with monks and servitors, all the principal personages being beyond the size of life. It had been preceded by the numerous pictures of the screen of St Peter Nolasco in the cathedral. In the church of Guadalupe he painted various large pictures, eight of which relate to the history of St Jerome, and in the church of St Paul, Seville, a famous figure of the Crucified Saviour, in grisaille, presenting an illusive effect of marble. In 1633 he finished the paintings of the high altar of the Carthusians in Jerez. In the palace of Buenretiro, Madrid, are four large canvases representing the Labours of Hercules, an unusual instance of non-Christian subjects from the hand of Zurbaran. A fine specimen is in the National Gallery, London, a whole-length, life-sized figure of a kneeling Franciscan holding a skull. It seems probable that another picture in the same gallery, the "Dead Roland," which used to be ascribed to Velasquez, is really by Zurbaran. His principal scholars, whose style has as much affinity to that of Ribera as to Caravaggio's, were Bernabe de Ayala and the brothers Polanco.

(W. M. R.)

ZÜRICH (Fr. *Zurich;* Ital. *Zurigo*), one of the cantons of north-eastern Switzerland, ranking officially as the first in the Confederation. Its total area is 665·7 sq. m., of which 625·2 sq. m. are reckoned as "productive" (forests covering 180·8 sq. m., and vineyards 16·9 sq. m., the most extensive Swiss wine district save in Vaud and in Ticino). Of the rest, 21 sq. m. are occupied by the cantonal share of the lake of Zürich, while wholly within the canton are the smaller lakes of Greifen (3¼ sq. m.) and Pfäffikon (1¼ sq. m.). The canton is of irregular shape, consisting simply of the acquisitions made in the course of years by the town. Of these the more important were the whole of the lower part of the lake (1362), Küssnacht (1384), Thalwil (1385), Erlenbach (1400), Greifensee (1402), Horgen (1406), Grüningen and Stäfa (1408), Bülach and Regensberg (1409), Wald (1425), Kyburg (1452), Winterthur (1467), Eglisau (1496), Konau (1512), and Wädenswil (1549)—Stein was held from 1484 to 1798, while in 1798 the lower part of the Stammheim glen, and finally in 1803 Rheinau, were added to the canton. In 1798 the town ruled nineteen "inner" bailiwicks and nine rural bailiwicks, besides the towns of Stein and of Winterthur. The canton at present extends from the left bank of the Rhine (including also Eglisau on the right bank) to the region west of the lake of Zürich. It is bounded on the E. and W. by low hills that divide it respectively from the valleys of the Thur, and from those of the Reuss and of the Aar. In itself the canton consists of four shallow river valleys, separated by low ranges, all running from S.E. to N.W. The most important of these is that of the Linth (*q.v.*), which forms the lake of Zürich. To the east are the valleys of the Glatt (forming lake Greifen) and of the Töss (forming lake Pfäffikon), both sending their streams direct to the Rhine. The highest point in the canton is the Albishorn (3012 ft.) in the Albis range, which limits the Sihl valley to the west. All the valleys named are traversed by railway lines, while many lines branch off in every direction from the town of Zürich. The first railway line opened (1847) in Switzerland was that from Zürich to Baden in Aargau (14 m.). From the town of Zürich mountain railways lead S.W. to near the summit of the Uetliberg (2864 ft.) and N.E. towards the Zürichberg (2284 ft.).

In 1900 the population was 431,036, of whom 413,141 were German-speaking, 11,192 Italian-speaking, 3894 French-speaking, and 610 Romonsch-speaking, while there were 345,446 Protestants, 80,752 Catholics (Roman or "Old"), and 2933 Jews. The capital of the canton is Zürich (*q.v.*), but Winterthur (*q.v.*) is the only other considerable town, Uster (7623 inhabitants), and Horgen (6883 inhabitants) being rather large manufacturing villages. The land in the canton is highly cultivated and much subdivided. But the canton is above all a great manufacturing district, especially of machinery and railway rolling-stock, while both silk weaving and cotton weaving are widely spread. It is divided into 11 administrative districts, which comprise 189 communes. In 1869 the cantonal constitution was revised in a democratic sense, and with the exception of a few changes made later, it is the existing constitution. There is an executive or *Regierungsrat* of seven members and a legislature or *Kantonsrat* (one member to every 1500 resident Swiss citizens or a fraction over 750), each holding office for three years and elected at the same time directly by the vote of the people. The referendum exists in both forms, compulsory and optional: all laws and all money grants of a total sum over 250,000 frcs. or an annual sum of 20,000 must be submitted to a popular vote, the people meeting for that purpose at least twice in each year, while the executive may submit to a popular vote any other matter, though it fall within its powers as defined by law. One-third of the members of the legislature or 5000 legally qualified voters can force the government to submit to the people any matter whatsoever (initiative). Both members of the Federal *Ständerat* and the 22 members of the Federal *Nationalrat* are elected simultaneously by a popular vote and hold office for three years. The constitution provides for the imposition of a graduated and progressive income tax. In 1885 the penalty of death was abolished in the canton.

(W. A. B. C.)

ZÜRICH (Fr. *Zurich;* Ital. *Zurigo*), the capital of the Swiss canton of the same name. It is the most populous, the most important, and on the whole the finest town in Switzerland, and till 1848 was practically the capital of the Swiss Confederation. It is built on both banks of the Limmat (higher up called Linth) as it issues from the lake of Zürich, and also of its tributary, the Sihl, that joins it just below the town. That portion of the town which lies on the right bank of the Limmat is called the "Grosse Stadt" and that on the left bank the "Kleine Stadt." Till 1893 the central portion of the town on either bank of the Limmat formed the "city" and ruled the outlying communes or townships that had sprung up around it. But at that time the eleven outer districts (including Aussersihl, the workmen's quarter on the left bank of the Sihl) or suburbs were incorporated with the town, which is now governed by a town council of 125 members (one to every 1200 inhabitants), and an executive of 9 members, both chosen direct by a popular vote. Much land has been rescued from the lake, and is the site of fine quays, stately public buildings, and splendid private villas. The older quarters are still crowded. But the newer quarters stretch up the slope of the Zürichberg (above the right bank of the Limmat) while the fine Bahnhofstrasse (extending from the railway station to the lake) has the best shops and is in the neighbourhood of the more important public buildings.

Zürich has always been wealthy and prosperous. It has increased enormously, as is shown by the following figures. Its population in 1900 (including the eleven suburbs above named) was 150,703, while (without these) in 1888 it was 94,129; in 1880, 78,345; in 1870, 58,657; in 1860, 44,978; and in 1850 only 35,483. Of the inhabitants in 1900 no fewer than 43,761 (as against 20,928 in 1888 and 3155 in 1850) were not Swiss citizens, Germans numbering 31,125, Italians 5350, Austrians 4210, Russians 683, French 652, British subjects 157, and citizens of the United States 232. In

1900 there were in the town 140,803 German-speaking persons, 5100 Italian-speaking, 2586 French-speaking, and 415 Romonsch-speaking. In 1888 the corresponding figures were 90,500, 1135, 1320, and 148. In 1900 the town numbered 102,794 Protestants, 43,655 "Catholics" (Roman or "Old") and 2713 Jews. In 1888 the religious figures were 70,970, 20,571 and 1221 respectively, while in 1850 the numbers were 32,763, 2664 and 56. The international character of the town has thus become much more marked. This is partly due to the immigration of many foreign workmen, and partly to the arrival of Russian and Polish exiles. Both have added a turbulent cosmopolitan element to the town, in which the Socialist party is strong, and is increasing in power and influence, even in matters concerned with civic government.

Of the old buildings the finest and most important is the Gross Münster (or Propstei), on the right bank of the Limmat. This was originally the church of the king's tenants, and in one of the chapels the bodies of Felix, Regula and Exuperantius, the patron saints of the city, were buried, the town treasury being formerly kept above this chapel. The present building was erected at two periods (*c.* 1090–1150 and *c.* 1225–1300), the high altar having been consecrated in 1278. The towers were first raised above the roof at the end of the 15th century and took their present form in 1779. The chapter consisted of twenty-four secular canons; it was reorganized at the Reformation (1526), and suppressed in 1832. On the site of the canons' houses stands a girls' school (opened 1853), but the fine Romanesque cloisters (12th and 13th centuries) still remain. There is a curious figure of Charlemagne in a niche on one of the towers; to him is attributed the founding or reform of the chapter. On the left bank of the Limmat stands the other great church of Zürich, the Frau Münster (or Abtei), founded for nuns in 853, by Louis the German. The high altar was consecrated in 1170; but the greater part of the buildings are of the 13th and 14th centuries. It was in this church that the relics of the three patron saints of the town were preserved till the Reformation, and it was here that the burgomaster Waldmann was buried in 1489. There were only twelve nuns of noble family, comparatively free from the severer monastic vows; the convent was suppressed in 1524. Of the other old churches may be mentioned St Peter's, the oldest parish church, though the present buildings date in part from the 13th century only (much altered in the early 18th century), and formerly the meeting-place of the citizens; the Dominican church (13th century), in the choir of which the cantonal library of 80,000 volumes has been stored since 1873; the church of the Austin friars (14th century), now used by the Old Catholics, and the Wasserkirche. The last-named church is on the site of a pagan holy place, where the patron saints of the city were martyred; since 1631 it has housed the Town Library, the largest in Switzerland, which contains 170,000 printed volumes and 4500 MSS. (among these being letters of Zwingli, Bullinger and Lady Jane Grey), as well as a splendid collection of objects from the lake dwellings of Switzerland. The building itself was erected from 1479 to 1484, and near it is a statue of Zwingli, erected in 1885. The existing town-hall dates from 1698, while the gild houses were mostly rebuilt in the 18th century. One of the most magnificent of the newer buildings is the Swiss National Museum, behind the railway station. This museum, which was opened in 1898, contains a wonderful collection of Swiss antiquities (especially medieval) and art treasures of all kinds, some of which are placed in rooms of the actual date, removed from various ancient buildings. There are some fine old fountains (the oldest dating back to 1568). There are several good bridges, Roman traces being seen in the case of the Niederbrücke (now called the Rathausbrücke). The mound of the Lindenhof was formerly crowned by the king's house, which disappeared in the 13th century, and the hillock was planted with limes as early as 1422.

The town is noted for its numerous clubs and societies, and is the intellectual capital of German-speaking Switzerland. Cotton-spinning and the manufacture of machinery are two leading industries, but by far the most important is the silk-weaving industry. This flourished in Zürich in the 12th and 13th centuries, but disappeared about 1420; it was revived by the Protestant exiles (such as the Muralti and Orelli families) from Locarno (1555) and by the Huguenot refugees from France (1682 and 1685). The value of the silk annually exported (mainly to France, the United States and England) is estimated at over three millions sterling. Zürich is the banking centre of Switzerland. Besides the excellent primary and secondary schools, there are the Cantonal School, including a gymnasium and a technical side (opened 1842), and a high school for girls (opened 1875). The Cantonal University and the Federal Polytechnic School are housed in the same building, but have no other connexion. The university was opened in 1833, no doubt as a successor to the ancient chapter school at the Gross Münster said to date back to Charlemagne's time—hence its name the Carolinum—reorganized at the Reformation, and suppressed in 1832. The Polytechnic School, opened in 1855, includes seven main sections (industrial chemistry, industrial mechanics, engineering, training of scientific and mathematical teachers, architecture, forestry and agriculture, and the military sciences), besides a general philosophical and political science department. The Polytechnic School has good collections of botanical specimens and of engravings. Near it is the observatory (1542 ft.). There are also in Zürich many institutions for special branches of education—*e.g.* veterinary surgery, music, industrial art, silk-weaving, &c.

The earliest inhabitants of the future site of Zürich were the lake dwellers. The Celtic Helvetians had a settlement on the Lindenhof when they were succeeded by the Romans, who established a custom station here for goods going to and coming from Italy; during their rule Christianity was introduced early in the 3rd century by Felix and Regula, with whom Exuperantius was afterwards associated. The district was later occupied by the Alamanni, who were conquered by the Franks.

The name Zürich is possibly derived from the Celtic *dur* (water). It is first mentioned in 807 under the form "Turigus," then in 853 as "Turegus." The true Latinized form is *Turicum*, but the false form *Tigurum* was given currency by Glareanus and held its ground from 1512 to 1748. It is not till the 9th century that we find the beginnings of the Teutonic town of Zürich, which arose from the union of four elements: (1) the royal house and castle on the Lindenhof, with the king's tenants around, (2) the Gross Münster, (3) the Frau Münster, (4) the community of "free men" (of Alamannian origin) on the Zürichberg. Similarly we can distinguish four stages in the constitutional development of the town: (i.) the gradual replacing (*c.* 1250) of the power of the abbess by that (real, though not nominal) of the patricians, (ii.) the admittance of the craft gilds (1336) to a share with the patricians in the government of the town, (iii.) the granting of equal political rights (1831) to the country districts, hitherto ruled as subject lands by the burghers, and (iv.) the reception as burghers of the numerous immigrants who had settled in the town (town schools opened in 1860, full incorporation in 1893).

The Frankish kings had special rights over their tenants, were the protectors of the two churches, and had jurisdiction over the free community. In 870 the sovereign placed his powers over all four in the hands of a single official (the Reichsvogt), and the union was still further strengthened by the wall built round the four settlements in the 10th century as a safeguard against Saracen marauders and feudal barons. The "Reichsvogtei" passed to the counts of Lenzburg (1063–1173), and then to the dukes of Zähringen (extinct 1218). Meanwhile the abbess of the Benedictine Frau Münster had been acquiring extensive rights and privileges over all the inhabitants, though she never obtained the criminal jurisdiction. The town flourished greatly in the 12th and 13th centuries, the silk trade being introduced from Italy. In 1218 the "Reichsvogtei" passed back into the hands of the king, who appointed one of the burghers as his deputy, the town thus becoming a free imperial city under the nominal rule of a distant sovereign. The abbess in 1234 became a princess of the empire, but power rapidly passed from her to the council which she had originally named to look after police, &c., but which came to be elected by the burghers, though the abbess was still "the lady of Zürich." This council (all powerful since 1304) was made up of the representatives of certain knightly and rich mercantile families (the "patricians"), who excluded the craftsmen from all share in the government, though it was to these last that the town was largely indebted for its rising wealth and importance.

In October 1291 the town made an alliance with Uri and

Schwyz, and in 1292 failed in a desperate attempt to seize the Habsburg town of Winterthur. After that Zürich began to display strong Austrian leanings, which characterize much of its later history. In 1315 the men of Zürich fought against the Swiss Confederates at Morgarten. The year 1336 marks the admission of the craftsmen to a share in the town government, which was brought about by Rudolf Brun, a patrician. Under the new constitution (the main features of which lasted till 1798) the Little Council was made up of the burgomaster and thirteen members from the "*Constafel*" (which included the old patricians and the wealthiest burghers) and the thirteen masters of the craft gilds, each of the twenty-six holding office for six months. The Great Council of 200 (really 212) members consisted of the Little Council, plus 78 representatives each of the *Constafel* and of the gilds, besides 3 members named by the burgomaster. The office of burgomaster was created and given to Brun for life. Out of this change arose a quarrel with one of the branches of the Habsburg family, in consequence of which Brun was induced to throw in the lot of Zürich with the Swiss Confederation (1st May 1351). The double position of Zürich as a free imperial city and as a member of the Everlasting League was soon found to be embarrassing to both parties (see SWITZERLAND). In 1373 and again in 1393 the powers of the *Constafel* were limited and the majority in the executive secured to the craftsmen, who could then aspire to the burgomastership. Meanwhile the town had been extending its rule far beyond its walls—a process which began in the 14th, and attained its height in the 15th century (1362–1467). This thirst for territorial aggrandizement brought about the first civil war in the Confederation (the "Old Zürich War," 1436–50), in which, at the fight of St Jacob on the Sihl (1443), under the walls of Zürich, the men of Zürich were completely beaten and their burgomaster Stüssi slain. The purchase of the town of Winterthur from the Habsburgs (1467) marks the culmination of the territorial power of the city. It was to the men of Zürich and their leader Hans Waldmann that the victory of Morat (1476) was due in the Burgundian war; and Zürich took a leading part in the Italian campaign of 1512–15, the burgomaster Schmid naming the new duke of Milan (1512). No doubt her trade connexions with Italy led her to pursue a southern policy, traces of which are seen as early as 1331 in an attack on the Val Leventina and in 1478, when Zürich men were in the van at the fight of Giornico, won by a handful of Confederates over 12,000 Milanese troops.

In 1400 the town obtained from the Emperor Wenceslaus the Reichsvogtei, which carried with it complete immunity from the empire and the right of criminal jurisdiction. As early as 1393 the chief power had practically fallen into the hands of the Great Council, and in 1498 this change was formally recognized.

This transfer of all power to the gilds had been one of the aims of the burgomaster Hans Waldmann (1483–89), who wished to make Zürich a great commercial centre. He also introduced many financial and moral reforms, and subordinated the interests of the country districts to those of the town. He practically ruled the Confederation, and under him Zürich became the real capital of the League. But such great changes excited opposition, and he was overthrown and executed. His main ideas were embodied, however, in the constitution of 1498, by which the patricians became the first of the gilds, and which remained in force till 1798; some special rights were also given to the subjects in country districts. It was the prominent part taken by Zürich in adopting and propagating (against the strenuous opposition of the *Constafel*) the principles of the Reformation (the Frau Münster being suppressed in 1524) which finally secured for it the lead in the Confederation (see SWITZERLAND and ZWINGLI).

The environs of Zürich are famous in military history on account of the two battles of 1799. In the first battle (4th June) the French under Masséna, on the defensive, were attacked by the Austrians under the Archduke Charles, Masséna retiring behind the Limmat before the engagement had reached a decisive stage. The second and far more important battle took place on the 25th and 26th of September. Masséna, having forced the passage of the Limmat, attacked and totally defeated the Russians and their Austrian allies under Korsákov's command. (See FRENCH REVOLUTIONARY WARS.)

In the 17th and 18th centuries a distinct tendency becomes observable in the town government to limit power to the actual holders. Thus the country districts were consulted for the last time in 1620 and 1640; and a similar breach of the charters of 1489 and 1531 (by which the consent of these districts was required for the conclusion of important alliances, war and peace, and might be asked for as to other matters) occasioned disturbances in 1777. The council of 200 came to be largely chosen by a small committee of the members of the gilds actually sitting in the council—by the constitution of 1713 it consisted of 50 members of the Little Council (named for a fixed term by the Great Council), 18 members named by the *Constafel*, and 144 selected by the 12 gilds, these 162 (forming the majority) being co-opted for life by those members of the two councils who belonged to the gild to which the deceased member himself had belonged. Early in the 18th century a determined effort was made to crush by means of heavy duties the flourishing rival silk trade in Winterthur. It was reckoned that about 1650 the number of privileged burghers was 9000, while their rule extended over 170,000 persons. The first symptoms of active discontent appeared later among the dwellers by the lake, who founded in 1794 a club at Stäfa and claimed the restoration of the liberties of 1489 and 1531, a movement which was put down by force of arms in 1795. The old system of government perished in Zürich, as elsewhere in Switzerland, in February 1798, and under the Helvetic constitution the country districts obtained political liberty. The cantonal constitution was rather complicated, and under it the patrician party obtained a small working majority. That constitution was meant to favour the town as against the country districts. But under the cantonal constitution of 1814 matters were worse still, for the town (10,000 inhab.) had 130 representatives in the Great Council, while the country districts (200,000 inhab.) had only 82. A great meeting at Uster on the 22nd of November 1830 demanded that two-thirds of the members in the Great Council should be chosen by the country districts; and in 1831 a new constitution was drawn up on these lines, the town getting 71 representatives as against 141 allotted to the country districts, though it was not till 1837–38 that the town finally lost the last relics of the privileges which it had so long enjoyed as compared with the country districts. From 1803 to 1814 Zürich was one of the six "directorial cantons," its chief magistrate becoming for a year the chief magistrate of the Confederation, while in 1815 it was one of the three cantons, the government of which acted for two years as the Federal government when the diet was not sitting. In 1833 Zürich tried hard to secure a revision of the Federal constitution and a strong central government. The town was the Federal capital for 1839–40, and consequently the victory of the Conservative party there in 1839 (due to indignation at the nomination by the Radical government to a theological chair in the university of D. F. Strauss, the author of the famous *Life of Jesus*) caused a great stir throughout Switzerland. But when in 1845 the Radicals regained power at Zürich, which was again the Federal capital for 1845–46, that town took the lead in opposing the Sonderbund cantons. It of course voted in favour of the Federal constitutions of 1848 and of 1874, while the cantonal constitution of 1869 was remarkably advanced for the time. The enormous immigration from the country districts into the town from the "thirties" onwards created an industrial class which, though "settled" in the town, did not possess the privileges of burghership, and consequently had no share in the municipal government. First of all in 1860 the town schools, hitherto open to "settlers" only on paying high fees, were made accessible to all, next in 1875 ten years' residence *ipso facto* conferred the right of burghership, while in 1893 the eleven outlying districts (largely peopled by working folk) were incorporated with the town proper. The town and canton continued to be on the Liberal, or Radical, or even Socialistic side, while from 1848 to 1907 they claimed 7 of the 37 members of the Federal executive or *Bundesrat*, these 7 having filled the presidential chair of the Confederation in twelve years, no canton surpassing this record. From 1833 onwards the walls and fortifications of Zürich were little by little pulled down, thus affording scope for the extension and beautification of the town.

Authorities.—J. Amiet, *Die Gründungs-Sage der Schwesterstädte Solothurn, Zürich, und Trier* (Soleure, 1890); F. Becker, *Die erste Schlacht bei Zürich; Juni, 1799* (Zürich, 1899); J. C. Bluntschli, *Staats-und Rechtsgeschichte d. Stadt und Landschaft Zürich* (2nd ed., Zürich, 1856); A. Bürkli-Meyer, *Geschichte d. zürch. Seidenindustrie vom Schlusse d. 13ten Jahrhunderts an bis in die neuere Zeit* (Zürich, 1884); K. Dändliker, *Hans Waldmann und die Zürcher Revolution von 1489* (Zürich, 1889); E. Egli, *Actensammlung z. Geschichte d. Zürcher Reformation, 1519–1533* (Zürich, 1897–99), *Die Schlacht von Kappel, 1531* (Zürich, 1873) and *Zwinglis Tod nach seiner Bedeutung für Kirche und Vaterland* (Zürich, 1893); *Festschrift zur Feier des 50jährigen Bestehens des eidgenöss. Polytechnicums*, 2 vols. (one by W. Oechsli as to the history of the institution, and the other by various hands as to the general development of the town) (Frauenfeld, 1905); G. Finsler, *Zürich in der zweiten Hälfte d. 18ten Jahrhunderts* (Zürich, 1884); G. Heer, *Die Zürcher-Heiligen, St Felix u. Regula* (Zürich, 1889); Max Huber, "Das Staatsrecht d. Republik Zürich vor dem Jahr 1798" (article in vol. i. of the *Schweiz. Geschlechterbuch*, Basel, 1905); W. Meyer, *Die zweite Schlacht bei Zürich, Sept. 1799* (Zürich, 1899); G. Meyer von Knonau, *Der Kanton Zürich* (2 vols., St Gall and Bern, 1834 and 1846); *Mittheilungen d. antiquarisch. Gesellschaft in Zürich* (from 1837); E. Müller, *Eine reindemokratische Republik. Der Kanton Zürich zu Anfang des 20 Jahrhunderts* (Zürich, 1908); R. von Reding-Biberegg, *Der Zug Suworoff's durch die Schweiz in 1799* (Stans, 1895); K. Ritter, *Die Politik Zürichs in der zweiten Hälfte d. 14ten Jahrhunderts* (Zürich, 1886); P. Rütsche, *Der Kanton Zürich zur Zeit. d. Helvetik (1798–1803)* (Zürich, 1900); *Stadtbücher, Zürcher (1314–1515)*, edited by H. Zeller-Werdmüller and Hans Nabholz, 3 vols. (Leipzig, 1899–1906); H. Sträuli, *Die Verfassung von Zürich von 1869* (Winterthur, 1902); J. J. Treichler, *Politische Wandlungen d. Stadt Zürich* (Berlin, 1886); *Turicensia—Beiträge z. zürch. Geschichte* (Zürich, 1891); *Urkundenbuch d. Stadt u. Landschaft Zürich*, edited by H. Escher and P. Schweizer, in course of publication since 1888 (vol. vii. reaches 1301)—an appendix is the *Siegelbildungen* (2 parts, Zürich, 1891–93), edited by P. Schweizer and H. Zeller-Werdmüller; S. Vögelin, *Das alte Zürich*, 2 vols. (Zürich, 1878 and 1890); W. Wettstein, *Die Regeneration d. Kant. Zürich (1830–39)* (Zürich, 1907); G. H. Wunderli, *Hans Waldmann und seine Zeit* (Zürich, 1889); F. von Wyss, "Die Reichsvogtei Zürich" (reprinted in his *Abhandlungen zur Geschichte d. schweiz. öffentlich. Rechts* (Zürich, 1892); G. von Wyss, "Geschichte d. Abtei Zürich" (in vol. viii. of the *Mittheil. d. antiq. Gesellschaft in Zürich*, 1851–58), and *Zürich am Ausgange d. 13ten Jahrhunderts* (Zürich, 1876); *Zürcher Taschenbuch* (from 1878). For the present state of the town see Nos. 126–29 of *Illustrated Europe* (Zürich), and Nos. 101–2 of *Städtebilder und Landschaften aus aller Welt* (Zürich). Many of the recent general works on Swiss history, *e.g.* those of Dändliker, Oechsli, Orelli, Schollenberger, Schweizer, Strickler, are by Zürich men and pay special attention to Zürich matters. See also Zwingli.

(W. A. B. C.)

ZÜRICH, LAKE OF, a Swiss lake, extending S.E. of the town of Zürich. It is formed by the river Linth, which, rising in the glaciers of the Tödi range in Glarus, was diverted by the Escher canal (completed in 1811) into the Walensee, whence, by means of the Linth canal (completed in 1816), its waters are carried to the east end of the lake of Zürich. This river issues from the lake at its north-west end, passing through the town of Zürich, but is then called the Limmat. No streams of importance flow into the lake. Its area is about 34 sq. m., its extreme length 25 m., its greatest breadth 2½ m., and its greatest depth 469 ft., while its surface is 1342 ft. above sea-level. It is included, or the greater portion, in the Canton of Zürich, but at its east end 8⅗ sq. m. towards the southern shore are in that of Schwyz, and 4 sq. m. towards the northern shore in that of St Gall. The great dam of masonry, carrying the railway line and carriage road from Rapperswil to Pfäffikon, which cuts off the extreme eastern part of the lake from the rest, is passed only by small boats; steamers (of which the first was placed on the lake in 1835) do not go beyond the dam, as the eastern portion of the lake is shallow and choked by weeds. West of this dam is the small island of Ufenau, where in 1523 Ulrich von Hutten took refuge and died. Both shores are well cultivated and fertile. There are many villas, particularly near Zürich, and elsewhere numerous factories in the various flourishing villages. Zürich, at the north end of the lake, is the principal place on it. On the west shore (which gradually becomes the south shore) are Thalwil, Horgen, Wädenswil, Richterswil, Pfäffikon, and Lachen. On the opposite shore are Meilen (near which the first lake dwellings were discovered in 1853–54), Stäfa, and the quaint town of Rapperswil, the castle of which shelters a Polish museum, wherein is the heart of Kosciuszko. Schmerikon is close to the east end of the lake, and a little beyond is the more important town of Uznach. (W. A. B. C.)

ZURITA Y CASTRO, JERÓNIMO (1512–1580), Spanish historian, was born at Saragossa, and studied at Alcalá de Henares under the celebrated Hellenist, Hernán Nuñez. Through the influence of his father, Miguel de Zurita, physician to Charles V., he entered the public service as magistrate at Barbastro, and in 1537 was appointed assistant-secretary of the Inquisition. In 1548 Zurita was nominated official chronicler of the kingdom of Aragon, and in 1566 Philip II. attached him as secretary to the council of the Inquisition, delegating to him the conduct of all matters sufficiently important to require the king's signature. Zurita resigned these posts on the 21st of January 1571, obtained a sinecure at Saragossa, and dedicated himself wholly to the composition of his *Anales de la corona de Aragón*, the first part of which had appeared in 1562; he lived to see the last volume printed at Saragossa on the 22nd of April 1580, and died on the 3rd of November following. Zurita's style is somewhat crabbed and dry, but his authority is unquestionable; he displayed a new conception of an historian's duties, and, not content with the ample materials stored in the archives of Aragon, continued his researches in the libraries of Rome, Naples and Sicily; he founded the school of historical scholarship in Spain.

ZUTPHEN, or Zutfen, a town in the province of Gelderland, Holland, on the right bank of the Ysel at the influx of the Berkel, and a junction station 18 m. by rail N.N.E. of Arnhem. Pop. 19,000. It is a picturesque old town with several brick houses of the 16th and 17th centuries. The most important building is the Groote Kerk, of St Walpurgis, which dates from the 12th century and contains monuments of the former counts of Zutphen, a 13th-century candelabrum, an elaborate copper font (1527), and a fine modern monument to the van Heeckeren family. The chapter-house contains a pre-Reformation library which includes some valuable MSS. and *incunabula*. There are some remains of the old town walls. The place has an active trade, especially in grain and in the timber floated down from the Black Forest by the Rhine and the Ysel; the industries include tanning, weaving, and oil and paper manufactures. Not far from Zutphen on the west at Monnikhuizen once stood the Carthusian convent founded by Reinald III., duke of Gelderland, in 1342 and dissolved in 1572. About 3 m. to the north of Zutphen is the agricultural colony of Nederlandsch-Mettray, founded by a private benefactor for the education of poor friendless boys in 1851, and since that date largely extended.

In the middle ages Zutphen was the seat of a line of counts, which became extinct in the 12th century. Having been fortified the town stood several sieges, specially during the wars of freedom waged by the Dutch, the most celebrated fight under its walls being the one in September 1586 when Sir Philip Sidney was mortally wounded. Taken by the Spaniards in 1587 Zutphen was recovered by Maurice, prince of Orange, in 1591, and except for two short periods, one in 1672 and the other during the French Revolutionary Wars, it has since then remained a part of the United Netherlands. Its fortifications were dismantled in 1874.

ZWEIBRÜCKEN, a town of Germany, in the Palatinate, on the Schwarzbach, and on the railway between Germersheim and Saarbrücken. Pop. (1905) 14,711. The town was the capital of the former duchy of Zweibrücken, and the Alexander-Kirche contains the tombs of the dukes. The ducal castle is now occupied by the chief court of the Palatinate. There is a fine Gothic Catholic church. Weaving and brewing and the manufacture of machinery, chicory, cigars, malt, boots, furniture and soap are the chief industries.

Zweibrücken ("two bridges") is the Latin *Bipontium*; it appears in early documents also as *Geminus Pons*, and was called by the French *Deux-Ponts*. The independent territory was at first a countship, the counts being descended from Henry I., youngest son of Simon I., count of Saarbrücken (d. 1180). This line became extinct on the death of Count Eberhard (1393), who in 1385 had sold half his territory to the count palatine of the Rhine, and held the other half as his feudatory. Louis (d. 1489), son of Stephen, count palatine of Zimmern-Veldenz, founded the line of the dukes of Zweibrücken, which became extinct in 1731, when the duchy passed to the Birkenfeld branch, whence it came under the sway of Bavaria in 1799. At the peace of Lunéville Zweibrücken was ceded to France; on its reunion with Germany in 1814 the greater part of the territory was given to Bavaria, the remainder to Oldenburg and Prussia. At the ducal printing office at Zweibrücken the fine edition of the classics known as the Bipontine Editions was published (1799 sqq.).

See Lehmann, *Geschichte des Herzogtums Zweibrücken* (Munich, 1867).

ZWICKAU, a town of Germany, in the kingdom of Saxony, situated in a pleasant valley at the foot of the Erzgebirge, on the left bank of the Zwickauer Mulde, 41 m. S. of Leipzig and 20 m. S.W. of Chemnitz on the main line of railway Dresden-Hof and at the junction of several other lines. Pop. (1834) 6701; (1880) 35,005; (1890) 44,198; (1905) 68,502. Among the nine churches, the fine Gothic church of St Mary (1451–1536 and restored 1885–91), with a spire 285 ft. high and a bell weighing 5½ tons, is remarkable. The church contains an altar with wood-carving and eight pictures by Michael Wohlgemuth and a remarkable *Pietà* in carved and painted wood, probably by Veit Stoss. The late Gothic church of St Catharine (restored 1893–94) has an altarpiece ascribed to Lucas Cranach the Elder, and is memorable for the pastorate (1520–22) of Thomas Münzer. Of the secular buildings the most noteworthy are the town-hall of 1581, with the municipal archives, including documents dating back to the 13th century and an autograph MS. of the works of Hans Sachs, and the late Gothic *Gewandhaus* (cloth merchants' hall), built 1522–24 and now in part converted into a theatre. The manufactures of Zwickau include spinning and weaving, machinery, motor-cars, chemicals, porcelain, paper, glass, dyestuffs, wire goods, tinware, stockings, and curtains. There are also steam saw-mills, diamond and glass polishing works, iron-foundries, and breweries. Though no longer relatively so important as when it lay on the chief trade route from Saxony to Bohemia and the Danube, Zwickau carries on considerable commerce in grain, linen, and coal. The mainstay of the industrial prosperity of the town is the adjacent coalfield, which in 1908 employed 13,000 hands, and yields 2½ million tons of coal annually. The mines are mentioned as early as 1348; but they have only been actively worked since 1823, during which time the population has increased more than tenfold.

Zwickau is of Slavonic origin, and is mentioned in 1118 as a trading place. The name is fancifully derived from the Latin *cygnea*, from a tradition that placed a "swan lake" here which had the property of renewing the youth of those who bathed in it. Zwickau was an imperial possession, but was pledged to Henry the Illustrious, margrave of Meissen (d. 1288). The German king Charles VI. conferred it as a fief in 1348 on the margraves of Meissen, and it thus passed to their successors the electors of Saxony. The discovery of silver in the Schneeberg in 1470 brought it much wealth. The Anabaptist movement of 1525 began at Zwickau under the inspiration of the "Zwickau prophets." Robert Schumann (1810–1856), the musical composer, was born here in a house which still stands in the market-place.

See Herzog, *Chronik der Kreisstadt Zwickau* (2 vols., Zwickau, 1839–45). *Geschichte des Zwickauer Steinkohlenbaues* (Dresden, 1852); Hänsch, *Das Zwickau-Chemnitzer Kohlengebiet* (Meissen, 1908).

ZWIEDINECK VON SÜDENHORST, HANS (1845–1906), German historian, was born at Frankfort-on-the-Main on the 14th of April 1845. He studied at the university of Gratz, where he became a professor in 1885, and died at Gratz on the 22nd of November 1906.

Südenhorst's principal writings are *Dorfleben im 18 Jahrhundert* (Vienna, 1877); *Hans Ulrich, Fürst von Eggenberg* (Vienna, 1880); *Die Politik der Republic Venedig während des dreissigjährigen Krieges* (Stuttgart, 1882–85); *Venedig als Weltmacht und Weltstadt* (Bielefeld, 1899 and 1906); *Kriegsbilder aus der Zeit der Landsknechte* (Stuttgart, 1883); *Die öffentliche Meinung in Deutschland im Zeitalter Ludwigs XIV. 1650–1700* (Stuttgart, 1888); *Erzherzog Johann im Feldzuge von 1809* (Gratz, 1892); and *Maria Theresia* (Bielefeld, 1905). He edited the *Bibliothek deutscher Geschichte*, writing for this series, *Deutsche Geschichte im Zeitalter der Gründung des preussischen Königtums* (Stuttgart, 1887–94); and *Deutsche Geschichte von der Auflösung des alten bis zur Gründung des neuen Reiches* (Stuttgart, 1897–1905). He completed A. Wolf's *Oesterreich unter Maria Theresia, Josef II. und Leopold II.* (Berlin, 1882–84), and edited the *Zeitschrift für allgemeine Geschichte* (Stuttgart, 1884–88).

ZWINGLI, HULDREICH (1484–1531), Swiss reformer, was born on the 1st of January 1484, at Wildhaus in the Toggenburg valley, in the canton of St Gall, Switzerland. He came of a free peasant stock, his father being *amtmann* of the village; his mother, Margaret Meili, was the sister of the abbot of Fischingen in Thurgau. His uncle, Bartholomew Zwingli, afterwards *dekan* or *superintendent* of Wesen, had been elected parish priest of Wildhaus. As he was keen at his books and fond of music he was destined for the Church, and when eight years old was sent to school at Wesen, where he lived with his uncle, the dean. Two years later he was sent to a school in Basel, where he remained three years, passing thence to the high school at Bern, where his master, Heinrich Wölflin, inspired him with an enthusiasm for the classics. After some two years there the boy took up his abode in the Dominican monastery. But his father had no thoughts of letting him become a monk, and in 1500 he was sent to the university of Vienna, where he remained for another two years and "included in his studies all that philosophy embraces." He then returned to Basel, where he graduated in the university and became a teacher of the classics in the school of St Martin's church.

The circumstances and surroundings of Zwingli's early life were thus dissimilar from those of his contemporary, Martin Luther. Zwingli, moreover, never knew anything of those spiritual experiences which drove Luther into a cloister and goaded him to a feverish "searching of the Scriptures" in the hope of finding spiritual peace. Zwingli was a humanist, a type abhorred of Luther; and he was far more ready for the polite Erasmian society of Basel than for a monastery. Luther never quite shook off scholasticism, whereas Zwingli had early learnt from Dr Thomas Wyttenbach that the time was at hand when scholastic theology must give place to the purer and more rational theology of the early Fathers and to a fearless study of the New Testament. He heard from this same teacher bold criticisms of Romish teaching concerning the sacraments, monastic vows and papal indulgences, and unconsciously he was thus trained for the great remonstrance of his maturer life.

At the age of twenty-two Zwingli was ordained by the bishop of Constance (1506), preached his first sermon at Rapperswyl, and said his first mass among his own people at Wildhaus. In the same year he was elected parish priest of Glarus, in spite of the pope's nomination of Heinrich Goldli, an influential pluralist of Zürich, whom Zwingli found it necessary to buy off at an expense of more than a hundred gulden. The Holy See, much dependent at that time on its Swiss mercenaries in the pursuit of its secular ends, expressed no resentment on this occasion. Zwingli indeed seemed still to be devoted to the pope, whom he styled "beatissimus Christi vicarius," and he publicly proclaimed the mercenary aid given by the Swiss to the papal cause to be its dutiful support of the Holy See. The Curia, following its accustomed policy, rewarded his zeal with a pension of 50 gulden.

The ten years which Zwingli spent at Glarus laid the foundations of his work as a reformer. He there began the study of

Greek that he might "learn the teaching of Christ from the original sources," and gave some attention to Hebrew. He read also the older Church Fathers and soon won for himself fame as a student, whilst his skill in the classics led his friends to hail him as "the undoubted Cicero of our age." He had an unbounded admiration for Erasmus, with whom he entered into correspondence, and from whom he received a somewhat chilling patronage; whilst the brilliant humanist, Pico della Mirandola (1463–1494), taught him to criticize, in a rationalizing way, the medieval doctrines of Rome. His first publications, which appeared as rhymed allegories, were political rather than religious, being aimed at what he deemed the degrading Swiss practice of hiring out mercenaries in the European wars. His convictions on this matter were so much intensified by his later experiences as army chaplain that in 1521 he prevailed upon the authorities of the canton of Zürich to renounce the practice altogether. Especially did he oppose alliances with France; but the French party in Glarus was strong, and it retaliated so fiercely that in 1516 Zwingli was glad to accept the post of people's priest at Einsiedeln. He always in later days dated his arrival at evangelical truth from the three years (1516–19) which he spent in this place. There he studied the New Testament in the editions of Erasmus and began to found his preaching on "the Gospel," which he declared to be simple and easy to understand. He held that the Bible was the sufficient revelation of the will of God, and he threw away the philosophy and theology of the later Roman Church, whereas he declared that the early Church Fathers were helpful, though still fallible, interpreters of the Word. In his definite recognition of the theological place of Scripture he showed, says Dr T. M. Lindsay (*History of the Reformation*), clearer insight than the Lutherans, and Zwingli rather than Luther was in this matter Calvin's guide, and the guide of the reformed churches of Switzerland, France, England and the Netherlands. All these set forth in their symbolical books the supreme place of Scripture, accepting the position which Zwingli laid down in 1536 in *The First Helvetic Confession*, namely, that "Canonic Scripture, the Word of God, given by the Holy Spirit and set forth to the world by the Prophets and Apostles, the most perfect and ancient of all philosophies, alone contains perfectly all piety and the whole rule of life."

Zwingli began to preach "the Gospel" in 1516, but a contemporary says that he did it so cunningly (*listiglich*) that none could suspect his drift. He still, to use his own words, hung his new exposition on to "the old doctrines, however much they at times pained me, rather than on to the purer and clearer"; for he hoped that the reformation of the Church would proceed quietly and from within. The papal curia had no wish to bring things to a quarrel with him. The Swiss, who furnished them with troops, were to be treated with consideration; and the pope sought to silence the reformer by offers of promotion, which he refused. He held himself, as did the Swiss in general, very free of papal control. They had long been used, in their orderly democratic life, to manage their own ecclesiastical affairs. Church property paid its share of the communal taxes, and religious houses were subject to civil inspection. Zwingli looked rather to the City Fathers than to the pope, and as long as he had them with him he moved confidently and laboured for reforms which were as much political and moral in character as religious. He had none of Luther's distrust of "the common man" and fear of popular government, and this fact won for his teaching the favour of the towns of South Germany not less than of Switzerland.

As yet he had preached his Gospel without saying much about corruptions in the Roman Church, and it was his political denunciation of the fratricidal wars into which the pope, not less than others, was drawing his fellow-countrymen, that first led to rupture with the papal see. Three visits which he had paid to Italy in his capacity of army chaplain had done much to open his eyes to the worldly character of the papal rule, and it was not long before he began to attack at Einsiedeln the superstitions which attended the great pilgrimages made to that place. Zwingli denounced the publication of plenary indulgence to all visitors to the shrine, and his sermons in the Swiss vernacular drew great crowds and attracted the attention of Rome. His quarrel was turned more immediately against the pope himself when in August 1518 the Franciscan monk Bernardin Samson, a pardon-seller like Johann Tetzel, made his appearance in Switzerland as the papally commissioned seller of indulgences. Zwingli prevailed on the council to forbid his entrance into Zürich; and even then the pope argued that, so long as the preacher was still receiving a papal pension, he could not be a formidable adversary, and he gave him a further sop in the form of an acolyte chaplaincy.

Zwingli had never meant to remain at Einsiedeln long, and he now threw himself into a competition for the place of people's priest at the Great Minster of Zürich, and obtained it (1518) after some opposition. He stipulated that his liberty to preach the truth should be respected. In the beginning of 1519 he began a series of discourses on St Matthew's Gospel, the Acts of the Apostles, and the Pauline epistles; and with these it may be said that the Reformation was fairly begun in Zürich. He had made a copy of St Paul's epistles and committed them to memory, and from this arsenal of Scripture he attacked the unrighteousness of the state no less than the superstition of the Church. His correspondence of this year shows him jealous of the growing influence of Luther. It was his claim that he had discovered the Gospel before ever Luther was heard of in Switzerland, and he was as anxious as Erasmus to make it clear that he was not Luther's disciple. Towards the end of September he fell a victim to the plague which was ravaging the land, and his illness sobered his spirit and brought into his message a deeper note than that merely moral and common-sense one with which, as a polite humanist, he had hitherto been content. He began to preach against fasting, saint worship and the celibacy of priests; and some of his hearers began to put his teachings into practice. The monasteries raised an outcry when people were found eating flesh in Lent, and the bishop of Constance accused them before the council of Zürich. Zwingli was heard in their defence and the accusation was abandoned. His first Reformation tract, April 1522, dealt with this subject: "*Von Erkiesen und Fryheit der Spysen*." The matter of the celibacy of the clergy was more serious. Zwingli had joined in an address to the bishop of Constance calling on him no longer to endure the scandal of harlotry, but to allow the priests to marry wives, or, at least, to wink at their marriages. He and his co-signatories confessed that they had lived unchastely, but argued that priests could not be expected to do otherwise, seeing that God had not seen fit to give the gift of continence. Pope Adrian VI. interfered and asked the Zürichers to abandon Zwingli, but the reformer persuaded the council to allow a public disputation (1523), when he produced sixty-seven theses[1] and vindicated his position so strongly that the council decided to uphold their preacher and to separate the canton from the bishopric of Constance. Thus legal sanction was given in Zürich to the Reformation. In 1522 Zwingli produced his first considerable writing, the *Architeles*, "the beginning and the end," in which he sought by a single blow to win his spiritual freedom from the control of the bishops, and in a sermon of that year he contended that only the Holy Spirit is requisite to make the Word intelligible, and that there is no need of Church, council, or pope in the matter.

The progress of the Reformation attracted the attention of all Switzerland, but there was a strong opposition to it, especially in the five Forest Cantons: Lucerne, Zug, Schwyz, Uri and Unterwalden; and the Zürichers felt it necessary to form a league in its defence. They were especially anxious to gain Bern, and Zwingli challenged the Romanists to a public disputation in that city. No less than 350 ecclesiastics came to Bern from the various cantons to hear the pleadings, which began on the 2nd of January 1523 and lasted nineteen days. Zwingli and his companions undertook to defend the following propositions:—

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[1] Cf. P. Schaff, *Creeds of the Evangelical Protestant Churches*, p. 197.

(1) That the Holy Christian Church, of which Christ is the only Head, is born of the Word of God, abides therein, and does not listen to the voice of a stranger; (2) that this Church imposes no laws on the conscience of people without the sanction of the Word of God, and that the laws of the Church are binding only in so far as they agree with the Word; (3) that Christ alone is our righteousness and our salvation, and that to trust to any other merit or satisfaction is to deny Him; (4) that it cannot be proved from the Holy Scripture that the body and blood of Christ are corporeally present in the bread and in the wine of the Lord's Supper; (5) that the mass, in which Christ is offered to God the Father for the sins of the living and of the dead, is contrary to Scripture and a gross affront to the sacrifice and death of the Saviour; (6) that we should not pray to dead mediators and intercessors, but to Jesus Christ alone; (7) that there is no trace of purgatory in Scripture; (8) that to set up pictures and to adore them is also contrary to Scripture, and that images and pictures ought to be destroyed where there is danger of giving them adoration; (9) that marriage is lawful to all, to the clergy as well as to the laity; (10) that shameful living is more disgraceful among the clergy than among the laity.

The result of the discussion was that Bern was won over to the side of the reformer, who apprehended the whole struggle of Protestantism as turning directly on the political decisions of the various units of the Confederation. He had enunciated in his theses the far-reaching new principle that the congregation, and not the hierarchy, was the representative of the Church; and he sought henceforward to reorganize the Swiss constitution on the principles of representative democracy so as to reduce the wholly disproportionate voting power which, till then, the Forest Cantons had exercised. He argued that the administration of the Church belongs, like all administration, to the state authorities, and that if these go wrong it then lies with Christian people to depose them.

On the 2nd of April 1524 the marriage of Zwingli with Anna Reinhard was publicly celebrated in the cathedral, though for some two years already he had had her to wife. Many of his colleagues followed his example and openly made profession of marriage. In the August of that year Zwingli printed a pamphlet in which he set forth his views of the Lord's Supper. They proved the occasion of a conflict with Luther which was never settled, but in the meantime more attention was attracted by Zwingli's denunciation of the worship of images and of the Roman doctrine of the mass. These points were discussed at a fresh congress where about 900 persons were present, and where Vadian (Joachim von Watt, the reformer of St Gall) presided. It was decided that images are forbidden by Scripture and that the mass is not a sacrifice. Shortly afterwards the images were removed from the churches, and many ceremonies and festivals were abolished. When a solemn embassy of rebuke was sent to Zürich from a diet held at Lucerne, on the 26th of January 1524, the city replied that in matters relating to the Word of God and the salvation of souls she would brook no interference. When a new embassy threatened Zürich with exclusion from the union she began to make preparations for war.

It was at this moment that the controversy between Luther and Zwingli took on a deeper significance. In March 1525 the latter brought out his long *Commentary on the True and False Religion*, in which he goes over all the topics of practical theology. Like others of the Reformers he had been led independently to preach justification by faith and to declare that Jesus Christ was the one and only Mediator between sinful man and God; but his construction rested upon what he regarded as biblical conceptions of the nature of God and man rather than upon such private personal experiences as those which Luther had made basal. In this Commentary there appear the mature views of Zwingli on the subject of the Elements of the Lord's Supper. He was quite as clear as Luther in repudiating the medieval doctrine of transubstantiation, but he declined to accept Luther's teaching that Christ's words of institution required the belief that the real flesh and blood of Christ co-exist in and with the natural elements. He declared that Luther was in a fog, and that Christ had warned His disciples against all such notions, and had proclaimed that by faith alone could His presence be received in a feast which He designed to be commemorative and symbolical. Efforts to reach agreement failed. The landgrave of Hesse brought the two Reformers together in vain at Marburg in October 1529, and the whole Protestant movement broke into two camps, with the result that the attempt made at Schmalkalden in 1530 to form a comprehensive league of defence against all foes of the Reformation was frustrated.

But the close of Zwingli's life was brought about by trouble nearer home. The long-felt strain between opposing cantons led at last to civil war. In February 1531 Zwingli himself urged the Evangelical Swiss to attack the Five Cantons, and on the 10th of October there was fought at Kappel a battle, disastrous to the Protestant cause and fatal to its leader. Zwingli, who as chaplain was carrying the banner, was struck to the ground, and was later despatched in cold blood. His corpse, after suffering every indignity, was quartered by the public hangman, and burnt with dung by the Romanist soldiers. A great boulder, roughly squared, standing a little way off the road, marks the place where Zwingli fell. It is inscribed, "'They may kill the body but not the soul': so spoke on this spot Ulrich Zwingli, who for truth and the freedom of the Christian Church died a hero's death, Oct. 11, 1531."

Zwingli's theological views are expressed succinctly in the sixty-seven theses published at Zürich in 1523, and at greater length in the *First Helvetic Confession*, compiled in 1536 by a number of his disciples.[1] They contain the elements of Reformed as distinguished from Lutheran doctrine. As opposed to Luther, Zwingli insisted more firmly on the supreme authority of Scripture, and broke more thoroughly and radically with the medieval Church. Luther was content with changes in one or two fundamental doctrines; Zwingli aimed at a reformation of government and discipline as well as of theology. Zwingli never faltered in his trust in the people, and was earnest to show that no class of men ought to be called *spiritual* simply because they were selected to perform certain functions. He thoroughly believed also that it was the duty of all in authority to rule in Christ's name and to obey His laws. He was led from these ideas to think that there should be no government in the Church separate from the civil government which ruled the commonwealth. All rules and regulations about the public worship, doctrines and discipline of the Church were made in Zwingli's time, and with his consent, by the council of Zürich, which was the supreme civil authority in the state. This was the ground of his quarrel with the Swiss Anabaptists, for the main idea in the minds of these greatly maligned men was the modern thought of a free Church in a free state. Like all the Reformers, he was strictly Augustinian in theology, but he dwelt chiefly on the positive side of predestination—the election to salvation—and he insisted upon the salvation of infants and of the pious heathen. His most distinctive doctrine is perhaps his theory of the sacrament, which involved him and his followers in a long and, on Luther's part, an acrimonious dispute with the German Protestants. His main idea was that the sacrament of the Lord's Supper was not the *repetition* of the sacrifice of Christ, but the faithful *remembrance* that that sacrifice had been made once for all; and his deeper idea of faith, which included in the act of faith a real union and communion of the faithful soul with Christ, really preserved what was also most valuable in the distinctively Lutheran doctrine. His peculiar theological opinions were set aside in Switzerland for the somewhat profounder views of Calvin. The publication of the Zürich Consensus (*Consensus Tigurinus*) in 1549 marks the adherence of the Swiss to Calvinist theology.

Zwingli's most important writings are—*Von Erkiesen und Fryheit der Spysen* (April 1522); *De Canone Missae Epichiresis* (September 1523); *Commentarius de Vera et Falsa Religione* (1525); *Vom Touf, vom Wiedertouf, und vom Kindertouf* (1525); *Ein klare Unterrichtung vom Nachtmol Christi* (1526); *De Providentia Dei* (1530); and *Christianae Fidei Expositio* (1531). For a full bibliography see G. Finsler, *Zwingli-Bibliographie* (Zürich, 1897).

Works.—Collected editions, 4 vols. (Zürich, 1545. 1581); by M. Schuler and Joh. Schulthess, 8 vols. (Zürich, 1828–42, with "supplementorum fasciculus," 1861); by E. Egli and G. Finsler in "Corpus Reformatorum" (Berlin, 1905 sqq.).

Lives.—O. Myconius (1532); H. Bullinger's *Reformationsgeschichte* (ed. Hottinger and Voegli, 1838); J. M. Schuler (1818); R. Christoffel (1857, Eng. tr. by J. Cochran, Edinburgh, 1858); J. C. Morikofer, 2 vols. (Leipzig, 1867–69); R. Stähelin, 2 vols. (Basel, 1895–97); S. M. Jackson in *Heroes of the Reformation* (New York and London, 1901); Prof. Egli's articles in Hauck-Herzog's *Realencyklopädie für prot. Theologie u. Kirche*, and *Zwingliana*, published twice a year since 1897 at Zürich. S. M. Jackson's book gives a chapter on Zwingli's Theology by Prof. F. H. Foster, and full details of further information on the subject, together with a list of modern English translations of Zwingli's works.

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[1] P. Schaff, *Creeds of the Evangelical Protestant Churches*, p. 211.

(E. Ar.*)

ZWOLLE, the capital of the province of Overysel, Holland, on the Zwarte Water, and a junction station 24½ m. N.E. of Harderwyk. Pop. (1905) 23,773. It is the centre of the whole northern and eastern canal systems, and by means of the short canal, the Willemsvaart, which joins the Zwarte Water and the Ysel, has regular steamboat communication with Kampen and Amsterdam. The Groote Kerk, of St Michael (first half of the 15th century) occupies the site of an earlier church of which an interesting 11th-century bas-relief remains. The church contains a richly carved pulpit, the work of Adam Straes van Weilborch about 1620, and there is besides some good carving and a fine organ (1721). The Roman Catholic church, also dedicated to St Michael, dates from the end of the 14th century. The modernized town hall was originally built in 1448. Mention should also be made of the Sassen Poort, one of the old city gates; a gild-house (1571); the provincial government offices, containing the archives; and a museum of antiquities and natural history. Three miles from Zwolle, on a slight eminence called the Agnietenberg, or hill of St Agnes, once stood the Augustinian convent in which Thomas à Kempis spent the greatest part of his life and died in 1471. Zwolle has a considerable trade by river, a large fish market, and the most important cattle market in Holland after Rotterdam. The more important industries comprise cotton manufactures, iron works, boat-building, dyeing and bleaching, tanning, rope-making and salt-making.

ZYMOTIC DISEASES (Gr. ζύμη, ferment), a term in medicine, formerly applied to the class of acute infectious maladies. As originally employed by Dr W. Farr, of the British Registrar-General's department, the term included the diseases which were "epidemic, endemic and contagious," and were regarded as owing their origin to the presence of a morbific principle in the system, acting in a manner analogous to, although not identical with, the process of fermentation. A large number of diseases were accordingly included under this designation. The term, however, came to be restricted in medical nomenclature to the chief fevers and contagious diseases (*e.g.* typhus and typhoid fevers, smallpox, scarlet fever, measles, erysipelas, cholera, whooping-cough, diphtheria, &c.). The science of bacteriology has displaced the old fermentation theory, and the term has practically dropped out of use.

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